Tampere University of Applied Sciences

Aerosol number concentration measurement:

Safety aspects of a hairspray

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ABSTRACT

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This work describes the preliminary assessment measurements which are necessary to evaluate a hazard potential of a hair care product before introducing it to the market, as well as the guidelines and requirements for a proper safety assessor to consider. The preparation stage consisted of a literature review on existing standards of aerosol products and guidelines on indoor air characteristics. A measurement procedure was developed at a preparation stage, and number concentrations and mass concentrations of the hairsprays were documented from the Trotec PC220 particle counter and ELPI. The obtained values were compared to the recommended values as well as to the reference of similar researches.

As a result, the products of interest fulfilled the main health assessment requirements, especially for the concentration of inhalable particles with a size of less than 10 µm, which are reported to be the most harmful for a human. The peak values from the number concentration measurement were 10^5 particles per litre, whereas the total mass concentration peak was observed at around 500 µg per cubic metre of air. The order of magnitude of these values was correlating with the values obtained in similar measurements. It was concluded, that the hairsprays pass the necessary tests.

Key words: aerosol, number concentration, mass concentration, health assessment, hairspray

CONTENTS

ABBREVIATIONS AND TERMS

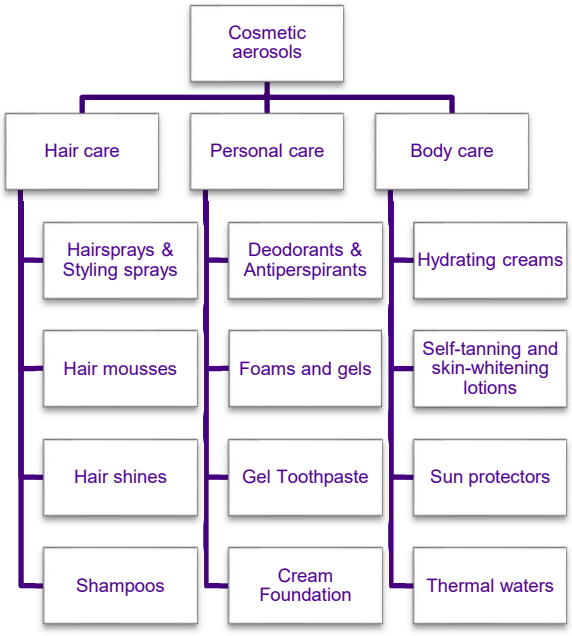
ACGIH	American Conference of Governmental Industrial Hygienists
CSA	Chemical Safety Assessment
EEC	European Economic Community
ELPI	Electric Low-Pressure Impactor
EMD	Electrical Mobility Diameter
EU	European Union
FEA	European Aerosol Federation
ISO	International Organization for Standardization
ISO/TC	ISO Technical Committee
ISO/TR	ISO Technical Report
MoE	Margins of Exposure
MoS	Margins of Safety
NSAM	Nanoparticle Surface Area Monitor
OPS	Optical Particle Sizer
PIF	Product Information File
PM	Particle Matter
PSD	Particle Size Distribution
RMM	Risk Management Measure
SCCP	Scientific committee on Consumer Products
SCCS	Scientific Committee on Consumer Safety (European Commission)
SD	Standard Deviation
TAMK	Tampere University of Applied Sciences
TIF	Technical information File

1 INTRODUCTION

Due to their convenience, the use of aerosols has arisen in the past years. There are multiple industries, in which repelling products are used, such as cleaning, maintenance, paints, pharmaceutical industry and food production (European Aerosol Federation (FEA) n.d.). Some specific types of aerosols can be used for safety reasons.

One of the biggest niches on the market which is demanding for aerosol cans is cosmetic and personal care in addition to household segment (MarketsandMarkets 2017). The personal care segment is accounted for 36.6% of aerosol market's volume (Grand View Research 2020), nearly 59% of global aerosol cans market (around 55% in Europe), and household industry holds around 21% of the European market. (European Aerosol Federation (FEA) n.d., MarketsandMarkets 2017).

The use is necessitated due to hygienical reasons, personal appearance and the sense of well-being (Williams et al. 2016 in Ficheux et al. 2018) is considered to be '*important or very important in daily lives*' for 71% of 4116 respondents across 10 EU Member States (Cosmetic Europe 2017 in Ficheux et al. 2018).



FiIGURE 1. Segments of cosmetic aerosols (adapted from European Aerosol Federation (FEA) n.d., by Viushkova 2020).

For such a huge demand, some obligatory health and safety requirements had been established. However recent epidemiological research correlates the particle air pollution with carcinogenesis, existing hazards of respiratory, cardiovascular diseases, or even mortality (Buzea 2007), thus the majority of the directives and regulations are strict and demanding for the aerosol manufacturers.

The Cosmetic Products Regulation (EC) No 1223/2009 gives a definition for a Cosmetic product as '*any substance or mixture intended to be placed in contact with the external parts of human body'* (Ficheux et al. 2018; Pauwels & Rogiers 2009). The same Regulation obliges the company to have a responsible person who ensures that the safety assessment required before introducing a cosmetic product to the European Union market (6 months prior for nanomaterials) includes the data on exposure via "*the normal and reasonably foreseeable exposure route(s*)", with droplet size distribution regarded in conjunction with physicochemical properties of the contents. (Ficheux et al. 2018; Pauwels & Rogiers 2009; Hamilton, Daggett & Pittinger 2006).

Such conditions of use and exposure routes often can be deducted from commercial advertisement and labelling (Pauwels & Rogiers 2009). It is obvious that for spray products this would include mostly exposure by inhalation (Booker et al. 1998, 3).

The same requirements are in the spotlight of Aerosol Dispensers Directive 75/324/EEC. (European Aerosol Federation (FEA) 2009, 6). Unfortunately, both above-mentioned regulatory texts do not mention any specific details on relevant aspects and guidance for hazard analysis or safety assessment of spray products. (FEA 2013, 9). In addition, Brostrøm et al. (2019) states that the current legislative limits on air quality are based mostly on the mass concentration, while particle size distribution had proven to be a better metrics for health effects prediction in recent studies.

The EU Cosmetics Regulation No 1223/2009 especially discusses the use of nanomaterials in cosmetics. It defines a term of a nanomaterial and a mechanism for notification, labelling, and safety evaluation of nanomaterials-containing cosmetics (SCCS/1484/12). Nanoparticles are obviously a subject of great concern

because of their size being smaller than cellular organelles, inevitably allowing them to penetrate through the biological structures. Consequently, such invasion leads to malfunctioning. According to Buzea (2007), abnormal functioning may be a result of tissue inflammation or increased oxidation state, which further is followed by cell death. According to Booker et al., inhalation exposure may lead to bronchitis or asthmatic attacks (1998, 3). Certain studies connect deteriorated air quality with respiratory allergies (e.g. Jones 1999; Pope and Dockery 1999; Bagley et al. 1996; Randerath et al. 1995 in Hussein et al. 2006).

In addition, international standards for a narrower scope of ultrafine aerosols, nanoparticle and nano-structured aerosols (e.g. ISO/TR 27628:2007, ISO 28439:2011) regulate the measurement protocols and defines the threshold of air quality characteristics at the workplace atmospheres. Some of the definitions from these documents will be used in this work. However, there are also mismatches and ambiguities spotted. A nanoparticle, according to SCCP 2007, is considered a particle with one or more dimensions at the nanoscale. In other words, at least one dimension should be less than 100 nm. On the other hand, according to ISO/TS 27687:2008 and its further version ISO/TS 80004-2:2015, a nanoparticle should have all three dimensions at nanoscale (SCCS 2012).

A nanomaterial is a structure composed of nanoparticles. There are two principal factors which affect the difference between properties of nano- and bulk- materials: quantum effects and increased relative surface area (Scientific Committee on Consumer Products (SCCP) 2007, 5).

ISO 27891:2015 designates calibration practices of condensation particle counters for aerosol particle number concentration studies, thus it will be the main source of guidance for following measurements.

Following the requirements of these legislative provisions, FEA has developed a guideline for measurements from aerosol products, and furthermore a guideline on safety assessment (Figure 2).

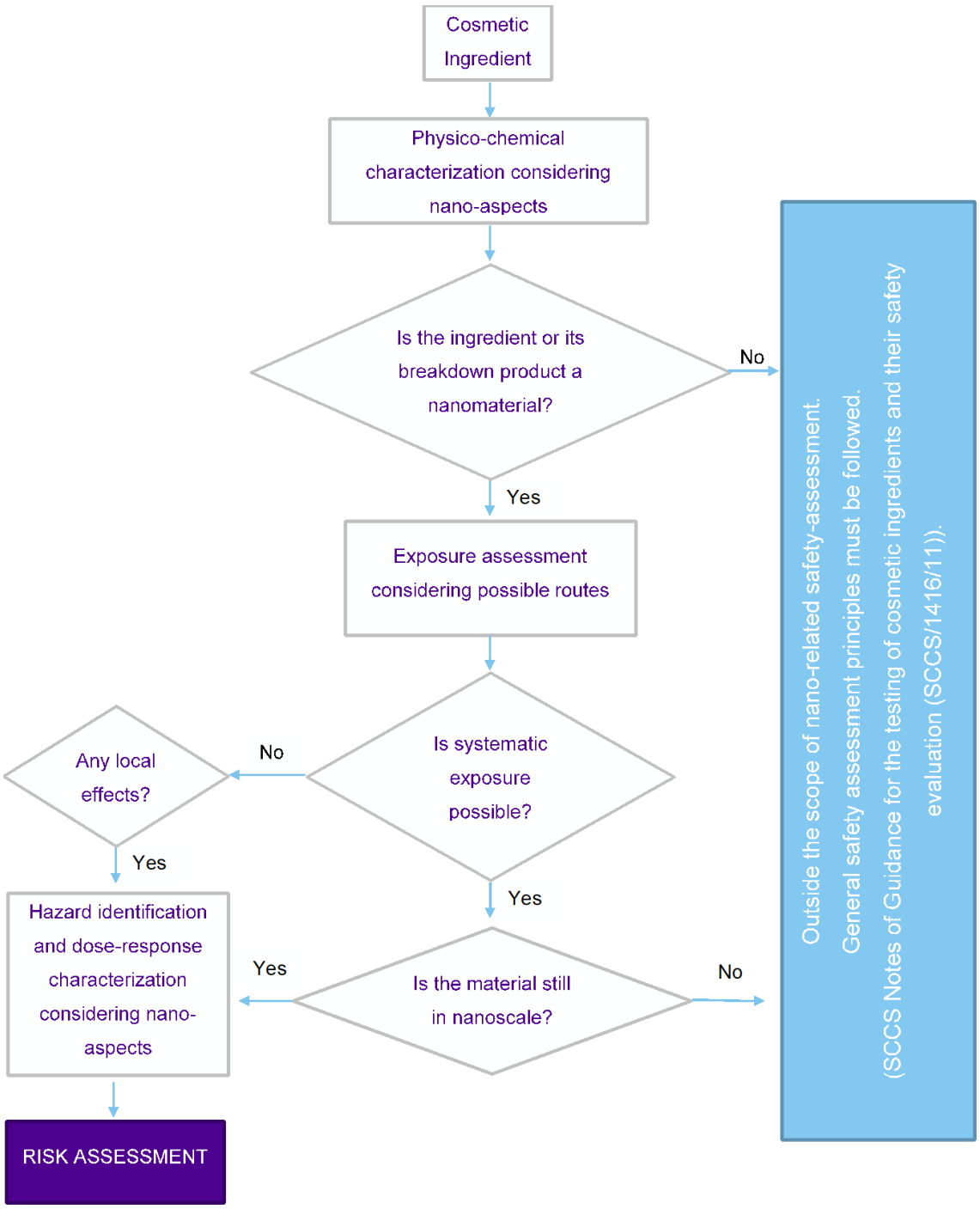


FIGURE 2. An algorithm for identification of safety assessment need (adapted from SCCS/1484/12, 2012, 13 by Viushkova, 2021).

To sum up, the topicality of the chosen field of study lies in the fact that when a company introduces a new product to the market, it should ensure, that all the necessary tests had been done, all the necessary safety regulations are followed, and the safety assessment has complied. This work, serving as a part of experimental studies on the product, will form the basis for the further safety assessment which is necessary prior launching of the product.

2 THEORY AND DEFINITIONS

2.1 Aerosol and its size-dependent characteristics

Aerosol as a scientific term is a metastable suspension of solid or liquid particles in a carrier gas (ISO/TR 27628:2007; Hinds 1998, 1). The word *aerosol* may also be popularly used for describing the spray-can products with an active element repelled with a pressurized gas (Hinds 1998, 1; Rothe et al. 2011).

All of the components in the system of solid and liquid particles and repelling gas have various degrees of stability that depend on such characteristics as particle size and concentration: while the biggest particles are under the effect of gravity and settle down faster, the smallest ones may float in the air for a long time; they are usually stable for at least a few seconds, but sometimes they may last more than a year (Hinds 1998, 3). In addition to settling out, smaller particles could also stick to the walls, furniture and other surfaces present in the room (Byrne 1998 in FEA 2011; Rothe et al. 2011), and the rougher the surface is, the better it serves as a repository.

However, a spray is always a dynamic population since big particles may deplete onto smaller ones in process of time, as conforming volatile solvents and propellants may evaporate (FEA 2009). The European Aerosol Federation, for example, states in its Guide on Inhalation Safety Assessment for Spray Products (FEA 2013, 26) that the intended use of the product resolves the fate of the majority of particles: coarse sprays stick to the surface and mostly remove themselves from the air, even though some bounce-back effect may occur, whilst, on the other hand, such fine-particle sources as air-fresheners are designed to stay in the air for a long period of time.

As it is presented in the FEA's "*Guide on particle size measurement*" (FEA 2009), *maturation* or *ageing* of an aerosol is the process when the sprayed particles or droplets change their properties after the initial spraying time. As a result, when assessing the health effects of various spray treatments, it's not just about the particles/droplets produced at the event of spraying, but also about how they grow after exposure. As a result, the concentration of spray that is really inhaled and

potentially become bio-available should be considered for a meaningful exposure estimate.

The Scientific Committee on Consumer Safety gives a similar recommendation in its Guidance on the Safety Assessment of Nanomaterials in Cosmetics (SCCS/1484/12, 2012, 36). It states that a rigorous characterization will be required for spray application of items containing nanomaterial to determine droplet size and nanomaterial distribution in the droplets. The size distribution of the produced droplets alone will not enough; it will need to be supplemented by the size distribution of the dried remaining aerosol particles.

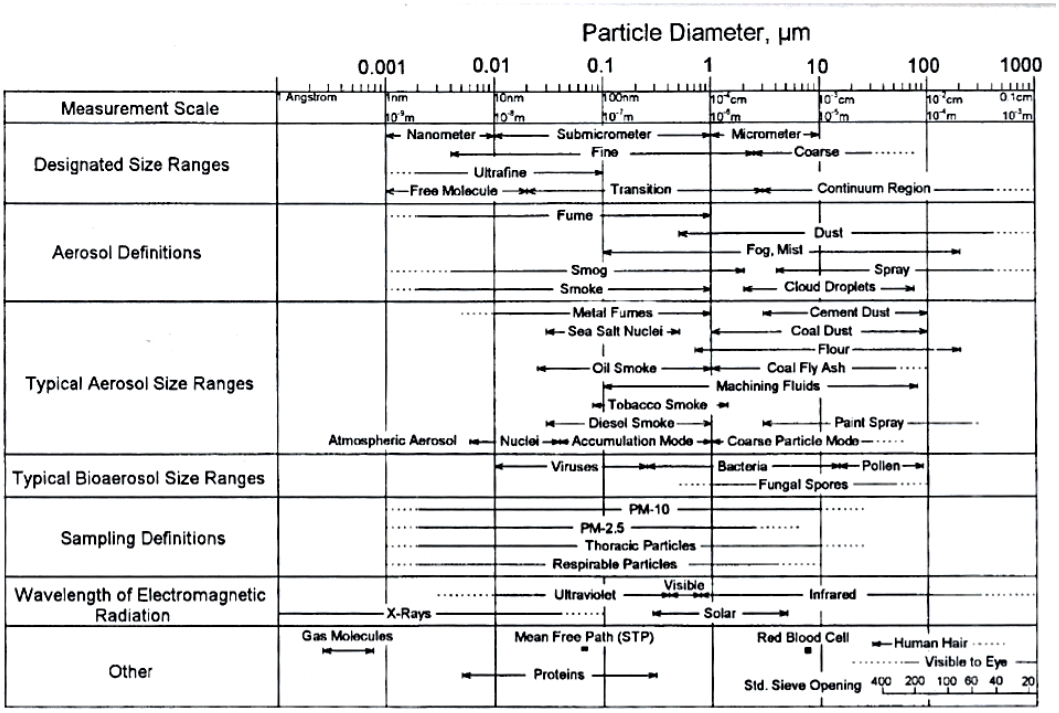


FIGURE 3. Summary classification of aerosols and aerosol particles. Source: Hinds 1998, 9. (Published with kind permission of John Wiley & Sons, Incorporated).

Lu & Howarth (1995) in FEA (2011) worked on modelling the fate of non-volatile particles in a room with ventilation. The results are shown in Table 1.

TABLE 1. Fate of non-volatile particles in air, depending on their size. Source: FEA 2011. Adapted by Viushkova 2020.

Fate of non-volatile particles in air, depending on their size	
Size range	**Fate of the particle**
>20 μm	fall to the ground within 3 minutes of spraying,
>7 μm	deposited on internal surfaces in less than 10 minutes.
>4 μm	all deposited within one hour
<1 μm	are still airborne after two hours and may still be airborne after 10 hours.

Phalen and Oldham, 2006; MAK-Commission, 2012; Heyder et al., 1986; Swiss Federal Office of Public Health, 2009 serve as the primary sources for further scientific research on fate of non-volatile particles in human body. The threshold values borrowed from the above-mentioned studies are present in the Table 2 adapted from FEA (2013), Steiling et al. (2014), Rothe et al. (2011).

TABLE 2. Fate of non-volatile particles in human body, depending on their size. Adapted from multiple sources by Viushkova, 2020.

Fate of non-volatile particles in human body, depending on their size		
Size	**Fate of the particle**	**Primary Sources**
>30 μm	encounter inertial impac-tion in the nasal passages	FEA, 2013
>15 μm	deposited in extrathoracic airways (nose, mouth, throat)	MAK-Commission, 2012
<10 μm	Respirable (i.e. reaching the deeper lung)	Heyder et al., 1986
>7 μm	Cleared out of tracheo-bronchial compartment	Phalen and Oldham, 2006; MAK-Commission, 2012; Heyder et al., 1986; Swiss Federal Office of Public Health, 2009
<5 μm	Reach the alveoli	MAK-Commission, 2012

European Committee for Standardization defined three sampling conventions of particles in "*Workplace atmospheres-size fraction definitions for measurement of airborne particles*" standard published in 1993 (Cherrie & Aitken (1999)). These include:

1. Inhalable fraction E_I (the mass fraction of airborne particles which is inhaled into the nose or mouth); For ambient atmospheres it is calculated by formula (1):

$$E_I = 0{,}5 * (1 + \exp(-0{,}06\ D)) + \ 10^{-5} U^{2{,}75} \exp(0{,}05\ D) \qquad (1)$$

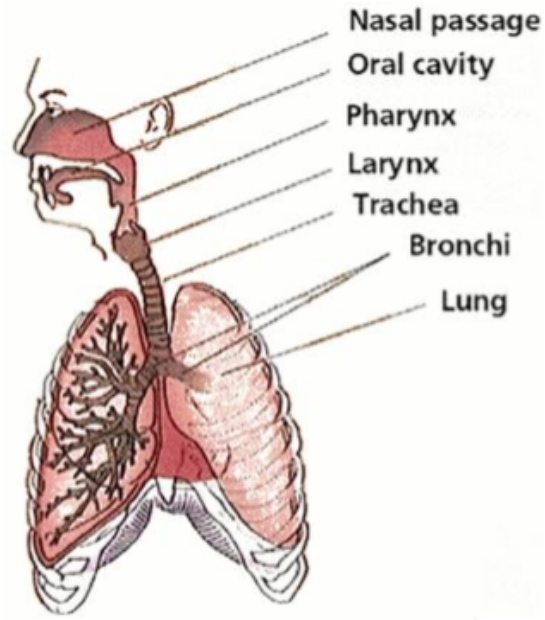
   where *D* stands for the aerodynamic diameter of the particle, defined as a diameter of an equivalent spherical particle of density 10^3 kg/m³ which has the same settling speed as the particle of interest, and *U* is the windspeed (up to 10 m/s) (Booker et al. 1998, p.4);

2. Thoracic fraction E_T (the mass fraction of inhaled permeable particles moving beyond the larynx), described by a cumulative lognormal curve with a median aerodynamic diameter of 11,64 μm and geometric SD of 1,5 (Booker et al. 1998, 4);

3. Respirable fraction E_R (the mass fraction of inhaled particles penetrating to the airways), described by a cumulative lognormal curve with a median aerodynamic diameter of 4,25 μm and geometric SD of 1,5 (Booker et al. 1998, 5);

The same definitions for workplace environment have been accepted as standards by the International Standards Organization and The American Conference of Governmental Industrial Hygienists (ACGIH) (Cherrie & Aitken (1999).

FIGURE 4. Human respiratory tract. Source – FEA 2013, Steiling et al. (2014), 43. (Published with kind permission of FEA).



Nasopharyngeal region

Deposition:	impaction, diffusion
Clearance:	mucociliary, sneezing/blowing
Pathology:	inflammation, cancer, ulceration
Targeted by:	>30 µm particles highly reactive, water soluble gas, "inhalable fraction"

Tracheobronchial region

Deposition:	impaction, sedimentation, diffusion
Clearance:	mucociliary, coughing
Pathology:	obstruction, irritation, cancer, ulceration
Targeted by:	10-30 µm particles, 200 µm fibres, "thoracic fraction"

Pulmonary region (parenchyma)

Deposition:	sedimentation, diffusion
Clearance:	phagocytosis, solubilisation, interstitial
Pathology:	inflammation, fibrosis, cancer, oedema, emphysema
Targeted by:	<10 µm particles, 10-12 µm fibres less reactive/water soluble gas, "respirable fraction"

2.2 History (theory) of safety assessment

Historically, the effect of aerosols on the human body was traditionally considered to be related to the mass concentration of particles (Formula 2, where C_m stands for mass concentration (g/m^3), *m* is mass of all particles (g), *V* is a unit of air volume (m^3)), however, many toxicological and epidemiological studies since the beginning of 1990's have shown that when expressing substances through mass, many ultrafine particles were more destructive than larger ones with a similar composition, so the size plays a very significant role. The massive study of aerosol activities in 60 European sites states, that there is no general correlation between mass and number concentration, even though increase of PM 2.5 levels is usually accompanied with increase of particle number concentrations (Putaud et al. 2009).

$$C_m = \frac{m}{V} \qquad (2)$$

There is an evidence showing that the determining indicator of the toxicological destructiveness of airborne particles is the surface area of the particles but not their linear dimensions (Oberdörster et al. 2007; Wittmaack, 2007b in Khakharia

& Goetheer (2016)). A list of studies declares that in case of all else being equal (namely, mass concentrations and formulation of the product), nano-sized particles are more harmful than those with micron-scale diameter (Brown et al., 2000, 2001; Cullen et al., 2000; Dick et al., 2003; Donaldson, 1996, 1999, 2000; Lison et al., 1997; MacNee and Donaldson, 2003; Oberdörster et al., 1995; Peters et al., 1997; Renwick et al., 2001; Seaton et al., 1995; Tran et al., 2000; Utell and Frampton, 2000 in Beaudrie et al. 2011).

Kreyling et al. (2006) in Beaudrie et al. 2011 give a possible explanation to that phenomena: the proportion of nano-sized particles in terms of mass is less than 10% of PM2.5 concentration, but more than 90% of the fine particle number concentration.

However, there is also evidence that, in some cases, the number of particles, i.e. particle concentration (Formula 3), where *n* stands for number of particles, *V* is a unit of air volume (cm^3) in certain size ranges can play a significant role. Recent studies have linked particle size to their ability to move in the human body and deposit in various parts of the respiratory system, as well as interact with living tissues and their membranes by sorption, translocation, and localized chemical exposure (Buzea 2007, Khakharia & Goetheer (2016). Anyway, currently available information is insufficient to determine which particle indicators (number of particles of a certain size, particle surface area and mass concentration) and, accordingly, what methods of obtaining these indicators should be used in assessing the effect of nanoaerosols on the body (ISO/TR 27628:2007)

$$C_n = \frac{n}{V} \qquad (3)$$

2.3 Aspects to consider in safety assessment

The major steps for safety assessment of cosmetic products are outlined in the article published by Rothe et al. 2011, and include:

1) exposure understanding, by modelling or measurement, systemically and locally;

2) using local toxicity data to establish margins of safety (MoS) and/ or margins of exposure (MoE) needed for the final safety assessment.

However, not only local toxicity data is needed, but also consumption/exposure data (Ficheux et al. 2018). Consumption data includes frequency of use, amount per application or per day (SCCS, 2015 in Ficheux et al. 2018). Epidemiological data evaluates association between health effects observed and cosmetic product consumption (Ficheux et al. 2018).

Practically, only significant factors from the Table 3, which affecting the human exposure, are taken into account in risk assessment. But generally, any of the mentioned factors can play a role in hazard potential:

TABLE 3. Factors affecting human exposure. Source: FEA 2013, 18; Steiling et al. 2014.

Spray can	Size
	Pressurizing system (propellant driven spray, pump spray)
	Geometry of the spray container (volume) and the nozzle
	Content delivery
Spray formulation	Qualitative/quantitative composition
	Propellant and solvents used
	Application format e.g. foam, mousse, jet, fine spray, coarse spray
Spray usage	Frequency
	Duration
	Product release per application/time
	Spraying jet
	Spray direction (e.g. towards or away from the body)
Exposure situation	Application type (consumer, industrial/professional)
	Particle/droplet size distribution at spraying and its maturation
	Duration of stay in spray environment
	Room volume and temperature
	Ventilation rate (air exchange)

	Activity level of the exposed individual (e.g. moving, resting, working, inactive)

FEA 2013 recommends a tiered (step-wise) approach for determining a hazard potential of ingredients and spray itself. The approach is summarized in Table 4. It denotes the importance of considering both acute and systematic exposure in different target groups, such as occupational users and typical consumers. The physical and environmental safety aspects, as well as dermal and background routes of exposure, are not considered.

TABLE 4. Step-wise approach for safety assessment, recommended by FEA 2013.

Safety assessment	**Target Groups**	**Route of exposure**	**Types of effect**
Human Health	Workers	Inhalation	Acute and chronic; Local and systematic
	Professional users		
	Consumers		

2.4 Requirements for a safety assessor

The corporate assessors rely on the information from a spread of sources: data on consumption habits and practices from marketing groups, observation of consumer comments and poison control center correspondence, focus groups, home use studies, and a wide range of public and private (subscription only) toxicology databases (Hamilton, Daggett & Pittinger 2006).

The toxicological databases, however, are no longer updated since on 11th of September, 2004 animal testing was a subject to an absolute ban (EU 2003 in Pauwels & Rogiers 2009), and afterwards from 11th of March, 2009, a testing ban of ingredients or their combinations within the EU was introduced to meet the requirements of the Cosmetic Products Directive (76/768/EEC in Pauwels & Rogiers 2009). Therefore, based on the already existing data, it is possible to

estimate an effect of certain chemical to a human, e.g. knowing intrinsic differences between species and by scaling exposure doses (Carthew et al., 2002). The hazard potential of accidents, (i.e. spills, fires, and incidental contact with reactive materials) is anticipated because of the understanding of an exposure route and the relevant population at risk (Hamilton, Daggett & Pittinger 2006).

A solid knowledge on subject is required from the safety assessor to ensure the quality of the safety evaluation; ideally, the responsible person is holding a doctoral diploma in pharmacy, toxicology, dermatology, medicine, or qualified as Chartered Chemist or Chartered Biologist with at least 3 years of experience (EU 1989a in Pauwels & Rogiers 2009). A qualification that is becoming increasingly accepted across Europe is registration as a Eurotox Registered Toxicologist (Betton (2007). Apparently, the safety assessor should have a good insight into legal documents ensuring the free movement and safe use of chemical-related products in the EU (Pauwels & Rogiers 2009). It is possible for the marketer to designate a suitably qualified supplier as a safety assessor (FEA 2013, 9).

Compiling the data on quality and quantity of the final product, every component's chemical characteristics and their chemical interaction, as well as toxicological profiles and levels of exposure (EU 1993b in Pauwels & Rogiers 2009) in addition to some production and manufacturing details, the responsible person should form and present an industry-specifically available Technical information File (TIF) or Product Information File (PIF), which he also underwrites with his name and address (Rogiers and Pauwels, 2008 in Pauwels & Rogiers 2009). Such details may include:

- Data on animal testing
- Existing data on undesirable health effects and proofs of the cases claimed
- Method of manufacture
- Physico-chemical nature, microbiology and purity of the ingredients (Betton 2007)
- Cosmetic Safety Report (Annex I to EU 2009c in Pauwels & Rogiers 2009)

Thus, role of the Safety Assessor, according to the European Law is mainly comprised of 3 duties:

1. Assurance of legal compliance,
2. Consumer protection;
3. Protection of the manufacturer in terms of product liability (Betton (2007).

2.5 Consumer data

Typical spraying values of hairspray products are given within the following table (Table 5), summarized from multiple resources. However, a number of these parameters are triggered by individual habits and any two people may use an equivalent product type differently. (Steiling et al., 2012). It is clearly seen from the scatter of data obtained from Loretz et al., (2006): the amount per spraying ranges from 0.05 g to 14.08 g of hairspray, the number of times of use per day is ranging from 0 to 7, and amount of use per day is scattered from 0.05 g to 18.25 g. There were 329 participants who completed the study, and most of participants reported using the product as often as their normal usage (68,8% - 79,4%), however, 9% of subjects reported using the hairspray less often than normally. All in all, the study in comparison to the earlier studies collected in 1983 (US EPA, 1997, in Loretz et al. 2006) the average frequency of use increased dramatically up to 6-fold difference.

TABLE 5. Statistics on spraying values from multiple resources. Adapted by Viushkova, 2020.

Discharge rate (g/s)	Spray time (s)	Amount per spraying (g)	Times per day	Amount per day (g)	Reference
0.7	3–4	2.1 - 2.8			BAMA 2008 in Steiling et al. 2014
		2.26 (from 0.05 to 14.08)	1.49 (from 0 to 7)	3.57 (from 0.05 to 18.25)	Loretz et al. 2006
				10 g/day	EC 1996 in Rothe et al. 2011

			1	6.8 (75th percentile)	Bremmer (2006) in Steiling et al. 2014

This data gives orientational values. Surely, the interaction between an organism and nanoparticle depends on nanoparticle chemistry, size, shape, agglomeration state, and electromagnetic properties. Moreover, adverse health effects caused by nanoparticles also depend on individual factors of an organism: e.g. genetics and existing diseases (Buzea, 2007).

2.6 Measured data

The results should be presented by multi log-normal distribution function as it has been commonly used to describe the parameters of the particle number size distribution indoors and outdoors (e.g. Hussein et al. 2005; Hussein et al. 2004; Birmili et al. 2001; Mäkelä et al. 2000; Morawska et al. 1999; Whitby, 1978 in Hussein et al. 2006).

Subsequently, Hussein et al. (2006, 15) had reported that particles of diameter 0.03 – 0.5 mm give an increment of concentration of 1000 particles per cubic centimeter. The graph (Hussein et al. 2006, 13) shows that a hairspray produces a small peak of concentration on the blue curve representing the living room at 12:00, while tobacco smoking produces much higher peak (Figure 5). Even though it can be seen on a graph that a hairspray is a minor emission source in comparison to cooking sources and tobacco smoking, however, the particles emitted survive for the longer time in the air, which is up to 4 hours.

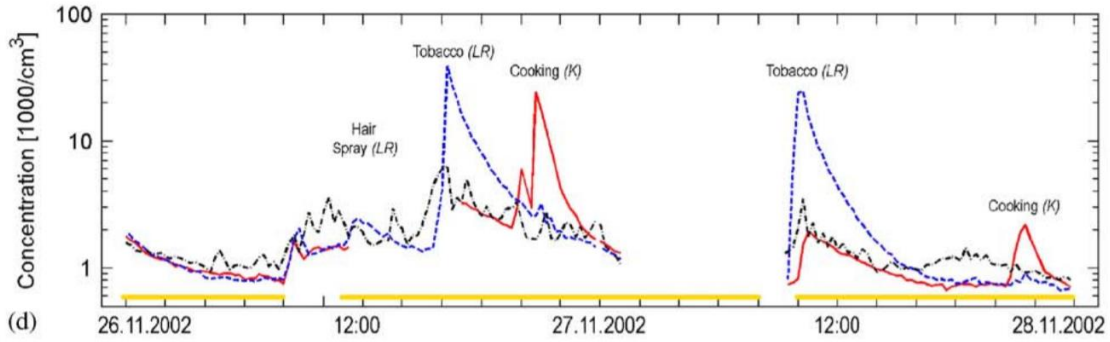


FIGURE 5. Concentrations of indoor particles from different emitting sources. Source: Hussein et al. 2006, 13. (Published with kind permission of Elsevier Science & Technology Journals).

Hussein et al. (2006, 14) gives a reference curve of a hairspray also for a relation between lognormal particle concentration distribution and particle diameter (Figure 6).

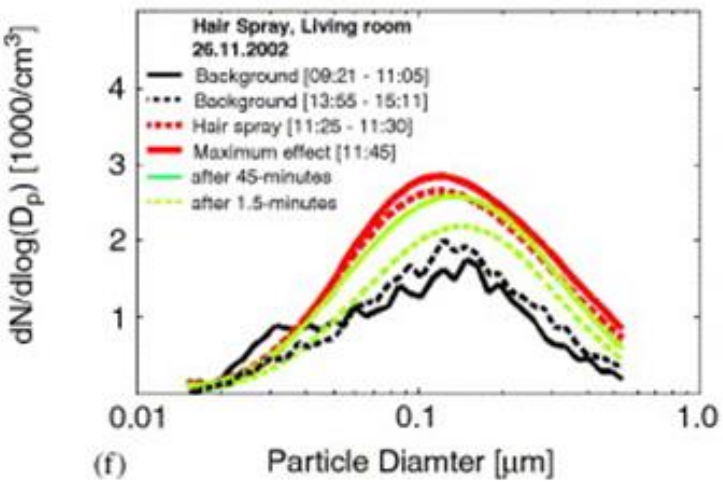


FIGURE 6. Lognormal distribution of a hairspray vs. particle diameter. Source: Hussein et al. (2006, 14). (Published with kind permission of Elsevier Science & Technology Journals).

Corsi et al. (2006) also states the increase of concentration falling in the range from 1000 to over 3000 particles per cubic centimeter. For the 2 hairsprays measured in the study, the particle concentration increased on 7% and 28% respectively compared to initial condition (room before spraying).

Nazarenko et al. (2011, 523) report that the particle number concentration of a regular hairspray was quite similar to that of hair nanospray, falling in the range of 10^2 to 10^3 $\frac{p}{cm^3}$ at the size below 100 nm, 10^3 to 10^4 at the Electrical Mobility Diameter ranging from 100 to 1000 nm, and decreasing down to 10^{-3} $\frac{p}{cm^3}$ at the

EMD around 10000 nm. That is, consequently, 10^5 to 10^6 particles per litre when size is less than 0.1 µm, 10^6 to 10^7 when EMD is less than 1 µm and 10^{-6} for the biggest particles of 10 µm.

Isaxon et al. (2014, 462) declare the concentration of ultrafine particles caused by the hairspray to fall in between 6000 particles per cubic centimeter and 60000 particles per cubic centimeter with the median approximately at 20000 particles per cubic centimeter. The conversion leads to $6 \cdot 10^6$ particles per litre and $6 \cdot 10^7$ with the median of $2 \cdot 10^7$ particles per litre.

Ciuzas et al. (2015, 111) theoretically and practically describes PNC-curve caused by oil heating in electric stove as three-parameter sigmoidal curve (increase in concentration) until it reaches the upper asymptote (Formulae 4 & 4.1 respectively)

$$C_t = \frac{(C_{max} - C_{min})}{1 + \exp(-\frac{t - t_0}{b})} \tag{4}$$

$$f = \frac{(2.2 \cdot 10^6 - 28{,}0)}{1 + \exp\left(-\frac{t - 584}{33}\right)} \tag{4.1}$$

and double four-parameter exponential decay equation (concentration decay) (Formulae 5 & 5.1).

$$C_t = C_1 \cdot \exp(-d_1 \cdot t) + C_2 \cdot \exp(-d_2 \cdot t) \tag{5}$$

$$f = 1.9 \cdot 10^7 \cdot \exp(-3.2 \cdot 10^{-3} \cdot t) + + 3.8 \cdot 10^5 \cdot \exp(-2.0 \cdot 10^{-4} \cdot t) \tag{5.1}$$

The curve is shown on Figure 7. From this sketch it is possible to imagine the actual behavior of the number concentration.

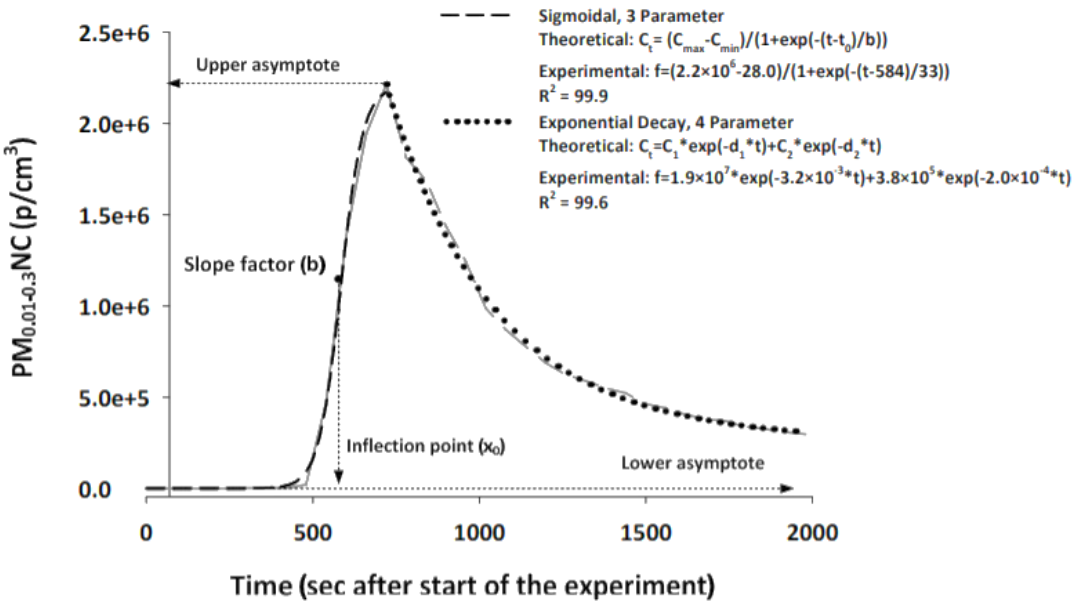


FIGURE 7. PNC-curve caused by cooking. Source: Ciuzas et al. (2015, 111). (Published with kind permission of Elsevier Science & Technology Journals).

Ciuzas et al. (2015) measured and compared different sources of indoor aerosol particles, including hairsprays. The measurement results for the hairspray of Ciuzas et al. (2015, 111) experiment are shown in the Table 6.

TABLE 6. Measured values of a sprayed hairspray at different places of interest. Source: Ciuzas et al. (2015, 111). (Published with kind permission of Elsevier Science & Technology Journals).

Exhaust Channel		Centre of the ceiling		Change in T ± SD	Change in RH ± SD
PM 0.01-0.3	PM 0.3-10	PM 0.01-0.3	PM 0.3-10	ºC	%
C_{max} ± SD · 10^3, p/cm	C_{max} ± SD, p/cm	C_{max} ± SD · 10^3, p/cm	C_{max} ± SD, p/cm		
7+1	378+82	2+0.4	159+53	0.9+0.03	0.2+0.02

The maximum PNC 0.01-0.3 was observed after 12 min following the hair spray repelling (Ciuzas et al. 2015, 111). The curve shows fast increase and slow decrease of the concentration, which can be explained by secondary aerosol formation.

Rogula-Kopiec et al. (2018) measured mass concentration of particles in 4 beauty salons, comparing indoor and outdoor sources' emissions. Those sources, however, included not only hairsprays, but hair paints, heating equipment such as fans, hair stylers and straighteners, and ventilation occurred when the customers were coming from the street and the doors were opened. However, these measurements give an overestimated reference value of particle spreading indoors.

TABLE 7. Indoor particle concentration in beauty salons, reference values. Adapted from Rogula-Kopiec et al. (2018). (Published with kind permission of Springer Nature BV).

Indoor particle concentration, µg/m³		
	PM4 ± SD	TPM ± SD
Beauty salon 1	156.8 ± 68.5	277.5 ± 254.5
Beauty salon 2	118.1 ± 76.2	185.5 ± 130.4
Beauty salon 3	92.8 ± 50.4	136.0 ± 60.0
Beauty salon 4	170.2 ± 72.8	272.5 ± 128.7

Since only limiting values based on the mass concentration exist, the measurement results of number concentration were also converted into mass concentration and compared to the legally bounded values and these reference values. These are expected to be much higher than the ones obtained from conversion, because in present measurement there are fewer emitting sources, i.e. only one hairspray at a time.

The study of indoor and outdoor air quality by Nadali et al. (2020) showed that hourly average PM_{10} concentration and SD indoors at residential buildings was 90.1 ± 33.5 µg/m³. Concentration of of $PM_{2.5}$ was 49.5 ± 18.2 µg/m³ and for PM_1 it was 6.5 ± 10.1 µg/m³.

2.6.1 Indoor air quality: WHO recommendations

Particle concentrations **indoors** in urban areas of developed countries were reported to be equal to 100 μg/m³, while outdoors those were equal to 70 μg/m³. In rural areas the referred quantities are reported to be 80 μg/m³ and 40 μg/m³, respectively (Smith 1996 in WHO 2000, 81).

However, by 2018, guided in accordance with Sustainable Development Goals (SDG), the limit values set by WHO tend to decrease. Thus, the limit values are now set on Interim target-2 level, which is 50 μg/m3 for PM10 and 25 μg/m3 for PM2.5 in 24-hour measured mean period (WHO 2005, 9-11).

WHO concluded that there is no strong evidence in difference of fine matter from indoor sources in comparison to outdoor emissions. In addition, in the presence of indoor emitting sources, their concentration is usually much higher than outdoors. Therefore, the air quality guidelines issued in 2005 are also applicable and do not need to be reviewed so far (WHO 2010, 4).

3 PRACTICUM, EXPERIMENT MODELLING

As it has been already mentioned, most aerosols are polydisperse, i.e. there are different sizes of the particles. Some articles showed that the particle and droplet size distribution is a quite complex characteristic, which depends on product ingredients or the technical construction of the applicator. The range of particle sizes in order to generate an optimized particle size distribution can be changed by modifying the valve construction or the spray formulation (Rothe et al. (2011); Sciarra, McGinley & Izzo (1969)).

