

MATERIAL SAFETY DATA SHEET**Put on the Register of MSDS**MSDS registration No. 0 0 2 0 3 8 0 3 . 2 0 . 8 2 5 5 0

dd. July 14, 2023

Valid through July 14, 2028

Association "Non-Commercial Partnership "CIS states coordination and
information center of the regulatory practices approximation"**NAME:**

Technical (acc. to RD)

Pentaerythritol technical

Chemical (acc. to IUPAC)

2,2 – Bis(hydroxymethyl)propandi-1,3-ol

Commercial

Pentaerythritol technical, grade A (high grade and first grade), B

Synonyms

Tetrahydroxypentane, tetramethylmethane,
tetraoxymethylmethane, 2,2-dimethylpropanediol-1,3**OKPD 2 code**2 0 . 1 4 . 2 3 . 1 2 0**TN VED of EAEU**2 9 0 5 4 2 0 0 0 0

Conventional description and designation of the main normative, technical or information document for the product (GOST, TU, OST, STO, (M)SDS)

GOST 9286-2012 Pentaerythritol technical. Technical specifications**HAZARD CHARACTERISTICS****Signal word****Missing****Brief description** (in words): Moderately hazardous product affecting human organism, 3rd class of hazard according to GOST 12.1.007. The product dust may cause mechanical irritation of skin and eyes. Combustible substance. It may pollute environmental objects.**Detailed description:** in 16 sections of the attached material safety data sheet.

MAIN HAZARDOUS COMPONENTS	MAC w.a., mg/m ³	Hazardous class	CAS No.	EC No.
Pentaerythritol	4	3	115-77-5	204-104-9

APPLICANT

JSC Metafrax Chemicals

(company name)

Gubakha

(city)

Type of applicant manufacturer, supplier, seller, exporter, importer

(delete as applicable)

OKPO code0 0 2 0 3 8 0 3**Emergency tel.**(34248) 4-03-38**Head of applying company**

(signature)

/ V. Maier /

(clarification)

Safety Data Sheet (SDS) meets UN Recommendations ST/SG/AC.10/30 “GHS (GHS)”

- IUPAC** – International Union of Pure and Applied Chemistry
- GHS (GHS)** – UNO Recommendations ST/SG/AC.10/30 “Globally Harmonized System of Classification and Labelling of Chemicals”
- OKPD 2** – All-Russian Classifier of Products by type of economic activity
- OKPO** – All-Russian Classifier of Companies and Organizations
- TN VED of EAEU** – Commodity Classification for Foreign Economic Activity of EAEU
- CAS No.** – Substance number in the Chemical Abstracts Service register
- EC No.** – Substance number in the European Chemical Agency register
- MAC w.a.** – Maximum admissible concentrations of chemical material in working area air, mg/m³
- Signal word** – A word used to draw attention to chemical product hazard degree and chosen according to GOST 31340-2022

1 Chemical products identification and information about a manufacturer and/or supplier

1.1 Chemical products identification

- 1.1.1 Technical name Pentaerythritol technical [1].
- 1.1.2 Brief recommendations for application (including application limitations) It's used for production of paint and varnish materials, printing dyes, lubricant oils, pentaplast and for nitration [1].

1.2 Information about a manufacturer and/or supplier

- 1.2.1 Organization's full official name Joint-Stock Company Metafrax Chemicals (JSC Metafrax Chemicals)
- 1.2.2 Address (post and legal) 618250, Gubakha, Perm region, Russia
- 1.2.3 Telephone, incl. emergencies and time limitations (34 248) 4 03 38
(around the clock information on hazardous impact types and first aid measures)
- 1.2.4 E-mail info@metafrax.ru

2 Hazard (hazards) identification

- 2.1 Chemical product hazard degree in general
(information on hazard classification in accordance with the RF legislation (GOST 12.1.007-76) and GHS (GOST 32419, GOST 32423, GOST 32424, GOST 32425))
- Classification as per GOST 12.1.007:
The material is moderately hazardous by the exposure on human organism, 3rd class of hazard [2].
Classification as per GHS: - not classified [3,8].

2.2 Information on warning marking as per GOST 31340

- 2.2.1 Signal word Not required [5].
- 2.2.2 Symbols (signs) of a hazard Not required [5].
- 2.2.3 Brief hazard description (H- phrases) Not required [5].

