CHEMICAL PRODUCT SAFETY DATA SHEET

Listed in the Safety Data Sheets Register

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Assosiation "Non-commercial partnership Coordination and information center of CIS states on alignment of regulatory practices"

DESCRIPTION

technical (as per RD)	**Paraformaldehyde**
chemical (as per IUP AC)	Paraformaldehyde
trade	Paraformaldehyde grade A/B
synonyms	Paraform, polyoxymethylene glycol

Code OKPD 2	**HS Code of EAEU**
2 0 . 1 4 . 6 1 . 0 0 0	2 9 1 2 6 0 0 0 0 0

Short title and description of the regulatory, technical or informational document for the product (GOST, TU, OST, STO, (M)SDS)

TU 20.14.61-044-00203803-2021 Paraformaldehyde. Technical conditions

HAZARD STATEMENT

Signal word **Hazard**

Brief (verbal): Highly hazardous by degree of exposure to the body products in accordance with GOST 12 .1.007. Harmful if swallowed, when inhaled. In contact with skin causes irritation. In contact with eyes causes irreversible consequences. Causes allergic reaction in contact with skin. Suspected of causing genetic defects. May cause cancer. May cause irritation of upper respiratory tract. Flammable solid. Harmful to aquatic life.

Detailed: indicated in 16 sections of the Safety data sheet attached

MAJOR HAZARDOUS COMPONENT	MAC w.a., mg/m³	Hazard class	No CAS	No EU
Paraformaldehyde	0,5 (formaldehyde based)	2	30525-89-4	200-001-8

APPLICANT PJSC Metafrax (company description) Gubakha (city)

Applicant type manufacturer, supllier, seller, exporter, ~~importer~~ (delete as applicable)

OKPO Code 0 0 2 0 3 8 0 3

Emergency phone number (34248)4-03-38

Applicant company manager (signature) sign here

V.V. Maier (printed)

The Materials Safety Data Sheet (MSDS) complies with the Recommendations of the UN ST/SG/AC.10/30 GHS

IUPAC	–	International Union of Pure and Applied Chemistry
GHS	–	The UN recommendations ST/SG/AC.10/30 |Globally Harmonized System of Classification and Labelling of Chemicals
OKPD 2	–	All-Russian Classification of Products by Activity
OKPO	–	All-Russian Classification of companies and organizations
FEACN of EEU	–	Foreign Economic Activity Commodity Nomenclature of Eurasian Economic Union
CAS No.	–	the substance number in the register of Chemical Abstracts Service
EU No.	–	the substance number in the register of European Chemicals Agency
MAC of w.a.	–	maximum acceptable concentration of the chemical substance in the working area air, mg/m^3
Signal word	–	a word that is used to highlight the hazard level of chemical products and which is chosen according to GOST 31340-2013

1 Identification of a chemical product and information about a manufacturer and/or a supplier

1.1 Identification of a chemical product

1.1.1 Technical name	Paraformaldehyde
1.1.2 Brief recommendatuins on use (incl. use limitations)	Paraformaldehyde is used for fabrication on its basis of synthetic resins, glues; to be used as a desinfectant for treatment of livestock houses, transportation means and other facilities [1].

1.2 Information on a manufacturer and/or a supplier

1.2.1 Full official company name	Public Joint Stock Company Metafrax
1.2.2 Address (postal and legal)	Gubakha, Perm region, 618250, Russia
1.2.3 Phone, incl. for emergency consulting and time limitations	(34248) 4 03 38 round-the-clock information on types of hazard impact and first aid means)
1.2.4 Fax	(34248) 4 71 21
1.2.5 E-mail	info@metafrax.ru

2 Hazard (hazards) identification

2.1 Hazard level of chemical products in general
(information on hazard classification according to the RF legislation (GOST 12.1.007-76) and GHS (GOST 32419-2013, GOST 32423-2013, GOST 32424-2013, GOST 32425-2013)

GOST classification 12.1.007:

In terms of the impact level on the body is classified as highly hazardous substances, 2d hazard class [1,2].