The distribution of particles in air is inextricably linked with the nature of diffusion, which, in turn, is influenced by ambient factors - temperature (at high temperatures air molecules have higher energy and move faster), humidity (when suspended, large water molecules affect the trajectory of aerosol particles), the presence of exhaust and/or ventilation Therefore, when measuring, the background characteristics will also be taken into account and indicated. However, no device can measure the full range of dimensional distribution (Hinds 1998, 456), so different devices described further in the subchapter “Devices” were chosen.

The effect of a spray on the respiratory system may be estimated from the distribution of the spray in the ambient air and the inhalation volumes, which strictly depend on the level of human activeness. Bremmer et al. 2006 in Rothe et al. 2011 assumed that 85% of sprayed hairsprays will end up as intended on the hair and head. The duration of exposure is usually taken as 10-20 min in worst case scenario, even though Dutch National Institute for Public Health and the Environment reported 5 min duration of exposure for hairsprays in their assessments (Bremmer et al. 2006a in Rothe et al. 2011).

The hair and body products distribute in a cloud of a volume 1–2 m^3 around the user in 2 minutes after the application. It is possible to assume the full distribution of the product into 10 m^3 space within the next 18 minutes. This air volume is a standard bathroom size (Bremmer et al. 2006 in Rothe et al. 2011).

Corsi et al. (2007) proposed a near-head region concept of measurement and assumed that the air remains in the region of interest for 1 second. The air speeds

located in the breathing zone were approximately 10-20 cm/s (Sørensen and Voigt, 2003). Such recirculating zones of natural convection flows can lead to longer reaction times and subsequent accumulation of reaction byproducts.

3.1 Techniques

There are 2 types of techniques used to measure the particle size: ***indirect*** and ***direct***. The only ***direct*** method of observation is microscopy. (Griffiths et al. 1998. p. 4 – 11).

Indirect measurement techniques include diffusion, sedimentation (aerodynamic sizing method), impaction, mobility analysis and light scattering, where particle size is estimated by some other property related to size. This causes the difference in all property-based equivalent diameters used to describe the particle and its behavior under certain conditions. The most fundamental is aerodynamic diameter, which is measured by inertial separation technique with the cascade impactors, inertial spectrometers and other types of equipment (p.8). (Griffiths et al. 1998).

The most efficient and widely used technique for measuring the submicron particles is an electrical mobility determination method. For the bigger particles (super-micrometer sized) the other methods can be efficiently used (Intra & Tippayawong (2007)).

The instruments to characterize PSDs include Electric Low-Pressure Impactors (ELPI), Diffusion Chargers (DC), Scanning Mobility Particle Sizers (SMPS), Nanoparticle Surface Area Monitors (NSAM), Condensation Particle Counters (CPC), and Optical particles Sizers (OPS) (Brostrøm et al. (2019)).

Figure 8 shows the possible techniques and devices which are available to measure certain size ranges.

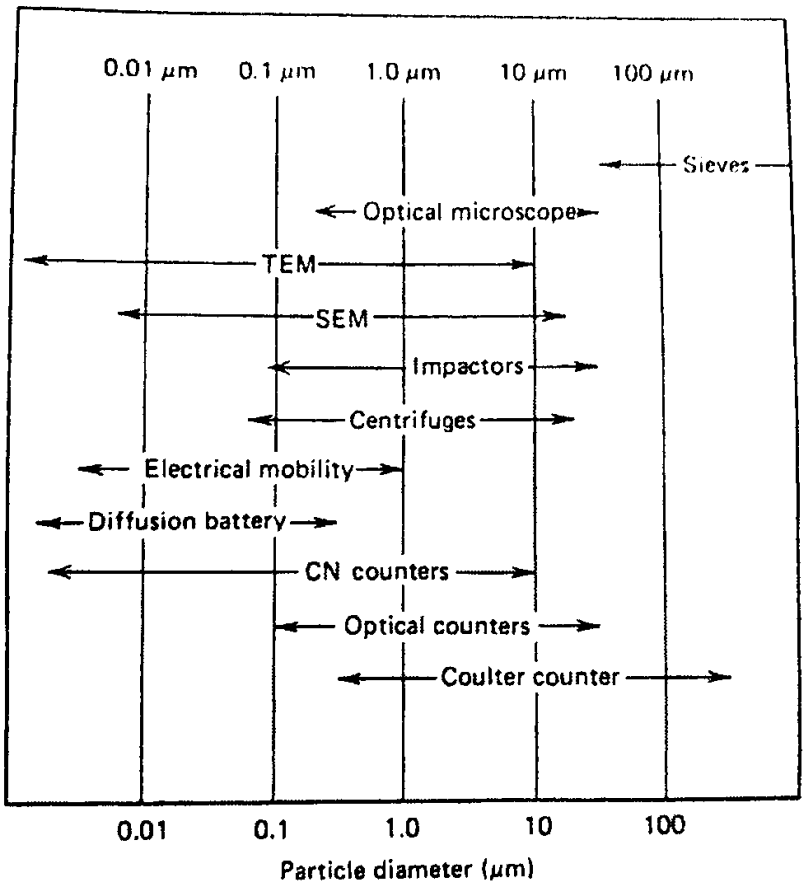


FIGURE 8. Particle size range of aerosol properties and measurement instruments. Source: Hinds 1998, 456. (Published with kind permission of John Wiley & Sons, Incorporated).

3.2 Devices

As it has been already mentioned, no single device could cover the full-size range of sprayed particles. There are various devices, but for health effects it is worth focusing on finer particles rather than on large / agglomerates. The following devices are in university use, the main characteristics and properties of which, declared by the manufacturer, are given in the Table 8.

TABLE 8. List of available devices at TAMK premises. Viushkova, 2020, adapted from Lilja, 2013.

Name of the device	Measuring quantities	Measuring size range in µm	Measuring size range in nm	Method of operation	Scope
Trotec	Mass/Number concentration, size distributions + humidity, temperature	0.3 - 10 µm	300 - 10^4 nm	Scattered light	
ARTI (HACH 2017, 3)	Number concentration and size distribution	0.5 µm - 10 µm	500 – 10^4 nm	Light blocking	
Boulder counter	Mass concentration and size distribution	2 µm - 100 µm	2000 – 10^5 nm		Manufacturing of Aerospace Flight and Space Hardware, Precision Engines, Automobile Flat Panel Displays, Medical Devices. Automotive Precision Machining and Paint
ELPI	Number and mass distribution and concentration, particle diameters	7 nm - 10 mm	7 - 10^7 nm	Inertial impaction method	Testing and development, National and international projects, Publications, Final theses, Teaching, Physical & Environmental Measurements, Air Pollution, Analysis of airborne particles

Since this study's aim is to analyze a specific pollution problem, it is classified as a short-term study, where a large number of samplers is concentrated in a small area around an aerosol source, and measurements are taken before and after specific operation (spraying) (Booker 1998, p. 13).

3.2.1 Trotec

Trotec PC220 (Picture 1) is a mobile hand-held portable device, which operates on light-scattering method.

PICTURE 1. Trotec PC220 device in standby mode before the measurement. Viushkova, 2020.

Light-scattering technique can be used to measure the size of the particles because the degree of absorbing, reflecting, or scattering the incident light-beam radiation is dependent upon the size of the particles (Sciarra, McGinley & Izzo (1969)).

The device has a certificate of calibration, and the following precision characteristics for particle counting: accuracy ± 30%, and counting efficiency 50% at 0.3 µm scale, but 100% counting efficiency for particles larger than 0.45 µm.

Within the room temperature limit (precisely from 10 ºC to 40 ºC) it has 0,5 ºC error.

Relative Humidity (RH) errors are

- 3.0 % for the range from 40 % to 60 %;
- 3.5 % for the range from 20% to 40 % and 60 % to 80 %; and
- 5.0 % from 0 to 20 % and 80 % to 100 %.

Differential mode of operation was recommended for such type of measurement because it measures the absolute concentration of the different particle sizes for each channel.

Alarm (limit) values (Table 9) are determined on the basis of ISO 14644-1 and in connection with practical experience.

TABLE 9. Alarm (limit) values of Trotec PC220. Source: Trotec PC220 Manual, p.6.

Channel	Green	Yellow (signal beep)	Red (signal beep)
0.3 µm	0 – 100000	100001 – 250000	250001 – 500000
0.5 µm	0 – 35200	35201 – 87500	87501 – 175000
1.0 µm	0 – 8320	8321 – 20800	20801 – 41600
2.5 µm	0 – 545	546 – 1362	1363 – 2724
5.0 µm	0 – 193	194 – 483	484 – 966
10 µm	0 – 68	69 – 170	170 – 340

3.2.2 ELPI

One more device chosen to estimate the particle size distribution for this work was Electrical Low Pressure Impactor (ELPI) which is presented on the Figure 9.

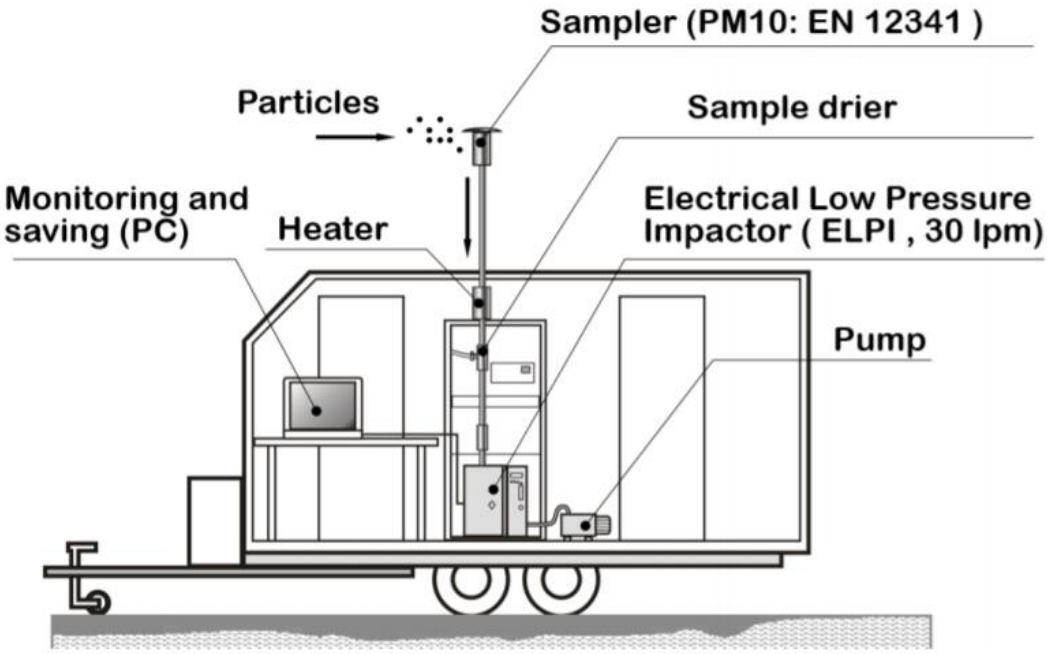


FIGURE 9. MOVA wagon inside view with Electrical Low-Pressure Impactor and other devices installed (TAMK internal MOVA project 2007-2011 in Lilja, 2013).

The functioning principle of ELPI consists of many steps. First, the particles are pumped into the charger cloud so that they get positively charged and carried with an air stream through a series of 12 small jets in a manner of a sieve, where each jet opening is smaller than the previous one. Thus, the larger particles are deposited onto the upper glass slides because they have a higher momentum of inertia to stick to the surface. Second, the air stream becomes stronger to give the smaller particles a sufficient momentum to deposit themselves on the smaller glass slides whilst the jet openings become smaller. By adjustment of the distance between the slide and the jet, particles in a limited size spectrum can be collected on each slide. Finally, the sensors data is analyzed with the computer, and henceforth, the conclusions about concentrations, mass and number distributions can be made with the help of Excel calculation sheets developed by Dekati company (Lilja, 2017; Sciarra, McGinley & Izzo, 1969).

Pictures 2 & 3 represent a view of the MOVA-wagon itself.

PICTURE 2. MOVA wagon outside TAMK main campus. Viushkova, 2020.

PICTURE 3. Front view of MOVA-wagon with ELPI installed inside. Viushkova, 2020.

3.3 Algoritmisation: Developing a measurement procedure

3.3.1 Recommendations

The measurement procedure was carried out in accordance with the proper recommendations of the FEA protocol (FEA 2009, 44-45).

The reasonably foreseeable conditions of use, and user habits were replicated and simulated during the measurement.

FEA recommends to sample from the same location (nozzle-to-hair) to ensure reproducibility. The fixed tripod-stand was used for holding the aerosol can, and the place and distance were primarily measured and reported.

Since the product is intended for indoor use, the samples were kept warm (at room temperature, 18 to 22°C recommended). The test was carried out in a temperature- and ventilation-controlled room without direct natural light sources. The temperature was reported, and ventilation was minimized i.e. door closed, no air conditioning during testing.

The test item was weighed before and after spraying so that resultant data could be related to the used amount of product.

Right before application, the aerosol was shaken for better agitation according to the common instructions.

Since the purpose was to assess the potential exposure to the resultant personal cloud of spray after use, the sampling happened throughout the spraying time and continued for an additional period after spraying. The duration of the sampling period was reported and, later, adjusted.

The distance between the nozzle of the measured item and the inlet of the estimating gadget is a key parameter which should be fitting for the way of product use. The particle size dissemination of the spray will change with the distance. Bigger particles will be more common closer to the nozzle while apart from the

nozzle the smaller particles will prevail because of aerosol formation, i.e. repellent evaporation. Thus, testing excessively near the spray is illogical since it underestimated the number of inhalable particles. A good practice and traditionalist methodology is to utilize a distance longer than the expected user propensities (FEA 2009, 44).

The researcher should take care if this convention is utilized for fluids where particles decrease in size as unstable solvents dissipate and evaporate. To keep away from underestimation of particle concentrations, it is important to comprehend the pace of dissolvable dissipation and its impact on the difference in molecule size.

For such a situation, the molecule size dispersion ought to be re-estimated at different occasions subsequent to spraying, either consistently or in predetermined intervals.

It is important to ventilate the test place in between the experiment sessions to keep away from the development of particles and combustible environment in the room.

After the test completion, a mean background value ought to be deducted from the overall measurement, however, some testing equipment is able to do it automatically (FEA 2009, 48).

The most suitable measurement methods for simulating the standard use of the product were selected and an algorithmic measurement model was developed according to all the recommendations (Appendix 1).

An important issue to be taken into consideration is that the air itself is never really calm, because different factors, ranging from draughts, temperature gradients, to the movement of objects and people may cause air flow. For the purposes of calculations air is considered calm, and particle sedimentation and diffusion is imagined as naturally occurring, being not under the influence of air movement or effects of particle inertia. Of course, it is an idealized situation, but it is relevant to sampling from many occupational and indoor environments (Booker et al.

1998, p.40). On the contrary, human presence and control of the measurement make the procedure more similar to the real-life use. In addition, Hussein et al. (2006, 6) recommends the following conditions to be used when examining the simplified indoor aerosol model:

(1) Assume indoor air to be well-mixed without any concentration gradients,
(2) Neglect the effects of coagulation, nucleation and condensation,
(3) Ensure the absence of interaction of the measured indoor compartment with any other compartments (Hussein et al. 2006, 6).

3.3.2 Modelling

Consequently, taking into account the recommendations on the experimental protocol and ensuring the compliance with the established measurement procedure, the following characteristics were established:

The imitation of the human soft body and head was performed using a soccer ball, statically hanging on a tripod, and wrapped up in a soft bag. In this way, the softness and imitation the same bounce-back effect which is observed on particles as the product would be used in real life, is guaranteed.

Since the measurement is carried out for subsequent analysis of the effect of aerosol on the human health and especially on the respiratory system, the device detector should be located approximately in the area of the upper airways (nose) on a real human head. To simulate the conditions, a situation was chosen when a person sprays a hair spray from aside of himself, perpendicular to the axial plane of the head.

The distance between the nozzle and the soft bag surface has been chosen to be equal to 20 cm, even though the different manufacturers recommend different distances. As an example, L'OREAL Paris in their article 'How to use Hairspray Like a Pro' recommends to hold a can in six inches (15 cm) from the head, Schwartzkopf in their article 'Hairspray: Tips & Tricks for Proper Use' and 'Using

Hairspray Correctly" recommends to be 30 cm (12 inches) away, and overall other aerosol producers on their product description pages recommend the hair-sprays to be used from 25-30 cm distance for an even spraying.

The distance between the soft surface and the detection equipment was 5 cm.

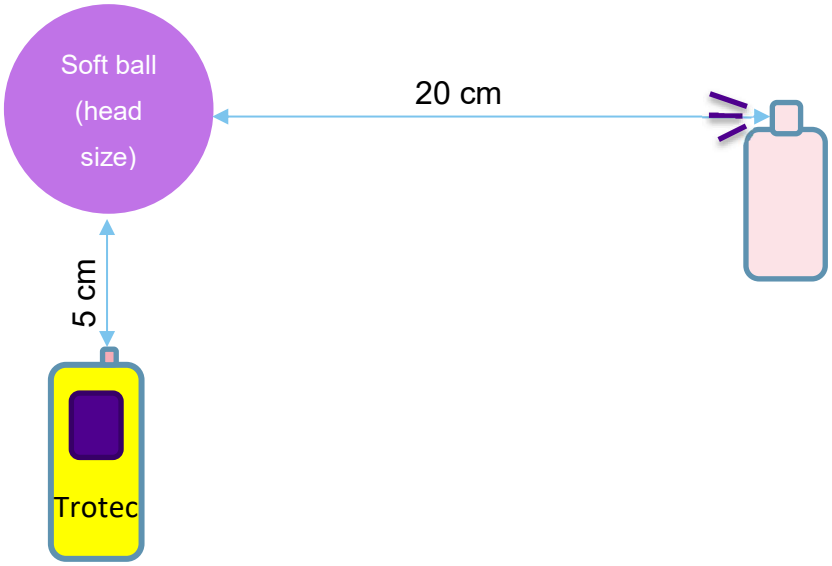
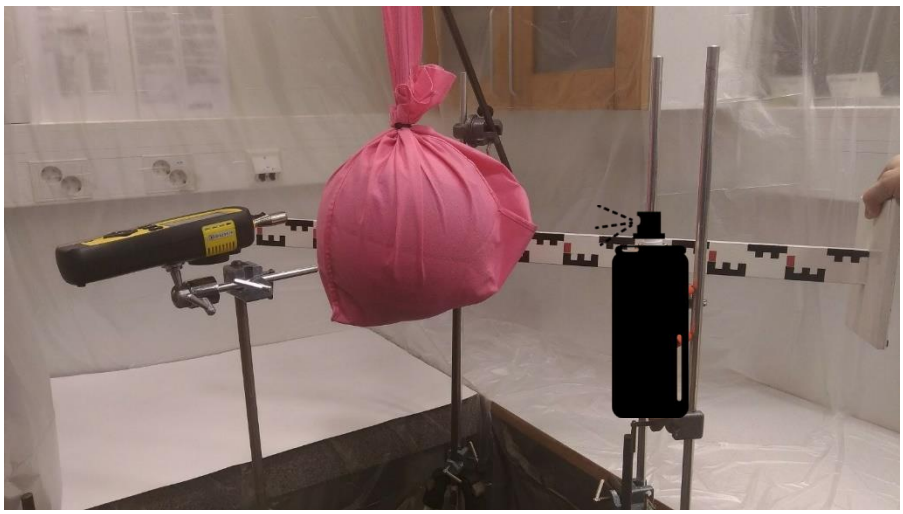


FIGURE 9. Schematic measurement setup. View from above. Viushkova, 2020.



PICTURE 4. Measurement setup on 25.02.2020. Viushkova, I., Arvela, P. 2020.

PICTURE 5. Measurement setup on 25.02.2020 Viushkova, I., Arvela, P. 2020.

Taking into account the fact that a person will spend half an hour after spraying in the bathroom, measurements were taken every 2 minutes for the period of 30 minutes.

The second measurement took part on 07.08.2020, from 10.30 to 15.00 in MOVA wagon outside of TAMK main campus. The settlings for the measurement were kept same, i.e. the distance of 20 cm from the spray to the head, and 5 cm from the head to the equipment inlet. The room size changed a little, but to keep it similar to the initial bathroom-alike size, a wall of the PVC-layer covered part of the room, and the part in which the measurements took place had following dimensions: 2,80 · 2,40 · 2,20 m.

The measurement took place in calm air, events of door-opening were minimized, and ventilation was controlled. The only, but the most significant and most important change was an introduction of Dekati Electrical Low-Pressure Impactor measuring device, which was located on the same level with Trotec. ELPI has more accurate and presized measurements, but for calibration practices the results will be compared to the ones obtained with Trotec.

The sampling time of 1 hairspray was set to 1.5 hours, which consisted of 1 background measurement (2 min) and following measurements for each 10 seconds from ELPI, and each 2 minutes from Trotec. The cycle of Trotec measurements consisted of 93 second of break-time followed by 6 seconds of countdown-time and 21 second of air-pumping (actual measurement) time.

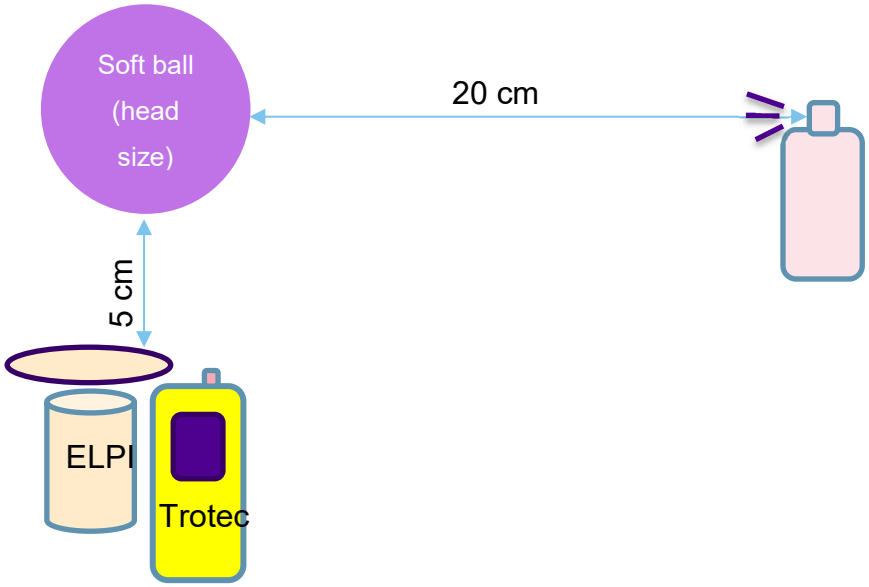
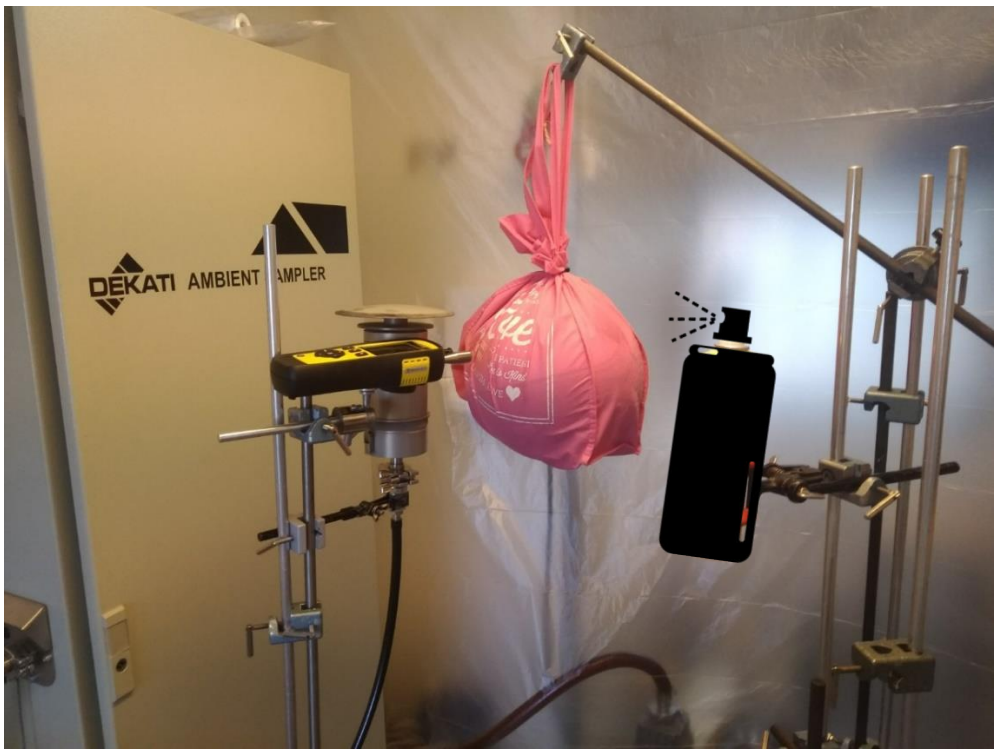


FIGURE 10. Measurement setup (schematic representation) of combined measurement. View from above. Viushkova, 2020.

PICTURE 6. Combined measurement setup on 07.08.2020. View from above. Viushkova I., Lilja, J., Pitkanen, J., Arvela, P. 2020.



PICTURE 7. Combined measurement setup on 07.08.2020. View from aside. Viushkova I., Lilja, J., Pitkanen, J., Arvela, P. 2020.

4 RESULTS

4.1 Trotec PC220 measurements

4.1.1 First hairspray measurement

The first measurements with Trotec PC220 took place on 25.02.2020 and 11.03.2020. The 1st hairspray sample was measured in duplicates, and the 2nd hairspray sample was measured in triplicates. During 3-4 seconds of spraying, the weight loss of the spray can (namely amount of spray used per one application) was 3.25 g in average (ranging from 3.0 to 4.0 g per use). The results were converted to common logarithmic scale with the basis of 10. The tables and the graphs are presented below.

Table 10 shows the raw data (number of particles of certain diameter measured in 2 minutes time frame in 1 liter of air pumped inside the analyzer) of 1st hairspray during half an hour (last row represents a number of particles detected between 28th and 30th minute). The numbers in **bold** signify that there was a red alarm beep, signifying that the number exceeds greatly the recommended values.

TABLE 10. Trotec PC220 measurement, raw data. Hairspray 1, measurement 1.

	0.3µm	0.5 µm	1.0 µm	2.5 µm	5.0 µm	10 µm
0	732	214	57	2	0	2
2	111296	58190	18933	**3587**	432	**441**
4	4497	1860	591	94	7	8
6	2803	1414	386	69	7	5
8	8564	4639	1526	275	19	20
10	14492	6324	1895	374	53	31
12	17806	7635	2300	375	53	33
14	16672	7568	2443	355	52	27
16	15717	7248	2111	328	16	30
18	15463	5936	1937	381	35	27
20	13455	5862	1650	302	40	18
22	11225	5419	1692	300	26	16
24	10586	5728	1443	217	23	19
26	10405	4950	1477	237	33	13
28	9219	3950	1040	201	27	18

The results were converted to logarithmic scale with the basis of 10 (Table 11).

TABLE 11. Trotec PC220 measurement. Logarithmic scale converted data. Hairspray 1, measurement 1.

	0.3µm	0.5 µm	1.0 µm	2.5 µm	5.0 µm	10 µm
0	2.86	2.33	1.76	0.30		0.30
2	5.05	4.76	4.28	3.55	2.64	2.64
4	3.65	3.27	2.77	1.97	0.85	0.90
6	3.45	3.15	2.59	1.84	0.85	0.70
8	3.93	3.67	3.18	2.44	1.28	1.30
10	4.16	3.80	3.28	2.57	1.72	1.49
12	4.25	3.88	3.36	2.57	1.72	1.52
14	4.22	3.88	3.39	2.55	1.72	1.43
16	4.20	3.86	3.32	2.52	1.20	1.48
18	4.19	3.77	3.29	2.58	1.54	1.43
20	4.13	3.77	3.22	2.48	1.60	1.26
22	4.05	3.73	3.23	2.48	1.41	1.20
24	4.02	3.76	3.16	2.34	1.36	1.28
26	4.02	3.69	3.17	2.37	1.52	1.11
28	3.96	3.60	3.02	2.30	1.43	1.26

The absolute temperature, relative humidity, dew point and wet-bulb temperature were also measured and reported in Table 12.

TABLE 12. Air conditions. Hairspray 1, measurement 1.

	AT(°C)	RH(%)	DP(°C)	WB(°C)
0	22,9	14,3	-3	14,2
2	23,1	14,5	-2,7	14,3
4	23,3	14	-2,9	14,5
6	23,5	13,8	-2,9	14,6
8	23,6	13,6	-3	14,7
10	23,8	13,4	-3	14,8
12	23,9	13,4	-2,9	14,9
14	24	13,1	-3	14,9
16	24,1	13,1	-2,9	15
18	24,1	13	-3	15
20	24,2	12,9	-3	15,1
22	24,3	12,9	-2,9	15,1
24	24,4	12,8	-2,9	15,2
26	24,5	12,7	-2,9	15,2
28	24,5	12,7	-2,9	15,2

The results are presented in graphs as well.

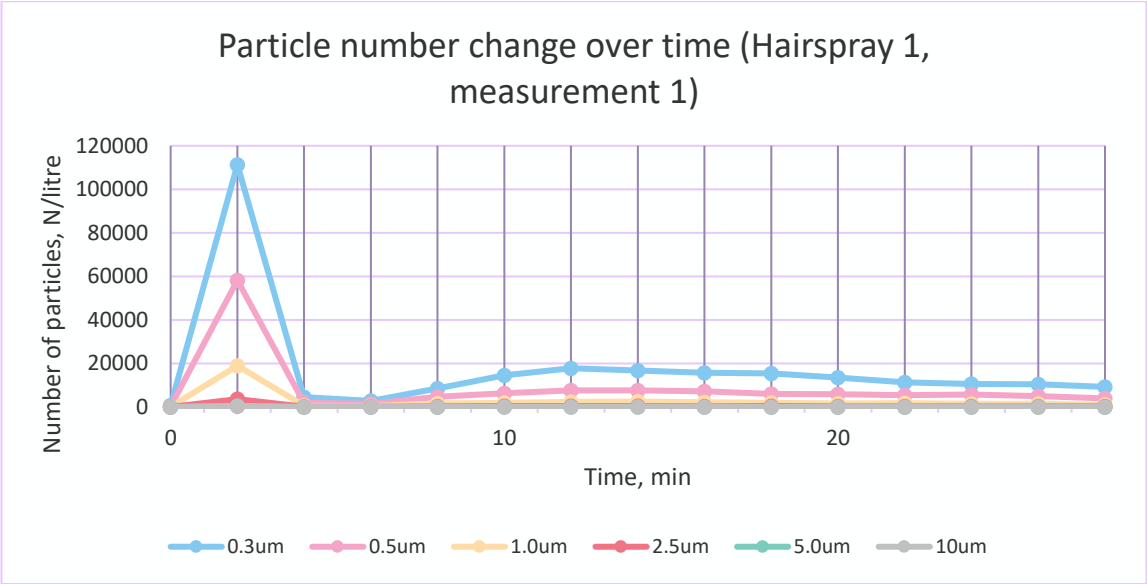


FIGURE 11. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 1, measurement 1.

The raw data graph is not representative because of tenfold differences in quantities, that is why logarithmic scale is usually used for presentation of results.

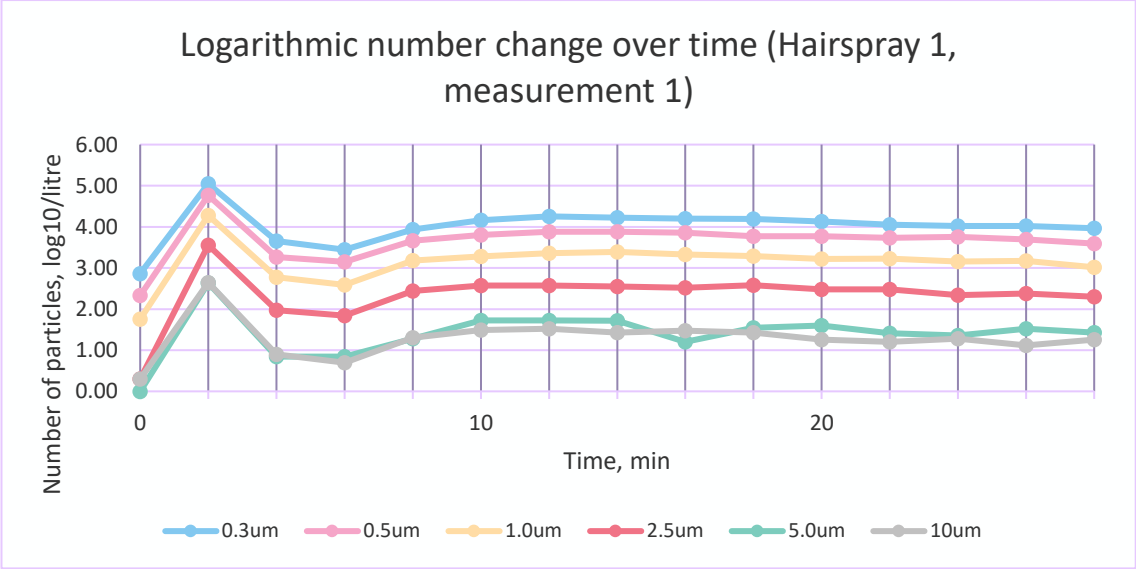


FIGURE 12. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 1, measurement 1.

The duplicate measurement of a first hairspray gave the following results (table 13):

TABLE 13. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 1, measurement 2.

	0.3µm	0.5 µm	1.0 µm	2.5 µm	5.0 µm	10 µm
0	827	324	56	4	1	3
2	143474	**90464**	**31332**	**6148**	**678**	**720**
4	2185	751	163	31	6	5
6	7059	2727	778	56	4	3
8	4058	2078	584	114	4	18
10	13352	5186	1535	302	22	28
12	29840	13593	3651	606	47	51
14	31229	13962	4310	656	65	54
16	30980	13537	4053	733	80	56
18	36412	17691	4839	871	41	63
20	32247	14996	4153	669	66	48
22	31988	13503	4351	794	65	56
24	30542	14020	4485	719	67	59
26	29750	13267	3888	571	73	47
28	24989	12393	4075	616	54	44

It can be seen, that the peak values are too high (red signal alarm) for all particle diameters.

The results were also converted to the logarithmic scale (Table 14).

TABLE 14. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 1, measurement 2.

	0.3µm	0.5 µm	1.0 µm	2.5 µm	5.0 µm	10 µm
0	2.92	2.51	1.75	0.60	0.00	0.48
2	5.16	4.96	4.50	3.79	2.83	2.86
4	3.34	2.88	2.21	1.49	0.78	0.70
6	3.85	3.44	2.89	1.75	0.60	0.48
8	3.61	3.32	2.77	2.06	0.60	1.26
10	4.13	3.71	3.19	2.48	1.34	1.45
12	4.47	4.13	3.56	2.78	1.67	1.71
14	4.49	4.14	3.63	2.82	1.81	1.73
16	4.49	4.13	3.61	2.87	1.90	1.75
18	4.56	4.25	3.68	2.94	1.61	1.80
20	4.51	4.18	3.62	2.83	1.82	1.68
22	4.50	4.13	3.64	2.90	1.81	1.75
24	4.48	4.15	3.65	2.86	1.83	1.77
26	4.47	4.12	3.59	2.76	1.86	1.67
28	4.40	4.09	3.61	2.79	1.73	1.64

Table 15 represents the ambient air conditions measured simultaneously.

TABLE 15. Ambient air conditions. Hairspray 1, measurement 2.

	AT(°C)	RH(%)	DP(°C)	WB(°C)
0	23,4	13,8	-3	14,5
2	23,5	13,5	-3,1	14,6
4	23,8	12,9	-3,3	14,8
6	24	12,9	-3,2	14,9
8	24,2	12,7	-3,2	15,1
10	24,3	12,6	-3,2	15,1
12	24,4	12,5	-3,2	15,2
14	24,5	12,3	-3,2	15,3
16	24,6	12,2	-3,2	15,3
18	24,7	12,2	-3,1	15,4
20	24,7	12,2	-3,1	15,4
22	24,7	12,2	-3,1	15,4
24	24,8	12,2	-3,1	15,4
26	24,8	12,1	-3,1	15,5
28	24,9	12,1	-3,1	15,5

Graphs (Figure 13 & 14) of the duplicate measurement based on the tables show the same behavior of the curve as in the first measurement:

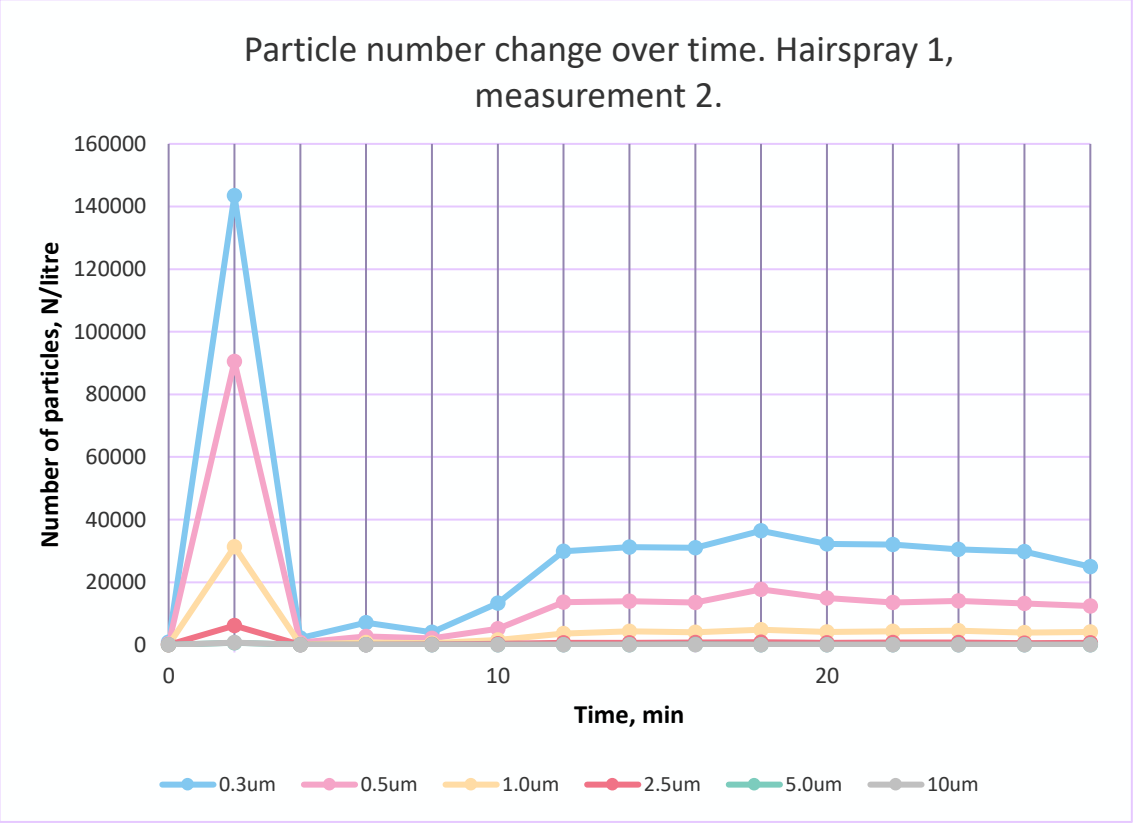


FIGURE 13. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 1, measurement 2.

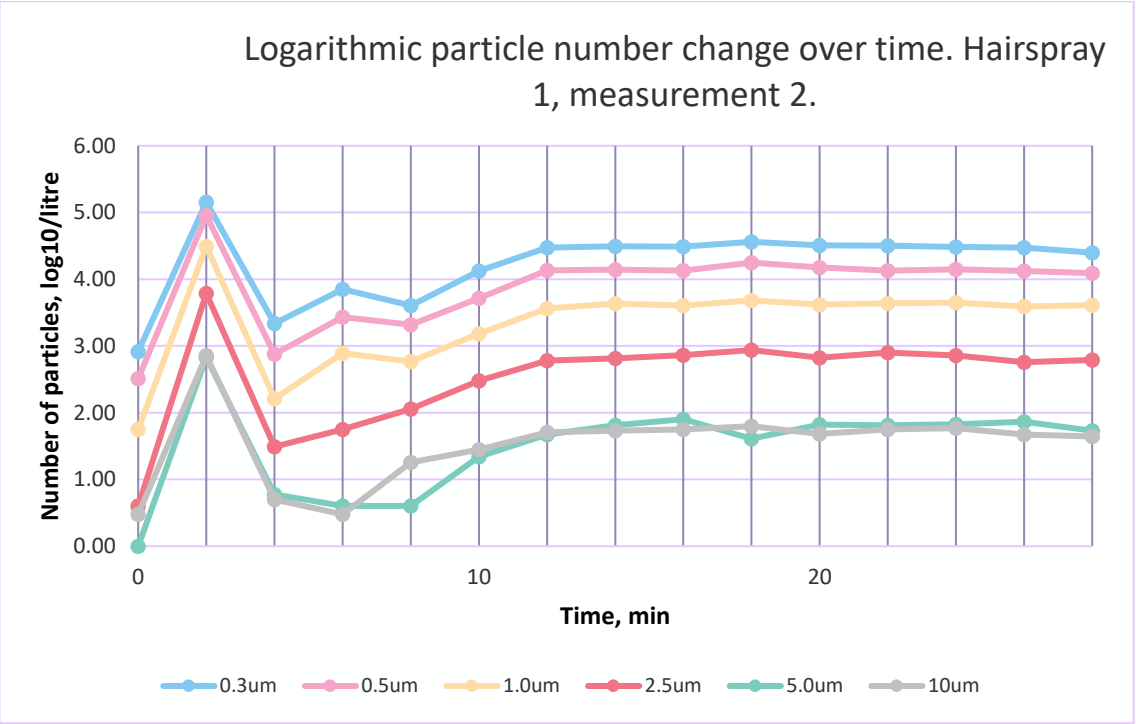


FIGURE 14. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 1, measurement 2.

4.1.2 Second hairspray measurement

Table 16 shows the raw data (number of particles of certain diameter measured in 2 minutes time frame in 1 liter of air pumped inside the analyzer) of the 2nd hairspray sample during half an hour (last row represents the number of particles detected between 28th and 30th minute). The numbers in **bold** signify that there was a red alarm beep, meaning that the number exceeds the recommended value.

TABLE 16. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 1.

	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	750	460	-3	12	1	5
2	146336	**105963**	**31461**	**7507**	**856**	**709**
4	7273	3860	769	178	10	18
6	4891	2024	797	135	16	14
8	6782	3831	1061	287	40	35
10	3169	1906	483	94	7	11
12	9744	5419	1521	286	27	17
14	9900	5119	1231	214	19	15
16	11982	5181	1635	262	24	19
18	17606	9070	2393	405	47	30
20	19448	9361	2585	442	37	32
22	17073	8921	2354	513	35	29
24	17124	8738	2441	441	46	24
26	18760	9505	2867	474	38	34
28	19549	10488	2507	460	42	35
30	18287	11078	3116	416	41	28

Figure 15 represents the content of a table 16 as a graph.