3 Composition (information on components)

3.1 Information on product in general

- 3.1.1 Chemical name (as per IUPAC) 2,2- Bis(hydroximethyl)propandi-1,3-ol [7].
- 3.1.2 Chemical formula $C_5H_{12}O_4$ [7].
- 3.1.3 Composition general description (considering brand assortment; production method) Pentaerythritol technical is obtained during the condensation process of acetaldehyde with formaldehyde in alkali media and it's a monopentaerythritol with admixture of dipentaerythritol, poly-pentaerythritols and pentaerythritol formals. Depending on the composition, the following grades are produced: Grade A for paint and varnish materials and printing dyes Grade B for production of pentaplast, lubricant oils and for nitration.

Grade A is produced in high and first grades [1,10].

3.2 Components

(name, CAS and EC numbers, mass fraction (in total shall be 100%), working area MAC or working area SRLI, hazard categories, reference to the data sources)

Table 1 [1,6]

Components (name)	Mass fraction, %	Hygienic regulations in the working area air		Hygienic regulations in the working area air	№ EC
		MAC w.a., mg/m ³	Hazard category		
Monopentaerythritol	95.0 – 98.7	4 (a)	3	115-77-5	204-104-9
Dipentaerythritol	1.1 – 4.5	Not established	No	126-58-9	204-794-1
Linear monoformale	0.1 – 0.3	Not established	No	No	No
Water and volatile substances “a” - aerosol	0.1 – 0.2	Not established	No	7732-18-5	231-791-2

4 First aid measures

4.1 Symptoms

4.1.1 When poisoning by inhalation (if inhaled) Excitement with subsequent sluggishness, reducing motor activity [7].

4.1.2 Skin contact No irritant effect [7].

4.1.3 Eye contact No irritant effect [7].

4.1.4 When poisoning by ingestion (if swallowed) Narcotic state, excitement with subsequent sluggishness, reducing of motor activity, tremor [7].

4.2 First aid measures for injured people

4.2.1 When poisoning by inhalation Fresh air, rest, heat. If necessary, apply for medical aid [7].

4.2.2 Skin contact Flush with much running water. If necessary, apply for medical aid [7].

4.2.3 Eye contact Flush with much running water. If necessary, apply for medical aid [7].

4.2.4 When poisoning by ingestion Flush mouth cavity with water, abundant water drinking, activated carbon, saline purgative. If necessary, apply for medical aid [7].

4.2.5 Contraindications N/A [7].

5 Measures and means of fire and explosion hazard management

5.1 Fire and explosion hazard general description Combustible substance. Dust is explosive and flammable [1].

(as per GOST 12.1.044-89)

5.2 Fire and explosion hazards

(set of parameters as per GOST 12.1.044-89)

Pentaerythritol:

Ignition temperature: 270°C [1];

Self-ignition temperature: 435°C [1];

Smoke-developed index: 730 m²/kg [1];

Min.ignition energy: 10 mJ [12];

	<p>Limiting oxygen concentration 14% vol. when diluted by CO₂ [12].</p> <p><u>Pentaerythritol dust:</u></p> <p>Self-ignition temperature: 435°C [1];</p> <p>Max. explosion pressure: 671 kPa [1];</p> <p>Max. explosion pressure rise rate: 34.2 MPa·f [1];</p> <p>Lower concentrated flame spread of air suspension: 30 g/m³ [12]</p> <p>Kst: 9.1 MPa·f [1].</p>
<p>5.3 Products of combustion and/or thermal destruction and the hazards they cause</p>	<p>The carbon oxides are formed during thermal destruction affecting central nervous and cardiovascular systems, blood system, liver, kidneys [7].</p> <p>Carbon monoxide (carbon monoxide gas) disrupts the transport and transfer of oxygen to the tissues, oxygen deficiency of the organism develops, to which the nervous and cardiovascular systems are particularly sensitive, if inhaled, can be lethal outcome.</p> <p>Carbon dioxide (carbonaceous gas) in the conditions of a fire causes increased respiratory rate and increased pulmonary ventilation, thereby promoting a large intake of toxic substances contained in the products of combustion; it has a vasodilatory effect [11].</p>
<p>5.4 Recommended means of fire fighting</p>	<p>Sprayed water with wetter, mechanical foam [1,7].</p>
<p>5.5 Forbidden means of fire fighting</p>	<p>N/A [1,12].</p>
<p>5.6 Personal protective equipment during fire fighting (fire PPE)</p>	<p>Firefighter's general service uniform (jacket and pants with removable heat insulation sherpa) complete with firefighter's belt, mittens and gloves, firefighter's helmet, special protective footwear [13].</p>
<p>5.7 Special fire fighting procedures</p>	<p>N/A [1, 12].</p>
<p>6 Measures for prevention and liquidation of accidents and emergency situations and their consequences</p>	
<p>6.1 Measures to prevent harmful impact on people, environment, buildings, structures, etc. in case of accidents and emergency situations</p>	
<p>6.1.1 Necessary general actions in accidents and emergency situations</p>	<p>Isolate the hazardous area within a radius of at least 50m. Remove outsiders. Don't smoke. Eliminate sources of fire and sparks. Enter the accident area in personal protective equipment and wearing breathing apparatus. Provide first aid to injured people [14].</p>
<p>6.1.2 Personal protective equipment in accidents (PPE emergency crews)</p>	<p>In case of fire: fireproof suit complete with SPI-20 self-rescuer.</p>