GHS classification:

-a chemical product, which is a flammable solid substance, class 2;
-a chemical product, which has acute toxicity in case of ingestion: class 4;
-a chemical product, which has acute toxicity in case of inhailing: class 4;
-a chemical product, which causes skin damage (necrosis)/skin irritation: class 2;
-a chemical product, which causes severe damage/irritation of eyes: class 1;
-a chemical product that has sensitizing impact in case of skin contact;
-mutagen: class 2;
-cancerogen: class 1A;
-a chemical product, which has selective toxicity for target organs in case of a single impact: class 3;
-a chemical product, which has acute toxicity for water medium: class 3 [3,5].

2.2 Information about warning marking as per GOST 31340-2013

2.2.1 Signal word HAZARD [4].

2.2.2 Symbols (signs) of hazard

Flame

Exclamation mark

Health hazard

Liquids pouring out of two tubes and striking metal and hand

2.2.3 Hazard summary (H-phrases)

H228: Flammable solid.
H302: Harmful if swallowed.
H332: Harmful if inhaled.
H315: Causes irritation in contact with skin.
H318: In case of eye contact it causes irreversible consequences.
H317: May cause an allergic reaction in contact with skin.
H335: May cause irritation of the upper respiratory tract.
H341: The substance is believed to cause genetic defects.
H350: May cause cancer.
H402: Harmful to aquatic life [4].

3 Composition (components information)

3.1 Product information in general

3.1.1 Chemical description (as per IUPAC): Paraformaldehyde [6].

3.1.2 Chemical formula: $[CH_2O]n$, where n=8÷100 [6].

3.1.3 Composition general description (taking into account the branded assortment; the method of production): Paraformaldehyde is a product of formaldehyde polymerization. It is obtained from an aqueous formaldehyde solution by vacuum evaporation to the desired concentration, resulting in polymer flakes, which are further dried and ground [1,11].

3.2 Components

(description, numbers of CAS and EU, mass fraction (total to be 100%), MAC w.a. or SRLI w.a., hazard classes, references)

Table 1 [5]

Components (description)	Mass fraction, %	Hygienic standards in the air of the working area		CAS No.	EU No.
		MAC w.a., mg/m^3	Hazard class		
Paraformaldehyde	91-95	0,5 (formaldehyde based)	2	30525-89-4	608-494-5
Water	9-5	absent	absent	7732-18-5	231-791-2

4 First aid means

4.1 Observed sympthoms

4.1.1 In case of intoxication by inhalation (when breathing in)	Tearing, sore throat, cough, burning in the mouth and behind the sternum, headache, irregular breathing rhythm, dyspnea [16].
4.1.2 In case of skin impact	Irritation after predominant sensitization to formaldehyde [19].
4.1.3 In case of eyes impact	Tearing, pain, smarting in eyes [7].
4.1.4 In case of intoxication by ingestion (when swallowing)	Weakness, headache, burning throat, vomiting, abdominal pain [6].
4.2 First aid means to injured	
4.2.1 In case of intoxication by inhalation	Remove the injured person to fresh air. Inhalation of water vapor with the addition of a few drops of ammonia. On the indications: inhalation of oxygen, cardiac, respiratory stimulants, sedatives. With irritation of the mucous membranes of the respiratory tract - oil or alkaline inhalation. In case of need to seek medical help [7].
4.2.2 In case of skin impact	Immediately flush with running water with a soap or 5% ammonia solution [7].
4.2.3 In case of eyes impact	Abundant rinsing with running water or saline solution with the eye slit wide open. Cold lotions, injection of 1-2 drops of 0.5% solution of dicaine or novocaine with addition of 8-10 drops of adrenaline (1:1000) per 10 ml of solution, or vaseline or peach oil. Consult an ophthalmologist [7].
4.2.4 In case of intoxication by ingestion	Immediately flush the gaster with 3% ammonium carbonate solution. After that internally 15% ammonium acetate solution (with table spoons), 15-20 of ammonia-anise drops, as well as big doses of urea (2,0-4,0 g each 2-3 hours – up to 15-40 g per day), raw eggs, protein water, milk, saline purges, high enemas [7].
4.2.5 Counter indications	Do not induce vomiting [16].