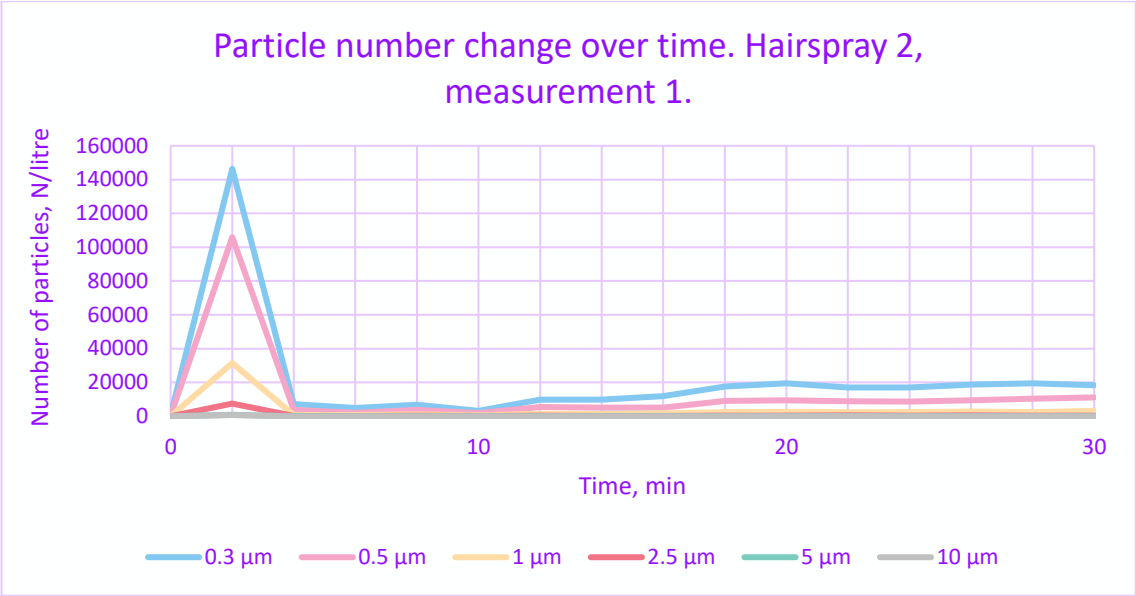


FIGURE 15. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 1.

The raw data results were also converted to a logarithmic scale on the basis on 10 for better representation. These are presented in Table 17.

TABLE 17. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 1.

	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	2.88	2.66		1.08	0.00	0.70
2	5.17	5.03	4.50	3.88	2.93	2.85
4	3.86	3.59	2.89	2.25	1.00	1.26
6	3.69	3.31	2.90	2.13	1.20	1.15
8	3.83	3.58	3.03	2.46	1.60	1.54
10	3.50	3.28	2.68	1.97	0.85	1.04
12	3.99	3.73	3.18	2.46	1.43	1.23
14	4.00	3.71	3.09	2.33	1.28	1.18
16	4.08	3.71	3.21	2.42	1.38	1.28
18	4.25	3.96	3.38	2.61	1.67	1.48
20	4.29	3.97	3.41	2.65	1.57	1.51
22	4.23	3.95	3.37	2.71	1.54	1.46
24	4.23	3.94	3.39	2.64	1.66	1.38
26	4.27	3.98	3.46	2.68	1.58	1.53
28	4.29	4.02	3.40	2.66	1.62	1.54
30	4.26	4.04	3.49	2.62	1.61	1.45

Graph on the Figure 16 represents the content of the Table 17.

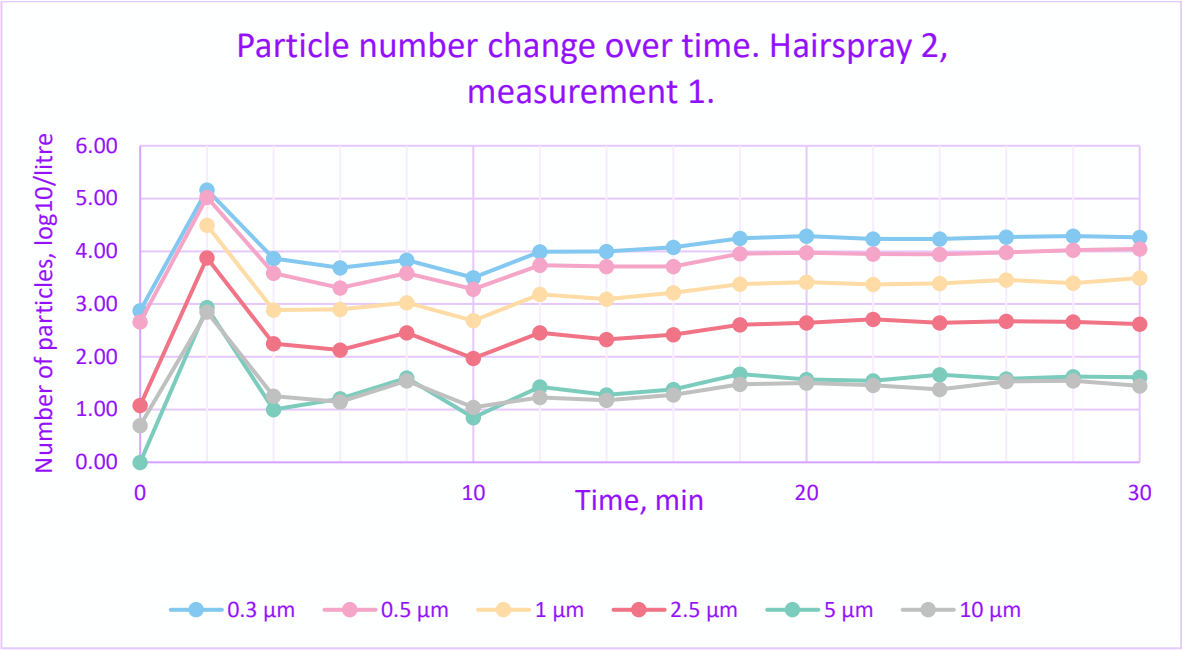


FIGURE 16. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 1.

The results of the duplicate measurement are shown in the Table 18.

TABLE 18. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 2.

	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	1085	588	87	12	0	3
2	37244	23437	7030	**1569**	144	156
4	41370	20930	6462	1311	119	139
6	10005	5249	1314	248	21	14
8	11924	7534	1868	400	39	40
10	11232	7394	1756	286	22	26
12	11597	6237	1417	265	29	18
14	14066	7950	1826	291	27	24
16	15821	7695	2070	355	16	13
18	14781	8068	2066	430	32	26
20	14979	8013	1795	356	24	24
22	17390	9931	2006	448	38	26
24	19239	10055	2776	554	40	41
26	19716	10678	3101	414	20	41
28	17957	9869	2809	480	57	30
30	17353	9414	2544	390	36	26

Figure 17 represents the raw data from the Table 18 as a curve.

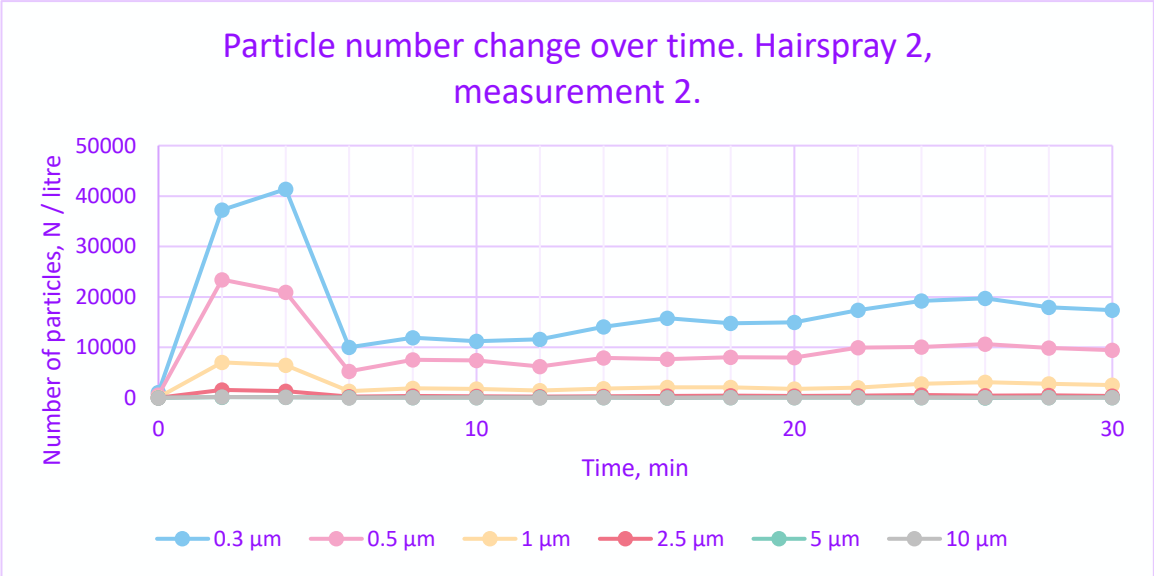


FIGURE 17. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 2.

The results are converted to the logarithmic scale presented in Table 19.

TABLE 19. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 2.

	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	3.04	2.77	1.94	1.08		0.48
2	4.57	4.37	3.85	3.20	2.16	2.19
4	4.62	4.32	3.81	3.12	2.08	2.14
6	4.00	3.72	3.12	2.39	1.32	1.15
8	4.08	3.88	3.27	2.60	1.59	1.60
10	4.05	3.87	3.24	2.46	1.34	1.41
12	4.06	3.79	3.15	2.42	1.46	1.26
14	4.15	3.90	3.26	2.46	1.43	1.38
16	4.20	3.89	3.32	2.55	1.20	1.11
18	4.17	3.91	3.32	2.63	1.51	1.41
20	4.18	3.90	3.25	2.55	1.38	1.38
22	4.24	4.00	3.30	2.65	1.58	1.41
24	4.28	4.00	3.44	2.74	1.60	1.61
26	4.29	4.03	3.49	2.62	1.30	1.61
28	4.25	3.99	3.45	2.68	1.76	1.48
30	4.24	3.97	3.41	2.59	1.56	1.41

The curve on the Figure 18 represents the changes in data presented in the Table 19.

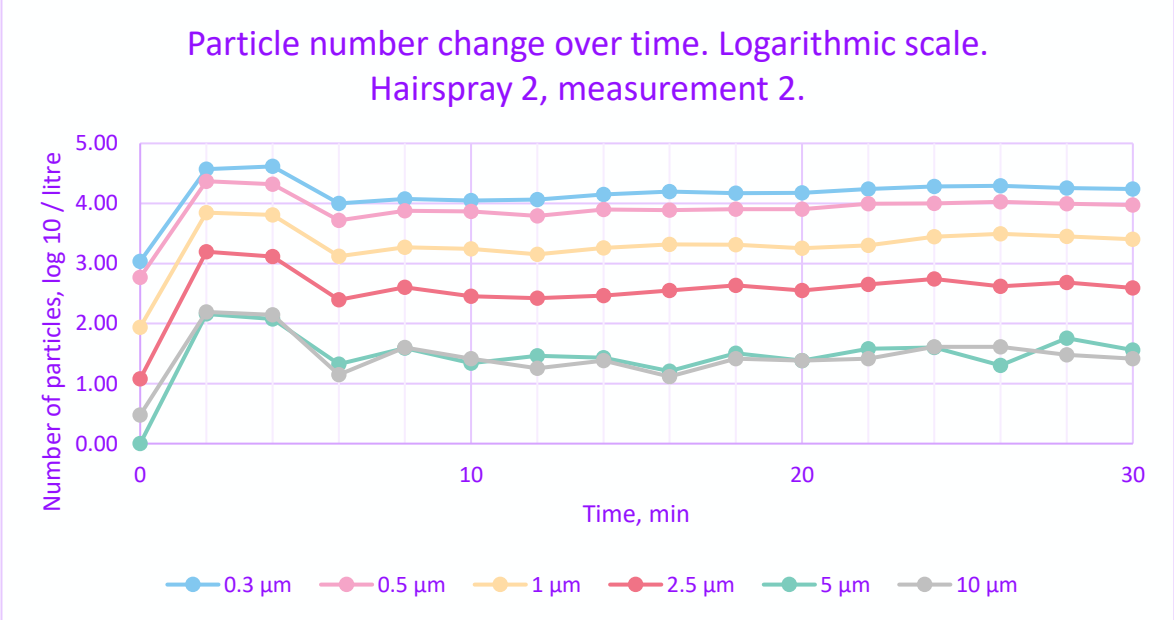


FIGURE 18. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 2.

The triplicate measurement of the second hairspray showed the following results, presented in the Table 20.

TABLE 20. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 3.

	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	1303	527	85	20	3	2
2	57622	48126	16471	**4729**	456	**428**
4	60285	33281	8323	**1577**	138	117
6	30852	15366	4431	851	89	75
8	8473	4997	1593	270	32	31
10	8168	4160	1108	212	7	16
12	22777	12109	3624	599	79	49
14	27496	13757	3957	675	58	47
16	38802	20695	6160	983	83	69
18	36941	20515	5639	1119	99	63
20	36610	20345	5519	990	109	64
22	31221	15206	4549	683	57	62
24	33209	17064	4760	792	74	49
26	30280	15982	4277	709	56	39
28	29298	16788	4330	779	65	51
30	23037	11371	3298	494	42	30

The results of the 3rd measurement' raw data are also presented as a graph (Figure 19).

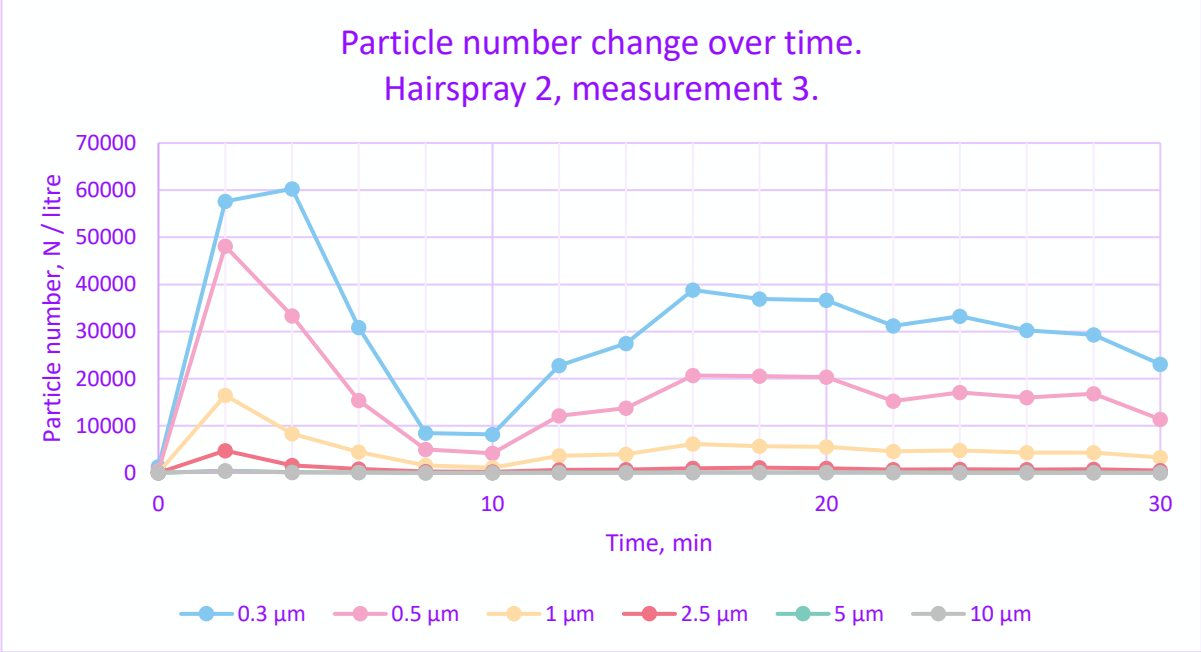


FIGURE 19. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 3.

The data was converted into logarithmic scale, presented in Table 21.

TABLE 21. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 3.

	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	3.11	2.72	1.93	1.30	0.48	0.30
2	4.76	4.68	4.22	3.67	2.66	2.63
4	4.78	4.52	3.92	3.20	2.14	2.07
6	4.49	4.19	3.65	2.93	1.95	1.88
8	3.93	3.70	3.20	2.43	1.51	1.49
10	3.91	3.62	3.04	2.33	0.85	1.20
12	4.36	4.08	3.56	2.78	1.90	1.69
14	4.44	4.14	3.60	2.83	1.76	1.67
16	4.59	4.32	3.79	2.99	1.92	1.84
18	4.57	4.31	3.75	3.05	2.00	1.80
20	4.56	4.31	3.74	3.00	2.04	1.81
22	4.49	4.18	3.66	2.83	1.76	1.79
24	4.52	4.23	3.68	2.90	1.87	1.69
26	4.48	4.20	3.63	2.85	1.75	1.59
28	4.47	4.22	3.64	2.89	1.81	1.71
30	4.36	4.06	3.52	2.69	1.62	1.48

The logarithmic scale data was also presented as a graph (Figure 20).

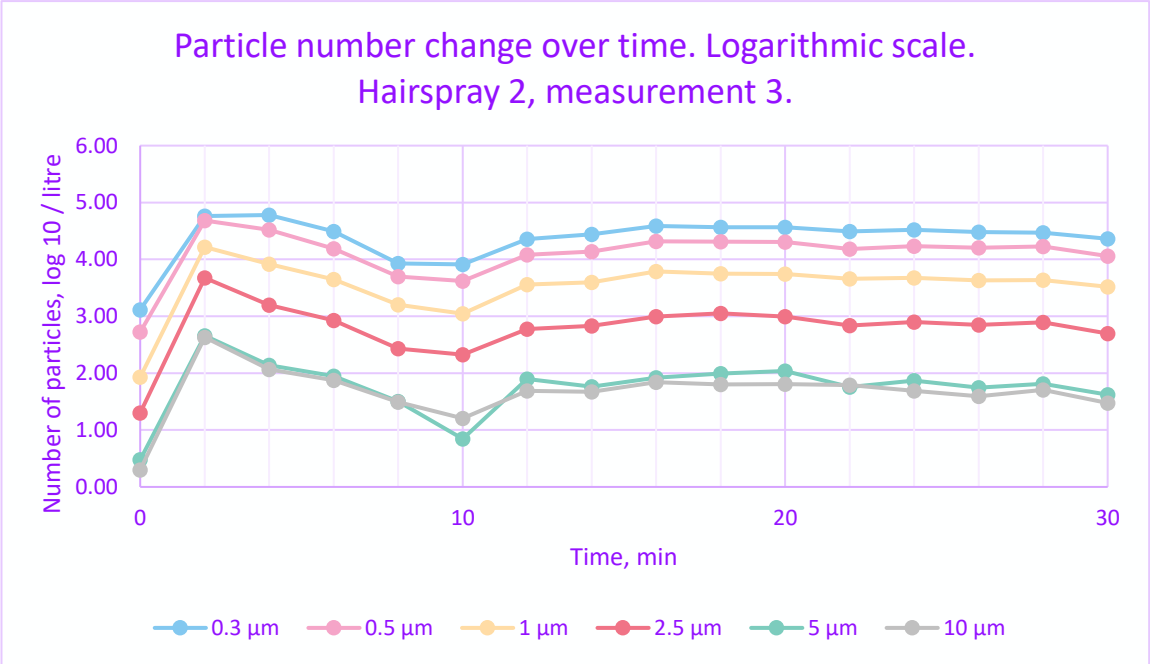


FIGURE 20. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 3.

It has been observed that the number of particles does not decrease down to their initial, i.e. background order of magnitude. Thus, it has been decided to prolongate the measurement time by increasing the number of measurements (from 15 to 30) and setting the time frame to 3 minutes. Thus, the overall final extra measurement of the 2nd hairspray took 1,5 hours. The data on this measurement may be found in the Table 22.

TABLE 22. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 4 (prolonged).

No.	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	1119	371	32	19	0	1
3	91992	52679	13924	**8612**	361	**891**
6	613	249	50	16	3	2
9	5689	2932	671	137	10	15
12	6105	2953	869	201	34	18
15	36480	20163	5813	1083	122	105
18	61567	32416	8789	1467	120	103
21	51898	27709	7369	1188	112	100
24	45635	24673	6877	1133	113	85
27	38193	19697	4627	936	100	71
30	39757	21285	4983	972	88	73
33	35184	17402	4682	874	94	56
36	34295	18032	5095	752	69	51
39	33043	16518	4106	665	47	47
42	28158	14872	3380	606	50	30
45	25705	12365	3036	526	47	30
48	24830	13010	3092	511	52	32
51	19476	10133	2670	468	36	34
54	19898	9851	2673	373	37	30
57	20256	9917	2379	320	41	16
60	16766	8651	1788	301	34	14
63	17373	9058	1956	294	17	17
66	15098	7888	2242	305	20	21
69	13646	6543	1464	227	22	13
72	14306	6770	1642	241	17	19
75	14607	5666	1608	227	21	14
78	11965	5457	1225	246	22	9
81	10992	4909	1332	168	22	9
84	10573	5120	908	135	8	11
87	8869	4978	1050	139	16	12

The results were converted to the logarithmic scale, presented in the Table 23.

TABLE 23. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 4 (prolonged).

No.	0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
0	3.05	2.57	1.51	1.28		0.00
3	4.96	4.72	4.14	3.94	2.56	2.95
6	2.79	2.40	1.70	1.20	0.48	0.30
9	3.76	3.47	2.83	2.14	1.00	1.18
12	3.79	3.47	2.94	2.30	1.53	1.26
15	4.56	4.30	3.76	3.03	2.09	2.02
18	4.79	4.51	3.94	3.17	2.08	2.01
21	4.72	4.44	3.87	3.07	2.05	2.00
24	4.66	4.39	3.84	3.05	2.05	1.93
27	4.58	4.29	3.67	2.97	2.00	1.85
30	4.60	4.33	3.70	2.99	1.94	1.86
33	4.55	4.24	3.67	2.94	1.97	1.75
36	4.54	4.26	3.71	2.88	1.84	1.71
39	4.52	4.22	3.61	2.82	1.67	1.67
42	4.45	4.17	3.53	2.78	1.70	1.48
45	4.41	4.09	3.48	2.72	1.67	1.48
48	4.39	4.11	3.49	2.71	1.72	1.51
51	4.29	4.01	3.43	2.67	1.56	1.53
54	4.30	3.99	3.43	2.57	1.57	1.48
57	4.31	4.00	3.38	2.51	1.61	1.20
60	4.22	3.94	3.25	2.48	1.53	1.15
63	4.24	3.96	3.29	2.47	1.23	1.23
66	4.18	3.90	3.35	2.48	1.30	1.32
69	4.14	3.82	3.17	2.36	1.34	1.11
72	4.16	3.83	3.22	2.38	1.23	1.28
75	4.16	3.75	3.21	2.36	1.32	1.15
78	4.08	3.74	3.09	2.39	1.34	0.95
81	4.04	3.69	3.12	2.23	1.34	0.95
84	4.02	3.71	2.96	2.13	0.90	1.04
87	3.95	3.70	3.02	2.14	1.20	1.08

Figure 21 represents the content of the Table 22.

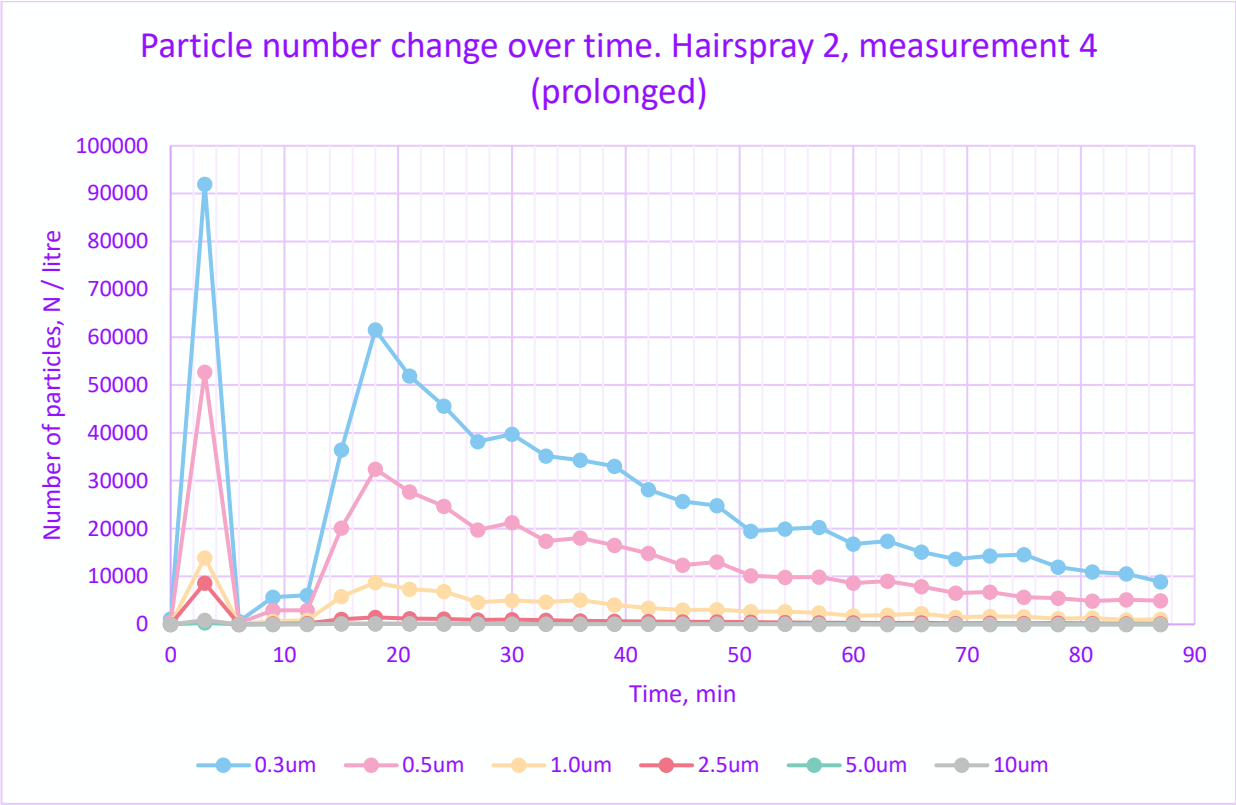


FIGURE 21. Trotec PC220 measurement. Particle number change over time. Raw data. Hairspray 2, measurement 4 (prolonged).

Figure 22 represents the content of the Table 23.

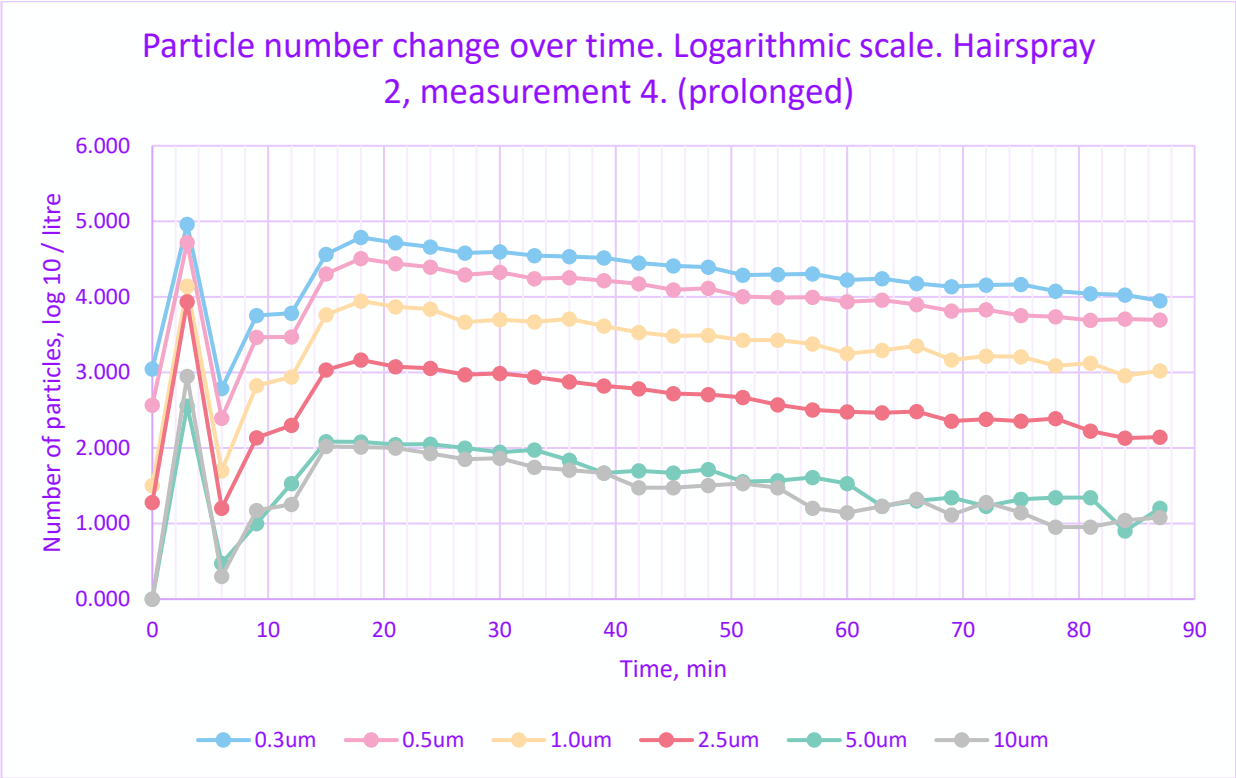


FIGURE 22. Trotec PC220 measurement. Particle number change over time. Logarithmic scale data. Hairspray 2, measurement 4 (prolonged).

Based on this prolonged measurement, the calculation of terminal velocities was performed. This calculation helps to estimate the time which the particle will be floating in the air. Even though it can be seen from the graph, that after 1.5 hours the concentration becomes really close to the initial value, it has been concluded based on the calculations, that after approximately 2 hours the particle concentration would be close to the initial values.

4.2 Calculation of terminal velocities

The basic equation (Formula 6) which represents sums of forces (drag force and gravitational force) acting on a settling spherical droplet, which gets a constant settling velocity is

$$3\pi\eta V d = \frac{(\rho_{part} - \rho_{gas})\pi d^3 g}{6} \qquad (6)$$

where the right part of the equation represents $m \cdot g$ in such a way that mass is a multiplication of volume of a sphere and its density, and the left part represents the drag force itself.

Settling velocity V is calculated in two different ways. One formula (Formula 7) is derived from the basic equation stated above, and it is valid for aerosol particles ranging from 1 up to 100 μm:

$$V_{TS} = \frac{\rho_{part} d^2 g}{18\eta} \qquad (7)$$

where V_{TS} is terminal settling velocity, ρ_{part} is particle density (in this case it is density of ethanol which is 789 kg/m^3 since it is the main component of an aerosol), g is gravitational acceleration, and η is dynamic viscosity of a fluid or a gas in which the droplets are sinking. Gravitational acceleration is equal to 9,80665 m/s² and dynamic viscosity is taken from the tables, which give a number of 1,81 $\cdot\ 10^{-5}$ Pa·s or N·s/m².

For the size ranges less than 1 μm, the experiments have shown that a specific correction factor is needed. There are also two formulas, for example, Cunningham correction factor extends the range of application of Stokes's law down to 0.1 μm in diameter:

$$C_c = 1 + \frac{2{,}52\lambda}{d} \qquad (8)$$

The mean free path λ is calculated from the Formula 9

$$\lambda = \frac{1}{\sqrt{2} n \pi d_m^2} \qquad (9)$$

where λ is mean free path, n is concentration of molecules per unit of volume (in this case, it is the number of aerosol molecules per cubic meter plus number of air molecules, which is reported to be =24.79 $\cdot\ 10^{24}$), d_m is collision diameter (between centers of each two spherical molecules) which is usually approximately equal to 0,37 nm.

$$d_m \approx 3{,}7\ \cdot\ 10^{-10}\ m$$

n is derived from Clapeyron-Mendeleev equation (Formula 10)

$$pV = NkT \tag{10}$$

Where *N* is the number of gas particles, *k* is Boltzmann's constant, *p* and *T* are controlled variables of pressure and temperature, and *V* is a volume of the gas. Finally, the formula (Formula 11) of drag force with the use of correction factor now looks like

$$F_D = \frac{3\pi\eta V d}{C_c} \tag{11}$$

There is the second formula of so-called slip correction factor which is applicable even for particles less than 0.1 μm in diameter (Formula 12):

$$C_c = 1 + \frac{\lambda}{d}(2{,}34 + 1{,}05\exp(-0{,}39\frac{d}{\lambda})) \tag{12}$$

The longer formula experimentally seemed to be a little bit more precise, especially for particles less than 100 nm. It has been developed in 1982 and 1985 by Alen and Raabe for oil droplets and solid particles respectively (Hinds 1998, 49). Thus, since this formula is applicable for all particle sizes when Reynolds Number is less than 1.0, it would be useful to have the terminal settling velocity formula (Formula 13) as follows:

$$V_{TS} = \frac{(\rho_{part} - \rho_{gas})\, d^2 g C_c}{18\eta}, \qquad \text{for } Re < 1.0 \tag{13}$$

There is also an easier formula (Formula 14) for slip correction factor calculation, depending only on pressure and particle diameter:

$$C_c = 1 + \frac{1}{Pd}(15{,}60 + 7{,}00\exp(-0{,}059\, Pd)) \tag{14}$$

where *P* is the absolute pressure in kPa and *d* is the particle diameter in micrometers.

Following these formulae, the mean free path λ was calculated and it was 0.066 µm/s, corresponding to the value which is presented in Hinds, 1998.

The calculated correction factor for small molecules (up to 1 µm) is shown in the Table 24.

TABLE 24. Calculated correction factor.

0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
Correction factor					
1.56	1.32	1.16	1.06	1.03	1.02

The terminal settling velocities and estimated time for settling is presented in the Table 25 for small molecules, and in the Table 26 for large molecules.

TABLE 25. Terminal settling velocities for small molecules (≤ 1 µm).

0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
V settling for small molecules, m/s					
3.32E-06	7.81E-06	2.74E-05	1.57E-04	6.11E-04	2.41E-03
3.32E-06	7.81E-06	2.74E-05	1.57E-04	6.11E-04	2.41E-03
V settling converted, m/h					
0.012	0.028	0.099	0.567	2.201	8.672
Time for falling from 1,5 m height, (h)					
125.34	53.32	15.20	2.65	0.68	0.17

TABLE 26. Terminal settling velocities for large molecules (>1 µm).

0.3 µm	0.5 µm	1 µm	2.5 µm	5 µm	10 µm
V settling for large molecules, (m/s)					
2.14E-07	5.94E-07	2.38E-06	1.48E-05	5.94E-05	2.38E-04
2.14E-07	5.94E-07	2.38E-06	1.48E-05	5.94E-05	2.38E-04
V settling converted, (m/h)					
		0.01	0.05	0.21	0.86
Time for falling from 1,5 m, hours					
		175.39	28.06	7.02	1.75

4.3 ELPI + Trotec measurements

The common measurement, performed with both ELPI and Trotec devices, gave a huge amount of raw data, which can be gathered from Appendix 2 for the hairspray 1, and Appendix 3 for the hairspray 2. The raw data was normalized so that for each measuring channel the average value for particle distribution was found, then the SD for each channel was calculated, and finally the lognormal distribution was put in the graphs in Excel. The graphs (Figure 23 & Figure 24) are presented below.

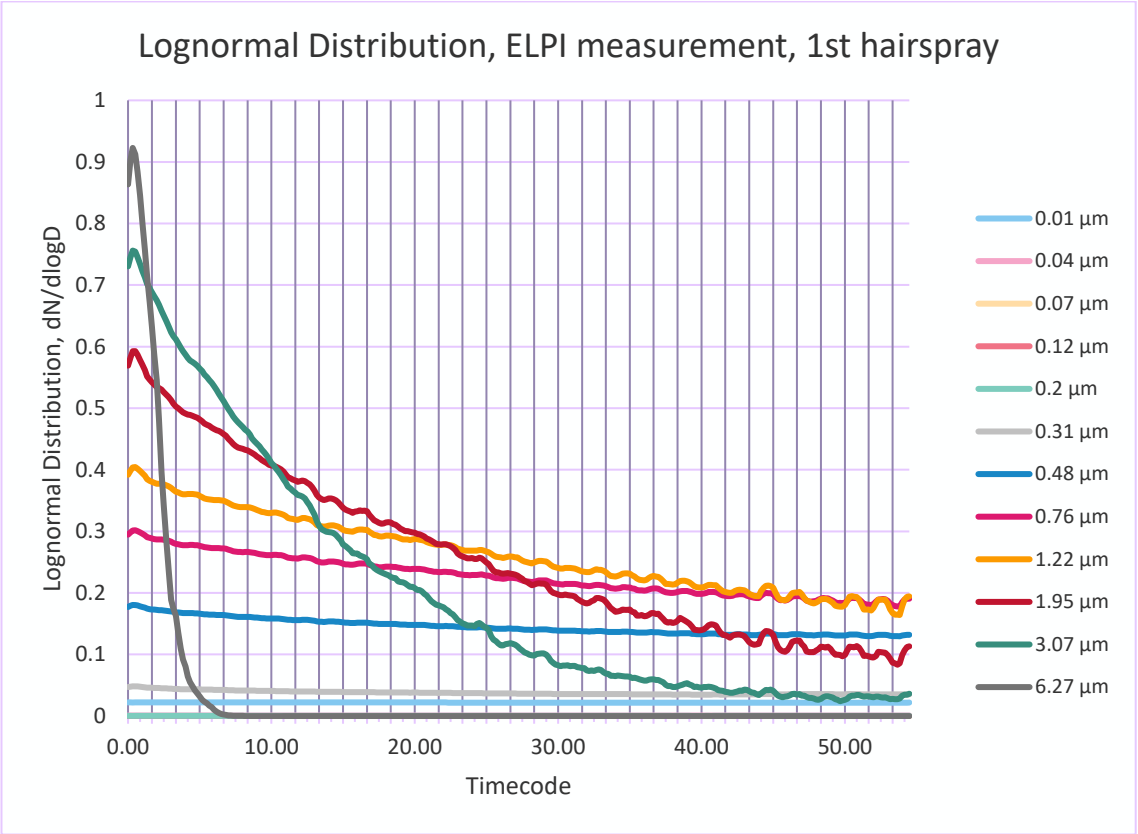


FIGURE 23. Lognormal distribution, ELPI data, 1st hairspray.

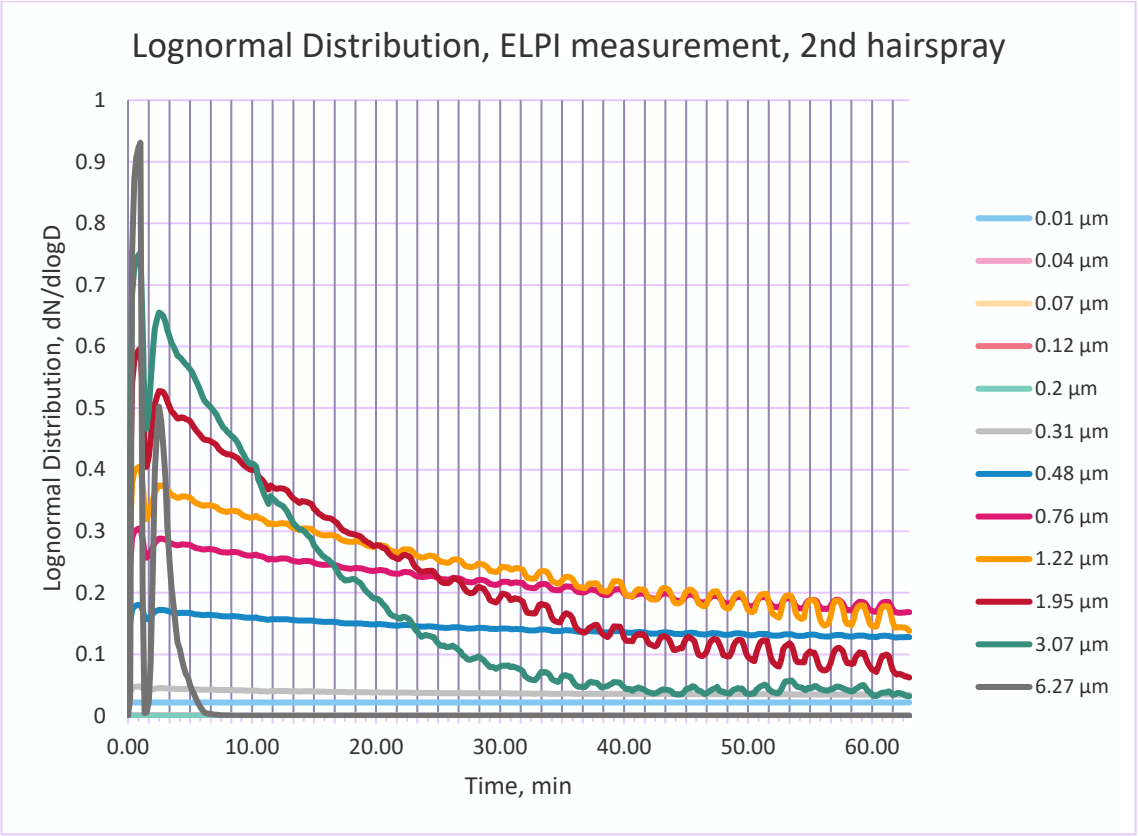


FIGURE 24. Lognormal distribution, ELPI data, 2nd hairspray.

The Trotec PC220 gave quite similar results, however, since it was measuring the concentration less frequently (due to device characteristics), such fluctuations as observed on ELPI graphs are almost imperceptible on Trotec graphs.

Table 27 shows raw data obtained from combined Trotec-and-ELPI measurement of the 1st hairspray.

TABLE 27. Raw data from Trotec, combined Trotec+ELPI measurement, 1st hairspray.

Time, Min	0.3µm	0.5µm	1.0µm	2.5µm	5.0µm	10µm
0	1223	497	85	21	1	3
2	1043	772	80	36	6	9
4	75552	56766	16910	**4894**	282	**253**
6	117411	66457	18778	**3960**	448	**428**
8	76107	43477	11365	**2399**	268	**235**
10	66971	36602	10689	**1966**	213	**177**
12	59980	30531	8948	**1801**	183	141
14	52004	27537	8122	**1433**	145	102

16	45710	22525	6290	1169	109	88
18	36221	20249	5540	899	105	67
20	32685	16883	4775	821	72	36
22	29555	16739	3758	683	56	39
24	26620	14470	3760	572	76	37
26	24870	12068	3233	460	40	30
28	20302	10541	2469	414	25	23
30	18323	8843	2278	375	32	20
32	17143	9014	2100	359	33	20
34	16747	7948	1831	288	20	15
36	13640	7287	1561	278	21	13
38	11361	5484	1167	265	17	9
40	9716	5640	1296	180	12	11
42	9907	5137	1119	167	11	6
44	7411	3796	803	121	4	11
46	7556	3350	961	136	16	7
48	6772	3176	699	101	6	6
50	5616	2933	715	116	8	6
52	4696	2883	880	94	13	6
54	5593	2087	472	74	4	3
56	4242	1870	457	51	4	7
58	4405	1775	405	49	3	2
60	3243	1473	457	60	1	3
62	3212	1374	347	66	1	4

The graph (Figure 25) represents the content of the Table 27.