In case of non-availability of such means – protective army suit L-1 or L-2 complete with industrial gas mask with cartridges A, B [14].

For emergency teams - insulating protective suit KIH-5 complete with isolating gas mask or breathing apparatus ASV-2 [14].

6.2 The procedure of actions in case of liquidation of accident and emergency situations

6.2.1 Actions on leaks, spills, scattering
(including measures to eliminate them and precautionary measures to ensure environmental protection)

In case of scattering indoors: put on a respirator, chemical protective rubber gloves, collect the scattered product. Avoid actions causing the dust to rise up (dusting). Use undamaged products for their intended purpose. Dispose products that became worthless as per p.13.2. Fence off scattering in the open with an earthen berm, collect it in dry containers, close them tight and hand over for disposal. Don't allow the product to get into water bodies and sewage systems. Inform the local Rospotrebnadzor and Rosprirodnadzor bodies [10, 14].

6.2.2 Actions in case of fire

Enter the emergency zone in protective cloths and respiratory apparatus. Extinguish from the maximum distance by sprinkled water, mechanical foam [1, 14].

7 Guidelines for storage and handling of chemical products during loading and unloading operations

7.1 Safety measures when handling chemical products

7.1.1 Systems of engineering safety measures

The working rooms shall be provided with supply-and-exhaust ventilation acc. to GOST 12.4.021 while areas of possible dusting – with local exhausters. Leak-tight design of equipment, tanks for storage and transportation. The working places shall have individual respiratory protective means.

The fire safety of production shall have fire prevention system, fire protection system, organization measures acc. to GOST 12.1.004. Explosion-proof design of equipment, utilities and fixtures of artificial lighting.

The protection of equipment and networks on the areas of possible static electricity charges formation shall be made acc. to GOST 12.4.124. Work places shall be equipped with primary means of firefighting [1, 10].

7.1.2 Measures to protect the environment

Observance of handling, storage, transportation, waste disposal rules. Control over

7.1.3 Recommendations on safe handling and transportation

observance of maximum allowable emissions. Maximum tightness of vessels, utilities and other equipment [10].

Pentaerythritol is transported by all transport means according to the cargo transportation rules specific for the type of transport. Pentaerythritol packed in bags is transported in closed means of transport. Pentaerythritol packed in specific soft containers is transported both in open and closed means of transport with additional protection against direct sunlight. If agreed with consumers the transportation of material is allowed without package in special auto transport ensuring the preservation of material characteristics during transportation [1].

7.2 Guidelines for chemical product storage

7.2.1 Terms and conditions of safe storage (including the guaranteed storage period, lifetime; substances and materials incompatible with storage)

Pentaerythritol is stored in closed storages with good ventilation protecting the material against atmospheric precipitation on pallets positioned above the floor not less than 5 cm and from heaters not less than 1 m. The pentaerythritol is allowed to be stored packed in containers on open areas under or without shed with additional protection against direct sunlight on pallets above the ground not less than 5 cm [1].

It's incompatible with oxidizers, acids, alkalis [7].

Guarantee storage period – 2 years since manufacturing [1].

7.2.2 Shipping containers and packaging (incl. the materials from which they are produced)

Pentaerythritol is packed in tare made of waterproof materials. As transport containers are used: laminated paper multilayer and bitumized bags (in bitumized bags the inner paper layer in contact with product shall be not impregnated), PE bags, bags made of PP fabrics with inner PE liner [1].