5 Actions and means to ensure fire safety

5.1 General characteristic of fire safety (according to GOST 12.1.044-89)	Flammable substance [1].
5.2 Parameters of fire safety (set of parameters according to GOST 12.1.044-89 and GOST 30852.0-2002)	Flash temperature in a closed crucible – 71 C Flash temperature in an opened crucible – 93 C Air suspension self-ignition temperature – 410°C. Lower concentrated flame spread – 40 g/m^3. Minimum ignition energy– 20 mJ. Maximum explosion pressure – 990 kPa. Maximum rate of pressurisation in case of dust-air mixture explosion – 91 MPa/s. Oxygen index – 15,3 %vol. of O_2 [8].

5.3 Combustion products and/or thermal destruction and danger they cause	When heated it is depolymerized with emission of formaldehyde and carbon oxide [8]. Formaldehyde is irritating gas, which causes degenerative processes in parenchymatous organs, sensibilizes skin, inactivates several ferments in organs and tissues, inhibits synthesis of nucleic acid, disrupts vitamin C metabolism, posesses mutagenic properties [7]. Carbon oxide displaces oxygen from blood oxyhemoglobin; causes toxic impact on cells, damaging tissues breathing and decreasing oxygen consumption by tissues [7].
5.4 Recommened means for fire extinguishing	Finely sprayed water, air-filled foam [1].
5.5 Forbidden means for fire extinguishing	No information [1].
5.6 Personal protective equipment for fire extinguishing (PPE of fire fighters)	Full body gear (a jacket and trousers with removable heat insulating lining) paired with a guard fire belt, fire gauntlets or gloves, a fire helmet, special protective shoes, an isolating gas mask [15].
5.7 Special fire fighting procedures	Fine particles create in air an explosive mixture. In case temperature is higher than 71°C might be formed explosion-hazard steam and air mixtures [1,16].

6 Measures for liquidation of emergency situations and incidents and their consequences

6.1 Measures for preventing adverse effect on humans, environment, buildings, structures, etc. in case of emergency situations

6.1.1 Required actions of general nature in case of accident	Move a vehicle to a safe place. Isolate dangerous area in a radius of at least 100m. Correct indicated distance based on results of the chemical survey. Remove the outsiders. Follow fire safety measures. Do not smoke. Remove sources of fire and sparks [10].
6.1.2 Personal protective equipment in emergency situations (PPE of an emergency response team)	In case of fire - fire protecting clothing paired with the self-rescue device SPI-20. In case there are no devices mentioned: field-protective suit L-1 or L-2 paired with an industrial gas mask with a filter box A, an industrial gas mask of small dimension PFM-1, general-purpose respirator Snezhok-KU-M [10].

6.2 Emergency situations and incidents liquidation procedure

6.2.1 Actions in case of leakage, spillage (incl. liquidation and caution measures for environment protection)	Notify the sanitary and epidemiologic supervision authorities. Disconnect (eliminate) all possible sources of ignition. Put on self-contained respiratory protective apparatus, rubber boots, gloves. Fill with dry lime, sand or soda ash.

	Place in closed containers and remove for disposal. Organize airing (ventilation) of the site, wash contaminated areas [17].
6.2.2 Actions in case of fire	Do not come close to the burning containers. Cool down containers from the maximum distance. Extinguish from the maximum distance with fine spray water with wetting agents, air-mechanical foam. Organize evacuation of people from nearby buildings, taking into account the direction of movement of toxic combustion products [10].