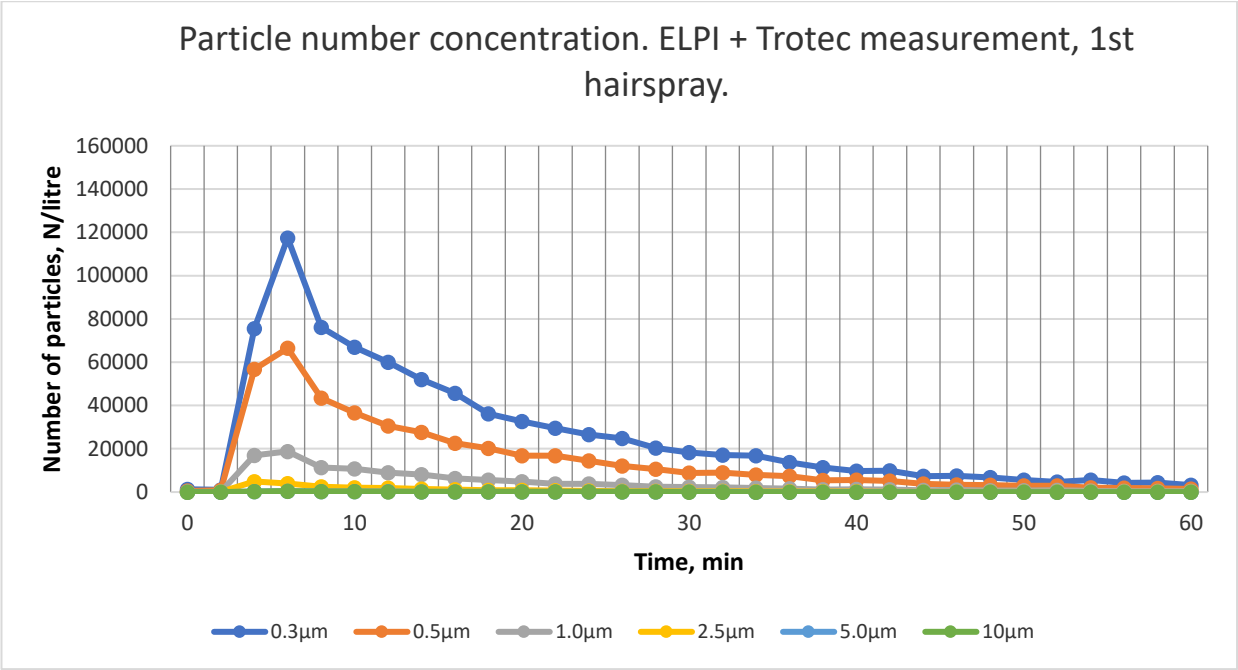


FIGURE 25. Raw data from Trotec PC220, combined Trotec+ELPI measurement, 1st hairspray.

Table 28 shows raw data converted to the logarithmic scale.

TABLE 28. Logarithmic scale data from Trotec, combined Trotec+ELPI measurement, 1st hairspray.

Time, Min	0.3µm	0.5µm	1.0µm	2.5µm	5.0µm	10µm
0	3.09	2.70	1.93	1.32	0.00	0.48
2	3.02	2.89	1.90	1.56	0.78	0.95
4	4.88	4.75	4.23	3.69	2.45	2.40
6	5.07	4.82	4.27	3.60	2.65	2.63
8	4.88	4.64	4.06	3.38	2.43	2.37
10	4.83	4.56	4.03	3.29	2.33	2.25
12	4.78	4.48	3.95	3.26	2.26	2.15
14	4.72	4.44	3.91	3.16	2.16	2.01
16	4.66	4.35	3.80	3.07	2.04	1.94
18	4.56	4.31	3.74	2.95	2.02	1.83
20	4.51	4.23	3.68	2.91	1.86	1.56
22	4.47	4.22	3.57	2.83	1.75	1.59
24	4.43	4.16	3.58	2.76	1.88	1.57
26	4.40	4.08	3.51	2.66	1.60	1.48
28	4.31	4.02	3.39	2.62	1.40	1.36
30	4.26	3.95	3.36	2.57	1.51	1.30

32	4.23	3.95	3.32	2.56	1.52	1.30
34	4.22	3.90	3.26	2.46	1.30	1.18
36	4.13	3.86	3.19	2.44	1.32	1.11
38	4.06	3.74	3.07	2.42	1.23	0.95
40	3.99	3.75	3.11	2.26	1.08	1.04
42	4.00	3.71	3.05	2.22	1.04	0.78
44	3.87	3.58	2.90	2.08	0.60	1.04
46	3.88	3.53	2.98	2.13	1.20	0.85
48	3.83	3.50	2.84	2.00	0.78	0.78
50	3.75	3.47	2.85	2.06	0.90	0.78
52	3.67	3.46	2.94	1.97	1.11	0.78
54	3.75	3.32	2.67	1.87	0.60	0.48
56	3.63	3.27	2.66	1.71	0.60	0.85
58	3.64	3.25	2.61	1.69	0.48	0.30
60	3.51	3.17	2.66	1.78	0.00	0.48
62	3.51	3.14	2.54	1.82	0.00	0.60

The graph (Figure 26) also represents the content of the previous table (Table 28) which is converted to the logarithmic scale.

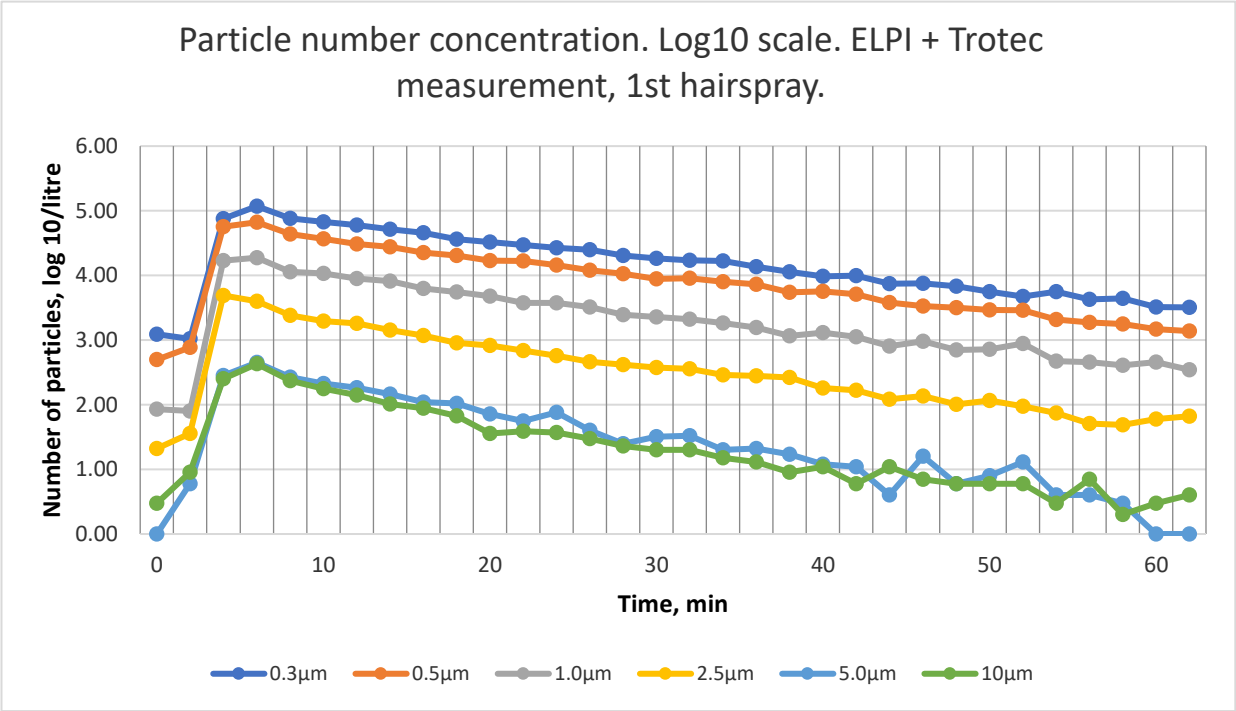


FIGURE 26. Logarithmic scale data from Trotec, combined Trotec+ELPI measurement, 1st hairspray.

The temperature, relative humidity, dew point and wet-bulb are shown in Table 29 for the measurement of the 1st hairspray.

TABLE 29. Air condition during the combined measurement of the 1st hairspray.

AT(°C)	RH(%)	DP(°C)	WB(°C)
19,9	46,3	8,2	14,1
19,9	46,8	8,3	14,1
19,9	46,8	8,3	14,1
20	46,7	8,4	14,2
20,1	46,5	8,4	14,3
20,1	46,4	8,4	14,3
20,2	46,2	8,4	14,3
20,3	46,1	8,5	14,4
20,4	46,1	8,6	14,5
20,6	46,1	8,8	14,6
20,8	46,1	9	14,8
21	46,2	9,2	15
21,2	46,1	9,3	15,1
21,4	45,9	9,4	15,2
21,5	45,9	9,5	15,3
21,6	45,6	9,5	15,4
21,6	45,5	9,5	15,3
21,7	45,4	9,6	15,4
21,9	45,3	9,7	15,6
21,9	45,1	9,6	15,5
22	44,9	9,7	15,6
22,1	44,7	9,7	15,6
22,2	44,5	9,7	15,7
22,4	44,4	9,9	15,8
22,4	44,1	9,8	15,8
22,6	43,9	9,9	15,9
22,6	43,8	9,9	15,9
22,7	43,6	9,9	16
22,8	43,5	10	16,1
23	43,2	10,1	16,2
23	43,1	10	16,2
23,1	43	10,1	16,2

Table 30 shows the raw data for the second hairspray.

TABLE 30. Raw data from Trotec PC220, combined Trotec+ELPI measurement, 2nd hairspray.

Time, Min	0.3µm	0.5µm	1.0µm	2.5µm	5.0µm	10µm
0	79540	66889	**24422**	**11577**	**515**	**578**
2	84669	44555	12933	**2605**	251	**323**
4	66543	35324	9591	**1857**	178	**211**
6	53536	31113	7898	**1613**	126	136

8	49599	27529	8014	**1437**	119	118
10	42216	22732	6338	1033	104	92
12	34314	19729	5199	850	59	67
14	32151	17032	4764	762	77	58
16	26098	15395	3410	617	60	38
18	23631	12631	3826	479	37	33
20	20824	11491	2484	421	31	26
22	18128	9483	2263	366	25	27
24	16141	7949	2218	324	29	19
26	13476	7486	1777	278	22	19
28	12940	6068	1590	295	44	9
30	11423	5824	1293	188	16	11
32	11651	5193	1480	169	7	13
34	9396	4667	1366	187	15	11
36	9419	4213	1006	169	25	10
38	7333	3624	989	92	17	7
40	7577	2782	733	113	4	7
42	6796	2925	609	105	5	7
44	4873	2488	508	69	2	5
46	5056	2013	730	46	7	5
48	4444	2151	487	82	3	7
50	4345	1952	335	36	1	7
52	3597	1651	362	76	2	7
54	3169	1588	347	53	7	7
56	4006	1378	381	64	8	6
58	2929	1394	226	34	2	10
60	2732	1305	240	52	5	9
62	2159	942	317	32	4	5

Figure 27 represents the content of the Table 30 as a graph.

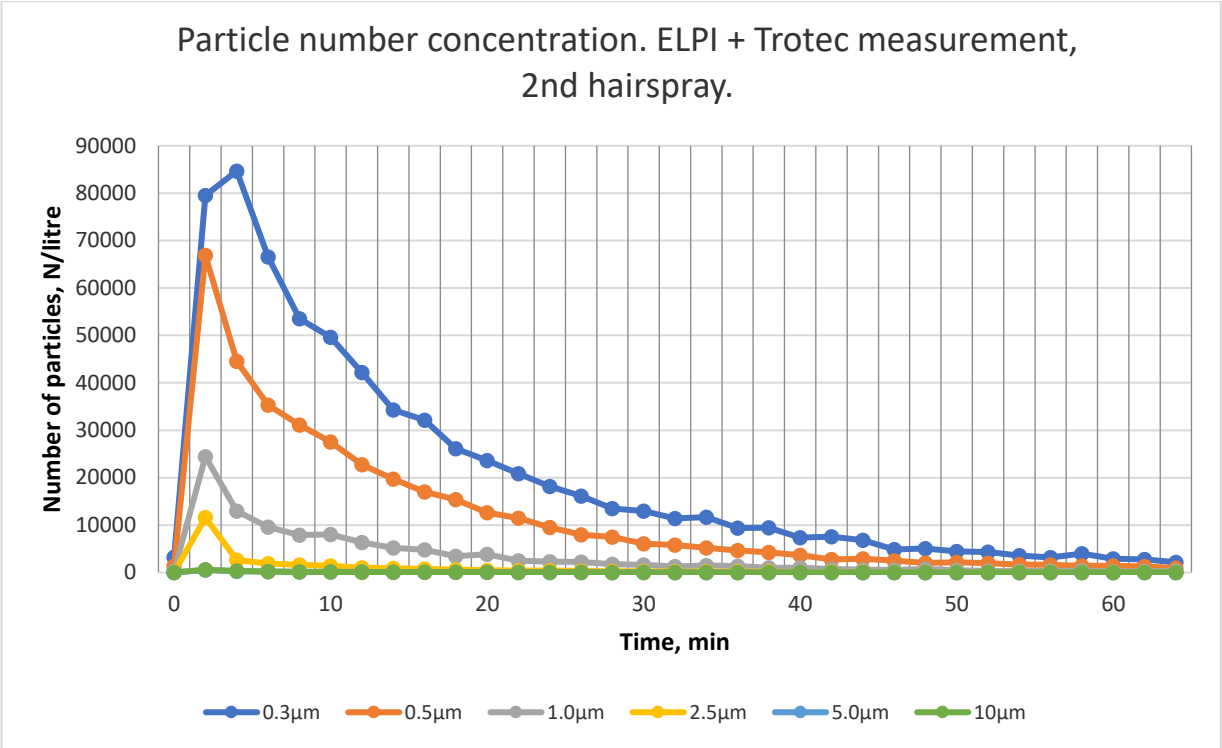


FIGURE 27. Raw data from Trotec PC220, combined Trotec+ELPI measurement, 2nd hairspray.

The table below (Table 31) shows the data converted to the logarithmic scale.

TABLE 31. Logarithmic scale data from Trotec PC220, combined Trotec+ELPI measurement, 2nd hairspray.

Time, Min	0.3µm	0.5µm	1.0µm	2.5µm	5.0µm	10µm
0	4.90	4.83	4.39	4.06	2.71	2.76
2	4.93	4.65	4.11	3.42	2.40	2.51
4	4.82	4.55	3.98	3.27	2.25	2.32
6	4.73	4.49	3.90	3.21	2.10	2.13
8	4.70	4.44	3.90	3.16	2.08	2.07
10	4.63	4.36	3.80	3.01	2.02	1.96
12	4.54	4.30	3.72	2.93	1.77	1.83
14	4.51	4.23	3.68	2.88	1.89	1.76
16	4.42	4.19	3.53	2.79	1.78	1.58
18	4.37	4.10	3.58	2.68	1.57	1.52
20	4.32	4.06	3.40	2.62	1.49	1.41
22	4.26	3.98	3.35	2.56	1.40	1.43
24	4.21	3.90	3.35	2.51	1.46	1.28

26	4.13	3.87	3.25	2.44	1.34	1.28
28	4.11	3.78	3.20	2.47	1.64	0.95
30	4.06	3.77	3.11	2.27	1.20	1.04
32	4.07	3.72	3.17	2.23	0.85	1.11
34	3.97	3.67	3.14	2.27	1.18	1.04
36	3.97	3.62	3.00	2.23	1.40	1.00
38	3.87	3.56	3.00	1.96	1.23	0.85
40	3.88	3.44	2.87	2.05	0.60	0.85
42	3.83	3.47	2.78	2.02	0.70	0.85
44	3.69	3.40	2.71	1.84	0.30	0.70
46	3.70	3.30	2.86	1.66	0.85	0.70
48	3.65	3.33	2.69	1.91	0.48	0.85
50	3.64	3.29	2.53	1.56	0.00	0.85
52	3.56	3.22	2.56	1.88	0.30	0.85
54	3.50	3.20	2.54	1.72	0.85	0.85
56	3.60	3.14	2.58	1.81	0.90	0.78
58	3.47	3.14	2.35	1.53	0.30	1.00
60	3.44	3.12	2.38	1.72	0.70	0.95
62	3.33	2.97	2.50	1.51	0.60	0.70

Figure 28 represents the content of the Table 31.

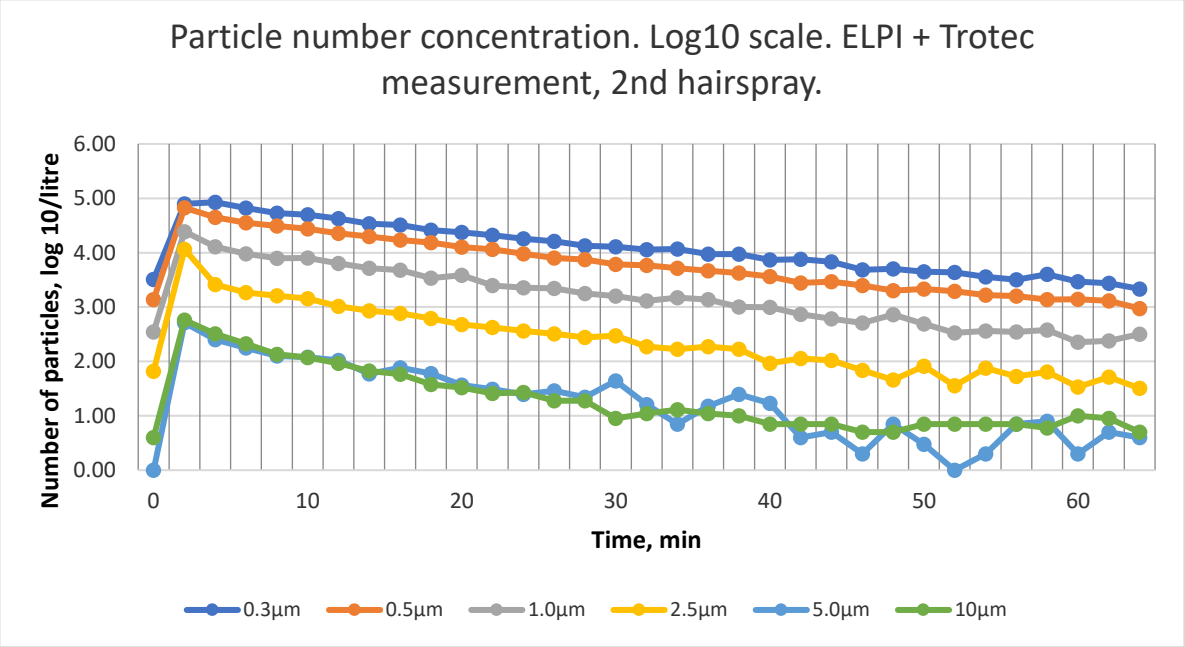


FIGURE 28. Logarithmic scale data from Trotec PC220, combined Trotec+ELPI measurement, 2nd hairspray.

The temperature, relative humidity, dew point and wet-bulb for the second measurement are shown in the Table 32.

TABLE 32. Air conditions during the combined measurement of the second hairspray.

AT(°C)	RH(%)	DP(°C)	WB(°C)
23,2	42,9	10,1	16,3
23,3	42,8	10,2	16,4
23,4	42,7	10,3	16,4
23,5	42,4	10,3	16,5
23,6	42,3	10,3	16,5
23,7	42,2	10,4	16,6
23,8	42,1	10,4	16,7
23,9	41,9	10,4	16,7
24,1	30,2	6,4	15,6
24,2	30,3	6,5	15,7
24,3	30	6,5	15,8
24,3	29,9	6,4	15,7
24,4	29,9	6,5	15,8
24,5	29,7	6,5	15,9
24,7	29,4	6,6	16
24,7	29,3	6,5	16
24,7	29,3	6,5	16
24,8	29,1	6,5	16
25	29	6,6	16,1
25,1	29	6,7	16,2
25,2	28,9	6,8	16,3
25,3	29	6,9	16,3
25,5	28,8	7	16,5
25,6	28,9	7,1	16,5
25,7	28,8	7,1	16,6
25,9	28,9	7,4	16,7
26	28,8	7,4	16,8
26,2	28,8	7,6	16,9
26,3	28,5	7,5	17
26,5	28,4	7,7	17,1
26,6	28,6	7,9	17,2
26,8	28,3	7,9	17,3

4.4 Mass concentration calculation

The indicators of air quality, which are straightly related to human health and used commonly, make reference to the mass concentration quantities of coarse particles with a diameter of less than 10 µm (PM_{10}) and of particles with a diameter of less than 2.5 µm ($PM_{2.5}$), which is also simply called fine PM. Moreover, $PM_{2.5}$ also comprises ultrafine particles having a diameter of less than 0.1 µm.

WHO limit values (WHO Expert Consultation 2015, 44 & World Health Organization 2005, 9) set the margins for the mass concentration of PM2.5: 10 µg/m3 for the annual average and 25 µg/m3 for the 24-hour mean (not to be exceeded for more than 3 days/year). For PM10 such values are: 20 µg/m3 for the annual average and 50 µg/m3 for the 24-hour mean.

These values do not change since 2005, however, in 2000 PM10 limit values were reported 100 µg/m3 indoors; 70 µg/m3 outdoors, so the tendency within the years is to slightly decrease the air pollution made by fine particles.

The mass concentration graph of the 1st hairspray, obtained by ELPI measurement, is presented below (Figure 29).

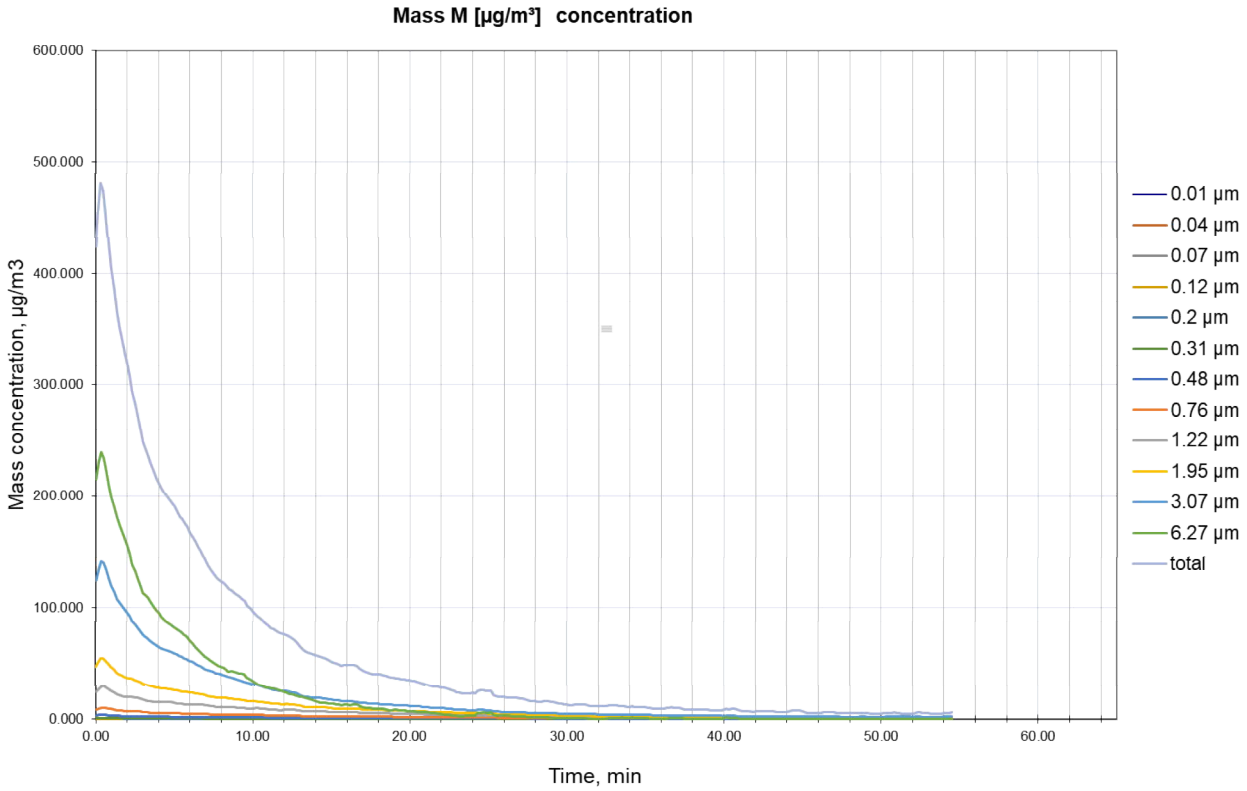


FIGURE 29. Mass Concentration data from Dekati ELPI, 1st hairspray.

Since ELPI measures all the particles below 6.27 µm, with the certain extent the total mass concentration of all measured particles may be compared with the PM10 WHO limit values. After approximately 15 minutes the values become smaller than 24-hour mean limit value.

The mass concentration graph of the 2nd hairspray is presented below (Figure 30).

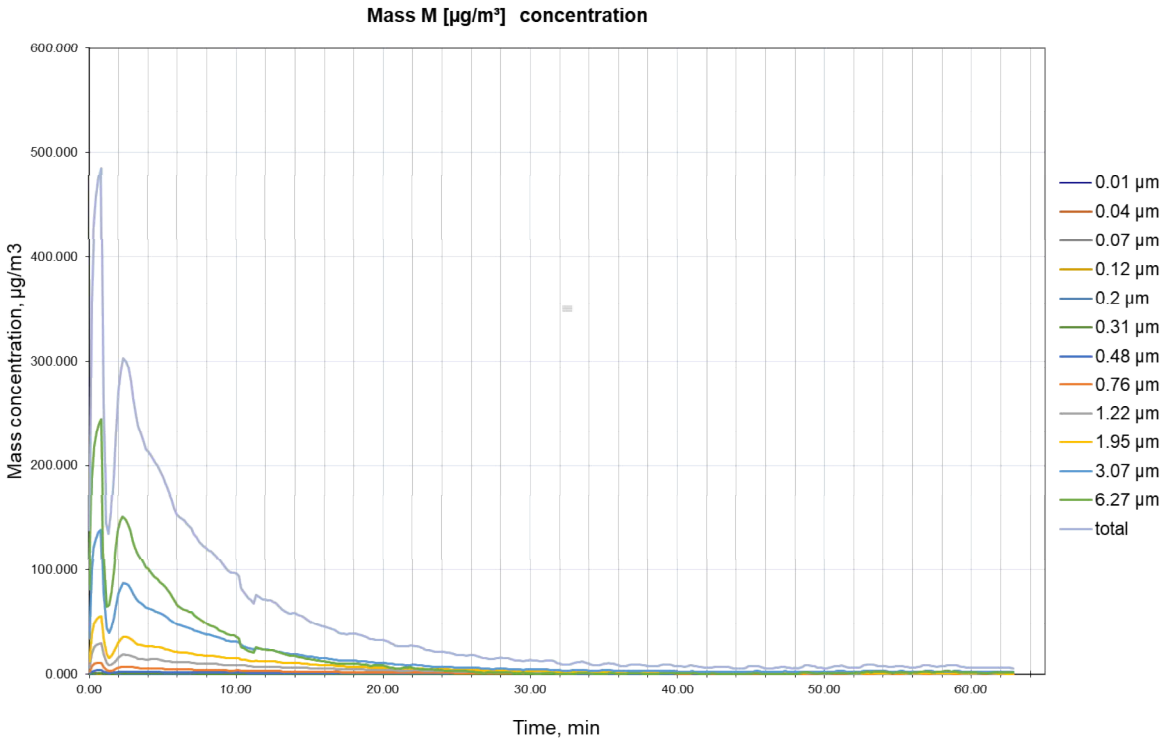


FIGURE 30. Mass Concentration data from Dekati ELPI, 2nd hairspray.

The curves on both graphs behave themselves in a very similar way. It should be admitted that even though th mass concentration reached almost 500 µg/m3 value momentarily, which is 10-fold the limit value, nevertheless the average person does not use the hairspray that often so that 24-hour mean limit value is exceeded.

The overall linear lognormal distribution graph obtained by both measurements is presented on the figure 31.

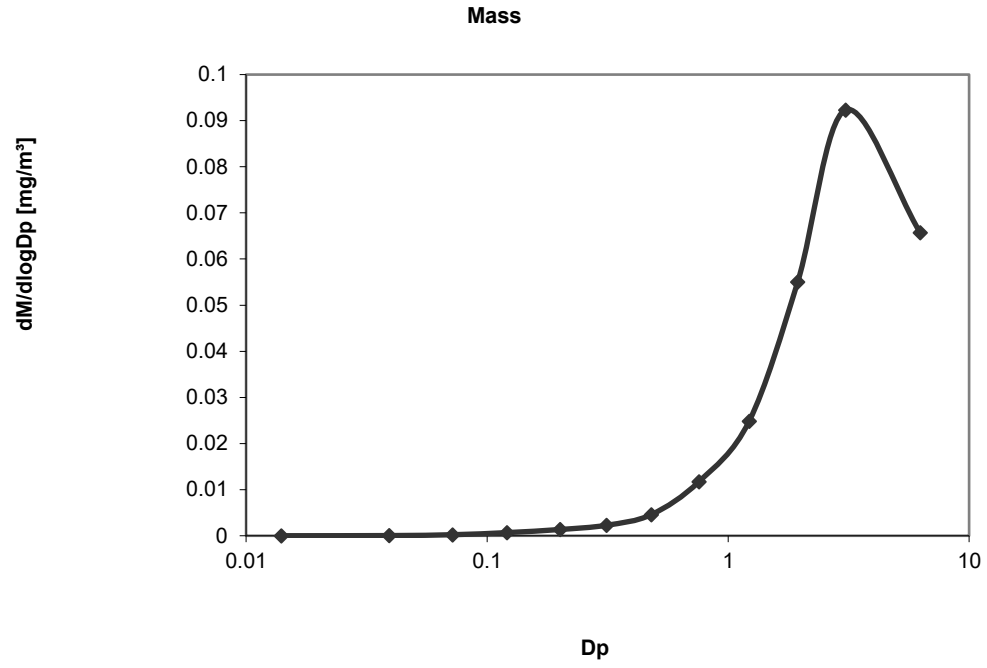


FIGURE 31. Mass Concentration lognormal distribution from Dekati ELPI (linear).

Lognormal mass distribution graph is presented on the figure 32.

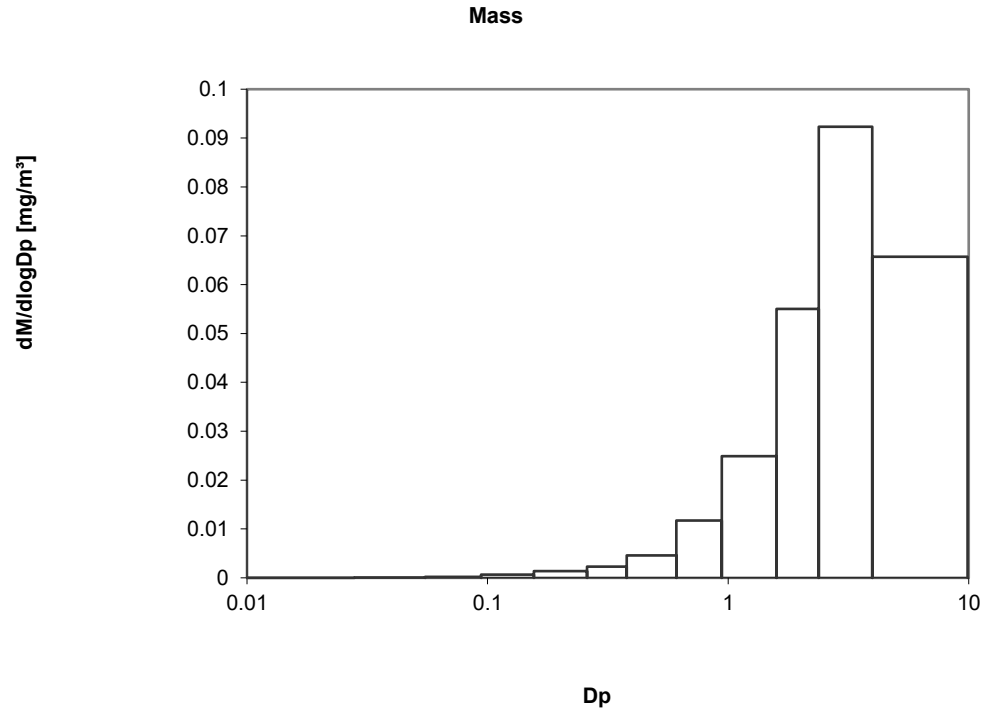


FIGURE 32. Mass Concentration lognormal distribution from Dekati ELPI (bar chart).

5 DISCUSSION

The graphs and data tables in the previous chapter described the behavior of the 2 hairsprays' particles within short (30 min) and long (60 min) periods of time. It can be concluded, firstly, that during the short period of time the aerosol concentration does not decrease down to the initial order of magnitude, however, experimentally it had been proven that after 1 hour the values become comparable with the initial ones, even though the theoretical calculations had shown that 2 hours would be needed.

Secondly, the behavior of the curves is quite interesting. Typically, it is followed by a sharp increase in concentration (highest peak) within two minutes after spraying, and then a sharp decline in 4 minutes after spraying. Such sharp peak and dramatic decrease may be explained with the nature of the product itself: the hairspray contains ethanol (a solvent) and some polymers, which form long chains. Once repelled, they coagulate and stick to each other, their settling velocities increase, and they fall down faster, thus falling out of the "air parcel" of interest.

The further behavior of the graphs of the concentration of hairspray 1 and hairspray 2 is also different: spray 1 reaches a secondary peak in approximately 12 minutes after spraying, and then the concentration decreases (Figures 11-14), while the second spray steadily increases the particle concentration after the drop down (Figures 15-20). Such behavior of the second hairspray can be explained with secondary aerosol formations: probably, the chemical composition of the aerosol is such that it undergoes more particle depletions and evaporations than the first one, so that the concentration of particles of each size constantly increases. Further studies may relate to mechanisms of secondary aerosol formation and its behavior.

However, the combined measurement showed some other behavior of the curves. First of all, the fluctuations observed in ELPI data (Figures 23-24) are not a subject of interest since they are probably caused by mechanical vibration of the stand with 2 devices. Once Trotec was sucking the air in, the stand holding

both Trotec and ELPI devices was undergoing slight circular motion, which could cause such fluctuations represented by waves on the graph. What is more interesting is that the curves do not have a sharp peak followed by a secondary peak anymore; indeed, they look more like the theoretical curve caused by cooking activities presented on the Figure 7. It should be admitted, however, that the ambient air parameters changed since the setup was moved from the laboratory to the MOVA-wagon.

The curves obtained in this measurement usually show similar results in relation to those obtained from the reference materials (Figure 5 & 6), since the peak points of the performed measurements in number concentration are observed at around 10^5 particles per litre. The results are significantly lower than those obtained by Isaxon et al. 2014, but comparable in the order of magnitude with the reference values by Hussein et al. 2011, and Nazarenko et al. 2011. However, the scope of the presented study (Hussein et al. 2011) differs from the scope of this study. Hussein et al. was studying the hairsprays as the sources of particle emissions indoors, while this paper limits the scope considering only personal reactive clouds and possibly inhalable fraction of the hairspray during use. Probably the setup of the measurement in the reference materials was different, as they also studied particle diffusion to the other rooms in the household.

The mass concentration measurement showed a peak which 10 times exceeds the recommended value momentarily, however, in broad terms i.e. in longer perspective, which is 24 hours, that one-time value is neglected.

Regarding the safety assessment of the hairsprays, yet again, the majority of the guidelines are mass-based, even though the health effect of the particle size, especially if the size is under 1 micrometer, recently had been proven to be more noticeable. In this study the results were compared to the alarm values given by Trotec PC220 in its manual, which are based on ISO 14644-1 standard. The dry-air experiments taken in the laboratory conditions showed relatively small number of cases, where the red alarm value has been exceeded. It usually happened at the highest peak points. On the other hand, the concentration of the PM2.5 increased so that it continously exceeded the recommended values up to 15 minutes after spraying. It may be recommended to change either the formulation

of the product or the construction of the aluminum can and the valve in order to minimize the cases when the values are exceeded.

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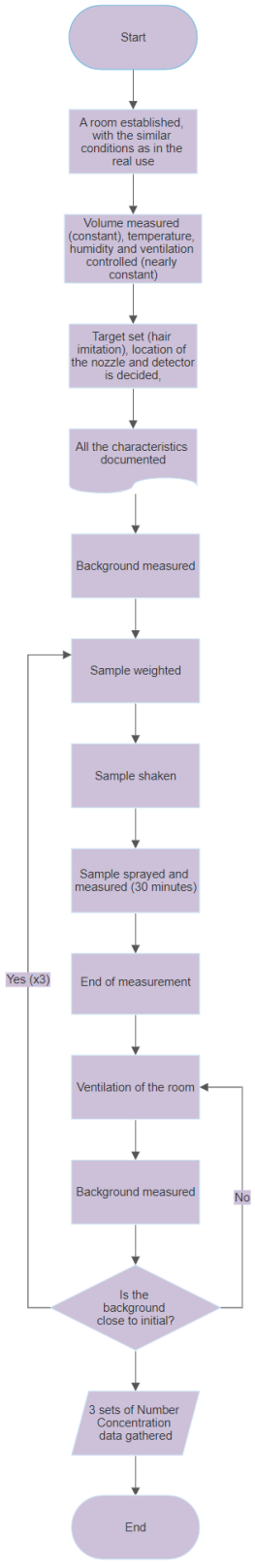
APPENDICES

Appendix 1. Algorithm of the measurement based on FEA guidelines. Viushkova, 2020.



Appendix 2. Raw data from ELPI measurement (Calculated moment). Hairspray 1.