Upon agreement with the consumer, pentaerythritol may be packed in soft special containers of a flexible intermediate bulk container type for bulk products, with a safety factor (safety margin) of at least 5:1 [1].

It's allowed to pack pentaerythritol in other transport packaging, which is not inferior in strength and quality to the above mentioned packaging, ensuring

7.3 Safety measures and guidelines for storage in the household

the safety of products during storage and transportation [1].

Bag spouts shall be sewed by mechanical way, bag spouts of PE bags shall be welded.

Spouts of flexible intermediate bulk container types shall be welded or tied up [1].

Not applicable in the household [1].

8 Means of control over dangerous influence and personal protective equipment

8.1 Working area parameters, which are subject to mandatory control

(MAC w.a. or SRLI w.a.)

MAC of working area: 4 mg/m³ [6].

8.2 Measures to ensure the content of harmful substances in permissible concentrations

The organization of the technological process shall be maximally mechanized and automated, shall ensure dust-free transportation of pentaerythritol and meet the requirements of GOST 12.3.002 and GOST 12.2.003. Control of technological process shall be provided by remote systems. Dusting equipment shall be sealed. Industrial spaces shall be wet cleaned. Periodically control the content of harmful substances in the air of the working area. Laboratory work shall be carried out only in a fume cupboard with working ventilation [1].

8.3 Personal protective equipment for personnel

8.3.1 General recommendations

Avoid direct contact with the substance. Wear protective cloths, safety glasses, gloves, respirator. Follow the rules of personal hygiene. Don't take food, don't drink and don't smoke while working. Production personnel shall pass preliminary and regular medical examination [1,10].

8.3.2 Respiratory protection (RPE types)

All workers involved in the production of pentaerythritol, in addition to the above means of protection, shall be equipped with gas masks according to GOST 12.4.121 with filters of grades A, B, E, K, SX [10].

8.3.3 Protection means (material, type)

(special clothing, special footwear, hands protection, eyes protection)

Special mittens according to GOST 12.4.010, rubber knitted gloves. Special suits for protection against general industrial contamination according to GOST 12.4.280, boots made of Russian leather according to GOST 5394 or special footwear with leather upper for protection from oil, oil products, acids, alkalis, non-toxic and explosive dust according to GOST 12.4.137 [1].

8.3.4 Personal protective equipment for the household application

Not applicable in the household [1].

9 Physical and chemical properties

9.1 Form

(aggregate state, color, odor)

White crystalline powder without odor [1].

9.2 Parameters characterizing the main properties of the products

(temperature, pH, solubility, n-octanol/water ratio and other parameters typical for this type of product)

Boiling point: 410°C [7].

Melting point: 245-259 [7].

Density: 1.38-1.4 g/cm³ [7].

Solubility in water: 55.6 g/l at 20°C [7].

pH of aqueous solution (5%): 5.0 – 7.0 [1].

10 Stability and reactivity

10.1 Chemical stability
(for unstable products, specify decomposition products)

Stable under normal conditions of production, storage, transportation and application [7].

10.2 Reactivity

It oxidizes, reduces, nitrates, alkylates, acidates. It forms complex compounds with metals. It reacts with ketones, aldehydes, chlorosulfonic acid, thionyl chloride [7].

10.3 Conditions to be avoided
(incl. dangerous effects when in contact with incompatible substances and materials)

Storing close to open flame sources. Joint storing with oxidizers, acids, alkalis [7].

11 Toxicity information

11.1 General characteristics of effect
(assessment of hazard degree (toxicity) for effect on the organism and the most typical evidences of hazard)

The grade of substance effect on human organism is moderately hazardous (3rd class of hazard) [1,2].

11.2 Exposure routes
(inhalation, oral, skin and eye contact)

In case of dust inhaling, dust contact with eyes, swallowing [7].

11.3 Affected organs, tissues and human systems

Central nervous system, gastrointestinal tract, blood, liver, kidneys [7].

11.4 Information about health hazards caused by direct contact with products, and the consequences of these effects

It has a narcotic effect. It causes excitement with subsequent sluggishness, reducing of motor activity, tremor. The product dust may cause mechanical irritation of skin and eyes.

(irritant effect on the upper respiratory tract, eyes, skin; skin-resorptive and sensitizing effect)

Skin-resorptive and sensitizing effects are not found [7].