7 Rules of chemicals storage and handling during loading and unloading operations

7.1 Safety measures when handling chemicals

7.1.1 Systems of engineering security measures	All production facilities shall be equipped with supply and exhaust ventilation in accordance with the requirements of GOST 12.4.021. The production areas should be wet cleaned. The organization of the technological process should be maximally mechanized and automated and meet the requirements of GOST 12.3.002 and GOST 12.2.003. Process control should be provided by remote systems. During manufacturing and packing of paraformaldehyde general fire safety requirements in accordance with GOST 12.1.004 and hygienic requirements shall be observed. Fire safety of production should be ensured by fire prevention system, fire protection system, organizational measures according to GOST 12.1.004. Protection of equipment and communications in areas of possible static electricity charges should be carried out in accordance with GOST 12.4.124 [1].
7.1.2 Measures for protecting the environment	Environmental protection during paraformaldehyde production is ensured by sealing of process equipment, arrangement of ventilation suctions in places of possible harmful emissions and treatment of polluted water [1].
7.1.3 Recommendations for safe handling and transportation	Paraformaldehyde is transported by rail and road transport in accordance with cargo transportation rules applicable to this type of transport. Paraformaldehyde is transported by rail in carload and container shipments in accordance with the Rules for Transportation of Dangerous Goods by Rail, taking into account the technical conditions of placement and securing of cargo in cars and containers and GOST 22235. Bagged paraformaldehyde is transported in covered vehicles [1].

7.2 Chemical product storage rules

7.2.1 Terms and conditions for safe storage (incl. guaranteed shelf life, service life; incompatible substances and materials during storage)	Paraformaldehyde is stored in closed, well ventilated warehouses, which protect the product from direct sunlight and precipitations, on the pallets that are spaced away from the floor minimum for 5 cm, and from the heating devices minimum for 1m. Storage temperature shall be maximum 35°C. It is not recommended to store the flexible containers and transportation bags one over another [1]. Guaranteed shelf life - one year from the date of manufacture [1]. Incompatible substances in storage - oxidizing agents, acids, alkalis [6].
7.2.2 Tare and package (including materials which they are made of)	Packaging made of moisture-proof materials - multilayer laminated paper bags, polyethylene bags with molded edges, woven polypropylene folded bags, flexible specialized containers of IBC type [1].
7.3 Safety and storage rules in household conditions	Material is not used in households [1].

8 Control for dangerous effect and personal protection equipment

8.1 Working area parameters subject to mandatory control (MAC w.a. or TSEL w.a.)	MAC w.a. = 0,5 mg/m^3 (based on formaldehyde) [5].
8.2 Measures for ensuring allowable concentrations of hazardous substances	Conducting the technological process in accordance with technological regulations and instructions on Labor protection; maintaining in good working order control and measuring devices, automation systems, alarm and interlock systems; maintenance of the supply and exhaust ventilation and fire protection systems; equipment and pipelines should have serviceable safety devices, alarm and interlock for immediate shutdown or transfer to a safe state in case of violation of standards for process conditions; keeping equipment, workplaces, premises and territory clean [11].

8.3 Employees personal protective equipment

8.3.1 General recommendations	Use personal protective equipment [1]. Avoid contact with the product. Follow the rules of personal hygiene, it is forbidden to eat at the workplace [1,11].

	Conduct preliminary and periodic medical examinations of personnel [1,11].
8.3.2 Respiratory protection (RPE types)	Dustproof respirator of A1B1E1K2P3 grade according to GOST 12.4.296. At high concentrations (above MAC) it is necessary to use filtering industrial gas mask according to GOST 12.4.121 with filters of A, B, AX, SX grades. [1].
8.3.3 Protective cloths (work clothing, work shoes, hands protection, eyes protection)	Special clothes according to GOST 12.4.280, boots according to GOST 5394 or GOST 12.4.137, special gauntlets according to GOST 12.4.010, rubber knitted gloves, closed safety glasses. [1].
8.3.4 Individual protection in household conditions	Material is not used in households [1].