DEKATI

ELPI Calculated moment

Date	08.11.2020	Filename	07082020a_JuliaNEW.dat
Time	14:52:11	Note	Korjattu impaktorikatakaisuarvo

Number N [1/cm³]

Calculated moment

Density	1.0
Dilution	1

☑ Correction

Concentration	
From Ch	1
To Ch	1

Time	0.01	0.04	0.07	0.12	0.20	0.31	0.48	0.76	1.22	1.95	3.07	6.27	Total
11.08.20 14:52	5.84E+03	7.98E+02	5.04E+02	3.18E+02	1.53E+02	6.30E+01	5.68E+01	3.77E+01	2.53E+01	1.20E+01	8.14E+00	1.67E+00	**7.82E+03**
11.08.20 14:52	5.97E+03	8.16E+02	5.16E+02	3.30E+02	1.61E+02	6.77E+01	6.20E+01	4.16E+01	2.78E+01	1.32E+01	8.79E+00	1.79E+00	**8.01E+03**
11.08.20 14:52	6.03E+03	8.24E+02	5.23E+02	3.36E+02	1.66E+02	7.09E+01	6.59E+01	4.50E+01	3.02E+01	1.41E+01	9.27E+00	1.86E+00	**8.11E+03**
11.08.20 14:52	5.96E+03	8.16E+02	5.18E+02	3.34E+02	1.65E+02	7.08E+01	6.59E+01	4.52E+01	3.04E+01	1.41E+01	9.18E+00	1.82E+00	**8.03E+03**
11.08.20 14:52	5.81E+03	7.99E+02	5.06E+02	3.25E+02	1.60E+02	6.85E+01	6.34E+01	4.36E+01	2.92E+01	1.36E+01	8.77E+00	1.73E+00	**7.83E+03**
11.08.20 14:53	5.64E+03	7.79E+02	4.90E+02	3.13E+02	1.54E+02	6.53E+01	6.00E+01	4.13E+01	2.77E+01	1.28E+01	8.28E+00	1.63E+00	**7.59E+03**
11.08.20 14:53	5.51E+03	7.64E+02	4.79E+02	3.05E+02	1.48E+02	6.26E+01	5.69E+01	3.91E+01	2.62E+01	1.22E+01	7.85E+00	1.54E+00	**7.41E+03**
11.08.20 14:53	5.40E+03	7.50E+02	4.69E+02	2.97E+02	1.43E+02	5.99E+01	5.39E+01	3.69E+01	2.46E+01	1.15E+01	7.46E+00	1.47E+00	**7.25E+03**
11.08.20 14:53	5.33E+03	7.42E+02	4.63E+02	2.93E+02	1.39E+02	5.73E+01	5.05E+01	3.41E+01	2.27E+01	1.07E+01	7.08E+00	1.41E+00	**7.15E+03**
11.08.20 14:53	5.27E+03	7.33E+02	4.57E+02	2.88E+02	1.36E+02	5.58E+01	4.89E+01	3.29E+01	2.19E+01	1.03E+01	6.85E+00	1.35E+00	**7.06E+03**
11.08.20 14:53	5.22E+03	7.26E+02	4.52E+02	2.85E+02	1.34E+02	5.47E+01	4.77E+01	3.22E+01	2.13E+01	1.01E+01	6.65E+00	1.31E+00	**6.99E+03**
11.08.20 14:54	5.18E+03	7.18E+02	4.47E+02	2.81E+02	1.32E+02	5.36E+01	4.67E+01	3.15E+01	2.08E+01	9.83E+00	6.45E+00	1.26E+00	**6.92E+03**
11.08.20 14:54	5.12E+03	7.09E+02	4.43E+02	2.78E+02	1.30E+02	5.27E+01	4.59E+01	3.09E+01	2.04E+01	9.57E+00	6.26E+00	1.21E+00	**6.85E+03**
11.08.20 14:54	5.02E+03	6.98E+02	4.34E+02	2.72E+02	1.28E+02	5.19E+01	4.56E+01	3.11E+01	2.04E+01	9.45E+00	6.06E+00	1.15E+00	**6.72E+03**
11.08.20 14:54	4.90E+03	6.83E+02	4.23E+02	2.65E+02	1.25E+02	5.11E+01	4.52E+01	3.12E+01	2.05E+01	9.30E+00	5.79E+00	1.07E+00	**6.56E+03**
11.08.20 14:54	4.79E+03	6.71E+02	4.15E+02	2.60E+02	1.23E+02	4.99E+01	4.42E+01	3.06E+01	2.01E+01	9.05E+00	5.59E+00	1.02E+00	**6.42E+03**
11.08.20 14:54	4.69E+03	6.60E+02	4.08E+02	2.55E+02	1.20E+02	4.88E+01	4.32E+01	2.99E+01	1.96E+01	8.79E+00	5.38E+00	9.72E-01	**6.29E+03**
11.08.20 14:55	4.61E+03	6.52E+02	4.01E+02	2.51E+02	1.19E+02	4.78E+01	4.24E+01	2.93E+01	1.91E+01	8.59E+00	5.18E+00	9.28E-01	**6.19E+03**
11.08.20 14:55	4.54E+03	6.42E+02	3.95E+02	2.47E+02	1.16E+02	4.66E+01	4.12E+01	2.83E+01	1.85E+01	8.30E+00	4.97E+00	8.76E-01	**6.09E+03**
11.08.20 14:55	4.52E+03	6.40E+02	3.94E+02	2.46E+02	1.14E+02	4.54E+01	3.96E+01	2.69E+01	1.75E+01	7.99E+00	4.84E+00	8.61E-01	**6.06E+03**
11.08.20 14:55	4.53E+03	6.38E+02	3.92E+02	2.46E+02	1.13E+02	4.45E+01	3.85E+01	2.58E+01	1.67E+01	7.75E+00	4.73E+00	8.48E-01	**6.05E+03**
11.08.20 14:55	4.51E+03	6.34E+02	3.91E+02	2.44E+02	1.12E+02	4.39E+01	3.79E+01	2.54E+01	1.64E+01	7.61E+00	4.60E+00	8.17E-01	**6.02E+03**
11.08.20 14:55	4.49E+03	6.30E+02	3.87E+02	2.42E+02	1.10E+02	4.31E+01	3.70E+01	2.48E+01	1.60E+01	7.43E+00	4.46E+00	7.83E-01	**5.99E+03**
11.08.20 14:56	4.46E+03	6.26E+02	3.84E+02	2.40E+02	1.09E+02	4.25E+01	3.64E+01	2.44E+01	1.58E+01	7.28E+00	4.35E+00	7.58E-01	**5.95E+03**
11.08.20 14:56	4.43E+03	6.22E+02	3.81E+02	2.38E+02	1.09E+02	4.22E+01	3.61E+01	2.43E+01	1.57E+01	7.19E+00	4.26E+00	7.40E-01	**5.91E+03**
11.08.20 14:56	4.39E+03	6.15E+02	3.78E+02	2.35E+02	1.08E+02	4.20E+01	3.61E+01	2.45E+01	1.58E+01	7.12E+00	4.16E+00	7.12E-01	**5.85E+03**
11.08.20 14:56	4.35E+03	6.11E+02	3.75E+02	2.33E+02	1.08E+02	4.18E+01	3.61E+01	2.46E+01	1.59E+01	7.08E+00	4.09E+00	6.95E-01	**5.81E+03**
11.08.20 14:56	4.33E+03	6.08E+02	3.73E+02	2.32E+02	1.07E+02	4.17E+01	3.61E+01	2.46E+01	1.58E+01	7.02E+00	4.04E+00	6.79E-01	**5.78E+03**
11.08.20 14:56	4.31E+03	6.04E+02	3.73E+02	2.31E+02	1.06E+02	4.16E+01	3.58E+01	2.45E+01	1.57E+01	6.94E+00	4.00E+00	6.65E-01	**5.75E+03**
11.08.20 14:57	4.29E+03	6.02E+02	3.71E+02	2.30E+02	1.06E+02	4.13E+01	3.56E+01	2.43E+01	1.56E+01	6.88E+00	3.94E+00	6.52E-01	**5.73E+03**
11.08.20 14:57	4.29E+03	6.02E+02	3.70E+02	2.30E+02	1.05E+02	4.08E+01	3.48E+01	2.36E+01	1.51E+01	6.75E+00	3.87E+00	6.39E-01	**5.72E+03**
11.08.20 14:57	4.28E+03	6.00E+02	3.69E+02	2.29E+02	1.05E+02	4.02E+01	3.41E+01	2.30E+01	1.46E+01	6.61E+00	3.81E+00	6.22E-01	**5.71E+03**
11.08.20 14:57	4.26E+03	5.97E+02	3.66E+02	2.28E+02	1.03E+02	3.95E+01	3.33E+01	2.23E+01	1.42E+01	6.45E+00	3.71E+00	6.11E-01	**5.67E+03**
11.08.20 14:57	4.23E+03	5.93E+02	3.63E+02	2.26E+02	1.03E+02	3.92E+01	3.29E+01	2.21E+01	1.40E+01	6.36E+00	3.65E+00	6.01E-01	**5.64E+03**
11.08.20 14:57	4.20E+03	5.91E+02	3.61E+02	2.25E+02	1.02E+02	3.88E+01	3.26E+01	2.18E+01	1.38E+01	6.29E+00	3.58E+00	5.86E-01	**5.60E+03**
11.08.20 14:58	4.15E+03	5.88E+02	3.58E+02	2.23E+02	1.01E+02	3.82E+01	3.22E+01	2.16E+01	1.37E+01	6.19E+00	3.51E+00	5.74E-01	**5.54E+03**
11.08.20 14:58	4.10E+03	5.81E+02	3.54E+02	2.19E+02	9.92E+01	3.78E+01	3.21E+01	2.16E+01	1.37E+01	6.08E+00	3.43E+00	5.49E-01	**5.46E+03**
11.08.20 14:58	4.06E+03	5.76E+02	3.50E+02	2.17E+02	9.82E+01	3.73E+01	3.17E+01	2.15E+01	1.36E+01	6.00E+00	3.35E+00	5.28E-01	**5.42E+03**
11.08.20 14:58	4.00E+03	5.71E+02	3.47E+02	2.15E+02	9.77E+01	3.72E+01	3.18E+01	2.16E+01	1.37E+01	5.96E+00	3.27E+00	5.05E-01	**5.35E+03**
11.08.20 14:58	3.95E+03	5.68E+02	3.44E+02	2.12E+02	9.65E+01	3.68E+01	3.15E+01	2.14E+01	1.35E+01	5.88E+00	3.19E+00	4.87E-01	**5.28E+03**
11.08.20 14:58	3.91E+03	5.62E+02	3.41E+02	2.11E+02	9.54E+01	3.64E+01	3.11E+01	2.11E+01	1.34E+01	5.77E+00	3.11E+00	4.69E-01	**5.23E+03**
11.08.20 14:59	3.87E+03	5.58E+02	3.38E+02	2.09E+02	9.46E+01	3.60E+01	3.07E+01	2.09E+01	1.32E+01	5.66E+00	3.02E+00	4.51E-01	**5.18E+03**
11.08.20 14:59	3.84E+03	5.52E+02	3.36E+02	2.07E+02	9.33E+01	3.53E+01	2.99E+01	2.02E+01	1.27E+01	5.48E+00	2.94E+00	4.34E-01	**5.13E+03**

11.08.20 14:59	3.81E+03	5.48E+02	3.34E+02	2.06E+02	9.21E+01	3.49E+01	2.93E+01	1.97E+01	1.24E+01	5.34E+00	2.88E+00	4.19E-01	**5.10E+03**
11.08.20 14:59	3.83E+03	5.47E+02	3.34E+02	2.05E+02	9.11E+01	3.40E+01	2.83E+01	1.89E+01	1.19E+01	5.17E+00	2.80E+00	4.02E-01	**5.11E+03**
11.08.20 14:59	3.84E+03	5.44E+02	3.33E+02	2.04E+02	9.06E+01	3.37E+01	2.78E+01	1.86E+01	1.17E+01	5.08E+00	2.75E+00	3.93E-01	**5.11E+03**
11.08.20 14:59	3.85E+03	5.44E+02	3.32E+02	2.03E+02	9.00E+01	3.34E+01	2.75E+01	1.84E+01	1.15E+01	4.99E+00	2.70E+00	3.80E-01	**5.12E+03**
11.08.20 15:00	3.87E+03	5.44E+02	3.33E+02	2.03E+02	8.94E+01	3.32E+01	2.72E+01	1.82E+01	1.14E+01	4.94E+00	2.66E+00	3.70E-01	**5.14E+03**
11.08.20 15:00	3.88E+03	5.46E+02	3.32E+02	2.02E+02	8.92E+01	3.31E+01	2.71E+01	1.82E+01	1.14E+01	4.92E+00	2.61E+00	3.64E-01	**5.14E+03**
11.08.20 15:00	3.86E+03	5.43E+02	3.30E+02	2.01E+02	8.87E+01	3.30E+01	2.71E+01	1.82E+01	1.15E+01	4.87E+00	2.57E+00	3.54E-01	**5.12E+03**
11.08.20 15:00	3.82E+03	5.40E+02	3.28E+02	2.00E+02	8.81E+01	3.29E+01	2.70E+01	1.82E+01	1.14E+01	4.83E+00	2.53E+00	3.45E-01	**5.07E+03**
11.08.20 15:00	3.80E+03	5.37E+02	3.27E+02	1.99E+02	8.75E+01	3.26E+01	2.68E+01	1.80E+01	1.13E+01	4.77E+00	2.48E+00	3.30E-01	**5.04E+03**
11.08.20 15:00	3.77E+03	5.32E+02	3.25E+02	1.97E+02	8.67E+01	3.22E+01	2.65E+01	1.77E+01	1.11E+01	4.69E+00	2.42E+00	3.33E-01	**5.00E+03**
11.08.20 15:01	3.75E+03	5.28E+02	3.23E+02	1.96E+02	8.62E+01	3.18E+01	2.61E+01	1.75E+01	1.09E+01	4.61E+00	2.37E+00	3.25E-01	**4.98E+03**
11.08.20 15:01	3.74E+03	5.26E+02	3.22E+02	1.95E+02	8.57E+01	3.14E+01	2.56E+01	1.70E+01	1.07E+01	4.52E+00	2.33E+00	3.20E-01	**4.96E+03**
11.08.20 15:01	3.74E+03	5.25E+02	3.20E+02	1.94E+02	8.50E+01	3.11E+01	2.51E+01	1.67E+01	1.04E+01	4.45E+00	2.30E+00	3.18E-01	**4.95E+03**
11.08.20 15:01	3.73E+03	5.22E+02	3.19E+02	1.93E+02	8.43E+01	3.07E+01	2.48E+01	1.64E+01	1.02E+01	4.35E+00	2.24E+00	3.16E-01	**4.94E+03**
11.08.20 15:01	3.70E+03	5.20E+02	3.16E+02	1.92E+02	8.38E+01	3.05E+01	2.45E+01	1.62E+01	1.00E+01	4.28E+00	2.20E+00	3.12E-01	**4.90E+03**
11.08.20 15:01	3.67E+03	5.18E+02	3.15E+02	1.90E+02	8.31E+01	3.02E+01	2.42E+01	1.60E+01	9.92E+00	4.20E+00	2.16E+00	2.85E-01	**4.87E+03**
11.08.20 15:02	3.64E+03	5.14E+02	3.13E+02	1.89E+02	8.23E+01	2.99E+01	2.40E+01	1.59E+01	9.81E+00	4.13E+00	2.10E+00	2.75E-01	**4.82E+03**
11.08.20 15:02	3.58E+03	5.07E+02	3.09E+02	1.87E+02	8.17E+01	2.98E+01	2.41E+01	1.60E+01	9.86E+00	4.10E+00	2.05E+00	2.62E-01	**4.75E+03**
11.08.20 15:02	3.54E+03	5.02E+02	3.07E+02	1.86E+02	8.16E+01	2.98E+01	2.42E+01	1.62E+01	1.00E+01	4.09E+00	2.01E+00	2.49E-01	**4.70E+03**
11.08.20 15:02	3.51E+03	4.99E+02	3.05E+02	1.85E+02	8.14E+01	2.97E+01	2.41E+01	1.62E+01	9.97E+00	4.04E+00	1.97E+00	2.39E-01	**4.67E+03**
11.08.20 15:02	3.49E+03	4.96E+02	3.04E+02	1.84E+02	8.10E+01	2.95E+01	2.38E+01	1.60E+01	9.81E+00	3.98E+00	1.93E+00	2.32E-01	**4.64E+03**
11.08.20 15:02	3.47E+03	4.94E+02	3.02E+02	1.83E+02	8.06E+01	2.94E+01	2.36E+01	1.58E+01	9.68E+00	3.92E+00	1.88E+00	2.26E-01	**4.62E+03**
11.08.20 15:03	3.46E+03	4.93E+02	3.01E+02	1.83E+02	8.01E+01	2.92E+01	2.30E+01	1.55E+01	9.46E+00	3.83E+00	1.83E+00	2.20E-01	**4.61E+03**
11.08.20 15:03	3.47E+03	4.93E+02	3.01E+02	1.83E+02	7.95E+01	2.87E+01	2.24E+01	1.49E+01	9.10E+00	3.71E+00	1.79E+00	2.15E-01	**4.60E+03**
11.08.20 15:03	3.46E+03	4.92E+02	3.00E+02	1.82E+02	7.86E+01	2.81E+01	2.17E+01	1.43E+01	8.68E+00	3.59E+00	1.74E+00	2.11E-01	**4.59E+03**
11.08.20 15:03	3.44E+03	4.91E+02	2.98E+02	1.81E+02	7.81E+01	2.79E+01	2.15E+01	1.41E+01	8.55E+00	3.55E+00	1.71E+00	2.08E-01	**4.56E+03**
11.08.20 15:03	3.42E+03	4.88E+02	2.97E+02	1.80E+02	7.76E+01	2.77E+01	2.14E+01	1.39E+01	8.45E+00	3.51E+00	1.69E+00	2.04E-01	**4.54E+03**
11.08.20 15:03	3.41E+03	4.85E+02	2.96E+02	1.79E+02	7.71E+01	2.75E+01	2.12E+01	1.38E+01	8.35E+00	3.46E+00	1.66E+00	1.99E-01	**4.52E+03**
11.08.20 15:04	3.38E+03	4.81E+02	2.94E+02	1.78E+02	7.68E+01	2.73E+01	2.11E+01	1.37E+01	8.27E+00	3.41E+00	1.64E+00	1.95E-01	**4.49E+03**
11.08.20 15:04	3.35E+03	4.78E+02	2.91E+02	1.78E+02	7.70E+01	2.75E+01	2.14E+01	1.40E+01	8.49E+00	3.43E+00	1.63E+00	1.89E-01	**4.45E+03**
11.08.20 15:04	3.32E+03	4.76E+02	2.89E+02	1.77E+02	7.73E+01	2.77E+01	2.17E+01	1.44E+01	8.68E+00	3.46E+00	1.62E+00	1.82E-01	**4.42E+03**
11.08.20 15:04	3.30E+03	4.73E+02	2.87E+02	1.76E+02	7.71E+01	2.76E+01	2.18E+01	1.45E+01	8.69E+00	3.44E+00	1.60E+00	1.72E-01	**4.40E+03**
11.08.20 15:04	3.28E+03	4.72E+02	2.85E+02	1.75E+02	7.66E+01	2.75E+01	2.16E+01	1.43E+01	8.56E+00	3.38E+00	1.56E+00	1.70E-01	**4.36E+03**
11.08.20 15:04	3.26E+03	4.71E+02	2.83E+02	1.74E+02	7.63E+01	2.73E+01	2.13E+01	1.41E+01	8.43E+00	3.32E+00	1.52E+00	1.64E-01	**4.34E+03**
11.08.20 15:05	3.26E+03	4.70E+02	2.82E+02	1.74E+02	7.58E+01	2.70E+01	2.08E+01	1.36E+01	8.15E+00	3.23E+00	1.47E+00	1.59E-01	**4.33E+03**
11.08.20 15:05	3.25E+03	4.67E+02	2.83E+02	1.73E+02	7.49E+01	2.65E+01	2.01E+01	1.29E+01	7.72E+00	3.09E+00	1.42E+00	1.54E-01	**4.32E+03**
11.08.20 15:05	3.24E+03	4.66E+02	2.82E+02	1.73E+02	7.39E+01	2.59E+01	1.91E+01	1.21E+01	7.26E+00	2.94E+00	1.35E+00	1.50E-01	**4.30E+03**
11.08.20 15:05	3.21E+03	4.63E+02	2.82E+02	1.72E+02	7.34E+01	2.58E+01	1.87E+01	1.18E+01	7.08E+00	2.86E+00	1.31E+00	1.45E-01	**4.27E+03**
11.08.20 15:05	3.18E+03	4.59E+02	2.81E+02	1.71E+02	7.28E+01	2.56E+01	1.85E+01	1.16E+01	6.98E+00	2.81E+00	1.27E+00	1.39E-01	**4.23E+03**
11.08.20 15:05	3.16E+03	4.56E+02	2.80E+02	1.71E+02	7.25E+01	2.54E+01	1.84E+01	1.15E+01	6.93E+00	2.77E+00	1.26E+00	1.34E-01	**4.20E+03**
11.08.20 15:06	3.13E+03	4.53E+02	2.77E+02	1.70E+02	7.22E+01	2.54E+01	1.86E+01	1.17E+01	6.98E+00	2.79E+00	1.25E+00	1.30E-01	**4.17E+03**
11.08.20 15:06	3.09E+03	4.48E+02	2.75E+02	1.68E+02	7.23E+01	2.54E+01	1.89E+01	1.20E+01	7.13E+00	2.83E+00	1.24E+00	1.25E-01	**4.12E+03**
11.08.20 15:06	3.07E+03	4.44E+02	2.73E+02	1.67E+02	7.23E+01	2.54E+01	1.91E+01	1.21E+01	7.21E+00	2.83E+00	1.24E+00	1.18E-01	**4.10E+03**
11.08.20 15:06	3.06E+03	4.44E+02	2.73E+02	1.67E+02	7.22E+01	2.54E+01	1.90E+01	1.21E+01	7.16E+00	2.80E+00	1.23E+00	1.14E-01	**4.08E+03**
11.08.20 15:06	3.05E+03	4.40E+02	2.71E+02	1.66E+02	7.21E+01	2.52E+01	1.88E+01	1.19E+01	7.05E+00	2.76E+00	1.22E+00	1.12E-01	**4.06E+03**
11.08.20 15:06	3.03E+03	4.37E+02	2.70E+02	1.65E+02	7.18E+01	2.50E+01	1.87E+01	1.18E+01	6.95E+00	2.70E+00	1.19E+00	1.10E-01	**4.04E+03**
11.08.20 15:07	3.02E+03	4.36E+02	2.71E+02	1.66E+02	7.14E+01	2.47E+01	1.81E+01	1.13E+01	6.67E+00	2.61E+00	1.17E+00	1.06E-01	**4.03E+03**
11.08.20 15:07	3.02E+03	4.36E+02	2.71E+02	1.66E+02	7.07E+01	2.43E+01	1.76E+01	1.08E+01	6.37E+00	2.53E+00	1.13E+00	1.05E-01	**4.03E+03**
11.08.20 15:07	3.01E+03	4.33E+02	2.70E+02	1.66E+02	7.05E+01	2.40E+01	1.73E+01	1.07E+01	6.25E+00	2.48E+00	1.11E+00	1.07E-01	**4.01E+03**
11.08.20 15:07	3.00E+03	4.32E+02	2.69E+02	1.65E+02	7.02E+01	2.38E+01	1.72E+01	1.06E+01	6.20E+00	2.45E+00	1.10E+00	1.02E-01	**3.99E+03**
11.08.20 15:07	2.98E+03	4.31E+02	2.68E+02	1.64E+02	6.99E+01	2.37E+01	1.70E+01	1.05E+01	6.15E+00	2.43E+00	1.08E+00	9.97E-02	**3.97E+03**
11.08.20 15:07	2.97E+03	4.31E+02	2.67E+02	1.64E+02	6.96E+01	2.36E+01	1.68E+01	1.04E+01	6.08E+00	2.39E+00	1.05E+00	9.52E-02	**3.96E+03**

11.08.20 15:08	2.97E+03	4.32E+02	2.66E+02	1.63E+02	6.97E+01	2.36E+01	1.69E+01	1.06E+01	6.22E+00	2.43E+00	1.05E+00	1.00E-01	**3.96E+03**
11.08.20 15:08	2.96E+03	4.30E+02	2.64E+02	1.62E+02	6.97E+01	2.37E+01	1.72E+01	1.08E+01	6.36E+00	2.44E+00	1.05E+00	9.87E-02	**3.95E+03**
11.08.20 15:08	2.94E+03	4.30E+02	2.63E+02	1.61E+02	6.98E+01	2.40E+01	1.74E+01	1.11E+01	6.46E+00	2.46E+00	1.03E+00	9.60E-02	**3.93E+03**
11.08.20 15:08	2.94E+03	4.30E+02	2.64E+02	1.61E+02	6.98E+01	2.41E+01	1.75E+01	1.11E+01	6.43E+00	2.44E+00	1.03E+00	9.93E-02	**3.93E+03**
11.08.20 15:08	2.93E+03	4.29E+02	2.64E+02	1.61E+02	6.99E+01	2.40E+01	1.74E+01	1.10E+01	6.40E+00	2.45E+00	1.02E+00	9.84E-02	**3.92E+03**
11.08.20 15:08	2.91E+03	4.27E+02	2.63E+02	1.61E+02	7.00E+01	2.40E+01	1.74E+01	1.10E+01	6.37E+00	2.44E+00	1.00E+00	9.79E-02	**3.90E+03**
11.08.20 15:09	2.90E+03	4.25E+02	2.63E+02	1.61E+02	6.95E+01	2.36E+01	1.69E+01	1.05E+01	6.05E+00	2.34E+00	9.64E-01	9.15E-02	**3.88E+03**
11.08.20 15:09	2.89E+03	4.24E+02	2.64E+02	1.61E+02	6.89E+01	2.33E+01	1.64E+01	1.01E+01	5.80E+00	2.26E+00	9.52E-01	8.42E-02	**3.87E+03**
11.08.20 15:09	2.87E+03	4.23E+02	2.63E+02	1.61E+02	6.85E+01	2.30E+01	1.60E+01	9.66E+00	5.60E+00	2.19E+00	9.29E-01	7.97E-02	**3.85E+03**
11.08.20 15:09	2.84E+03	4.20E+02	2.62E+02	1.60E+02	6.79E+01	2.28E+01	1.58E+01	9.50E+00	5.52E+00	2.16E+00	9.15E-01	7.51E-02	**3.80E+03**
11.08.20 15:09	2.82E+03	4.17E+02	2.60E+02	1.59E+02	6.74E+01	2.26E+01	1.56E+01	9.35E+00	5.41E+00	2.12E+00	9.04E-01	7.53E-02	**3.78E+03**
11.08.20 15:09	2.79E+03	4.15E+02	2.59E+02	1.58E+02	6.69E+01	2.25E+01	1.54E+01	9.31E+00	5.37E+00	2.10E+00	8.94E-01	7.23E-02	**3.74E+03**
11.08.20 15:10	2.74E+03	4.10E+02	2.57E+02	1.56E+02	6.64E+01	2.25E+01	1.55E+01	9.39E+00	5.37E+00	2.10E+00	8.87E-01	7.31E-02	**3.68E+03**
11.08.20 15:10	2.71E+03	4.07E+02	2.55E+02	1.55E+02	6.62E+01	2.24E+01	1.57E+01	9.52E+00	5.47E+00	2.13E+00	8.78E-01	7.25E-02	**3.65E+03**
11.08.20 15:10	2.70E+03	4.06E+02	2.53E+02	1.54E+02	6.62E+01	2.22E+01	1.57E+01	9.58E+00	5.50E+00	2.14E+00	8.73E-01	7.19E-02	**3.63E+03**
11.08.20 15:10	2.70E+03	4.05E+02	2.53E+02	1.54E+02	6.62E+01	2.22E+01	1.57E+01	9.53E+00	5.44E+00	2.13E+00	8.61E-01	6.90E-02	**3.64E+03**
11.08.20 15:10	2.70E+03	4.07E+02	2.53E+02	1.54E+02	6.61E+01	2.21E+01	1.57E+01	9.47E+00	5.38E+00	2.09E+00	8.54E-01	6.73E-02	**3.64E+03**
11.08.20 15:10	2.71E+03	4.07E+02	2.53E+02	1.54E+02	6.64E+01	2.20E+01	1.56E+01	9.44E+00	5.35E+00	2.07E+00	8.51E-01	6.23E-02	**3.65E+03**
11.08.20 15:11	2.71E+03	4.08E+02	2.53E+02	1.55E+02	6.62E+01	2.18E+01	1.53E+01	9.16E+00	5.22E+00	2.02E+00	8.27E-01	6.11E-02	**3.65E+03**
11.08.20 15:11	2.74E+03	4.10E+02	2.55E+02	1.55E+02	6.63E+01	2.17E+01	1.49E+01	8.97E+00	5.07E+00	1.98E+00	8.22E-01	6.39E-02	**3.67E+03**
11.08.20 15:11	2.74E+03	4.10E+02	2.56E+02	1.55E+02	6.62E+01	2.16E+01	1.47E+01	8.82E+00	4.96E+00	1.94E+00	8.19E-01	6.28E-02	**3.68E+03**
11.08.20 15:11	2.73E+03	4.09E+02	2.56E+02	1.55E+02	6.61E+01	2.15E+01	1.46E+01	8.70E+00	4.96E+00	1.92E+00	8.12E-01	6.12E-02	**3.67E+03**
11.08.20 15:11	2.72E+03	4.07E+02	2.56E+02	1.55E+02	6.58E+01	2.15E+01	1.45E+01	8.63E+00	4.95E+00	1.92E+00	7.98E-01	6.05E-02	**3.66E+03**
11.08.20 15:11	2.71E+03	4.06E+02	2.56E+02	1.54E+02	6.53E+01	2.14E+01	1.44E+01	8.53E+00	4.87E+00	1.90E+00	7.85E-01	5.85E-02	**3.64E+03**
11.08.20 15:12	2.69E+03	4.03E+02	2.55E+02	1.53E+02	6.50E+01	2.16E+01	1.45E+01	8.63E+00	4.93E+00	1.89E+00	7.87E-01	5.67E-02	**3.62E+03**
11.08.20 15:12	2.66E+03	4.00E+02	2.54E+02	1.52E+02	6.47E+01	2.16E+01	1.46E+01	8.67E+00	4.99E+00	1.88E+00	7.77E-01	5.39E-02	**3.58E+03**
11.08.20 15:12	2.64E+03	4.00E+02	2.53E+02	1.52E+02	6.47E+01	2.16E+01	1.46E+01	8.66E+00	4.97E+00	1.85E+00	7.64E-01	5.41E-02	**3.56E+03**
11.08.20 15:12	2.63E+03	4.01E+02	2.52E+02	1.52E+02	6.49E+01	2.14E+01	1.45E+01	8.65E+00	4.91E+00	1.84E+00	7.62E-01	5.13E-02	**3.55E+03**
11.08.20 15:12	2.62E+03	4.02E+02	2.51E+02	1.52E+02	6.48E+01	2.13E+01	1.44E+01	8.52E+00	4.86E+00	1.82E+00	7.52E-01	5.07E-02	**3.54E+03**
11.08.20 15:12	2.62E+03	4.02E+02	2.51E+02	1.52E+02	6.48E+01	2.12E+01	1.43E+01	8.38E+00	4.78E+00	1.79E+00	7.36E-01	4.73E-02	**3.54E+03**
11.08.20 15:13	2.61E+03	4.02E+02	2.52E+02	1.52E+02	6.45E+01	2.10E+01	1.40E+01	8.10E+00	4.62E+00	1.75E+00	7.23E-01	4.74E-02	**3.53E+03**
11.08.20 15:13	2.61E+03	4.01E+02	2.52E+02	1.52E+02	6.43E+01	2.07E+01	1.37E+01	7.89E+00	4.48E+00	1.73E+00	7.02E-01	4.63E-02	**3.53E+03**
11.08.20 15:13	2.61E+03	3.99E+02	2.52E+02	1.52E+02	6.38E+01	2.04E+01	1.34E+01	7.75E+00	4.42E+00	1.70E+00	6.84E-01	4.58E-02	**3.52E+03**
11.08.20 15:13	2.59E+03	3.97E+02	2.52E+02	1.52E+02	6.35E+01	2.03E+01	1.33E+01	7.62E+00	4.35E+00	1.67E+00	6.72E-01	4.34E-02	**3.50E+03**
11.08.20 15:13	2.59E+03	3.95E+02	2.52E+02	1.51E+02	6.35E+01	2.01E+01	1.31E+01	7.53E+00	4.30E+00	1.63E+00	6.60E-01	4.12E-02	**3.50E+03**
11.08.20 15:13	2.57E+03	3.93E+02	2.52E+02	1.51E+02	6.33E+01	2.01E+01	1.29E+01	7.45E+00	4.26E+00	1.63E+00	6.56E-01	3.96E-02	**3.48E+03**
11.08.20 15:14	2.55E+03	3.91E+02	2.51E+02	1.50E+02	6.33E+01	2.02E+01	1.30E+01	7.51E+00	4.28E+00	1.62E+00	6.50E-01	3.89E-02	**3.46E+03**
11.08.20 15:14	2.53E+03	3.89E+02	2.51E+02	1.50E+02	6.33E+01	2.03E+01	1.31E+01	7.54E+00	4.30E+00	1.62E+00	6.44E-01	3.69E-02	**3.44E+03**
11.08.20 15:14	2.52E+03	3.85E+02	2.50E+02	1.50E+02	6.33E+01	2.03E+01	1.32E+01	7.58E+00	4.30E+00	1.63E+00	6.32E-01	3.35E-02	**3.41E+03**
11.08.20 15:14	2.50E+03	3.83E+02	2.50E+02	1.50E+02	6.30E+01	2.02E+01	1.30E+01	7.51E+00	4.28E+00	1.60E+00	6.20E-01	3.32E-02	**3.39E+03**
11.08.20 15:14	2.48E+03	3.81E+02	2.49E+02	1.49E+02	6.27E+01	2.01E+01	1.30E+01	7.46E+00	4.23E+00	1.58E+00	6.06E-01	3.05E-02	**3.37E+03**
11.08.20 15:14	2.47E+03	3.81E+02	2.49E+02	1.49E+02	6.23E+01	2.00E+01	1.29E+01	7.36E+00	4.15E+00	1.56E+00	5.97E-01	2.68E-02	**3.35E+03**
11.08.20 15:15	2.46E+03	3.82E+02	2.49E+02	1.49E+02	6.20E+01	1.97E+01	1.26E+01	7.15E+00	4.01E+00	1.51E+00	5.78E-01	2.54E-02	**3.35E+03**
11.08.20 15:15	2.45E+03	3.80E+02	2.47E+02	1.48E+02	6.13E+01	1.94E+01	1.22E+01	6.87E+00	3.84E+00	1.44E+00	5.60E-01	2.23E-02	**3.33E+03**
11.08.20 15:15	2.44E+03	3.79E+02	2.47E+02	1.48E+02	6.12E+01	1.93E+01	1.22E+01	6.71E+00	3.77E+00	1.41E+00	5.50E-01	2.10E-02	**3.32E+03**
11.08.20 15:15	2.43E+03	3.78E+02	2.46E+02	1.48E+02	6.09E+01	1.92E+01	1.20E+01	6.61E+00	3.70E+00	1.39E+00	5.42E-01	2.17E-02	**3.30E+03**
11.08.20 15:15	2.43E+03	3.75E+02	2.46E+02	1.48E+02	6.08E+01	1.92E+01	1.19E+01	6.55E+00	3.65E+00	1.37E+00	5.35E-01	2.35E-02	**3.30E+03**
11.08.20 15:15	2.42E+03	3.73E+02	2.46E+02	1.48E+02	6.08E+01	1.90E+01	1.18E+01	6.51E+00	3.63E+00	1.35E+00	5.27E-01	2.49E-02	**3.29E+03**
11.08.20 15:16	2.40E+03	3.71E+02	2.46E+02	1.47E+02	6.05E+01	1.89E+01	1.18E+01	6.48E+00	3.64E+00	1.35E+00	5.27E-01	2.61E-02	**3.27E+03**
11.08.20 15:16	2.38E+03	3.73E+02	2.45E+02	1.48E+02	6.05E+01	1.89E+01	1.18E+01	6.51E+00	3.64E+00	1.36E+00	5.28E-01	2.70E-02	**3.25E+03**
11.08.20 15:16	2.37E+03	3.73E+02	2.45E+02	1.47E+02	6.05E+01	1.88E+01	1.18E+01	6.53E+00	3.63E+00	1.34E+00	5.23E-01	2.70E-02	**3.24E+03**
11.08.20 15:16	2.35E+03	3.71E+02	2.44E+02	1.46E+02	6.02E+01	1.88E+01	1.18E+01	6.50E+00	3.63E+00	1.34E+00	5.38E-01	4.14E-02	**3.21E+03**

11.08.20 15:16	2.32E+03	3.67E+02	2.42E+02	1.45E+02	6.00E+01	1.88E+01	1.19E+01	6.59E+00	3.71E+00	1.37E+00	5.44E-01	4.48E-02	**3.17E+03**
11.08.20 15:16	2.28E+03	3.63E+02	2.39E+02	1.43E+02	5.94E+01	1.88E+01	1.19E+01	6.69E+00	3.71E+00	1.35E+00	5.33E-01	4.52E-02	**3.13E+03**
11.08.20 15:17	2.26E+03	3.60E+02	2.38E+02	1.42E+02	5.91E+01	1.87E+01	1.17E+01	6.57E+00	3.64E+00	1.32E+00	5.20E-01	4.42E-02	**3.10E+03**
11.08.20 15:17	2.24E+03	3.55E+02	2.37E+02	1.42E+02	5.83E+01	1.85E+01	1.14E+01	6.37E+00	3.54E+00	1.28E+00	5.13E-01	4.36E-02	**3.07E+03**
11.08.20 15:17	2.21E+03	3.52E+02	2.36E+02	1.41E+02	5.78E+01	1.82E+01	1.13E+01	6.30E+00	3.47E+00	1.26E+00	5.01E-01	4.67E-02	**3.04E+03**
11.08.20 15:17	2.20E+03	3.51E+02	2.35E+02	1.40E+02	5.76E+01	1.81E+01	1.10E+01	6.09E+00	3.34E+00	1.19E+00	4.62E-01	2.93E-02	**3.02E+03**
11.08.20 15:17	2.20E+03	3.52E+02	2.35E+02	1.40E+02	5.72E+01	1.78E+01	1.08E+01	5.80E+00	3.17E+00	1.14E+00	4.44E-01	2.72E-02	**3.02E+03**
11.08.20 15:17	2.20E+03	3.52E+02	2.37E+02	1.40E+02	5.72E+01	1.77E+01	1.06E+01	5.63E+00	3.08E+00	1.12E+00	4.34E-01	2.54E-02	**3.03E+03**
11.08.20 15:18	2.20E+03	3.53E+02	2.37E+02	1.41E+02	5.74E+01	1.77E+01	1.06E+01	5.60E+00	3.05E+00	1.12E+00	4.22E-01	2.61E-02	**3.03E+03**
11.08.20 15:18	2.19E+03	3.53E+02	2.37E+02	1.41E+02	5.73E+01	1.78E+01	1.05E+01	5.55E+00	3.01E+00	1.10E+00	4.11E-01	2.63E-02	**3.02E+03**
11.08.20 15:18	2.19E+03	3.53E+02	2.37E+02	1.41E+02	5.72E+01	1.78E+01	1.05E+01	5.46E+00	2.97E+00	1.10E+00	4.11E-01	2.41E-02	**3.01E+03**
11.08.20 15:18	2.18E+03	3.54E+02	2.36E+02	1.41E+02	5.73E+01	1.79E+01	1.05E+01	5.55E+00	3.02E+00	1.10E+00	4.17E-01	2.28E-02	**3.01E+03**
11.08.20 15:18	2.17E+03	3.52E+02	2.36E+02	1.41E+02	5.75E+01	1.80E+01	1.06E+01	5.67E+00	3.08E+00	1.11E+00	4.19E-01	2.09E-02	**2.99E+03**
11.08.20 15:18	2.16E+03	3.52E+02	2.36E+02	1.40E+02	5.75E+01	1.80E+01	1.07E+01	5.69E+00	3.09E+00	1.10E+00	4.23E-01	2.09E-02	**2.98E+03**
11.08.20 15:19	2.14E+03	3.50E+02	2.35E+02	1.40E+02	5.74E+01	1.79E+01	1.06E+01	5.68E+00	3.06E+00	1.09E+00	4.19E-01	2.09E-02	**2.96E+03**
11.08.20 15:19	2.14E+03	3.48E+02	2.35E+02	1.40E+02	5.74E+01	1.76E+01	1.05E+01	5.58E+00	3.02E+00	1.08E+00	4.14E-01	1.93E-02	**2.95E+03**
11.08.20 15:19	2.13E+03	3.47E+02	2.34E+02	1.40E+02	5.72E+01	1.75E+01	1.04E+01	5.55E+00	3.00E+00	1.07E+00	4.05E-01	1.70E-02	**2.94E+03**
11.08.20 15:19	2.11E+03	3.46E+02	2.34E+02	1.39E+02	5.72E+01	1.71E+01	1.02E+01	5.30E+00	2.87E+00	1.04E+00	3.92E-01	1.66E-02	**2.92E+03**
11.08.20 15:19	2.11E+03	3.46E+02	2.34E+02	1.39E+02	5.69E+01	1.69E+01	9.93E+00	5.09E+00	2.75E+00	1.02E+00	3.82E-01	1.38E-02	**2.92E+03**
11.08.20 15:19	2.10E+03	3.45E+02	2.34E+02	1.39E+02	5.67E+01	1.67E+01	9.71E+00	4.90E+00	2.66E+00	9.88E-01	3.71E-01	1.31E-02	**2.91E+03**
11.08.20 15:20	2.09E+03	3.44E+02	2.33E+02	1.39E+02	5.65E+01	1.67E+01	9.64E+00	4.82E+00	2.63E+00	9.73E-01	3.67E-01	1.18E-02	**2.90E+03**
11.08.20 15:20	2.09E+03	3.42E+02	2.33E+02	1.38E+02	5.59E+01	1.66E+01	9.56E+00	4.75E+00	2.57E+00	9.52E-01	3.58E-01	1.38E-02	**2.89E+03**
11.08.20 15:20	2.07E+03	3.42E+02	2.33E+02	1.38E+02	5.57E+01	1.66E+01	9.46E+00	4.70E+00	2.54E+00	9.32E-01	3.56E-01	1.35E-02	**2.88E+03**
11.08.20 15:20	2.07E+03	3.39E+02	2.33E+02	1.38E+02	5.56E+01	1.67E+01	9.56E+00	4.76E+00	2.59E+00	9.38E-01	3.54E-01	1.34E-02	**2.87E+03**
11.08.20 15:20	2.06E+03	3.37E+02	2.32E+02	1.37E+02	5.57E+01	1.69E+01	9.73E+00	4.89E+00	2.66E+00	9.54E-01	3.63E-01	1.35E-02	**2.86E+03**
11.08.20 15:20	2.05E+03	3.36E+02	2.30E+02	1.37E+02	5.58E+01	1.70E+01	9.86E+00	5.02E+00	2.72E+00	9.57E-01	3.65E-01	1.15E-02	**2.84E+03**
11.08.20 15:21	2.04E+03	3.35E+02	2.30E+02	1.37E+02	5.58E+01	1.70E+01	9.87E+00	5.04E+00	2.72E+00	9.52E-01	3.66E-01	1.23E-02	**2.84E+03**
11.08.20 15:21	2.04E+03	3.35E+02	2.30E+02	1.37E+02	5.61E+01	1.70E+01	9.88E+00	5.06E+00	2.71E+00	9.51E-01	3.66E-01	8.41E-03	**2.83E+03**
11.08.20 15:21	2.03E+03	3.32E+02	2.28E+02	1.36E+02	5.59E+01	1.69E+01	9.90E+00	5.03E+00	2.68E+00	9.38E-01	3.58E-01	9.61E-03	**2.82E+03**
11.08.20 15:21	2.01E+03	3.32E+02	2.28E+02	1.36E+02	5.57E+01	1.67E+01	9.70E+00	4.84E+00	2.54E+00	8.96E-01	3.44E-01	9.20E-03	**2.80E+03**
11.08.20 15:21	2.01E+03	3.32E+02	2.28E+02	1.36E+02	5.53E+01	1.64E+01	9.46E+00	4.58E+00	2.40E+00	8.51E-01	3.26E-01	9.51E-03	**2.80E+03**
11.08.20 15:21	2.01E+03	3.33E+02	2.29E+02	1.36E+02	5.52E+01	1.62E+01	9.24E+00	4.41E+00	2.31E+00	8.28E-01	3.14E-01	8.99E-03	**2.79E+03**
11.08.20 15:22	2.00E+03	3.32E+02	2.29E+02	1.36E+02	5.52E+01	1.61E+01	9.14E+00	4.31E+00	2.26E+00	8.20E-01	3.05E-01	7.73E-03	**2.79E+03**
11.08.20 15:22	1.99E+03	3.32E+02	2.28E+02	1.36E+02	5.50E+01	1.60E+01	9.03E+00	4.24E+00	2.21E+00	8.09E-01	3.01E-01	8.25E-03	**2.77E+03**
11.08.20 15:22	1.98E+03	3.32E+02	2.28E+02	1.35E+02	5.48E+01	1.59E+01	8.87E+00	4.18E+00	2.18E+00	8.02E-01	2.97E-01	4.66E-03	**2.76E+03**
11.08.20 15:22	1.96E+03	3.32E+02	2.28E+02	1.35E+02	5.47E+01	1.58E+01	8.85E+00	4.16E+00	2.18E+00	8.00E-01	3.00E-01	5.38E-03	**2.74E+03**
11.08.20 15:22	1.95E+03	3.30E+02	2.27E+02	1.35E+02	5.46E+01	1.59E+01	8.89E+00	4.24E+00	2.21E+00	8.07E-01	3.01E-01	6.37E-03	**2.73E+03**
11.08.20 15:22	1.94E+03	3.28E+02	2.27E+02	1.35E+02	5.45E+01	1.59E+01	8.93E+00	4.28E+00	2.22E+00	8.01E-01	3.02E-01	8.40E-03	**2.72E+03**
11.08.20 15:23	1.92E+03	3.27E+02	2.26E+02	1.35E+02	5.43E+01	1.59E+01	8.94E+00	4.25E+00	2.21E+00	7.98E-01	2.97E-01	7.94E-03	**2.70E+03**
11.08.20 15:23	1.92E+03	3.26E+02	2.26E+02	1.35E+02	5.44E+01	1.59E+01	8.90E+00	4.25E+00	2.20E+00	7.94E-01	2.99E-01	8.00E-03	**2.70E+03**
11.08.20 15:23	1.93E+03	3.24E+02	2.26E+02	1.35E+02	5.45E+01	1.60E+01	8.93E+00	4.25E+00	2.18E+00	7.83E-01	2.98E-01	6.12E-03	**2.70E+03**
11.08.20 15:23	1.92E+03	3.22E+02	2.25E+02	1.35E+02	5.43E+01	1.58E+01	8.73E+00	4.18E+00	2.11E+00	7.54E-01	2.92E-01	3.60E-03	**2.68E+03**
11.08.20 15:23	1.90E+03	3.20E+02	2.25E+02	1.34E+02	5.40E+01	1.57E+01	8.60E+00	4.06E+00	2.06E+00	7.39E-01	2.91E-01	2.67E-03	**2.67E+03**
11.08.20 15:23	1.88E+03	3.18E+02	2.24E+02	1.33E+02	5.35E+01	1.56E+01	8.45E+00	3.98E+00	1.99E+00	7.18E-01	2.86E-01	0.00E+00	**2.64E+03**
11.08.20 15:24	1.87E+03	3.16E+02	2.24E+02	1.33E+02	5.34E+01	1.54E+01	8.41E+00	3.94E+00	1.98E+00	7.10E-01	2.87E-01	2.71E-03	**2.62E+03**
11.08.20 15:24	1.85E+03	3.15E+02	2.22E+02	1.32E+02	5.31E+01	1.54E+01	8.34E+00	3.89E+00	1.96E+00	7.02E-01	2.75E-01	2.27E-03	**2.60E+03**
11.08.20 15:24	1.83E+03	3.13E+02	2.21E+02	1.32E+02	5.28E+01	1.54E+01	8.27E+00	3.83E+00	1.95E+00	7.08E-01	2.72E-01	2.64E-03	**2.58E+03**
11.08.20 15:24	1.82E+03	3.14E+02	2.21E+02	1.31E+02	5.29E+01	1.55E+01	8.37E+00	3.87E+00	1.99E+00	7.26E-01	2.74E-01	2.89E-03	**2.57E+03**
11.08.20 15:24	1.82E+03	3.14E+02	2.21E+02	1.32E+02	5.31E+01	1.56E+01	8.48E+00	3.98E+00	2.07E+00	7.39E-01	2.71E-01	3.49E-03	**2.57E+03**
11.08.20 15:24	1.82E+03	3.15E+02	2.21E+02	1.33E+02	5.35E+01	1.58E+01	8.66E+00	4.09E+00	2.13E+00	7.67E-01	2.77E-01	6.08E-03	**2.57E+03**
11.08.20 15:25	1.82E+03	3.17E+02	2.21E+02	1.33E+02	5.37E+01	1.59E+01	8.64E+00	4.08E+00	2.10E+00	7.65E-01	2.80E-01	6.13E-03	**2.58E+03**
11.08.20 15:25	1.83E+03	3.19E+02	2.22E+02	1.34E+02	5.39E+01	1.59E+01	8.56E+00	4.02E+00	2.09E+00	7.56E-01	2.77E-01	6.93E-03	**2.59E+03**