11.5 Information about dangerous long-term effects of products on the organism
(effect on reproduction function, carcinogenicity, mutagenicity, cumulation and other chronic effects)

Mutagenic, reprotoxic, gonadotropic, teratogenic effect is not found.
Embryotrope and carcinogenic effects were not studied.
Cumulativity: moderate [7].

11.6 Acute toxicity indexes
(DL₅₀ (ЛД₅₀), entry route (intragastrically, epidermally), animal specimen; CL₅₀ (ЛК₅₀), exposure period (h), animal specimen)

DL₅₀ = 19500 - 27170 mg/kg, intragastrically, rats [7].
DL₅₀ = >10000 mg/kg, epidermally, rabbits [8].
CL₅₀ = >11000 mg/m³, 6 h, rats [7].

12 Information on environmental impact

12.1 General characteristics of the impact on environmental objects

(atmospheric air, water bodies, soils, including observed signs of impact)

The product pollutes the environment, changes the sanitary regime of water bodies, organoleptic water properties. In significant quantities, it can have a detrimental effect on the inhabitants of water bodies. The ingestion of significant quantities of pentaerythritol into the soil may have adverse effects, resulting in deterioration of the appearance of vegetation, contamination and degradation of soils [7].

12.2 Ways to impact the environment

Violations of storage and transportation rules, uncontrolled waste dumping and burning of waste, discharge in water and terrain, accidents and emergencies [10].

12.3 Most important environmental impact characteristics**12.3.1 Hygienic regulations**

(permissible concentrations in atmospheric air, water, including fishery water bodies, soils)

Table 2 [6,9]

Components	MAC atm.a. or SRLI atm.a., mg/m ³ (LHI ¹ , hazard category)	MAC water ² or APC water, mg/l, (LHI, hazard category)	MAC fishery water bodies ³ or SRLI fishery water bodies, mg/l (LHI, hazard category)	MAC soil or APC soil, mg/kg (LHI)
Pentaerythritol	0.04 (SRLI)	0.1 s.-t., 2 nd category	Not established	Not established

12.3.2 Indicators of ecotoxicity

(CL, EC, NOEC and other for fishes (96 h.), daphnia (48 h.), algae (72 or 96 h.) and other)

Acute toxicity for fish:

CL₅₀ ≥ 50000 mg/l (Cyprinodon), 96 h;

Acute toxicity for daphnia magna:

CL₅₀ 40000 mg/l, 24 h [7].

It transforms in the environment [7].

12.3.3 Migration and transformation in the environment through biodegradation and other processes (oxidation, hydrolysis, etc.)**13 Recommendations on waste (residue) disposal**

13.1 Safety measures for handling waste generated during application, storage, transportation

Similar to the measures applied when working with the product. (see sections 7,8 of MSDS)

13.2 Information about places and methods of decontamination, recycling or disposal of waste products, including shipping containers (packaging)

Waste disposal shall be performed in accordance with SanPiN 1.2.3684-21.

¹ LHI – limiting harmful index (tox. - toxicological; s.t. (san.-tox.) - sanitary and toxicological; org. - organoleptic with the decoding of the nature of changes in organoleptic properties of water (smell - changes the smell of water, turb. - increases the turbidity of the water, col. - gives the water a color, foam - causes the formation of foam, film - forms a film on the surface of the water, flvr. - gives a flavor to the water, op. - causes opalescence); ref. - reflexive; res. - resorptive; ref.-res. - reflexive- resorptive; fish farm. - fishery water body (change of commercial qualities of commercial aquatic organisms); general - general sanitary).

² Water of water bodies of municipal and amenity water use

³ Water of water bodies of commercial fishing importance (including marine)

13.3 Recommendations for the disposal of waste generated by the use of products in the household

Dissolve or mix the product with a combustible solvent and then burn it in a chemical destruction kiln equipped with an afterburner and scrubber.

Non-refundable shipping packaging released from the product are collected in containers and sent for dumping to places agreed with local authorities of Rospotrebnadzor and Rosprirodnadzor [11].

Not applicable in the household [1].

14 Information on shipping (transportation)

14.1 UN Number

(in accordance with the UN Recommendations on the Transport of Dangerous Goods)

Missing [15].

14.2 Proper shipping and transport name

Proper shipping name:

Not applicable [15].

Transport name: pentaerythritol technical, grade A (high grade and first grade), B [1].

14.3 Used modes of transport

It's transported by all types of transport in accordance with the goods transportation rules valid for this type of transport [1].