11.08.20 15:25	1.84E+03	3.21E+02	2.24E+02	1.34E+02	5.40E+01	1.58E+01	8.47E+00	3.96E+00	2.03E+00	7.45E-01	2.66E-01	8.51E-03	**2.61E+03**
11.08.20 15:25	1.85E+03	3.22E+02	2.25E+02	1.35E+02	5.39E+01	1.57E+01	8.31E+00	3.82E+00	1.96E+00	7.18E-01	2.58E-01	9.29E-03	**2.62E+03**
11.08.20 15:25	1.86E+03	3.21E+02	2.25E+02	1.34E+02	5.38E+01	1.55E+01	8.06E+00	3.64E+00	1.84E+00	6.82E-01	2.57E-01	1.15E-02	**2.63E+03**
11.08.20 15:25	1.86E+03	3.19E+02	2.26E+02	1.34E+02	5.37E+01	1.54E+01	7.88E+00	3.50E+00	1.75E+00	6.53E-01	2.47E-01	1.02E-02	**2.62E+03**
11.08.20 15:26	1.87E+03	3.17E+02	2.27E+02	1.34E+02	5.36E+01	1.53E+01	7.87E+00	3.43E+00	1.73E+00	6.31E-01	2.46E-01	1.01E-02	**2.63E+03**
11.08.20 15:26	1.85E+03	3.16E+02	2.26E+02	1.34E+02	5.36E+01	1.53E+01	7.88E+00	3.39E+00	1.72E+00	6.12E-01	2.44E-01	9.41E-03	**2.61E+03**
11.08.20 15:26	1.83E+03	3.13E+02	2.26E+02	1.34E+02	5.36E+01	1.53E+01	7.93E+00	3.42E+00	1.74E+00	6.16E-01	2.48E-01	1.15E-02	**2.58E+03**
11.08.20 15:26	1.82E+03	3.12E+02	2.26E+02	1.34E+02	5.38E+01	1.54E+01	8.02E+00	3.50E+00	1.80E+00	6.22E-01	2.46E-01	9.93E-03	**2.58E+03**
11.08.20 15:26	1.81E+03	3.10E+02	2.25E+02	1.33E+02	5.38E+01	1.54E+01	8.14E+00	3.64E+00	1.87E+00	6.36E-01	2.44E-01	8.88E-03	**2.56E+03**
11.08.20 15:26	1.80E+03	3.09E+02	2.25E+02	1.33E+02	5.38E+01	1.54E+01	8.15E+00	3.63E+00	1.89E+00	6.30E-01	2.44E-01	9.03E-03	**2.55E+03**
11.08.20 15:27	1.79E+03	3.10E+02	2.24E+02	1.32E+02	5.37E+01	1.53E+01	8.09E+00	3.60E+00	1.89E+00	6.30E-01	2.43E-01	6.53E-03	**2.54E+03**
11.08.20 15:27	1.80E+03	3.09E+02	2.24E+02	1.32E+02	5.35E+01	1.52E+01	8.05E+00	3.57E+00	1.86E+00	6.34E-01	2.42E-01	6.82E-03	**2.54E+03**
11.08.20 15:27	1.81E+03	3.10E+02	2.24E+02	1.32E+02	5.32E+01	1.51E+01	7.90E+00	3.45E+00	1.77E+00	6.11E-01	2.35E-01	5.73E-03	**2.56E+03**
11.08.20 15:27	1.81E+03	3.10E+02	2.24E+02	1.32E+02	5.30E+01	1.50E+01	7.83E+00	3.35E+00	1.71E+00	6.04E-01	2.36E-01	3.74E-03	**2.56E+03**
11.08.20 15:27	1.82E+03	3.11E+02	2.25E+02	1.33E+02	5.27E+01	1.49E+01	7.62E+00	3.15E+00	1.61E+00	5.71E-01	2.33E-01	1.24E-03	**2.57E+03**
11.08.20 15:27	1.82E+03	3.11E+02	2.26E+02	1.33E+02	5.28E+01	1.48E+01	7.58E+00	3.11E+00	1.56E+00	5.74E-01	2.28E-01	1.96E-03	**2.57E+03**
11.08.20 15:28	1.82E+03	3.10E+02	2.26E+02	1.33E+02	5.28E+01	1.48E+01	7.58E+00	3.09E+00	1.53E+00	5.77E-01	2.25E-01	2.48E-03	**2.57E+03**
11.08.20 15:28	1.81E+03	3.10E+02	2.26E+02	1.33E+02	5.31E+01	1.48E+01	7.52E+00	3.06E+00	1.52E+00	5.67E-01	2.22E-01	2.01E-03	**2.56E+03**
11.08.20 15:28	1.81E+03	3.09E+02	2.26E+02	1.33E+02	5.33E+01	1.48E+01	7.54E+00	3.09E+00	1.55E+00	5.68E-01	2.22E-01	2.25E-03	**2.56E+03**
11.08.20 15:28	1.80E+03	3.08E+02	2.26E+02	1.33E+02	5.37E+01	1.49E+01	7.73E+00	3.26E+00	1.64E+00	5.82E-01	2.27E-01	4.11E-03	**2.55E+03**
11.08.20 15:28	1.79E+03	3.08E+02	2.24E+02	1.33E+02	5.37E+01	1.50E+01	7.88E+00	3.37E+00	1.71E+00	5.99E-01	2.29E-01	7.11E-03	**2.54E+03**
11.08.20 15:28	1.79E+03	3.07E+02	2.23E+02	1.32E+02	5.36E+01	1.50E+01	7.82E+00	3.40E+00	1.74E+00	5.98E-01	2.29E-01	7.73E-03	**2.53E+03**
11.08.20 15:29	1.79E+03	3.08E+02	2.23E+02	1.32E+02	5.32E+01	1.50E+01	7.80E+00	3.41E+00	1.71E+00	5.89E-01	2.26E-01	8.18E-03	**2.54E+03**
11.08.20 15:29	1.80E+03	3.09E+02	2.23E+02	1.32E+02	5.29E+01	1.49E+01	7.74E+00	3.36E+00	1.69E+00	5.91E-01	2.25E-01	8.80E-03	**2.54E+03**
11.08.20 15:29	1.80E+03	3.11E+02	2.24E+02	1.32E+02	5.27E+01	1.48E+01	7.52E+00	3.18E+00	1.60E+00	5.64E-01	2.19E-01	7.60E-03	**2.55E+03**
11.08.20 15:29	1.81E+03	3.11E+02	2.25E+02	1.32E+02	5.23E+01	1.46E+01	7.30E+00	2.99E+00	1.49E+00	5.42E-01	2.13E-01	5.49E-03	**2.55E+03**
11.08.20 15:29	1.82E+03	3.13E+02	2.26E+02	1.32E+02	5.21E+01	1.44E+01	7.10E+00	2.83E+00	1.37E+00	5.14E-01	2.01E-01	3.21E-03	**2.57E+03**
11.08.20 15:29	1.82E+03	3.12E+02	2.26E+02	1.32E+02	5.21E+01	1.44E+01	7.03E+00	2.79E+00	1.36E+00	5.06E-01	1.95E-01	3.41E-03	**2.57E+03**
11.08.20 15:30	1.81E+03	3.11E+02	2.25E+02	1.32E+02	5.24E+01	1.42E+01	6.97E+00	2.74E+00	1.34E+00	5.10E-01	1.95E-01	4.02E-03	**2.56E+03**
11.08.20 15:30	1.80E+03	3.08E+02	2.25E+02	1.31E+02	5.20E+01	1.42E+01	6.89E+00	2.75E+00	1.34E+00	5.01E-01	1.89E-01	3.19E-03	**2.54E+03**
11.08.20 15:30	1.80E+03	3.07E+02	2.23E+02	1.31E+02	5.21E+01	1.41E+01	6.91E+00	2.78E+00	1.35E+00	5.09E-01	1.89E-01	3.51E-03	**2.53E+03**
11.08.20 15:30	1.79E+03	3.06E+02	2.23E+02	1.30E+02	5.23E+01	1.41E+01	7.03E+00	2.86E+00	1.42E+00	5.24E-01	1.93E-01	2.44E-03	**2.53E+03**
11.08.20 15:30	1.77E+03	3.03E+02	2.22E+02	1.30E+02	5.24E+01	1.43E+01	7.14E+00	2.97E+00	1.49E+00	5.50E-01	1.98E-01	3.33E-03	**2.51E+03**
11.08.20 15:30	1.77E+03	3.03E+02	2.21E+02	1.29E+02	5.22E+01	1.43E+01	7.22E+00	3.01E+00	1.51E+00	5.39E-01	2.01E-01	2.30E-04	**2.50E+03**
11.08.20 15:31	1.77E+03	3.02E+02	2.21E+02	1.29E+02	5.21E+01	1.43E+01	7.22E+00	3.01E+00	1.51E+00	5.24E-01	2.06E-01	0.00E+00	**2.50E+03**
11.08.20 15:31	1.76E+03	3.03E+02	2.22E+02	1.30E+02	5.23E+01	1.43E+01	7.18E+00	3.00E+00	1.48E+00	5.10E-01	2.09E-01	0.00E+00	**2.50E+03**
11.08.20 15:31	1.76E+03	3.03E+02	2.22E+02	1.30E+02	5.21E+01	1.42E+01	7.06E+00	2.93E+00	1.43E+00	4.96E-01	2.02E-01	0.00E+00	**2.50E+03**
11.08.20 15:31	1.76E+03	3.04E+02	2.22E+02	1.30E+02	5.18E+01	1.41E+01	6.85E+00	2.81E+00	1.35E+00	4.69E-01	1.97E-01	0.00E+00	**2.50E+03**
11.08.20 15:31	1.77E+03	3.04E+02	2.22E+02	1.31E+02	5.17E+01	1.39E+01	6.69E+00	2.68E+00	1.26E+00	4.42E-01	1.90E-01	0.00E+00	**2.50E+03**
11.08.20 15:31	1.77E+03	3.04E+02	2.23E+02	1.31E+02	5.20E+01	1.39E+01	6.56E+00	2.63E+00	1.23E+00	4.40E-01	1.91E-01	1.35E-03	**2.50E+03**
11.08.20 15:32	1.76E+03	3.04E+02	2.23E+02	1.31E+02	5.19E+01	1.38E+01	6.53E+00	2.62E+00	1.22E+00	4.38E-01	1.88E-01	3.43E-03	**2.49E+03**
11.08.20 15:32	1.75E+03	3.00E+02	2.22E+02	1.31E+02	5.17E+01	1.38E+01	6.51E+00	2.59E+00	1.21E+00	4.39E-01	1.85E-01	8.96E-03	**2.48E+03**
11.08.20 15:32	1.75E+03	2.99E+02	2.22E+02	1.31E+02	5.18E+01	1.38E+01	6.58E+00	2.64E+00	1.23E+00	4.44E-01	1.88E-01	1.19E-02	**2.48E+03**
11.08.20 15:32	1.75E+03	2.98E+02	2.23E+02	1.31E+02	5.21E+01	1.39E+01	6.76E+00	2.76E+00	1.28E+00	4.61E-01	1.88E-01	1.00E-02	**2.48E+03**
11.08.20 15:32	1.73E+03	2.96E+02	2.21E+02	1.30E+02	5.22E+01	1.41E+01	6.91E+00	2.90E+00	1.32E+00	4.82E-01	1.91E-01	1.01E-02	**2.46E+03**
11.08.20 15:32	1.72E+03	2.96E+02	2.21E+02	1.30E+02	5.20E+01	1.41E+01	6.94E+00	2.89E+00	1.32E+00	4.91E-01	1.89E-01	1.02E-02	**2.44E+03**
11.08.20 15:33	1.71E+03	2.95E+02	2.20E+02	1.30E+02	5.22E+01	1.42E+01	6.89E+00	2.87E+00	1.30E+00	4.89E-01	1.85E-01	7.75E-03	**2.44E+03**
11.08.20 15:33	1.70E+03	2.95E+02	2.20E+02	1.29E+02	5.24E+01	1.43E+01	6.90E+00	2.85E+00	1.30E+00	4.78E-01	1.81E-01	1.85E-03	**2.42E+03**
11.08.20 15:33	1.69E+03	2.95E+02	2.20E+02	1.29E+02	5.26E+01	1.42E+01	6.63E+00	2.68E+00	1.22E+00	4.44E-01	1.73E-01	1.29E-04	**2.41E+03**
11.08.20 15:33	1.69E+03	2.95E+02	2.20E+02	1.30E+02	5.25E+01	1.42E+01	6.48E+00	2.53E+00	1.14E+00	4.20E-01	1.72E-01	0.00E+00	**2.41E+03**
11.08.20 15:33	1.70E+03	2.96E+02	2.21E+02	1.31E+02	5.28E+01	1.41E+01	6.28E+00	2.40E+00	1.07E+00	4.01E-01	1.69E-01	4.15E-04	**2.43E+03**
11.08.20 15:33	1.70E+03	2.97E+02	2.21E+02	1.31E+02	5.32E+01	1.41E+01	6.23E+00	2.35E+00	1.05E+00	3.97E-01	1.65E-01	4.60E-04	**2.43E+03**

11.08.20 15:34	1.71E+03	2.97E+02	2.21E+02	1.32E+02	5.35E+01	1.42E+01	6.27E+00	2.32E+00	1.03E+00	3.87E-01	1.63E-01	4.50E-04	**2.44E+03**
11.08.20 15:34	1.71E+03	2.97E+02	2.21E+02	1.32E+02	5.35E+01	1.44E+01	6.25E+00	2.32E+00	1.02E+00	3.78E-01	1.59E-01	1.80E-03	**2.43E+03**
11.08.20 15:34	1.71E+03	2.98E+02	2.21E+02	1.32E+02	5.38E+01	1.45E+01	6.29E+00	2.38E+00	1.03E+00	3.95E-01	1.60E-01	1.62E-03	**2.44E+03**
11.08.20 15:34	1.70E+03	2.97E+02	2.21E+02	1.32E+02	5.39E+01	1.47E+01	6.39E+00	2.47E+00	1.09E+00	3.99E-01	1.62E-01	1.89E-04	**2.43E+03**
11.08.20 15:34	1.70E+03	2.96E+02	2.20E+02	1.32E+02	5.43E+01	1.48E+01	6.48E+00	2.55E+00	1.13E+00	4.02E-01	1.65E-01	0.00E+00	**2.43E+03**
11.08.20 15:34	1.70E+03	2.96E+02	2.21E+02	1.32E+02	5.45E+01	1.47E+01	6.48E+00	2.55E+00	1.13E+00	4.02E-01	1.72E-01	0.00E+00	**2.43E+03**
11.08.20 15:35	1.70E+03	2.96E+02	2.22E+02	1.33E+02	5.48E+01	1.49E+01	6.43E+00	2.55E+00	1.12E+00	3.97E-01	1.69E-01	0.00E+00	**2.43E+03**
11.08.20 15:35	1.72E+03	2.96E+02	2.22E+02	1.33E+02	5.52E+01	1.49E+01	6.38E+00	2.51E+00	1.11E+00	3.91E-01	1.75E-01	0.00E+00	**2.45E+03**
11.08.20 15:35	1.70E+03	2.96E+02	2.23E+02	1.34E+02	5.53E+01	1.48E+01	6.30E+00	2.38E+00	1.05E+00	3.65E-01	1.74E-01	1.10E-04	**2.44E+03**
11.08.20 15:35	1.71E+03	2.99E+02	2.25E+02	1.35E+02	5.55E+01	1.48E+01	6.18E+00	2.29E+00	9.89E-01	3.44E-01	1.67E-01	0.00E+00	**2.45E+03**
11.08.20 15:35	1.70E+03	2.99E+02	2.25E+02	1.35E+02	5.55E+01	1.47E+01	6.07E+00	2.20E+00	9.54E-01	3.32E-01	1.61E-01	0.00E+00	**2.44E+03**
11.08.20 15:35	1.69E+03	2.99E+02	2.24E+02	1.35E+02	5.55E+01	1.48E+01	6.09E+00	2.15E+00	9.29E-01	3.26E-01	1.59E-01	0.00E+00	**2.43E+03**
11.08.20 15:36	1.68E+03	2.99E+02	2.25E+02	1.35E+02	5.56E+01	1.49E+01	6.11E+00	2.13E+00	9.16E-01	3.26E-01	1.53E-01	0.00E+00	**2.42E+03**
11.08.20 15:36	1.67E+03	3.01E+02	2.25E+02	1.35E+02	5.59E+01	1.50E+01	6.13E+00	2.10E+00	9.17E-01	3.32E-01	1.48E-01	3.25E-04	**2.41E+03**
11.08.20 15:36	1.67E+03	2.98E+02	2.23E+02	1.34E+02	5.63E+01	1.55E+01	6.48E+00	2.38E+00	1.09E+00	3.79E-01	1.56E-01	1.37E-03	**2.41E+03**
11.08.20 15:36	1.66E+03	2.96E+02	2.23E+02	1.34E+02	5.67E+01	1.57E+01	6.76E+00	2.60E+00	1.21E+00	4.17E-01	1.67E-01	2.93E-03	**2.39E+03**
11.08.20 15:36	1.65E+03	2.96E+02	2.22E+02	1.34E+02	5.70E+01	1.59E+01	6.97E+00	2.73E+00	1.29E+00	4.31E-01	1.75E-01	1.28E-03	**2.38E+03**
11.08.20 15:36	1.64E+03	2.95E+02	2.22E+02	1.33E+02	5.71E+01	1.59E+01	6.95E+00	2.71E+00	1.29E+00	4.29E-01	1.73E-01	1.54E-03	**2.38E+03**
11.08.20 15:37	1.63E+03	2.94E+02	2.21E+02	1.34E+02	5.70E+01	1.58E+01	6.91E+00	2.70E+00	1.28E+00	4.22E-01	1.76E-01	7.78E-04	**2.36E+03**
11.08.20 15:37	1.63E+03	2.93E+02	2.20E+02	1.34E+02	5.68E+01	1.57E+01	6.78E+00	2.55E+00	1.21E+00	3.97E-01	1.70E-01	0.00E+00	**2.36E+03**
11.08.20 15:37	1.62E+03	2.92E+02	2.20E+02	1.34E+02	5.64E+01	1.53E+01	6.42E+00	2.27E+00	1.03E+00	3.48E-01	1.58E-01	0.00E+00	**2.35E+03**
11.08.20 15:37	1.62E+03	2.92E+02	2.20E+02	1.34E+02	5.60E+01	1.50E+01	6.10E+00	1.99E+00	8.82E-01	3.08E-01	1.44E-01	0.00E+00	**2.35E+03**
11.08.20 15:37	1.61E+03	2.92E+02	2.20E+02	1.34E+02	5.59E+01	1.51E+01	6.00E+00	1.88E+00	8.18E-01	2.90E-01	1.39E-01	0.00E+00	**2.34E+03**
11.08.20 15:37	1.62E+03	2.90E+02	2.21E+02	1.34E+02	5.61E+01	1.51E+01	6.02E+00	1.89E+00	8.07E-01	2.81E-01	1.36E-01	0.00E+00	**2.34E+03**
11.08.20 15:38	1.62E+03	2.89E+02	2.21E+02	1.34E+02	5.63E+01	1.50E+01	6.00E+00	1.85E+00	7.97E-01	2.78E-01	1.39E-01	0.00E+00	**2.35E+03**
11.08.20 15:38	1.62E+03	2.89E+02	2.22E+02	1.34E+02	5.65E+01	1.52E+01	6.09E+00	1.90E+00	8.25E-01	2.87E-01	1.41E-01	0.00E+00	**2.35E+03**
11.08.20 15:38	1.63E+03	2.90E+02	2.22E+02	1.34E+02	5.69E+01	1.54E+01	6.30E+00	2.06E+00	9.18E-01	3.13E-01	1.46E-01	0.00E+00	**2.36E+03**
11.08.20 15:38	1.63E+03	2.91E+02	2.21E+02	1.35E+02	5.77E+01	1.57E+01	6.49E+00	2.28E+00	1.01E+00	3.46E-01	1.53E-01	0.00E+00	**2.36E+03**
11.08.20 15:38	1.63E+03	2.90E+02	2.22E+02	1.35E+02	5.81E+01	1.58E+01	6.55E+00	2.34E+00	1.04E+00	3.54E-01	1.54E-01	0.00E+00	**2.36E+03**
11.08.20 15:38	1.63E+03	2.90E+02	2.22E+02	1.35E+02	5.83E+01	1.59E+01	6.57E+00	2.33E+00	1.04E+00	3.55E-01	1.50E-01	0.00E+00	**2.36E+03**
11.08.20 15:39	1.62E+03	2.90E+02	2.22E+02	1.35E+02	5.83E+01	1.59E+01	6.58E+00	2.33E+00	1.06E+00	3.55E-01	1.52E-01	0.00E+00	**2.35E+03**
11.08.20 15:39	1.62E+03	2.90E+02	2.22E+02	1.35E+02	5.81E+01	1.58E+01	6.43E+00	2.26E+00	9.83E-01	3.30E-01	1.45E-01	0.00E+00	**2.35E+03**
11.08.20 15:39	1.63E+03	2.88E+02	2.22E+02	1.35E+02	5.79E+01	1.56E+01	6.21E+00	2.04E+00	8.66E-01	3.11E-01	1.44E-01	0.00E+00	**2.35E+03**
11.08.20 15:39	1.62E+03	2.88E+02	2.23E+02	1.35E+02	5.78E+01	1.55E+01	6.07E+00	1.85E+00	7.90E-01	2.79E-01	1.38E-01	0.00E+00	**2.35E+03**
11.08.20 15:39	1.63E+03	2.87E+02	2.23E+02	1.35E+02	5.77E+01	1.56E+01	5.97E+00	1.77E+00	7.60E-01	2.75E-01	1.33E-01	0.00E+00	**2.36E+03**
11.08.20 15:39	1.62E+03	2.87E+02	2.22E+02	1.35E+02	5.76E+01	1.55E+01	5.96E+00	1.77E+00	7.35E-01	2.75E-01	1.32E-01	0.00E+00	**2.35E+03**
11.08.20 15:40	1.61E+03	2.86E+02	2.22E+02	1.34E+02	5.77E+01	1.55E+01	5.95E+00	1.78E+00	7.19E-01	2.75E-01	1.29E-01	0.00E+00	**2.33E+03**
11.08.20 15:40	1.59E+03	2.85E+02	2.21E+02	1.35E+02	5.79E+01	1.56E+01	6.09E+00	1.82E+00	7.41E-01	2.86E-01	1.24E-01	0.00E+00	**2.31E+03**
11.08.20 15:40	1.58E+03	2.85E+02	2.21E+02	1.34E+02	5.78E+01	1.54E+01	6.17E+00	1.93E+00	7.70E-01	2.94E-01	1.23E-01	0.00E+00	**2.30E+03**
11.08.20 15:40	1.57E+03	2.85E+02	2.21E+02	1.34E+02	5.76E+01	1.54E+01	6.29E+00	2.05E+00	8.22E-01	3.11E-01	1.28E-01	0.00E+00	**2.30E+03**
11.08.20 15:40	1.56E+03	2.84E+02	2.20E+02	1.34E+02	5.77E+01	1.54E+01	6.34E+00	2.10E+00	8.34E-01	3.10E-01	1.36E-01	0.00E+00	**2.28E+03**
11.08.20 15:40	1.56E+03	2.82E+02	2.19E+02	1.34E+02	5.77E+01	1.54E+01	6.36E+00	2.06E+00	8.32E-01	3.05E-01	1.41E-01	0.00E+00	**2.28E+03**
11.08.20 15:41	1.55E+03	2.81E+02	2.20E+02	1.34E+02	5.79E+01	1.55E+01	6.33E+00	2.06E+00	8.16E-01	3.11E-01	1.41E-01	0.00E+00	**2.27E+03**
11.08.20 15:41	1.55E+03	2.81E+02	2.19E+02	1.34E+02	5.78E+01	1.54E+01	6.18E+00	1.94E+00	7.74E-01	2.95E-01	1.38E-01	0.00E+00	**2.27E+03**
11.08.20 15:41	1.54E+03	2.80E+02	2.19E+02	1.34E+02	5.77E+01	1.53E+01	6.08E+00	1.84E+00	7.34E-01	2.75E-01	1.35E-01	0.00E+00	**2.26E+03**
11.08.20 15:41	1.54E+03	2.82E+02	2.20E+02	1.34E+02	5.77E+01	1.52E+01	5.92E+00	1.68E+00	6.64E-01	2.58E-01	1.25E-01	0.00E+00	**2.26E+03**
11.08.20 15:41	1.55E+03	2.83E+02	2.21E+02	1.35E+02	5.75E+01	1.52E+01	5.83E+00	1.62E+00	6.50E-01	2.59E-01	1.22E-01	0.00E+00	**2.27E+03**
11.08.20 15:41	1.56E+03	2.83E+02	2.21E+02	1.35E+02	5.75E+01	1.52E+01	5.81E+00	1.63E+00	6.41E-01	2.57E-01	1.15E-01	0.00E+00	**2.28E+03**
11.08.20 15:42	1.56E+03	2.83E+02	2.22E+02	1.34E+02	5.74E+01	1.51E+01	5.80E+00	1.60E+00	6.37E-01	2.48E-01	1.20E-01	0.00E+00	**2.28E+03**
11.08.20 15:42	1.57E+03	2.83E+02	2.22E+02	1.35E+02	5.75E+01	1.52E+01	5.86E+00	1.67E+00	6.73E-01	2.56E-01	1.22E-01	0.00E+00	**2.29E+03**
11.08.20 15:42	1.57E+03	2.82E+02	2.21E+02	1.35E+02	5.78E+01	1.53E+01	6.05E+00	1.83E+00	7.71E-01	2.85E-01	1.28E-01	0.00E+00	**2.29E+03**
11.08.20 15:42	1.55E+03	2.81E+02	2.20E+02	1.34E+02	5.81E+01	1.57E+01	6.35E+00	2.06E+00	8.97E-01	3.12E-01	1.40E-01	0.00E+00	**2.27E+03**

11.08.20 15:42	1.55E+03	2.80E+02	2.20E+02	1.34E+02	5.83E+01	1.57E+01	6.45E+00	2.15E+00	9.19E-01	3.10E-01	1.45E-01	0.00E+00	**2.27E+03**
11.08.20 15:42	1.55E+03	2.80E+02	2.19E+02	1.34E+02	5.84E+01	1.56E+01	6.42E+00	2.12E+00	8.96E-01	3.07E-01	1.44E-01	0.00E+00	**2.27E+03**
11.08.20 15:43	1.54E+03	2.79E+02	2.18E+02	1.34E+02	5.83E+01	1.55E+01	6.37E+00	2.10E+00	8.93E-01	3.17E-01	1.48E-01	0.00E+00	**2.25E+03**
11.08.20 15:43	1.53E+03	2.78E+02	2.18E+02	1.34E+02	5.80E+01	1.53E+01	6.15E+00	1.98E+00	8.17E-01	3.05E-01	1.48E-01	0.00E+00	**2.24E+03**
11.08.20 15:43	1.53E+03	2.77E+02	2.18E+02	1.34E+02	5.76E+01	1.51E+01	5.93E+00	1.75E+00	6.81E-01	2.78E-01	1.42E-01	0.00E+00	**2.24E+03**
11.08.20 15:43	1.50E+03	2.75E+02	2.18E+02	1.33E+02	5.72E+01	1.47E+01	5.66E+00	1.55E+00	5.80E-01	2.50E-01	1.39E-01	0.00E+00	**2.21E+03**
11.08.20 15:43	1.49E+03	2.73E+02	2.18E+02	1.33E+02	5.67E+01	1.47E+01	5.60E+00	1.50E+00	5.75E-01	2.52E-01	1.41E-01	0.00E+00	**2.20E+03**
11.08.20 15:43	1.48E+03	2.73E+02	2.18E+02	1.32E+02	5.68E+01	1.46E+01	5.59E+00	1.48E+00	5.80E-01	2.49E-01	1.41E-01	0.00E+00	**2.18E+03**
11.08.20 15:44	1.47E+03	2.73E+02	2.18E+02	1.32E+02	5.67E+01	1.47E+01	5.60E+00	1.46E+00	5.58E-01	2.43E-01	1.38E-01	0.00E+00	**2.17E+03**
11.08.20 15:44	1.46E+03	2.72E+02	2.17E+02	1.32E+02	5.69E+01	1.47E+01	5.75E+00	1.54E+00	6.10E-01	2.41E-01	1.36E-01	7.95E-05	**2.16E+03**
11.08.20 15:44	1.44E+03	2.71E+02	2.16E+02	1.31E+02	5.71E+01	1.49E+01	5.98E+00	1.77E+00	7.26E-01	2.51E-01	1.39E-01	2.20E-03	**2.14E+03**
11.08.20 15:44	1.44E+03	2.71E+02	2.15E+02	1.31E+02	5.74E+01	1.51E+01	6.20E+00	1.93E+00	8.16E-01	2.77E-01	1.39E-01	3.13E-03	**2.14E+03**
11.08.20 15:44	1.43E+03	2.70E+02	2.15E+02	1.30E+02	5.75E+01	1.50E+01	6.25E+00	1.99E+00	8.16E-01	2.75E-01	1.37E-01	3.37E-03	**2.12E+03**
11.08.20 15:44	1.42E+03	2.68E+02	2.14E+02	1.30E+02	5.73E+01	1.51E+01	6.26E+00	2.00E+00	8.18E-01	2.74E-01	1.34E-01	1.99E-03	**2.11E+03**
11.08.20 15:45	1.42E+03	2.67E+02	2.15E+02	1.31E+02	5.72E+01	1.51E+01	6.23E+00	1.98E+00	8.14E-01	2.72E-01	1.36E-01	4.25E-04	**2.11E+03**
11.08.20 15:45	1.42E+03	2.68E+02	2.15E+02	1.31E+02	5.70E+01	1.49E+01	6.02E+00	1.82E+00	7.08E-01	2.55E-01	1.31E-01	0.00E+00	**2.11E+03**
11.08.20 15:45	1.41E+03	2.68E+02	2.16E+02	1.31E+02	5.68E+01	1.48E+01	5.69E+00	1.59E+00	5.82E-01	2.35E-01	1.25E-01	0.00E+00	**2.11E+03**
11.08.20 15:45	1.41E+03	2.67E+02	2.16E+02	1.31E+02	5.66E+01	1.46E+01	5.53E+00	1.46E+00	5.06E-01	2.10E-01	1.28E-01	0.00E+00	**2.10E+03**
11.08.20 15:45	1.41E+03	2.67E+02	2.15E+02	1.31E+02	5.67E+01	1.45E+01	5.51E+00	1.39E+00	4.81E-01	2.08E-01	1.25E-01	0.00E+00	**2.10E+03**
11.08.20 15:45	1.40E+03	2.67E+02	2.15E+02	1.31E+02	5.68E+01	1.45E+01	5.47E+00	1.35E+00	4.79E-01	1.99E-01	1.26E-01	0.00E+00	**2.09E+03**
11.08.20 15:46	1.40E+03	2.65E+02	2.14E+02	1.30E+02	5.67E+01	1.44E+01	5.45E+00	1.35E+00	4.73E-01	2.06E-01	1.29E-01	0.00E+00	**2.08E+03**
11.08.20 15:46	1.39E+03	2.64E+02	2.13E+02	1.30E+02	5.70E+01	1.46E+01	5.79E+00	1.68E+00	6.56E-01	2.56E-01	1.44E-01	0.00E+00	**2.07E+03**
11.08.20 15:46	1.38E+03	2.62E+02	2.12E+02	1.29E+02	5.71E+01	1.48E+01	6.11E+00	1.94E+00	8.13E-01	2.86E-01	1.49E-01	0.00E+00	**2.06E+03**
11.08.20 15:46	1.36E+03	2.59E+02	2.10E+02	1.29E+02	5.71E+01	1.50E+01	6.26E+00	2.05E+00	9.03E-01	3.10E-01	1.49E-01	0.00E+00	**2.04E+03**
11.08.20 15:46	1.35E+03	2.59E+02	2.10E+02	1.29E+02	5.72E+01	1.49E+01	6.21E+00	2.05E+00	9.09E-01	3.14E-01	1.54E-01	0.00E+00	**2.03E+03**

Appendix 3. Raw data from ELPI measurement (Calculated moment). Hairspray 2.

DEKATI

ELPI Calculated moment

Date	08.11.2020	Filename	07082020a_JuliaNEW.dat
Time	14:52:11	Note	Korjattu impaktorikatakaisuarvo

Number N [1/cm³]

Calculated moment

Density	1.0
Dilution	1

☑ Correction

Concentration	
From Ch	1
To Ch	1

Time	0.01	0.04	0.07	0.12	0.20	0.31	0.48	0.76	1.22	1.95	3.07	6.27	Total
11.08.20 15:46	1.73E+03	2.98E+02	2.37E+02	1.50E+02	7.15E+01	2.37E+01	1.67E+01	1.02E+01	6.31E+00	3.16E+00	2.24E+00	6.33E-01	**2.55E+03**
11.08.20 15:47	3.14E+03	4.44E+02	3.29E+02	2.20E+02	1.17E+02	5.03E+01	4.65E+01	3.27E+01	2.06E+01	9.92E+00	6.55E+00	1.46E+00	**4.42E+03**
11.08.20 15:47	3.52E+03	4.80E+02	3.51E+02	2.38E+02	1.32E+02	6.03E+01	5.87E+01	4.28E+01	2.71E+01	1.27E+01	8.02E+00	1.69E+00	**4.93E+03**
11.08.20 15:47	3.67E+03	4.97E+02	3.62E+02	2.47E+02	1.38E+02	6.37E+01	6.26E+01	4.57E+01	2.90E+01	1.37E+01	8.56E+00	1.80E+00	**5.14E+03**
11.08.20 15:47	3.79E+03	5.08E+02	3.70E+02	2.53E+02	1.42E+02	6.59E+01	6.51E+01	4.76E+01	3.02E+01	1.42E+01	8.92E+00	1.86E+00	**5.30E+03**
11.08.20 15:47	3.84E+03	5.13E+02	3.74E+02	2.56E+02	1.43E+02	6.70E+01	6.64E+01	4.86E+01	3.08E+01	1.45E+01	9.10E+00	1.90E+00	**5.36E+03**
11.08.20 15:47	2.84E+03	4.10E+02	3.04E+02	2.03E+02	1.10E+02	4.71E+01	4.38E+01	3.15E+01	1.98E+01	8.90E+00	5.15E+00	8.93E-01	**4.02E+03**
11.08.20 15:48	2.11E+03	3.37E+02	2.60E+02	1.69E+02	8.54E+01	3.22E+01	2.66E+01	1.79E+01	1.10E+01	4.95E+00	2.88E+00	5.00E-01	**3.06E+03**
11.08.20 15:48	2.06E+03	3.34E+02	2.58E+02	1.68E+02	8.15E+01	2.92E+01	2.24E+01	1.40E+01	8.46E+00	4.02E+00	2.58E+00	5.14E-01	**2.98E+03**
11.08.20 15:48	2.15E+03	3.45E+02	2.66E+02	1.73E+02	8.51E+01	3.12E+01	2.45E+01	1.56E+01	9.41E+00	4.49E+00	2.91E+00	6.06E-01	**3.11E+03**
11.08.20 15:48	2.32E+03	3.65E+02	2.78E+02	1.83E+02	9.14E+01	3.50E+01	2.85E+01	1.85E+01	1.12E+01	5.41E+00	3.52E+00	7.50E-01	**3.34E+03**
11.08.20 15:48	2.56E+03	3.90E+02	2.94E+02	1.97E+02	1.00E+02	4.02E+01	3.41E+01	2.26E+01	1.38E+01	6.68E+00	4.36E+00	9.29E-01	**3.66E+03**
11.08.20 15:48	2.79E+03	4.15E+02	3.09E+02	2.10E+02	1.09E+02	4.54E+01	3.97E+01	2.69E+01	1.64E+01	7.93E+00	5.10E+00	1.07E+00	**3.97E+03**
11.08.20 15:49	2.87E+03	4.25E+02	3.15E+02	2.15E+02	1.14E+02	4.85E+01	4.31E+01	2.96E+01	1.81E+01	8.62E+00	5.45E+00	1.13E+00	**4.10E+03**
11.08.20 15:49	2.91E+03	4.31E+02	3.17E+02	2.17E+02	1.17E+02	5.05E+01	4.56E+01	3.17E+01	1.94E+01	9.15E+00	5.71E+00	1.17E+00	**4.16E+03**
11.08.20 15:49	2.90E+03	4.30E+02	3.16E+02	2.16E+02	1.17E+02	5.04E+01	4.56E+01	3.17E+01	1.93E+01	9.11E+00	5.66E+00	1.15E+00	**4.14E+03**
11.08.20 15:49	2.88E+03	4.28E+02	3.15E+02	2.16E+02	1.17E+02	5.02E+01	4.55E+01	3.16E+01	1.92E+01	9.04E+00	5.58E+00	1.11E+00	**4.12E+03**
11.08.20 15:49	2.81E+03	4.23E+02	3.10E+02	2.12E+02	1.15E+02	4.89E+01	4.42E+01	3.06E+01	1.85E+01	8.68E+00	5.34E+00	1.07E+00	**4.02E+03**
11.08.20 15:49	2.72E+03	4.15E+02	3.04E+02	2.07E+02	1.12E+02	4.71E+01	4.21E+01	2.90E+01	1.75E+01	8.19E+00	5.04E+00	9.93E-01	**3.90E+03**
11.08.20 15:50	2.66E+03	4.09E+02	3.02E+02	2.05E+02	1.09E+02	4.55E+01	4.00E+01	2.71E+01	1.63E+01	7.72E+00	4.81E+00	9.40E-01	**3.83E+03**
11.08.20 15:50	2.62E+03	4.04E+02	2.99E+02	2.03E+02	1.07E+02	4.41E+01	3.82E+01	2.56E+01	1.54E+01	7.33E+00	4.60E+00	8.99E-01	**3.77E+03**
11.08.20 15:50	2.58E+03	4.00E+02	2.97E+02	2.02E+02	1.06E+02	4.36E+01	3.77E+01	2.52E+01	1.51E+01	7.22E+00	4.51E+00	8.69E-01	**3.72E+03**
11.08.20 15:50	2.52E+03	3.93E+02	2.93E+02	1.99E+02	1.05E+02	4.27E+01	3.67E+01	2.45E+01	1.47E+01	6.99E+00	4.35E+00	8.30E-01	**3.64E+03**
11.08.20 15:50	2.45E+03	3.86E+02	2.90E+02	1.97E+02	1.03E+02	4.20E+01	3.59E+01	2.40E+01	1.43E+01	6.81E+00	4.22E+00	7.96E-01	**3.56E+03**
11.08.20 15:50	2.42E+03	3.80E+02	2.88E+02	1.94E+02	1.03E+02	4.20E+01	3.61E+01	2.43E+01	1.45E+01	6.83E+00	4.17E+00	7.82E-01	**3.51E+03**
11.08.20 15:51	2.38E+03	3.75E+02	2.84E+02	1.92E+02	1.03E+02	4.21E+01	3.67E+01	2.50E+01	1.49E+01	6.89E+00	4.11E+00	7.60E-01	**3.47E+03**
11.08.20 15:51	2.35E+03	3.71E+02	2.80E+02	1.90E+02	1.03E+02	4.19E+01	3.69E+01	2.51E+01	1.50E+01	6.86E+00	4.04E+00	7.36E-01	**3.42E+03**
11.08.20 15:51	2.32E+03	3.68E+02	2.78E+02	1.89E+02	1.02E+02	4.17E+01	3.65E+01	2.49E+01	1.48E+01	6.75E+00	3.97E+00	7.19E-01	**3.38E+03**
11.08.20 15:51	2.31E+03	3.68E+02	2.77E+02	1.88E+02	1.02E+02	4.15E+01	3.62E+01	2.47E+01	1.47E+01	6.71E+00	3.92E+00	7.08E-01	**3.38E+03**
11.08.20 15:51	2.30E+03	3.67E+02	2.75E+02	1.87E+02	1.01E+02	4.12E+01	3.58E+01	2.43E+01	1.45E+01	6.61E+00	3.85E+00	6.84E-01	**3.36E+03**
11.08.20 15:51	2.29E+03	3.67E+02	2.76E+02	1.88E+02	1.00E+02	4.04E+01	3.46E+01	2.31E+01	1.37E+01	6.38E+00	3.76E+00	6.64E-01	**3.34E+03**
11.08.20 15:52	2.27E+03	3.66E+02	2.76E+02	1.87E+02	9.88E+01	3.95E+01	3.34E+01	2.21E+01	1.30E+01	6.17E+00	3.65E+00	6.47E-01	**3.31E+03**
11.08.20 15:52	2.24E+03	3.63E+02	2.75E+02	1.86E+02	9.79E+01	3.90E+01	3.26E+01	2.14E+01	1.26E+01	5.99E+00	3.55E+00	6.26E-01	**3.28E+03**
11.08.20 15:52	2.20E+03	3.59E+02	2.73E+02	1.84E+02	9.71E+01	3.85E+01	3.21E+01	2.10E+01	1.24E+01	5.83E+00	3.44E+00	6.00E-01	**3.22E+03**
11.08.20 15:52	2.16E+03	3.54E+02	2.71E+02	1.83E+02	9.64E+01	3.80E+01	3.16E+01	2.06E+01	1.21E+01	5.68E+00	3.33E+00	5.73E-01	**3.18E+03**
11.08.20 15:52	2.13E+03	3.48E+02	2.69E+02	1.81E+02	9.56E+01	3.74E+01	3.11E+01	2.02E+01	1.18E+01	5.50E+00	3.20E+00	5.42E-01	**3.13E+03**
11.08.20 15:52	2.09E+03	3.45E+02	2.65E+02	1.79E+02	9.50E+01	3.72E+01	3.11E+01	2.03E+01	1.18E+01	5.43E+00	3.11E+00	5.13E-01	**3.09E+03**
11.08.20 15:53	2.06E+03	3.43E+02	2.63E+02	1.77E+02	9.48E+01	3.73E+01	3.12E+01	2.05E+01	1.19E+01	5.39E+00	3.06E+00	4.96E-01	**3.05E+03**
11.08.20 15:53	2.06E+03	3.42E+02	2.62E+02	1.76E+02	9.46E+01	3.73E+01	3.12E+01	2.06E+01	1.20E+01	5.38E+00	3.02E+00	4.86E-01	**3.05E+03**
11.08.20 15:53	2.07E+03	3.43E+02	2.60E+02	1.76E+02	9.41E+01	3.70E+01	3.10E+01	2.04E+01	1.19E+01	5.33E+00	2.98E+00	4.81E-01	**3.05E+03**
11.08.20 15:53	2.05E+03	3.43E+02	2.60E+02	1.75E+02	9.34E+01	3.67E+01	3.07E+01	2.02E+01	1.18E+01	5.24E+00	2.92E+00	4.71E-01	**3.03E+03**
11.08.20 15:53	2.02E+03	3.44E+02	2.58E+02	1.75E+02	9.30E+01	3.65E+01	3.04E+01	1.99E+01	1.16E+01	5.17E+00	2.88E+00	4.61E-01	**3.00E+03**