14.4 Classification of cargo hazard according to GOST 19433-88:

Not classified

- class
- subclass
- classification code

(acc.to GOST 19433-88 and in railway transportation)

- number(s) of drawing(s) for hazard sign(s)

14.5 Cargo hazard classification on UN recommendations during hazard cargo transportation:

Not classified

- category or subcategory
- additional hazard
- UN packing group

14.6 Shipping marking

(handling symbols as per GOST 14192-96)

“Protect from moisture“ [1].

14.7 Emergency cards

(for rail, sea and other transportation)

Not required [1].

15 Information on national and international legislation

15.1 National legislation

15.1.1 RF laws

"On Environmental Protection", "On Protection of Atmospheric Air", "On Industrial Safety of Hazardous Production Facilities", "On Sanitary and Epidemiological Welfare of the Population",

15.1.2 Information about documentation regulating requirements for human and environmental protection

15.2 International conventions and agreements

(whether products are regulated by the Montreal Protocol, the Stockholm Convention, etc.)

“On Production and Consumption Wastes”, “On Technical Regulation”

State registration certificate: series VT No. 000162.

It doesn't fall under international conventions and agreements [16, 17].

16 Additional information

16.1 Information on revision (reissue) of MSDS

(indicated: “MSDS is prepared for the first time“ or “MSDS is re-registered upon expiration. Previous SDSR No. ...“ or “Revised the clauses ..., effective date ...“)

MSDS is re-registered upon expiration. Previous SDS registration No. 00203803.20.53111 dd. 30.08.2018

16.2 List of data sources used to create the Material Safety Data Sheet ⁴

1. GOST 9286-2012 Pentaerythritol technical. Technical specifications Rev.1
2. GOST 12.1.007-76 Occupational safety standards system. Noxious substances. Classification and general safety requirements
3. GOST 32419-2022 Chemical hazard classification. General requirements
4. GOST 12.01.044-89 Occupational safety standards system. Fire and explosion hazard of substances and materials. Nomenclature of indices and methods of their determination
5. GOST 31340-2022 Labelling of chemicals. General requirements
6. SanPiN 1.2.3685-21 Hygienic standards and requirements for ensuring safety and (or) harmlessness to humans from environmental factors
7. Information card of potentially hazardous chemical and biological substance.
2,2 – Bis(hydroxymethyl)propanedi-1,3-ol. State registration certificate, series VT No. 000162-M.: RPOHV, 1994
8. Information about substance. 2,2 – Bis(hydroxymethyl)propanedi-1,3-ol. Registration No.: series VT 000162. Electronic database ARIPS, 2005.
9. Data from the ECHA (European Chemicals Agency) information system. [Electronic source]: Access mode –<https://echa.europa.eu/en/registration-dossier/-/registered-dossier/15344/7/3/4>
10. Order of Russian Agriculture Ministry dd. 13.12.2016 No.552 “On approval of norms of water quality of water bodies of fishery significance, including norms of maximum permissible concentrations of harmful substances in water bodies of fishery significance”
11. Permanent process regulation No. 15 of pentaerythritol production Rev.1-6, JSC Metafrax Chemicals, Gubakha, 2017
12. Chernyshev A.K., Gusev V.K. Hazard values of substances and materials. Directory. vol. II – m.: I.D. Sytin Fund, 1999
13. Korolchenko A.Y., Korolchenko D.A., Fire and explosion safety of substances and materials and means of fire extinguishing. Directory. p.2 – M., Association “Pozhnauka”, 2004

⁴ Sequential numbers of data sources are given in each MSDS point as references

14. Decree of the Government of the Russian Federation dd. 10.03.2009 No. 304-r (Rev. dd. 26.04.2022). On approval of the list of national standards containing rules and methods of research (tests) and measurements including rules of sampling necessary for application and execution of the Federal Law "Technical Regulations on Fire Safety Requirements and Conformity Assessment".
15. Transport emergency cards on cargoes transported by railways of CIS, the Republic of Latvia, the Republic of Lithuania, the Republic of Estonia approved by the Council on Railway Transport of member countries of the Commonwealth (Rev.as of 01.01.2023)
16. UN Recommendations on the Transport of Dangerous Goods. Model Regulations. The 22nd revised edition. United Nations, New York and Geneva, 2021.
17. The Montreal Protocol on Substances that Deplete the Ozone Layer dd. 16.09.1987
18. The Stockholm Convention on Persistent Organic Pollutants dd. 22.05.2001