11.08.20 15:53	2.02E+03	3.42E+02	2.59E+02	1.75E+02	9.24E+01	3.62E+01	2.98E+01	1.93E+01	1.13E+01	5.07E+00	2.82E+00	4.59E-01	**2.99E+03**
11.08.20 15:54	2.00E+03	3.39E+02	2.58E+02	1.74E+02	9.15E+01	3.55E+01	2.90E+01	1.86E+01	1.08E+01	4.90E+00	2.74E+00	4.39E-01	**2.96E+03**
11.08.20 15:54	1.97E+03	3.36E+02	2.57E+02	1.73E+02	9.09E+01	3.50E+01	2.85E+01	1.81E+01	1.05E+01	4.80E+00	2.67E+00	4.21E-01	**2.93E+03**
11.08.20 15:54	1.94E+03	3.32E+02	2.56E+02	1.72E+02	9.02E+01	3.47E+01	2.83E+01	1.79E+01	1.03E+01	4.71E+00	2.61E+00	4.07E-01	**2.89E+03**
11.08.20 15:54	1.93E+03	3.29E+02	2.55E+02	1.71E+02	8.99E+01	3.44E+01	2.81E+01	1.78E+01	1.02E+01	4.67E+00	2.57E+00	3.97E-01	**2.87E+03**
11.08.20 15:54	1.91E+03	3.30E+02	2.54E+02	1.70E+02	8.94E+01	3.42E+01	2.79E+01	1.76E+01	1.01E+01	4.62E+00	2.53E+00	3.88E-01	**2.85E+03**
11.08.20 15:54	1.88E+03	3.30E+02	2.52E+02	1.69E+02	8.91E+01	3.43E+01	2.81E+01	1.79E+01	1.03E+01	4.61E+00	2.50E+00	3.76E-01	**2.82E+03**
11.08.20 15:55	1.85E+03	3.28E+02	2.50E+02	1.68E+02	8.90E+01	3.43E+01	2.83E+01	1.81E+01	1.04E+01	4.60E+00	2.46E+00	3.65E-01	**2.79E+03**
11.08.20 15:55	1.84E+03	3.26E+02	2.49E+02	1.67E+02	8.86E+01	3.42E+01	2.83E+01	1.82E+01	1.04E+01	4.54E+00	2.43E+00	3.59E-01	**2.77E+03**
11.08.20 15:55	1.82E+03	3.25E+02	2.48E+02	1.66E+02	8.83E+01	3.40E+01	2.80E+01	1.80E+01	1.03E+01	4.48E+00	2.40E+00	3.49E-01	**2.75E+03**
11.08.20 15:55	1.81E+03	3.23E+02	2.47E+02	1.66E+02	8.80E+01	3.39E+01	2.77E+01	1.78E+01	1.02E+01	4.43E+00	2.35E+00	3.37E-01	**2.74E+03**
11.08.20 15:55	1.80E+03	3.18E+02	2.45E+02	1.65E+02	8.75E+01	3.34E+01	2.73E+01	1.74E+01	9.94E+00	4.33E+00	2.29E+00	3.24E-01	**2.71E+03**
11.08.20 15:55	1.79E+03	3.16E+02	2.44E+02	1.65E+02	8.69E+01	3.28E+01	2.66E+01	1.68E+01	9.54E+00	4.21E+00	2.22E+00	3.17E-01	**2.70E+03**
11.08.20 15:56	1.79E+03	3.15E+02	2.44E+02	1.64E+02	8.60E+01	3.22E+01	2.57E+01	1.61E+01	9.16E+00	4.10E+00	2.16E+00	3.08E-01	**2.69E+03**
11.08.20 15:56	1.78E+03	3.13E+02	2.44E+02	1.64E+02	8.54E+01	3.18E+01	2.54E+01	1.58E+01	8.96E+00	4.04E+00	2.10E+00	3.01E-01	**2.68E+03**
11.08.20 15:56	1.77E+03	3.11E+02	2.43E+02	1.63E+02	8.51E+01	3.17E+01	2.52E+01	1.56E+01	8.82E+00	3.97E+00	2.06E+00	2.91E-01	**2.66E+03**
11.08.20 15:56	1.76E+03	3.09E+02	2.43E+02	1.62E+02	8.47E+01	3.14E+01	2.50E+01	1.55E+01	8.71E+00	3.91E+00	2.03E+00	2.86E-01	**2.65E+03**
11.08.20 15:56	1.76E+03	3.08E+02	2.42E+02	1.62E+02	8.42E+01	3.14E+01	2.49E+01	1.56E+01	8.73E+00	3.89E+00	2.04E+00	2.85E-01	**2.64E+03**
11.08.20 15:56	1.74E+03	3.06E+02	2.41E+02	1.61E+02	8.43E+01	3.15E+01	2.52E+01	1.59E+01	8.93E+00	3.90E+00	2.02E+00	2.74E-01	**2.62E+03**
11.08.20 15:57	1.72E+03	3.03E+02	2.39E+02	1.60E+02	8.43E+01	3.18E+01	2.56E+01	1.63E+01	9.10E+00	3.89E+00	1.99E+00	2.64E-01	**2.59E+03**
11.08.20 15:58	1.64E+03	2.92E+02	2.32E+02	1.55E+02	8.02E+01	2.87E+01	2.25E+01	1.35E+01	7.58E+00	3.28E+00	1.62E+00	1.99E-01	**2.47E+03**
11.08.20 15:58	1.61E+03	2.92E+02	2.32E+02	1.54E+02	8.00E+01	2.85E+01	2.23E+01	1.33E+01	7.47E+00	3.21E+00	1.59E+00	1.95E-01	**2.45E+03**
11.08.20 15:58	1.59E+03	2.90E+02	2.32E+02	1.54E+02	8.01E+01	2.83E+01	2.21E+01	1.32E+01	7.38E+00	3.16E+00	1.57E+00	1.90E-01	**2.43E+03**
11.08.20 15:58	1.57E+03	2.90E+02	2.31E+02	1.53E+02	8.01E+01	2.83E+01	2.21E+01	1.32E+01	7.35E+00	3.14E+00	1.55E+00	1.84E-01	**2.40E+03**
11.08.20 15:58	1.56E+03	2.89E+02	2.30E+02	1.53E+02	8.05E+01	2.86E+01	2.24E+01	1.35E+01	7.48E+00	3.17E+00	1.53E+00	1.79E-01	**2.39E+03**
11.08.20 15:59	1.56E+03	2.89E+02	2.29E+02	1.53E+02	8.07E+01	2.89E+01	2.26E+01	1.37E+01	7.59E+00	3.17E+00	1.52E+00	1.78E-01	**2.39E+03**
11.08.20 15:59	1.57E+03	2.88E+02	2.29E+02	1.53E+02	8.07E+01	2.88E+01	2.25E+01	1.37E+01	7.57E+00	3.15E+00	1.51E+00	1.75E-01	**2.40E+03**
11.08.20 15:59	1.57E+03	2.88E+02	2.28E+02	1.52E+02	8.05E+01	2.88E+01	2.24E+01	1.37E+01	7.53E+00	3.13E+00	1.48E+00	1.73E-01	**2.39E+03**
11.08.20 15:59	1.56E+03	2.88E+02	2.28E+02	1.52E+02	8.00E+01	2.87E+01	2.23E+01	1.36E+01	7.47E+00	3.09E+00	1.45E+00	1.70E-01	**2.39E+03**
11.08.20 15:59	1.56E+03	2.87E+02	2.28E+02	1.52E+02	7.94E+01	2.82E+01	2.18E+01	1.31E+01	7.19E+00	2.99E+00	1.40E+00	1.63E-01	**2.38E+03**
11.08.20 15:59	1.56E+03	2.86E+02	2.28E+02	1.51E+02	7.88E+01	2.77E+01	2.12E+01	1.26E+01	6.91E+00	2.90E+00	1.37E+00	1.57E-01	**2.38E+03**
11.08.20 16:00	1.53E+03	2.85E+02	2.28E+02	1.51E+02	7.82E+01	2.72E+01	2.08E+01	1.21E+01	6.68E+00	2.81E+00	1.33E+00	1.51E-01	**2.35E+03**
11.08.20 16:00	1.52E+03	2.84E+02	2.27E+02	1.50E+02	7.78E+01	2.69E+01	2.06E+01	1.20E+01	6.56E+00	2.78E+00	1.30E+00	1.46E-01	**2.33E+03**
11.08.20 16:00	1.51E+03	2.82E+02	2.27E+02	1.50E+02	7.75E+01	2.66E+01	2.03E+01	1.18E+01	6.43E+00	2.72E+00	1.29E+00	1.39E-01	**2.32E+03**
11.08.20 16:00	1.50E+03	2.82E+02	2.26E+02	1.49E+02	7.71E+01	2.64E+01	2.01E+01	1.17E+01	6.35E+00	2.68E+00	1.26E+00	1.36E-01	**2.30E+03**
11.08.20 16:00	1.48E+03	2.80E+02	2.25E+02	1.49E+02	7.71E+01	2.66E+01	2.03E+01	1.21E+01	6.54E+00	2.74E+00	1.27E+00	1.37E-01	**2.28E+03**
11.08.20 16:00	1.47E+03	2.78E+02	2.23E+02	1.48E+02	7.70E+01	2.67E+01	2.04E+01	1.22E+01	6.60E+00	2.72E+00	1.25E+00	1.36E-01	**2.26E+03**
11.08.20 16:01	1.47E+03	2.74E+02	2.22E+02	1.47E+02	7.67E+01	2.68E+01	2.04E+01	1.23E+01	6.61E+00	2.72E+00	1.23E+00	1.30E-01	**2.26E+03**
11.08.20 16:01	1.47E+03	2.73E+02	2.21E+02	1.47E+02	7.65E+01	2.67E+01	2.03E+01	1.22E+01	6.59E+00	2.69E+00	1.21E+00	1.26E-01	**2.25E+03**
11.08.20 16:01	1.46E+03	2.72E+02	2.20E+02	1.47E+02	7.63E+01	2.67E+01	2.03E+01	1.20E+01	6.57E+00	2.67E+00	1.19E+00	1.23E-01	**2.24E+03**
11.08.20 16:01	1.46E+03	2.71E+02	2.20E+02	1.46E+02	7.63E+01	2.66E+01	2.02E+01	1.19E+01	6.47E+00	2.63E+00	1.17E+00	1.18E-01	**2.25E+03**
11.08.20 16:01	1.46E+03	2.71E+02	2.21E+02	1.46E+02	7.56E+01	2.60E+01	1.94E+01	1.12E+01	6.08E+00	2.50E+00	1.12E+00	1.13E-01	**2.24E+03**
11.08.20 16:01	1.46E+03	2.71E+02	2.21E+02	1.46E+02	7.53E+01	2.58E+01	1.92E+01	1.10E+01	5.92E+00	2.45E+00	1.10E+00	1.10E-01	**2.24E+03**
11.08.20 16:02	1.46E+03	2.74E+02	2.22E+02	1.47E+02	7.51E+01	2.54E+01	1.88E+01	1.06E+01	5.75E+00	2.38E+00	1.07E+00	1.08E-01	**2.24E+03**
11.08.20 16:02	1.46E+03	2.74E+02	2.22E+02	1.47E+02	7.49E+01	2.52E+01	1.85E+01	1.05E+01	5.64E+00	2.34E+00	1.05E+00	1.05E-01	**2.24E+03**
11.08.20 16:02	1.45E+03	2.74E+02	2.23E+02	1.46E+02	7.47E+01	2.49E+01	1.83E+01	1.04E+01	5.55E+00	2.30E+00	1.03E+00	1.02E-01	**2.23E+03**
11.08.20 16:02	1.45E+03	2.72E+02	2.22E+02	1.46E+02	7.44E+01	2.48E+01	1.81E+01	1.03E+01	5.47E+00	2.26E+00	1.02E+00	9.97E-02	**2.22E+03**
11.08.20 16:02	1.44E+03	2.72E+02	2.21E+02	1.46E+02	7.43E+01	2.47E+01	1.81E+01	1.03E+01	5.49E+00	2.25E+00	1.00E+00	9.45E-02	**2.22E+03**
11.08.20 16:02	1.44E+03	2.71E+02	2.21E+02	1.46E+02	7.41E+01	2.47E+01	1.81E+01	1.04E+01	5.54E+00	2.24E+00	9.94E-01	9.27E-02	**2.21E+03**
11.08.20 16:03	1.42E+03	2.67E+02	2.19E+02	1.45E+02	7.39E+01	2.48E+01	1.82E+01	1.04E+01	5.54E+00	2.23E+00	9.74E-01	8.93E-02	**2.19E+03**
11.08.20 16:03	1.41E+03	2.65E+02	2.18E+02	1.44E+02	7.38E+01	2.46E+01	1.80E+01	1.04E+01	5.50E+00	2.20E+00	9.63E-01	8.73E-02	**2.17E+03**
11.08.20 16:03	1.41E+03	2.66E+02	2.16E+02	1.43E+02	7.33E+01	2.45E+01	1.78E+01	1.02E+01	5.42E+00	2.15E+00	9.34E-01	8.57E-02	**2.17E+03**

11.08.20 16:03	1.39E+03	2.65E+02	2.16E+02	1.43E+02	7.30E+01	2.44E+01	1.76E+01	1.00E+01	5.34E+00	2.12E+00	9.11E-01	8.21E-02	**2.15E+03**
11.08.20 16:03	1.38E+03	2.65E+02	2.16E+02	1.42E+02	7.26E+01	2.41E+01	1.71E+01	9.63E+00	5.12E+00	2.05E+00	8.80E-01	7.88E-02	**2.14E+03**
11.08.20 16:03	1.38E+03	2.66E+02	2.16E+02	1.42E+02	7.22E+01	2.37E+01	1.66E+01	9.26E+00	4.92E+00	1.99E+00	8.57E-01	7.70E-02	**2.13E+03**
11.08.20 16:04	1.37E+03	2.68E+02	2.16E+02	1.42E+02	7.20E+01	2.34E+01	1.63E+01	8.98E+00	4.80E+00	1.94E+00	8.46E-01	7.61E-02	**2.12E+03**
11.08.20 16:04	1.37E+03	2.67E+02	2.16E+02	1.42E+02	7.19E+01	2.32E+01	1.61E+01	8.87E+00	4.70E+00	1.91E+00	8.31E-01	7.60E-02	**2.12E+03**
11.08.20 16:04	1.36E+03	2.66E+02	2.16E+02	1.41E+02	7.17E+01	2.31E+01	1.60E+01	8.81E+00	4.65E+00	1.89E+00	8.33E-01	7.59E-02	**2.11E+03**
11.08.20 16:04	1.37E+03	2.67E+02	2.17E+02	1.41E+02	7.13E+01	2.29E+01	1.59E+01	8.72E+00	4.62E+00	1.86E+00	8.34E-01	7.81E-02	**2.12E+03**
11.08.20 16:04	1.36E+03	2.67E+02	2.17E+02	1.41E+02	7.10E+01	2.28E+01	1.59E+01	8.71E+00	4.61E+00	1.85E+00	8.42E-01	7.89E-02	**2.11E+03**
11.08.20 16:04	1.35E+03	2.67E+02	2.16E+02	1.41E+02	7.10E+01	2.28E+01	1.60E+01	8.80E+00	4.62E+00	1.84E+00	8.44E-01	7.96E-02	**2.10E+03**
11.08.20 16:05	1.34E+03	2.65E+02	2.16E+02	1.40E+02	7.08E+01	2.28E+01	1.62E+01	8.92E+00	4.69E+00	1.83E+00	8.39E-01	7.85E-02	**2.09E+03**
11.08.20 16:05	1.33E+03	2.64E+02	2.14E+02	1.40E+02	7.06E+01	2.27E+01	1.61E+01	8.91E+00	4.67E+00	1.81E+00	8.25E-01	7.51E-02	**2.08E+03**
11.08.20 16:05	1.31E+03	2.63E+02	2.14E+02	1.39E+02	7.05E+01	2.27E+01	1.60E+01	8.85E+00	4.61E+00	1.80E+00	8.18E-01	7.42E-02	**2.05E+03**
11.08.20 16:05	1.31E+03	2.61E+02	2.13E+02	1.39E+02	7.03E+01	2.26E+01	1.59E+01	8.76E+00	4.54E+00	1.77E+00	8.01E-01	7.00E-02	**2.04E+03**
11.08.20 16:05	1.30E+03	2.59E+02	2.11E+02	1.38E+02	7.00E+01	2.23E+01	1.57E+01	8.57E+00	4.44E+00	1.72E+00	7.78E-01	6.88E-02	**2.03E+03**
11.08.20 16:05	1.29E+03	2.58E+02	2.11E+02	1.38E+02	6.97E+01	2.21E+01	1.54E+01	8.31E+00	4.28E+00	1.69E+00	7.57E-01	6.59E-02	**2.02E+03**
11.08.20 16:06	1.29E+03	2.59E+02	2.11E+02	1.38E+02	6.93E+01	2.20E+01	1.51E+01	8.07E+00	4.14E+00	1.66E+00	7.43E-01	6.09E-02	**2.01E+03**
11.08.20 16:06	1.28E+03	2.59E+02	2.10E+02	1.38E+02	6.92E+01	2.19E+01	1.50E+01	7.94E+00	4.09E+00	1.64E+00	7.28E-01	6.39E-02	**2.01E+03**
11.08.20 16:06	1.29E+03	2.60E+02	2.09E+02	1.37E+02	6.92E+01	2.17E+01	1.48E+01	7.86E+00	4.06E+00	1.60E+00	7.14E-01	6.55E-02	**2.02E+03**
11.08.20 16:06	1.28E+03	2.59E+02	2.09E+02	1.37E+02	6.92E+01	2.15E+01	1.47E+01	7.78E+00	3.99E+00	1.58E+00	7.03E-01	6.46E-02	**2.01E+03**
11.08.20 16:06	1.29E+03	2.56E+02	2.09E+02	1.37E+02	6.95E+01	2.18E+01	1.49E+01	7.99E+00	4.15E+00	1.60E+00	7.02E-01	6.51E-02	**2.01E+03**
11.08.20 16:06	1.30E+03	2.56E+02	2.09E+02	1.37E+02	6.95E+01	2.17E+01	1.51E+01	8.11E+00	4.21E+00	1.60E+00	6.97E-01	6.37E-02	**2.02E+03**
11.08.20 16:07	1.32E+03	2.58E+02	2.10E+02	1.37E+02	6.96E+01	2.17E+01	1.51E+01	8.13E+00	4.24E+00	1.59E+00	6.86E-01	6.03E-02	**2.05E+03**
11.08.20 16:07	1.33E+03	2.58E+02	2.11E+02	1.37E+02	6.93E+01	2.17E+01	1.50E+01	8.05E+00	4.18E+00	1.55E+00	6.66E-01	5.38E-02	**2.06E+03**
11.08.20 16:07	1.35E+03	2.57E+02	2.11E+02	1.37E+02	6.91E+01	2.16E+01	1.48E+01	7.91E+00	4.11E+00	1.55E+00	6.54E-01	4.98E-02	**2.07E+03**
11.08.20 16:07	1.35E+03	2.58E+02	2.11E+02	1.37E+02	6.89E+01	2.16E+01	1.46E+01	7.78E+00	4.04E+00	1.52E+00	6.40E-01	4.69E-02	**2.07E+03**
11.08.20 16:07	1.34E+03	2.60E+02	2.12E+02	1.37E+02	6.84E+01	2.12E+01	1.41E+01	7.40E+00	3.79E+00	1.45E+00	6.14E-01	4.38E-02	**2.07E+03**
11.08.20 16:07	1.35E+03	2.59E+02	2.11E+02	1.37E+02	6.81E+01	2.10E+01	1.38E+01	7.11E+00	3.65E+00	1.41E+00	5.98E-01	4.24E-02	**2.07E+03**
11.08.20 16:08	1.35E+03	2.58E+02	2.12E+02	1.37E+02	6.78E+01	2.08E+01	1.36E+01	6.97E+00	3.56E+00	1.38E+00	5.88E-01	4.34E-02	**2.07E+03**
11.08.20 16:08	1.35E+03	2.58E+02	2.12E+02	1.37E+02	6.77E+01	2.06E+01	1.35E+01	6.92E+00	3.52E+00	1.36E+00	5.83E-01	4.59E-02	**2.08E+03**
11.08.20 16:08	1.35E+03	2.60E+02	2.13E+02	1.37E+02	6.76E+01	2.06E+01	1.34E+01	6.88E+00	3.47E+00	1.34E+00	5.77E-01	4.74E-02	**2.07E+03**
11.08.20 16:08	1.35E+03	2.61E+02	2.12E+02	1.37E+02	6.76E+01	2.05E+01	1.34E+01	6.86E+00	3.44E+00	1.34E+00	5.69E-01	4.84E-02	**2.07E+03**
11.08.20 16:08	1.35E+03	2.61E+02	2.13E+02	1.37E+02	6.79E+01	2.06E+01	1.36E+01	7.03E+00	3.54E+00	1.37E+00	5.70E-01	5.12E-02	**2.08E+03**
11.08.20 16:08	1.35E+03	2.61E+02	2.13E+02	1.36E+02	6.83E+01	2.10E+01	1.41E+01	7.41E+00	3.73E+00	1.41E+00	5.82E-01	4.81E-02	**2.07E+03**
11.08.20 16:09	1.34E+03	2.60E+02	2.12E+02	1.36E+02	6.84E+01	2.11E+01	1.42E+01	7.48E+00	3.77E+00	1.42E+00	5.80E-01	4.20E-02	**2.06E+03**
11.08.20 16:09	1.33E+03	2.60E+02	2.11E+02	1.36E+02	6.83E+01	2.10E+01	1.41E+01	7.41E+00	3.75E+00	1.40E+00	5.74E-01	4.00E-02	**2.05E+03**
11.08.20 16:09	1.34E+03	2.60E+02	2.11E+02	1.35E+02	6.81E+01	2.08E+01	1.40E+01	7.35E+00	3.73E+00	1.38E+00	5.64E-01	3.82E-02	**2.06E+03**
11.08.20 16:09	1.34E+03	2.59E+02	2.11E+02	1.35E+02	6.78E+01	2.07E+01	1.38E+01	7.17E+00	3.66E+00	1.34E+00	5.48E-01	3.43E-02	**2.06E+03**
11.08.20 16:09	1.34E+03	2.59E+02	2.10E+02	1.35E+02	6.73E+01	2.02E+01	1.33E+01	6.74E+00	3.44E+00	1.26E+00	5.25E-01	3.43E-02	**2.06E+03**
11.08.20 16:09	1.34E+03	2.61E+02	2.11E+02	1.35E+02	6.68E+01	1.98E+01	1.27E+01	6.29E+00	3.21E+00	1.20E+00	5.01E-01	3.51E-02	**2.06E+03**
11.08.20 16:10	1.35E+03	2.63E+02	2.12E+02	1.35E+02	6.67E+01	1.96E+01	1.26E+01	6.10E+00	3.11E+00	1.17E+00	4.88E-01	3.54E-02	**2.07E+03**
11.08.20 16:10	1.36E+03	2.63E+02	2.13E+02	1.35E+02	6.66E+01	1.95E+01	1.24E+01	6.00E+00	3.04E+00	1.14E+00	4.72E-01	3.57E-02	**2.08E+03**
11.08.20 16:10	1.36E+03	2.63E+02	2.12E+02	1.35E+02	6.65E+01	1.94E+01	1.23E+01	5.85E+00	2.96E+00	1.12E+00	4.59E-01	3.33E-02	**2.08E+03**
11.08.20 16:10	1.37E+03	2.64E+02	2.12E+02	1.35E+02	6.64E+01	1.94E+01	1.23E+01	5.87E+00	2.98E+00	1.13E+00	4.64E-01	3.39E-02	**2.09E+03**
11.08.20 16:10	1.38E+03	2.62E+02	2.11E+02	1.35E+02	6.65E+01	1.94E+01	1.24E+01	5.95E+00	3.05E+00	1.13E+00	4.69E-01	3.29E-02	**2.09E+03**
11.08.20 16:10	1.37E+03	2.60E+02	2.10E+02	1.34E+02	6.67E+01	1.95E+01	1.25E+01	6.11E+00	3.14E+00	1.14E+00	4.66E-01	2.98E-02	**2.08E+03**
11.08.20 16:11	1.36E+03	2.58E+02	2.09E+02	1.34E+02	6.66E+01	1.94E+01	1.25E+01	6.14E+00	3.16E+00	1.14E+00	4.64E-01	2.68E-02	**2.07E+03**
11.08.20 16:11	1.35E+03	2.59E+02	2.09E+02	1.34E+02	6.67E+01	1.94E+01	1.25E+01	6.13E+00	3.12E+00	1.14E+00	4.58E-01	2.54E-02	**2.06E+03**
11.08.20 16:11	1.36E+03	2.59E+02	2.10E+02	1.34E+02	6.65E+01	1.93E+01	1.24E+01	6.10E+00	3.09E+00	1.12E+00	4.57E-01	2.54E-02	**2.07E+03**
11.08.20 16:11	1.36E+03	2.60E+02	2.11E+02	1.35E+02	6.65E+01	1.92E+01	1.21E+01	5.90E+00	2.97E+00	1.07E+00	4.37E-01	2.27E-02	**2.07E+03**
11.08.20 16:11	1.35E+03	2.60E+02	2.12E+02	1.35E+02	6.61E+01	1.90E+01	1.17E+01	5.66E+00	2.83E+00	1.03E+00	4.21E-01	2.27E-02	**2.06E+03**
11.08.20 16:11	1.35E+03	2.63E+02	2.12E+02	1.35E+02	6.57E+01	1.88E+01	1.14E+01	5.40E+00	2.67E+00	9.95E-01	4.10E-01	2.44E-02	**2.06E+03**
11.08.20 16:12	1.36E+03	2.62E+02	2.12E+02	1.35E+02	6.57E+01	1.86E+01	1.12E+01	5.33E+00	2.62E+00	9.67E-01	4.08E-01	2.49E-02	**2.07E+03**

11.08.20 16:12	1.35E+03	2.61E+02	2.11E+02	1.34E+02	6.54E+01	1.85E+01	1.12E+01	5.29E+00	2.60E+00	9.57E-01	4.09E-01	2.51E-02	**2.06E+03**
11.08.20 16:12	1.34E+03	2.61E+02	2.10E+02	1.34E+02	6.53E+01	1.84E+01	1.12E+01	5.25E+00	2.58E+00	9.59E-01	4.00E-01	2.50E-02	**2.05E+03**
11.08.20 16:12	1.34E+03	2.61E+02	2.09E+02	1.34E+02	6.54E+01	1.83E+01	1.12E+01	5.19E+00	2.55E+00	9.55E-01	4.01E-01	2.32E-02	**2.05E+03**
11.08.20 16:12	1.34E+03	2.61E+02	2.09E+02	1.34E+02	6.57E+01	1.84E+01	1.14E+01	5.34E+00	2.65E+00	9.81E-01	4.02E-01	2.17E-02	**2.05E+03**
11.08.20 16:12	1.33E+03	2.59E+02	2.08E+02	1.34E+02	6.60E+01	1.86E+01	1.18E+01	5.62E+00	2.81E+00	1.02E+00	4.09E-01	2.05E-02	**2.04E+03**
11.08.20 16:13	1.32E+03	2.58E+02	2.08E+02	1.33E+02	6.59E+01	1.87E+01	1.18E+01	5.64E+00	2.84E+00	1.03E+00	4.00E-01	1.92E-02	**2.02E+03**
11.08.20 16:13	1.32E+03	2.58E+02	2.08E+02	1.33E+02	6.59E+01	1.88E+01	1.18E+01	5.58E+00	2.82E+00	1.01E+00	3.95E-01	1.57E-02	**2.02E+03**
11.08.20 16:13	1.31E+03	2.57E+02	2.09E+02	1.33E+02	6.57E+01	1.89E+01	1.17E+01	5.54E+00	2.78E+00	9.99E-01	3.85E-01	1.46E-02	**2.02E+03**
11.08.20 16:13	1.31E+03	2.56E+02	2.09E+02	1.33E+02	6.53E+01	1.87E+01	1.15E+01	5.42E+00	2.72E+00	9.74E-01	3.73E-01	1.25E-02	**2.01E+03**
11.08.20 16:13	1.31E+03	2.56E+02	2.09E+02	1.33E+02	6.49E+01	1.84E+01	1.11E+01	5.11E+00	2.54E+00	9.22E-01	3.54E-01	9.93E-03	**2.01E+03**
11.08.20 16:13	1.32E+03	2.58E+02	2.09E+02	1.33E+02	6.46E+01	1.82E+01	1.08E+01	4.78E+00	2.36E+00	8.69E-01	3.46E-01	1.36E-02	**2.02E+03**
11.08.20 16:14	1.32E+03	2.58E+02	2.09E+02	1.33E+02	6.44E+01	1.81E+01	1.07E+01	4.70E+00	2.31E+00	8.42E-01	3.36E-01	1.31E-02	**2.02E+03**
11.08.20 16:14	1.31E+03	2.58E+02	2.09E+02	1.33E+02	6.41E+01	1.80E+01	1.06E+01	4.64E+00	2.28E+00	8.28E-01	3.30E-01	1.25E-02	**2.01E+03**
11.08.20 16:14	1.31E+03	2.57E+02	2.09E+02	1.33E+02	6.41E+01	1.80E+01	1.05E+01	4.57E+00	2.25E+00	8.22E-01	3.31E-01	1.22E-02	**2.01E+03**
11.08.20 16:14	1.32E+03	2.58E+02	2.10E+02	1.33E+02	6.43E+01	1.80E+01	1.06E+01	4.62E+00	2.28E+00	8.28E-01	3.38E-01	1.49E-02	**2.02E+03**
11.08.20 16:14	1.32E+03	2.58E+02	2.10E+02	1.33E+02	6.45E+01	1.82E+01	1.07E+01	4.77E+00	2.33E+00	8.56E-01	3.38E-01	1.39E-02	**2.02E+03**
11.08.20 16:14	1.31E+03	2.56E+02	2.10E+02	1.32E+02	6.48E+01	1.84E+01	1.10E+01	5.10E+00	2.49E+00	9.01E-01	3.47E-01	1.51E-02	**2.01E+03**
11.08.20 16:15	1.32E+03	2.58E+02	2.10E+02	1.32E+02	6.53E+01	1.86E+01	1.11E+01	5.13E+00	2.50E+00	9.06E-01	3.46E-01	1.31E-02	**2.03E+03**
11.08.20 16:15	1.33E+03	2.60E+02	2.11E+02	1.33E+02	6.55E+01	1.86E+01	1.10E+01	5.11E+00	2.47E+00	8.85E-01	3.35E-01	1.42E-02	**2.03E+03**
11.08.20 16:15	1.34E+03	2.63E+02	2.11E+02	1.34E+02	6.58E+01	1.86E+01	1.11E+01	5.07E+00	2.43E+00	8.84E-01	3.29E-01	1.30E-02	**2.05E+03**
11.08.20 16:15	1.35E+03	2.62E+02	2.12E+02	1.34E+02	6.58E+01	1.85E+01	1.09E+01	4.89E+00	2.34E+00	8.42E-01	3.16E-01	1.34E-02	**2.06E+03**
11.08.20 16:15	1.35E+03	2.64E+02	2.13E+02	1.34E+02	6.59E+01	1.83E+01	1.07E+01	4.64E+00	2.22E+00	8.01E-01	3.05E-01	9.60E-03	**2.06E+03**
11.08.20 16:15	1.35E+03	2.66E+02	2.13E+02	1.35E+02	6.54E+01	1.80E+01	1.03E+01	4.27E+00	2.03E+00	7.42E-01	2.91E-01	8.87E-03	**2.06E+03**
11.08.20 16:16	1.34E+03	2.65E+02	2.12E+02	1.34E+02	6.51E+01	1.80E+01	1.02E+01	4.17E+00	2.01E+00	7.28E-01	2.91E-01	8.85E-03	**2.05E+03**
11.08.20 16:16	1.33E+03	2.63E+02	2.12E+02	1.34E+02	6.48E+01	1.78E+01	1.01E+01	4.09E+00	1.98E+00	7.22E-01	2.90E-01	1.01E-02	**2.04E+03**
11.08.20 16:16	1.33E+03	2.63E+02	2.12E+02	1.34E+02	6.46E+01	1.78E+01	1.01E+01	4.03E+00	1.94E+00	7.11E-01	2.82E-01	1.10E-02	**2.03E+03**
11.08.20 16:16	1.33E+03	2.63E+02	2.11E+02	1.34E+02	6.47E+01	1.78E+01	1.01E+01	4.15E+00	2.01E+00	7.36E-01	2.89E-01	8.97E-03	**2.04E+03**
11.08.20 16:16	1.33E+03	2.62E+02	2.11E+02	1.34E+02	6.47E+01	1.80E+01	1.04E+01	4.42E+00	2.16E+00	7.75E-01	2.94E-01	8.72E-03	**2.03E+03**
11.08.20 16:16	1.34E+03	2.63E+02	2.11E+02	1.33E+02	6.50E+01	1.80E+01	1.07E+01	4.68E+00	2.29E+00	8.17E-01	2.99E-01	7.83E-03	**2.04E+03**
11.08.20 16:17	1.32E+03	2.61E+02	2.10E+02	1.33E+02	6.50E+01	1.79E+01	1.06E+01	4.70E+00	2.26E+00	8.14E-01	2.99E-01	5.77E-03	**2.03E+03**
11.08.20 16:17	1.30E+03	2.61E+02	2.09E+02	1.33E+02	6.49E+01	1.78E+01	1.05E+01	4.71E+00	2.25E+00	8.05E-01	2.99E-01	3.52E-03	**2.00E+03**
11.08.20 16:17	1.29E+03	2.60E+02	2.08E+02	1.33E+02	6.48E+01	1.77E+01	1.04E+01	4.66E+00	2.25E+00	7.88E-01	3.01E-01	3.58E-03	**1.99E+03**
11.08.20 16:17	1.28E+03	2.59E+02	2.07E+02	1.33E+02	6.46E+01	1.75E+01	1.01E+01	4.37E+00	2.09E+00	7.40E-01	2.90E-01	3.56E-03	**1.98E+03**
11.08.20 16:17	1.27E+03	2.56E+02	2.07E+02	1.32E+02	6.43E+01	1.74E+01	1.00E+01	4.39E+00	2.10E+00	7.45E-01	2.95E-01	5.82E-03	**1.96E+03**
11.08.20 16:17	1.25E+03	2.56E+02	2.06E+02	1.32E+02	6.44E+01	1.76E+01	1.00E+01	4.54E+00	2.18E+00	7.61E-01	2.91E-01	7.19E-03	**1.95E+03**
11.08.20 16:18	1.26E+03	2.56E+02	2.07E+02	1.32E+02	6.45E+01	1.76E+01	1.01E+01	4.54E+00	2.20E+00	7.56E-01	2.89E-01	9.32E-03	**1.95E+03**
11.08.20 16:18	1.27E+03	2.55E+02	2.07E+02	1.32E+02	6.46E+01	1.76E+01	1.01E+01	4.49E+00	2.18E+00	7.49E-01	2.82E-01	8.26E-03	**1.97E+03**
11.08.20 16:18	1.27E+03	2.56E+02	2.07E+02	1.31E+02	6.42E+01	1.75E+01	9.99E+00	4.46E+00	2.14E+00	7.36E-01	2.78E-01	1.01E-02	**1.97E+03**
11.08.20 16:18	1.27E+03	2.56E+02	2.07E+02	1.31E+02	6.42E+01	1.75E+01	9.91E+00	4.38E+00	2.10E+00	7.19E-01	2.69E-01	6.82E-03	**1.96E+03**
11.08.20 16:18	1.27E+03	2.58E+02	2.08E+02	1.31E+02	6.39E+01	1.72E+01	9.50E+00	3.93E+00	1.83E+00	6.53E-01	2.45E-01	3.51E-03	**1.96E+03**
11.08.20 16:18	1.28E+03	2.58E+02	2.09E+02	1.31E+02	6.34E+01	1.68E+01	9.15E+00	3.58E+00	1.65E+00	6.01E-01	2.37E-01	2.89E-03	**1.97E+03**
11.08.20 16:19	1.27E+03	2.57E+02	2.10E+02	1.31E+02	6.32E+01	1.66E+01	9.04E+00	3.52E+00	1.61E+00	5.94E-01	2.28E-01	0.00E+00	**1.97E+03**
11.08.20 16:19	1.26E+03	2.56E+02	2.10E+02	1.32E+02	6.30E+01	1.66E+01	9.02E+00	3.49E+00	1.61E+00	5.96E-01	2.27E-01	1.21E-04	**1.96E+03**
11.08.20 16:19	1.27E+03	2.56E+02	2.10E+02	1.32E+02	6.30E+01	1.65E+01	9.03E+00	3.44E+00	1.59E+00	5.92E-01	2.23E-01	0.00E+00	**1.96E+03**
11.08.20 16:19	1.28E+03	2.56E+02	2.11E+02	1.32E+02	6.30E+01	1.64E+01	9.01E+00	3.45E+00	1.60E+00	5.92E-01	2.23E-01	0.00E+00	**1.97E+03**
11.08.20 16:19	1.26E+03	2.58E+02	2.09E+02	1.31E+02	6.32E+01	1.66E+01	9.30E+00	3.79E+00	1.80E+00	6.39E-01	2.35E-01	5.72E-04	**1.96E+03**
11.08.20 16:19	1.25E+03	2.56E+02	2.08E+02	1.31E+02	6.34E+01	1.68E+01	9.67E+00	4.10E+00	1.95E+00	6.83E-01	2.51E-01	2.95E-03	**1.95E+03**
11.08.20 16:20	1.24E+03	2.55E+02	2.06E+02	1.31E+02	6.34E+01	1.69E+01	9.80E+00	4.20E+00	2.02E+00	6.95E-01	2.66E-01	4.89E-03	**1.93E+03**
11.08.20 16:20	1.24E+03	2.54E+02	2.06E+02	1.30E+02	6.33E+01	1.69E+01	9.77E+00	4.20E+00	2.01E+00	6.85E-01	2.63E-01	6.30E-03	**1.93E+03**
11.08.20 16:20	1.24E+03	2.53E+02	2.06E+02	1.30E+02	6.33E+01	1.69E+01	9.67E+00	4.19E+00	2.00E+00	6.84E-01	2.65E-01	9.12E-03	**1.93E+03**
11.08.20 16:20	1.24E+03	2.53E+02	2.06E+02	1.30E+02	6.33E+01	1.69E+01	9.55E+00	4.03E+00	1.92E+00	6.68E-01	2.60E-01	9.32E-03	**1.93E+03**
11.08.20 16:20	1.25E+03	2.52E+02	2.07E+02	1.30E+02	6.29E+01	1.64E+01	9.07E+00	3.61E+00	1.70E+00	6.07E-01	2.48E-01	9.49E-03	**1.93E+03**

11.08.20 16:20	1.26E+03	2.53E+02	2.08E+02	1.30E+02	6.26E+01	1.61E+01	8.62E+00	3.29E+00	1.51E+00	5.50E-01	2.30E-01	5.36E-03	**1.95E+03**
11.08.20 16:21	1.27E+03	2.55E+02	2.08E+02	1.31E+02	6.27E+01	1.60E+01	8.54E+00	3.20E+00	1.43E+00	5.26E-01	2.22E-01	2.66E-03	**1.96E+03**
11.08.20 16:21	1.28E+03	2.56E+02	2.09E+02	1.31E+02	6.26E+01	1.60E+01	8.48E+00	3.14E+00	1.40E+00	5.13E-01	2.19E-01	0.00E+00	**1.97E+03**
11.08.20 16:21	1.28E+03	2.56E+02	2.08E+02	1.30E+02	6.26E+01	1.59E+01	8.44E+00	3.12E+00	1.37E+00	5.10E-01	2.14E-01	0.00E+00	**1.97E+03**
11.08.20 16:21	1.28E+03	2.56E+02	2.08E+02	1.30E+02	6.27E+01	1.59E+01	8.45E+00	3.12E+00	1.38E+00	5.05E-01	2.22E-01	5.86E-04	**1.97E+03**
11.08.20 16:21	1.27E+03	2.56E+02	2.07E+02	1.30E+02	6.31E+01	1.64E+01	8.72E+00	3.38E+00	1.50E+00	5.44E-01	2.44E-01	0.00E+00	**1.96E+03**
11.08.20 16:21	1.26E+03	2.55E+02	2.06E+02	1.30E+02	6.34E+01	1.66E+01	9.01E+00	3.64E+00	1.63E+00	5.78E-01	2.48E-01	3.11E-03	**1.95E+03**
11.08.20 16:22	1.25E+03	2.54E+02	2.05E+02	1.29E+02	6.33E+01	1.68E+01	9.13E+00	3.78E+00	1.71E+00	5.94E-01	2.48E-01	4.02E-03	**1.93E+03**
11.08.20 16:22	1.24E+03	2.55E+02	2.05E+02	1.30E+02	6.33E+01	1.68E+01	9.06E+00	3.75E+00	1.68E+00	5.85E-01	2.43E-01	6.69E-03	**1.93E+03**
11.08.20 16:22	1.23E+03	2.54E+02	2.05E+02	1.30E+02	6.34E+01	1.69E+01	9.06E+00	3.73E+00	1.66E+00	5.76E-01	2.42E-01	4.88E-03	**1.91E+03**
11.08.20 16:22	1.22E+03	2.52E+02	2.05E+02	1.30E+02	6.33E+01	1.67E+01	8.92E+00	3.58E+00	1.58E+00	5.41E-01	2.22E-01	5.64E-03	**1.90E+03**
11.08.20 16:22	1.23E+03	2.52E+02	2.05E+02	1.30E+02	6.30E+01	1.64E+01	8.51E+00	3.25E+00	1.43E+00	4.89E-01	2.06E-01	3.94E-03	**1.91E+03**
11.08.20 16:22	1.23E+03	2.50E+02	2.06E+02	1.31E+02	6.26E+01	1.61E+01	8.19E+00	2.95E+00	1.27E+00	4.50E-01	1.94E-01	3.48E-03	**1.90E+03**
11.08.20 16:23	1.21E+03	2.50E+02	2.06E+02	1.31E+02	6.27E+01	1.60E+01	8.08E+00	2.81E+00	1.22E+00	4.37E-01	1.90E-01	3.56E-03	**1.89E+03**
11.08.20 16:23	1.22E+03	2.49E+02	2.07E+02	1.31E+02	6.27E+01	1.59E+01	8.06E+00	2.77E+00	1.22E+00	4.28E-01	1.89E-01	3.27E-03	**1.90E+03**
11.08.20 16:23	1.22E+03	2.51E+02	2.07E+02	1.31E+02	6.28E+01	1.59E+01	8.06E+00	2.77E+00	1.19E+00	4.18E-01	1.91E-01	1.65E-03	**1.90E+03**
11.08.20 16:23	1.25E+03	2.56E+02	2.09E+02	1.32E+02	6.30E+01	1.60E+01	8.10E+00	2.81E+00	1.18E+00	4.17E-01	1.88E-01	6.47E-03	**1.93E+03**
11.08.20 16:23	1.30E+03	2.63E+02	2.13E+02	1.33E+02	6.34E+01	1.62E+01	8.19E+00	2.96E+00	1.25E+00	4.33E-01	1.97E-01	8.77E-03	**2.00E+03**
11.08.20 16:23	1.33E+03	2.68E+02	2.14E+02	1.33E+02	6.39E+01	1.64E+01	8.36E+00	3.16E+00	1.36E+00	4.54E-01	2.10E-01	8.84E-03	**2.04E+03**
11.08.20 16:24	1.37E+03	2.70E+02	2.16E+02	1.33E+02	6.41E+01	1.64E+01	8.37E+00	3.20E+00	1.38E+00	4.66E-01	2.15E-01	8.30E-03	**2.08E+03**
11.08.20 16:24	1.40E+03	2.75E+02	2.17E+02	1.34E+02	6.41E+01	1.63E+01	8.33E+00	3.16E+00	1.37E+00	4.74E-01	2.11E-01	7.12E-03	**2.12E+03**
11.08.20 16:24	1.42E+03	2.78E+02	2.18E+02	1.34E+02	6.42E+01	1.62E+01	8.30E+00	3.12E+00	1.39E+00	4.86E-01	2.10E-01	6.67E-03	**2.14E+03**
11.08.20 16:24	1.41E+03	2.76E+02	2.16E+02	1.34E+02	6.39E+01	1.61E+01	8.19E+00	3.00E+00	1.36E+00	4.81E-01	2.09E-01	4.14E-03	**2.12E+03**
11.08.20 16:24	1.39E+03	2.76E+02	2.16E+02	1.34E+02	6.38E+01	1.58E+01	7.95E+00	2.75E+00	1.23E+00	4.43E-01	1.97E-01	3.17E-03	**2.10E+03**
11.08.20 16:24	1.38E+03	2.77E+02	2.16E+02	1.35E+02	6.36E+01	1.55E+01	7.78E+00	2.55E+00	1.10E+00	4.16E-01	1.87E-01	3.33E-03	**2.10E+03**
11.08.20 16:25	1.38E+03	2.80E+02	2.17E+02	1.35E+02	6.35E+01	1.56E+01	7.64E+00	2.51E+00	1.08E+00	4.01E-01	1.88E-01	3.43E-03	**2.10E+03**
11.08.20 16:25	1.38E+03	2.79E+02	2.17E+02	1.35E+02	6.37E+01	1.55E+01	7.60E+00	2.46E+00	1.07E+00	3.90E-01	1.91E-01	4.08E-03	**2.10E+03**
11.08.20 16:25	1.38E+03	2.79E+02	2.18E+02	1.35E+02	6.36E+01	1.55E+01	7.59E+00	2.42E+00	1.05E+00	3.80E-01	1.92E-01	4.29E-03	**2.11E+03**
11.08.20 16:25	1.38E+03	2.79E+02	2.18E+02	1.34E+02	6.39E+01	1.57E+01	7.72E+00	2.57E+00	1.13E+00	3.99E-01	2.01E-01	4.33E-03	**2.11E+03**
11.08.20 16:25	1.38E+03	2.78E+02	2.17E+02	1.34E+02	6.43E+01	1.60E+01	8.09E+00	2.89E+00	1.30E+00	4.31E-01	2.04E-01	5.53E-03	**2.11E+03**
11.08.20 16:25	1.38E+03	2.76E+02	2.16E+02	1.33E+02	6.46E+01	1.63E+01	8.37E+00	3.21E+00	1.47E+00	4.70E-01	2.13E-01	4.83E-03	**2.10E+03**
11.08.20 16:26	1.39E+03	2.74E+02	2.17E+02	1.33E+02	6.45E+01	1.64E+01	8.44E+00	3.24E+00	1.48E+00	4.68E-01	2.13E-01	5.96E-03	**2.11E+03**
11.08.20 16:26	1.38E+03	2.75E+02	2.16E+02	1.33E+02	6.44E+01	1.64E+01	8.43E+00	3.25E+00	1.48E+00	4.68E-01	2.12E-01	5.43E-03	**2.10E+03**
11.08.20 16:26	1.38E+03	2.75E+02	2.16E+02	1.33E+02	6.45E+01	1.64E+01	8.50E+00	3.31E+00	1.47E+00	4.67E-01	2.11E-01	8.75E-03	**2.10E+03**
11.08.20 16:26	1.39E+03	2.75E+02	2.18E+02	1.34E+02	6.43E+01	1.60E+01	8.18E+00	3.00E+00	1.28E+00	4.22E-01	1.96E-01	4.86E-03	**2.11E+03**
11.08.20 16:26	1.40E+03	2.77E+02	2.19E+02	1.34E+02	6.40E+01	1.56E+01	7.74E+00	2.61E+00	1.07E+00	3.75E-01	1.87E-01	7.14E-03	**2.12E+03**
11.08.20 16:26	1.41E+03	2.80E+02	2.20E+02	1.35E+02	6.39E+01	1.54E+01	7.45E+00	2.38E+00	9.38E-01	3.53E-01	1.78E-01	9.43E-03	**2.14E+03**
11.08.20 16:27	1.41E+03	2.81E+02	2.20E+02	1.35E+02	6.41E+01	1.54E+01	7.39E+00	2.35E+00	9.24E-01	3.52E-01	1.79E-01	9.64E-03	**2.14E+03**
11.08.20 16:27	1.41E+03	2.82E+02	2.21E+02	1.36E+02	6.43E+01	1.54E+01	7.32E+00	2.31E+00	9.22E-01	3.54E-01	1.78E-01	6.08E-03	**2.15E+03**
11.08.20 16:27	1.43E+03	2.84E+02	2.21E+02	1.36E+02	6.43E+01	1.54E+01	7.25E+00	2.22E+00	9.03E-01	3.48E-01	1.67E-01	7.18E-03	**2.16E+03**
11.08.20 16:27	1.42E+03	2.83E+02	2.19E+02	1.35E+02	6.45E+01	1.56E+01	7.48E+00	2.41E+00	1.01E+00	3.81E-01	1.78E-01	9.32E-03	**2.15E+03**
11.08.20 16:27	1.40E+03	2.80E+02	2.18E+02	1.35E+02	6.44E+01	1.57E+01	7.65E+00	2.49E+00	1.10E+00	3.95E-01	1.81E-01	8.25E-03	**2.13E+03**
11.08.20 16:27	1.39E+03	2.79E+02	2.16E+02	1.35E+02	6.45E+01	1.58E+01	7.79E+00	2.61E+00	1.15E+00	4.06E-01	1.85E-01	6.93E-03	**2.11E+03**
11.08.20 16:28	1.39E+03	2.77E+02	2.15E+02	1.34E+02	6.43E+01	1.57E+01	7.74E+00	2.60E+00	1.14E+00	3.99E-01	1.81E-01	5.17E-03	**2.11E+03**
11.08.20 16:28	1.38E+03	2.76E+02	2.15E+02	1.33E+02	6.40E+01	1.57E+01	7.69E+00	2.62E+00	1.14E+00	4.05E-01	1.78E-01	4.57E-03	**2.09E+03**
11.08.20 16:28	1.36E+03	2.75E+02	2.14E+02	1.33E+02	6.39E+01	1.56E+01	7.57E+00	2.60E+00	1.11E+00	3.93E-01	1.73E-01	2.03E-03	**2.08E+03**
11.08.20 16:28	1.37E+03	2.76E+02	2.15E+02	1.33E+02	6.37E+01	1.54E+01	7.21E+00	2.34E+00	9.46E-01	3.59E-01	1.64E-01	1.50E-03	**2.08E+03**
11.08.20 16:28	1.37E+03	2.75E+02	2.14E+02	1.33E+02	6.35E+01	1.52E+01	7.03E+00	2.18E+00	8.58E-01	3.30E-01	1.61E-01	3.16E-03	**2.08E+03**
11.08.20 16:28	1.36E+03	2.75E+02	2.15E+02	1.34E+02	6.34E+01	1.52E+01	6.87E+00	2.09E+00	8.21E-01	3.25E-01	1.58E-01	3.74E-03	**2.07E+03**
11.08.20 16:29	1.36E+03	2.77E+02	2.15E+02	1.34E+02	6.34E+01	1.53E+01	6.87E+00	2.06E+00	8.19E-01	3.20E-01	1.54E-01	4.06E-03	**2.08E+03**
11.08.20 16:29	1.38E+03	2.79E+02	2.15E+02	1.35E+02	6.32E+01	1.53E+01	6.84E+00	2.00E+00	8.07E-01	3.12E-01	1.56E-01	4.97E-03	**2.09E+03**
11.08.20 16:29	1.39E+03	2.81E+02	2.16E+02	1.34E+02	6.33E+01	1.53E+01	6.84E+00	1.99E+00	8.31E-01	3.21E-01	1.59E-01	4.86E-03	**2.11E+03**

11.08.20 16:29	1.38E+03	2.81E+02	2.15E+02	1.34E+02	6.31E+01	1.55E+01	7.08E+00	2.24E+00	9.92E-01	3.58E-01	1.67E-01	3.89E-03	**2.10E+03**
11.08.20 16:29	1.38E+03	2.82E+02	2.15E+02	1.33E+02	6.32E+01	1.56E+01	7.35E+00	2.52E+00	1.13E+00	3.82E-01	1.72E-01	2.01E-03	**2.10E+03**
11.08.20 16:29	1.39E+03	2.82E+02	2.13E+02	1.32E+02	6.32E+01	1.57E+01	7.53E+00	2.64E+00	1.19E+00	3.91E-01	1.76E-01	8.27E-04	**2.11E+03**
11.08.20 16:30	1.39E+03	2.81E+02	2.13E+02	1.31E+02	6.31E+01	1.56E+01	7.57E+00	2.64E+00	1.18E+00	3.87E-01	1.74E-01	2.35E-03	**2.11E+03**
11.08.20 16:30	1.39E+03	2.80E+02	2.13E+02	1.31E+02	6.32E+01	1.56E+01	7.54E+00	2.64E+00	1.16E+00	3.75E-01	1.74E-01	2.60E-03	**2.10E+03**
11.08.20 16:30	1.38E+03	2.81E+02	2.12E+02	1.31E+02	6.31E+01	1.55E+01	7.44E+00	2.54E+00	1.08E+00	3.57E-01	1.71E-01	3.62E-03	**2.10E+03**
11.08.20 16:30	1.39E+03	2.82E+02	2.13E+02	1.32E+02	6.32E+01	1.53E+01	7.14E+00	2.25E+00	9.14E-01	3.16E-01	1.64E-01	1.32E-03	**2.11E+03**
11.08.20 16:30	1.40E+03	2.83E+02	2.13E+02	1.33E+02	6.30E+01	1.51E+01	6.87E+00	1.97E+00	7.62E-01	2.88E-01	1.52E-01	0.00E+00	**2.12E+03**
11.08.20 16:30	1.41E+03	2.84E+02	2.13E+02	1.33E+02	6.29E+01	1.50E+01	6.66E+00	1.86E+00	7.16E-01	2.88E-01	1.51E-01	0.00E+00	**2.12E+03**
11.08.20 16:31	1.40E+03	2.85E+02	2.12E+02	1.33E+02	6.27E+01	1.48E+01	6.64E+00	1.81E+00	7.10E-01	2.94E-01	1.50E-01	0.00E+00	**2.11E+03**
11.08.20 16:31	1.38E+03	2.82E+02	2.11E+02	1.32E+02	6.27E+01	1.47E+01	6.64E+00	1.80E+00	7.28E-01	3.00E-01	1.49E-01	0.00E+00	**2.10E+03**
11.08.20 16:31	1.39E+03	2.81E+02	2.11E+02	1.32E+02	6.26E+01	1.46E+01	6.59E+00	1.84E+00	7.69E-01	2.99E-01	1.51E-01	0.00E+00	**2.10E+03**
11.08.20 16:31	1.39E+03	2.82E+02	2.11E+02	1.32E+02	6.24E+01	1.47E+01	6.85E+00	2.06E+00	9.17E-01	3.38E-01	1.61E-01	3.89E-04	**2.11E+03**
11.08.20 16:31	1.39E+03	2.82E+02	2.10E+02	1.31E+02	6.27E+01	1.49E+01	7.10E+00	2.35E+00	1.06E+00	3.71E-01	1.77E-01	4.63E-03	**2.10E+03**
11.08.20 16:31	1.39E+03	2.83E+02	2.10E+02	1.31E+02	6.30E+01	1.50E+01	7.27E+00	2.49E+00	1.11E+00	3.82E-01	1.81E-01	3.98E-03	**2.11E+03**
11.08.20 16:32	1.39E+03	2.83E+02	2.11E+02	1.31E+02	6.30E+01	1.51E+01	7.31E+00	2.50E+00	1.13E+00	3.74E-01	1.82E-01	5.02E-03	**2.11E+03**
11.08.20 16:32	1.40E+03	2.85E+02	2.11E+02	1.31E+02	6.30E+01	1.52E+01	7.28E+00	2.50E+00	1.11E+00	3.66E-01	1.92E-01	5.01E-03	**2.11E+03**
11.08.20 16:32	1.40E+03	2.86E+02	2.11E+02	1.31E+02	6.29E+01	1.51E+01	7.22E+00	2.37E+00	1.03E+00	3.48E-01	1.90E-01	4.96E-03	**2.11E+03**
11.08.20 16:32	1.40E+03	2.86E+02	2.11E+02	1.31E+02	6.28E+01	1.49E+01	6.91E+00	2.08E+00	8.93E-01	3.00E-01	1.79E-01	3.69E-03	**2.12E+03**
11.08.20 16:32	1.41E+03	2.86E+02	2.11E+02	1.31E+02	6.24E+01	1.47E+01	6.57E+00	1.75E+00	7.13E-01	2.59E-01	1.70E-01	8.04E-04	**2.13E+03**
11.08.20 16:32	1.40E+03	2.84E+02	2.10E+02	1.31E+02	6.21E+01	1.47E+01	6.41E+00	1.68E+00	6.92E-01	2.51E-01	1.69E-01	1.05E-03	**2.11E+03**
11.08.20 16:33	1.41E+03	2.84E+02	2.09E+02	1.31E+02	6.22E+01	1.46E+01	6.34E+00	1.67E+00	6.50E-01	2.48E-01	1.60E-01	0.00E+00	**2.12E+03**
11.08.20 16:33	1.42E+03	2.84E+02	2.09E+02	1.32E+02	6.23E+01	1.46E+01	6.32E+00	1.63E+00	6.45E-01	2.58E-01	1.51E-01	0.00E+00	**2.13E+03**
11.08.20 16:33	1.42E+03	2.82E+02	2.09E+02	1.32E+02	6.24E+01	1.47E+01	6.39E+00	1.73E+00	7.04E-01	2.77E-01	1.56E-01	0.00E+00	**2.13E+03**
11.08.20 16:33	1.41E+03	2.81E+02	2.09E+02	1.32E+02	6.27E+01	1.49E+01	6.65E+00	1.99E+00	8.51E-01	3.23E-01	1.64E-01	0.00E+00	**2.12E+03**
11.08.20 16:33	1.41E+03	2.80E+02	2.08E+02	1.31E+02	6.29E+01	1.50E+01	6.90E+00	2.23E+00	9.82E-01	3.49E-01	1.71E-01	0.00E+00	**2.11E+03**
11.08.20 16:33	1.40E+03	2.79E+02	2.08E+02	1.31E+02	6.31E+01	1.51E+01	7.11E+00	2.34E+00	1.06E+00	3.66E-01	1.78E-01	0.00E+00	**2.11E+03**
11.08.20 16:34	1.40E+03	2.78E+02	2.08E+02	1.31E+02	6.28E+01	1.51E+01	7.03E+00	2.34E+00	1.06E+00	3.65E-01	1.82E-01	5.09E-04	**2.10E+03**
11.08.20 16:34	1.39E+03	2.76E+02	2.08E+02	1.30E+02	6.26E+01	1.51E+01	6.96E+00	2.36E+00	1.07E+00	3.61E-01	1.89E-01	2.05E-03	**2.09E+03**
11.08.20 16:34	1.39E+03	2.75E+02	2.07E+02	1.30E+02	6.23E+01	1.49E+01	6.74E+00	2.15E+00	9.39E-01	3.32E-01	1.70E-01	5.65E-06	**2.09E+03**
11.08.20 16:34	1.38E+03	2.76E+02	2.07E+02	1.30E+02	6.17E+01	1.48E+01	6.47E+00	1.93E+00	7.93E-01	2.95E-01	1.65E-01	0.00E+00	**2.08E+03**
11.08.20 16:34	1.39E+03	2.77E+02	2.08E+02	1.30E+02	6.15E+01	1.45E+01	6.18E+00	1.66E+00	6.49E-01	2.55E-01	1.65E-01	0.00E+00	**2.09E+03**
11.08.20 16:34	1.40E+03	2.78E+02	2.08E+02	1.30E+02	6.14E+01	1.44E+01	6.08E+00	1.60E+00	6.12E-01	2.50E-01	1.58E-01	3.98E-03	**2.10E+03**
11.08.20 16:35	1.41E+03	2.78E+02	2.07E+02	1.30E+02	6.14E+01	1.43E+01	6.16E+00	1.55E+00	6.01E-01	2.46E-01	1.57E-01	4.08E-03	**2.11E+03**
11.08.20 16:35	1.41E+03	2.80E+02	2.07E+02	1.30E+02	6.15E+01	1.42E+01	6.21E+00	1.54E+00	5.96E-01	2.48E-01	1.53E-01	8.58E-03	**2.11E+03**
11.08.20 16:35	1.41E+03	2.81E+02	2.08E+02	1.30E+02	6.18E+01	1.43E+01	6.34E+00	1.69E+00	6.86E-01	2.74E-01	1.65E-01	1.22E-02	**2.11E+03**
11.08.20 16:35	1.42E+03	2.81E+02	2.07E+02	1.30E+02	6.23E+01	1.46E+01	6.70E+00	1.98E+00	8.64E-01	3.18E-01	1.74E-01	1.45E-02	**2.12E+03**
11.08.20 16:35	1.43E+03	2.82E+02	2.07E+02	1.30E+02	6.26E+01	1.48E+01	6.88E+00	2.13E+00	9.60E-01	3.47E-01	1.77E-01	1.54E-02	**2.13E+03**
11.08.20 16:35	1.42E+03	2.83E+02	2.07E+02	1.30E+02	6.25E+01	1.49E+01	6.92E+00	2.20E+00	9.93E-01	3.59E-01	1.82E-01	1.11E-02	**2.13E+03**
11.08.20 16:36	1.42E+03	2.83E+02	2.08E+02	1.30E+02	6.26E+01	1.50E+01	6.88E+00	2.22E+00	1.01E+00	3.60E-01	1.79E-01	9.59E-03	**2.13E+03**
11.08.20 16:36	1.43E+03	2.85E+02	2.08E+02	1.30E+02	6.26E+01	1.50E+01	6.85E+00	2.17E+00	9.74E-01	3.55E-01	1.81E-01	7.41E-03	**2.14E+03**
11.08.20 16:36	1.43E+03	2.86E+02	2.08E+02	1.30E+02	6.22E+01	1.47E+01	6.54E+00	1.87E+00	8.30E-01	3.13E-01	1.67E-01	2.72E-03	**2.14E+03**
11.08.20 16:36	1.42E+03	2.85E+02	2.08E+02	1.30E+02	6.21E+01	1.44E+01	6.20E+00	1.59E+00	6.70E-01	2.68E-01	1.55E-01	5.29E-03	**2.13E+03**
11.08.20 16:36	1.43E+03	2.84E+02	2.09E+02	1.30E+02	6.19E+01	1.42E+01	6.00E+00	1.41E+00	5.58E-01	2.42E-01	1.54E-01	6.16E-03	**2.14E+03**
11.08.20 16:36	1.43E+03	2.83E+02	2.08E+02	1.30E+02	6.17E+01	1.41E+01	5.91E+00	1.35E+00	5.30E-01	2.33E-01	1.51E-01	5.46E-03	**2.13E+03**
11.08.20 16:37	1.41E+03	2.82E+02	2.08E+02	1.29E+02	6.16E+01	1.40E+01	5.94E+00	1.33E+00	5.21E-01	2.23E-01	1.56E-01	5.85E-03	**2.12E+03**
11.08.20 16:37	1.42E+03	2.81E+02	2.08E+02	1.30E+02	6.16E+01	1.42E+01	5.87E+00	1.39E+00	5.37E-01	2.18E-01	1.54E-01	7.60E-03	**2.12E+03**
11.08.20 16:37	1.41E+03	2.79E+02	2.07E+02	1.30E+02	6.18E+01	1.44E+01	6.16E+00	1.68E+00	6.90E-01	2.66E-01	1.74E-01	1.01E-02	**2.12E+03**
11.08.20 16:37	1.41E+03	2.80E+02	2.07E+02	1.30E+02	6.17E+01	1.47E+01	6.53E+00	1.99E+00	8.61E-01	3.13E-01	1.83E-01	8.08E-03	**2.12E+03**
11.08.20 16:37	1.40E+03	2.81E+02	2.06E+02	1.29E+02	6.18E+01	1.49E+01	6.68E+00	2.17E+00	9.54E-01	3.43E-01	1.91E-01	9.28E-03	**2.11E+03**
11.08.20 16:37	1.40E+03	2.81E+02	2.06E+02	1.29E+02	6.16E+01	1.47E+01	6.69E+00	2.19E+00	9.71E-01	3.57E-01	1.96E-01	9.26E-03	**2.10E+03**
11.08.20 16:38	1.39E+03	2.79E+02	2.05E+02	1.28E+02	6.15E+01	1.47E+01	6.68E+00	2.18E+00	9.78E-01	3.56E-01	2.01E-01	9.71E-03	**2.09E+03**

11.08.20 16:38	1.40E+03	2.78E+02	2.06E+02	1.28E+02	6.14E+01	1.47E+01	6.64E+00	2.14E+00	9.79E-01	3.55E-01	1.95E-01	9.42E-03	**2.09E+03**
11.08.20 16:38	1.41E+03	2.80E+02	2.06E+02	1.28E+02	6.11E+01	1.45E+01	6.25E+00	1.78E+00	7.55E-01	2.97E-01	1.76E-01	6.82E-03	**2.10E+03**
11.08.20 16:38	1.41E+03	2.80E+02	2.07E+02	1.28E+02	6.10E+01	1.42E+01	5.93E+00	1.53E+00	5.86E-01	2.43E-01	1.69E-01	5.91E-03	**2.11E+03**
11.08.20 16:38	1.41E+03	2.81E+02	2.08E+02	1.28E+02	6.07E+01	1.40E+01	5.75E+00	1.35E+00	4.88E-01	2.13E-01	1.62E-01	7.74E-03	**2.11E+03**
11.08.20 16:38	1.43E+03	2.80E+02	2.08E+02	1.29E+02	6.09E+01	1.41E+01	5.68E+00	1.32E+00	4.65E-01	2.01E-01	1.60E-01	8.86E-03	**2.13E+03**
11.08.20 16:39	1.43E+03	2.83E+02	2.08E+02	1.29E+02	6.11E+01	1.40E+01	5.67E+00	1.29E+00	4.41E-01	1.90E-01	1.56E-01	1.11E-02	**2.13E+03**
11.08.20 16:39	1.44E+03	2.86E+02	2.07E+02	1.29E+02	6.12E+01	1.40E+01	5.65E+00	1.26E+00	4.27E-01	1.88E-01	1.60E-01	1.01E-02	**2.14E+03**
11.08.20 16:39	1.44E+03	2.84E+02	2.06E+02	1.29E+02	6.14E+01	1.41E+01	5.86E+00	1.48E+00	5.55E-01	2.27E-01	1.77E-01	1.34E-02	**2.14E+03**
11.08.20 16:39	1.43E+03	2.81E+02	2.04E+02	1.29E+02	6.17E+01	1.44E+01	6.27E+00	1.83E+00	7.97E-01	2.95E-01	1.97E-01	1.59E-02	**2.13E+03**
11.08.20 16:39	1.42E+03	2.80E+02	2.03E+02	1.29E+02	6.17E+01	1.45E+01	6.46E+00	2.03E+00	9.11E-01	3.14E-01	2.16E-01	1.63E-02	**2.11E+03**
11.08.20 16:39	1.41E+03	2.81E+02	2.03E+02	1.28E+02	6.16E+01	1.46E+01	6.50E+00	2.07E+00	9.31E-01	3.23E-01	2.17E-01	1.62E-02	**2.11E+03**
11.08.20 16:40	1.43E+03	2.79E+02	2.02E+02	1.29E+02	6.15E+01	1.45E+01	6.48E+00	2.06E+00	9.37E-01	3.35E-01	2.18E-01	1.58E-02	**2.12E+03**
11.08.20 16:40	1.43E+03	2.80E+02	2.03E+02	1.28E+02	6.14E+01	1.45E+01	6.48E+00	2.03E+00	9.07E-01	3.20E-01	2.22E-01	1.69E-02	**2.12E+03**
11.08.20 16:40	1.43E+03	2.81E+02	2.03E+02	1.28E+02	6.13E+01	1.42E+01	6.14E+00	1.75E+00	7.45E-01	2.83E-01	2.12E-01	1.68E-02	**2.13E+03**
11.08.20 16:40	1.44E+03	2.84E+02	2.06E+02	1.29E+02	6.10E+01	1.40E+01	5.73E+00	1.39E+00	5.14E-01	2.27E-01	1.98E-01	1.75E-02	**2.15E+03**
11.08.20 16:40	1.45E+03	2.85E+02	2.08E+02	1.30E+02	6.10E+01	1.39E+01	5.63E+00	1.24E+00	4.46E-01	2.12E-01	1.89E-01	1.77E-02	**2.16E+03**
11.08.20 16:40	1.46E+03	2.88E+02	2.08E+02	1.31E+02	6.11E+01	1.39E+01	5.59E+00	1.21E+00	4.18E-01	2.12E-01	1.87E-01	1.74E-02	**2.17E+03**
11.08.20 16:41	1.46E+03	2.88E+02	2.08E+02	1.31E+02	6.11E+01	1.38E+01	5.52E+00	1.20E+00	4.07E-01	2.13E-01	1.86E-01	1.84E-02	**2.17E+03**
11.08.20 16:41	1.46E+03	2.88E+02	2.08E+02	1.31E+02	6.10E+01	1.39E+01	5.49E+00	1.23E+00	4.25E-01	2.11E-01	1.77E-01	1.58E-02	**2.17E+03**
11.08.20 16:41	1.46E+03	2.88E+02	2.08E+02	1.31E+02	6.12E+01	1.40E+01	5.88E+00	1.57E+00	6.24E-01	2.53E-01	1.73E-01	1.29E-02	**2.17E+03**
11.08.20 16:41	1.47E+03	2.88E+02	2.07E+02	1.30E+02	6.13E+01	1.41E+01	6.11E+00	1.80E+00	7.43E-01	2.69E-01	1.84E-01	8.94E-03	**2.18E+03**
11.08.20 16:41	1.47E+03	2.87E+02	2.06E+02	1.29E+02	6.12E+01	1.42E+01	6.21E+00	1.89E+00	7.93E-01	2.79E-01	1.81E-01	1.04E-02	**2.18E+03**
11.08.20 16:41	1.47E+03	2.86E+02	2.06E+02	1.29E+02	6.13E+01	1.42E+01	6.22E+00	1.88E+00	7.98E-01	2.67E-01	1.84E-01	1.38E-02	**2.17E+03**
11.08.20 16:42	1.47E+03	2.85E+02	2.06E+02	1.29E+02	6.11E+01	1.41E+01	6.24E+00	1.91E+00	8.01E-01	2.71E-01	1.92E-01	1.37E-02	**2.17E+03**
11.08.20 16:42	1.48E+03	2.86E+02	2.06E+02	1.29E+02	6.09E+01	1.41E+01	6.06E+00	1.78E+00	7.05E-01	2.38E-01	1.92E-01	1.12E-02	**2.18E+03**
11.08.20 16:42	1.48E+03	2.87E+02	2.07E+02	1.30E+02	6.06E+01	1.39E+01	5.70E+00	1.46E+00	5.19E-01	1.98E-01	1.82E-01	1.29E-02	**2.19E+03**
11.08.20 16:42	1.48E+03	2.87E+02	2.06E+02	1.30E+02	6.04E+01	1.37E+01	5.46E+00	1.28E+00	3.88E-01	1.78E-01	1.79E-01	1.40E-02	**2.18E+03**
11.08.20 16:42	1.48E+03	2.88E+02	2.06E+02	1.30E+02	6.02E+01	1.37E+01	5.38E+00	1.17E+00	3.32E-01	1.69E-01	1.75E-01	8.54E-03	**2.18E+03**
11.08.20 16:42	1.48E+03	2.89E+02	2.07E+02	1.30E+02	6.02E+01	1.37E+01	5.29E+00	1.18E+00	3.10E-01	1.67E-01	1.72E-01	1.17E-02	**2.19E+03**
11.08.20 16:43	1.47E+03	2.89E+02	2.07E+02	1.30E+02	6.02E+01	1.37E+01	5.25E+00	1.16E+00	3.22E-01	1.71E-01	1.70E-01	1.28E-02	**2.18E+03**
11.08.20 16:43	1.46E+03	2.88E+02	2.07E+02	1.30E+02	6.02E+01	1.37E+01	5.25E+00	1.20E+00	3.41E-01	1.83E-01	1.71E-01	1.50E-02	**2.17E+03**
11.08.20 16:43	1.45E+03	2.88E+02	2.06E+02	1.29E+02	6.02E+01	1.38E+01	5.47E+00	1.41E+00	4.69E-01	2.10E-01	1.77E-01	1.61E-02	**2.16E+03**
11.08.20 16:43	1.45E+03	2.87E+02	2.06E+02	1.29E+02	6.04E+01	1.40E+01	5.77E+00	1.67E+00	6.62E-01	2.54E-01	1.78E-01	2.07E-02	**2.15E+03**
11.08.20 16:43	1.44E+03	2.85E+02	2.06E+02	1.29E+02	6.07E+01	1.41E+01	5.95E+00	1.89E+00	7.79E-01	2.87E-01	1.86E-01	1.84E-02	**2.15E+03**
11.08.20 16:43	1.43E+03	2.85E+02	2.06E+02	1.29E+02	6.06E+01	1.42E+01	6.04E+00	1.92E+00	7.85E-01	2.99E-01	1.91E-01	1.61E-02	**2.13E+03**
11.08.20 16:44	1.44E+03	2.85E+02	2.06E+02	1.29E+02	6.05E+01	1.43E+01	6.05E+00	1.89E+00	7.83E-01	3.03E-01	1.89E-01	1.65E-02	**2.15E+03**
11.08.20 16:44	1.44E+03	2.85E+02	2.06E+02	1.29E+02	6.05E+01	1.43E+01	5.99E+00	1.74E+00	7.02E-01	2.93E-01	1.87E-01	1.22E-02	**2.15E+03**
11.08.20 16:44	1.45E+03	2.84E+02	2.05E+02	1.29E+02	6.05E+01	1.41E+01	5.81E+00	1.56E+00	5.80E-01	2.77E-01	1.82E-01	1.52E-02	**2.15E+03**
11.08.20 16:44	1.46E+03	2.87E+02	2.06E+02	1.29E+02	6.02E+01	1.38E+01	5.43E+00	1.21E+00	3.76E-01	2.29E-01	1.75E-01	1.64E-02	**2.16E+03**
11.08.20 16:44	1.47E+03	2.91E+02	2.06E+02	1.29E+02	6.02E+01	1.38E+01	5.34E+00	1.09E+00	3.31E-01	2.06E-01	1.73E-01	2.10E-02	**2.18E+03**
11.08.20 16:44	1.48E+03	2.91E+02	2.05E+02	1.29E+02	6.03E+01	1.37E+01	5.32E+00	1.08E+00	3.44E-01	2.07E-01	1.69E-01	2.10E-02	**2.18E+03**
11.08.20 16:45	1.48E+03	2.92E+02	2.04E+02	1.29E+02	6.04E+01	1.36E+01	5.28E+00	1.11E+00	3.16E-01	2.01E-01	1.65E-01	2.38E-02	**2.19E+03**
11.08.20 16:45	1.49E+03	2.94E+02	2.04E+02	1.28E+02	6.06E+01	1.35E+01	5.31E+00	1.19E+00	3.88E-01	2.06E-01	1.67E-01	2.48E-02	**2.19E+03**
11.08.20 16:45	1.48E+03	2.94E+02	2.05E+02	1.28E+02	6.07E+01	1.36E+01	5.57E+00	1.44E+00	5.24E-01	2.41E-01	1.78E-01	2.32E-02	**2.19E+03**
11.08.20 16:45	1.47E+03	2.91E+02	2.05E+02	1.27E+02	6.06E+01	1.38E+01	5.70E+00	1.62E+00	6.28E-01	2.59E-01	1.85E-01	1.99E-02	**2.17E+03**
11.08.20 16:45	1.45E+03	2.88E+02	2.04E+02	1.27E+02	6.06E+01	1.37E+01	5.73E+00	1.73E+00	6.60E-01	2.73E-01	1.92E-01	1.76E-02	**2.15E+03**
11.08.20 16:45	1.45E+03	2.87E+02	2.04E+02	1.27E+02	6.04E+01	1.37E+01	5.74E+00	1.71E+00	6.60E-01	2.63E-01	1.97E-01	1.67E-02	**2.15E+03**
11.08.20 16:46	1.44E+03	2.88E+02	2.04E+02	1.27E+02	6.05E+01	1.37E+01	5.76E+00	1.68E+00	6.60E-01	2.68E-01	1.98E-01	1.25E-02	**2.15E+03**
11.08.20 16:46	1.45E+03	2.87E+02	2.04E+02	1.28E+02	6.06E+01	1.37E+01	5.53E+00	1.50E+00	5.44E-01	2.37E-01	1.83E-01	1.36E-02	**2.15E+03**
11.08.20 16:46	1.46E+03	2.90E+02	2.05E+02	1.28E+02	6.05E+01	1.35E+01	5.23E+00	1.24E+00	4.19E-01	2.05E-01	1.69E-01	1.31E-02	**2.17E+03**
11.08.20 16:46	1.48E+03	2.91E+02	2.05E+02	1.29E+02	6.07E+01	1.34E+01	5.10E+00	1.09E+00	3.31E-01	1.87E-01	1.61E-01	1.13E-02	**2.19E+03**
11.08.20 16:46	1.48E+03	2.91E+02	2.06E+02	1.29E+02	6.07E+01	1.34E+01	5.06E+00	1.04E+00	3.02E-01	1.70E-01	1.48E-01	1.14E-02	**2.19E+03**

11.08.20 16:46	1.49E+03	2.91E+02	2.06E+02	1.29E+02	6.06E+01	1.34E+01	5.06E+00	1.01E+00	2.98E-01	1.68E-01	1.44E-01	1.31E-02	**2.20E+03**
11.08.20 16:47	1.50E+03	2.91E+02	2.06E+02	1.29E+02	6.06E+01	1.34E+01	5.02E+00	9.98E-01	2.99E-01	1.59E-01	1.41E-01	1.29E-02	**2.20E+03**
11.08.20 16:47	1.49E+03	2.91E+02	2.06E+02	1.29E+02	6.04E+01	1.34E+01	5.22E+00	1.17E+00	3.89E-01	1.88E-01	1.48E-01	1.18E-02	**2.20E+03**
11.08.20 16:47	1.49E+03	2.89E+02	2.05E+02	1.28E+02	6.04E+01	1.36E+01	5.51E+00	1.46E+00	5.53E-01	2.26E-01	1.55E-01	9.32E-03	**2.20E+03**
11.08.20 16:47	1.50E+03	2.91E+02	2.05E+02	1.28E+02	6.05E+01	1.37E+01	5.64E+00	1.64E+00	6.27E-01	2.51E-01	1.60E-01	7.50E-03	**2.20E+03**
11.08.20 16:47	1.51E+03	2.90E+02	2.04E+02	1.28E+02	6.06E+01	1.38E+01	5.66E+00	1.69E+00	6.48E-01	2.53E-01	1.60E-01	5.72E-03	**2.21E+03**
11.08.20 16:47	1.50E+03	2.91E+02	2.04E+02	1.27E+02	6.05E+01	1.37E+01	5.64E+00	1.71E+00	6.45E-01	2.59E-01	1.59E-01	6.44E-03	**2.21E+03**
11.08.20 16:48	1.50E+03	2.90E+02	2.03E+02	1.27E+02	6.04E+01	1.36E+01	5.60E+00	1.71E+00	6.33E-01	2.48E-01	1.66E-01	6.93E-03	**2.20E+03**
11.08.20 16:48	1.49E+03	2.91E+02	2.03E+02	1.27E+02	6.05E+01	1.35E+01	5.32E+00	1.42E+00	4.92E-01	2.05E-01	1.57E-01	7.83E-03	**2.19E+03**
11.08.20 16:48	1.50E+03	2.92E+02	2.03E+02	1.27E+02	6.03E+01	1.32E+01	5.04E+00	1.15E+00	3.56E-01	1.71E-01	1.49E-01	1.37E-02	**2.20E+03**
11.08.20 16:48	1.50E+03	2.92E+02	2.03E+02	1.27E+02	6.04E+01	1.31E+01	4.82E+00	9.79E-01	2.90E-01	1.55E-01	1.50E-01	1.55E-02	**2.20E+03**
11.08.20 16:48	1.50E+03	2.92E+02	2.03E+02	1.27E+02	6.04E+01	1.31E+01	4.89E+00	9.51E-01	2.89E-01	1.47E-01	1.57E-01	1.59E-02	**2.21E+03**
11.08.20 16:48	1.50E+03	2.94E+02	2.03E+02	1.28E+02	6.05E+01	1.31E+01	4.93E+00	9.41E-01	2.94E-01	1.49E-01	1.58E-01	1.54E-02	**2.21E+03**
11.08.20 16:49	1.52E+03	2.94E+02	2.03E+02	1.28E+02	6.07E+01	1.32E+01	4.96E+00	9.47E-01	2.91E-01	1.48E-01	1.54E-01	1.48E-02	**2.22E+03**
11.08.20 16:49	1.52E+03	2.96E+02	2.03E+02	1.28E+02	6.05E+01	1.32E+01	4.97E+00	9.58E-01	2.88E-01	1.44E-01	1.52E-01	1.44E-02	**2.22E+03**
11.08.20 16:49	1.50E+03	2.95E+02	2.03E+02	1.27E+02	6.04E+01	1.32E+01	5.02E+00	9.60E-01	2.90E-01	1.38E-01	1.44E-01	1.59E-02	**2.21E+03**
11.08.20 16:49	1.50E+03	2.95E+02	2.03E+02	1.27E+02	6.01E+01	1.32E+01	5.08E+00	9.95E-01	2.72E-01	1.38E-01	1.41E-01	1.53E-02	**2.20E+03**
11.08.20 16:49	1.50E+03	2.96E+02	2.03E+02	1.28E+02	6.00E+01	1.33E+01	4.99E+00	9.81E-01	2.51E-01	1.33E-01	1.40E-01	1.25E-02	**2.21E+03**

Appendix 4. Distributions data from Dekati Excel file

DEKATI

ALL DISTRIBUTIONS

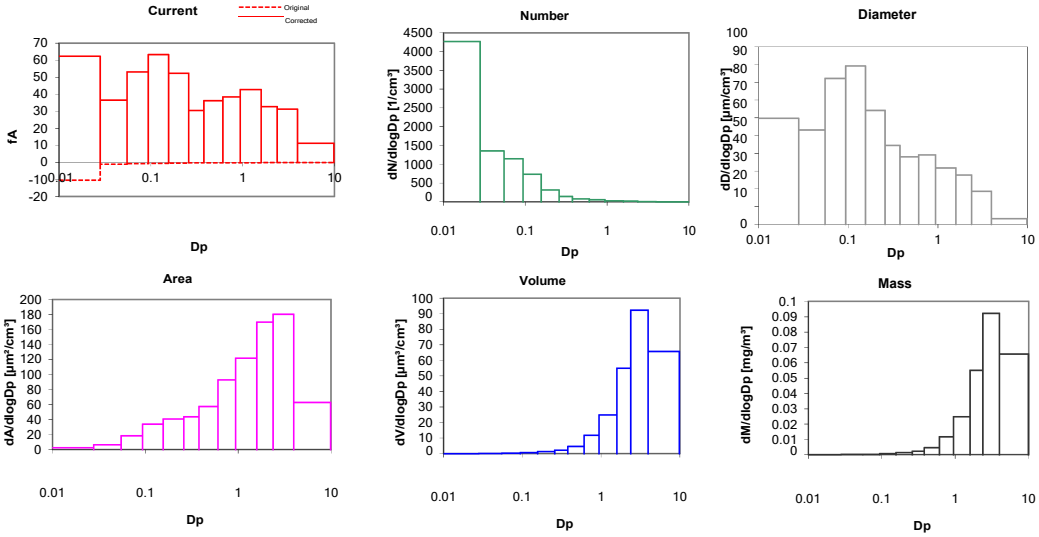
Date	#######	Filename	07082020a_JuliaNEW.dat
Time	14:52:11	Note	Korjattu impaktorikatakaisua

		Sample	Time
Distribution average	From	1	14:52:11
	To	327	15:46:40

Dilution	1
Density	1

☑ Correction ☐ Stokes Dp

Stage n:o	1	2	3	4	5	6	7	8	9	10	11	12	13
Dp	0.007	0.028	0.055	0.094	0.156	0.259	0.379	0.609	0.942	1.590	2.380	3.970	9.890



c	1	2	3	4	5	6	7	8	9	10	11	12	Total	From Ch	1
Di	0.014	0.03924	0.0719	0.1211	0.20101	0.31331	0.48043	0.75742	1.22384	1.9453	3.07386	6.26604		To	12
Current	62	36	53	63	52	31	36	38	43	33	31	11	490.94794	fA	
Number	2568	397	266	162	70	23	16	10	6	3	1	0	3523	1/cm³	
Diameter	36	16	19	20	14	7	8	7	7	5	4	1	144.46569	µm/cm³	
Area	2	2	4	7	9	7	12	18	28	30	40	25	183.31662	µm²/cm³	
Volume	0	0	0	0	0	0	1	2	6	10	21	26	65.926179	µm³/cm³	
Mass	0	0	0	0	0	0	0	0	0	0	0	0	0.0659262	mg/m³	
dlogdp	1	0	0	0	0	0	0	0	0	0	0	0			
Current dI/dlogDp	104	124	229	288	238	185	176	203	189	187	141	28			
Number dN/dlogDp	4265	1354	1143	736	319	142	79	52	26	14	6	1			
Diameter dD/dlogDp	60	53	82	89	64	44	38	39	32	28	19	3			
Area dA/dlogDp	3	7	19	34	41	44	57	93	122	170	180	63			
Volume dV/dlogDp	0	0	0	1	1	2	5	12	25	55	92	66			
Mass dM/dlogDp	0	0	0	0	0	0	0	0	0	0	0	0