9 Physical and chemical properties

9.1 Physical state (aggregate state, colour, odour)	White crystalline powder with formaldehyde odor [1].
9.2 Parameters characterizing main properties of product (temperature parameters, pH, solubility, n-oktanol/water ratio, and other parameters specific for this type of product)	Melting point: 100-170°C decomposed [6]. Density: 1,39 g/cm^3 at melting point [6]. Solubility in water: low [6]. pH of saturated solution: 5,5 [6]. Vapors pressure: 1,93 at 25 C [6]. The emission product of paraformaldehyde is formaldehyde[1].

10 Stability and reactivity

10.1 Chemical stability (for unstable material, specify destruction products)	Stability in abiotic conditions : 1-15 days [6]. When depolymerized, converts to formaldehyde gas. When dissolved in hot water it forms formaldehyde solution - formalin [6].
10.2 Reactivity	Interacts with acids, alcohols, amines, hydrogen sulfide; depolymerizes. Paraformaldehyde is not resistant to strong acids; resistance to alkalis depends on the nature of the end groups. [6].
10.3 Conditions to be avoided (including hazard events when contact with incompatible substances or materials)	Do not store together with oxidizing agents, acids, alkalis; storage near sources of open flame and sparks, contact with heated surfaces [1,6]. The substance can react dangerously with strong oxidizing agents, liquid oxygen. When heated, it decomposes[19].

11 Toxicity information

11.1 General impact characteristics (assessment of hazard (toxicity) degree at impact on organism and the most distinctive gazard aspects)	Highly hazardous in terms of its impact on the body. Harmful by ingestion and inhalation, in contact with skin causes irritation, in contact with eyes causes irreversible effects, in contact with skin may cause allergic reaction, may cause irritation of upper respiratory tract, this substance is suspected of causing genetic defects, may cause cancers [1,4].

11.2 Ways of impact (inhalation, oral, in case of skin and eyes contact)	Inhalation, oral, when contacting with skin and eyes[6].
11.3 Affected human organs, tissues and systems	Central nervous and respiratory systems, liver, kidneys, gastrointestinal tract, eyes, skin [6].
11.4 Health dangerous effects when direct contact with the product, and its consequences (irritating effect on upper airways, eyes, skin, including skin resorptive effect; sensitization)	The product in contact with the skin causes irritation, in contact with the eyes causes burns, may cause irritation of the upper respiratory tract. It has skin-resorptive and sensitizing effects [6].
11.5 Information about product long-term adverse effects to organism (reproduction function, cancerogenic effect, mutagenity, cumulativity, and other chronic effects)	Cumulativity is weak. It has a mutagenic effect. Carcinogenic effects have been established for formaldehyde [5,6].
11.6 Parameters of acute toxicity (DL_{50} (LD_{50}), penetration way (i/s, o/s), animal species; CL_{50} (LK_{50}), time of exposition (h), species of animal)	DL_{50} = 680-5000 mg/kg, i/s, (rats) DL_{50} = 2000 mg/kg, o/s (rabbits) CL_{50} = 1070-1100 mg/m^3, 4 h. (rats) [6].

12 Information regarding effect on environment

12.1 General characteristics of effects on environmental objects (atmospheric air, basins, soil, including observed signs of effects)	Hazardous for environmental objects: air, water, soil. Transformation products are also hazardous for the environment [6].
12.2 Ways of impact to environment	Dumping into water bodies and on the relief, violation of storage and transportation rules, emergencies, unorganized disposal, incineration or burial of wastes [11].

12.3 The most important characteristics of impact to environment

12.3.1 Hygienic norms
(AC in the atmospheric air, water, including fishing basins, soil)

Table 2 [5,6,13]

Components	MAC atm.air or TSEL atm. air, mg/m3 (LHI1, hazard class)	MAC water2 or TAL water, mg/l (LHI, hazard class)	MAC fish.basin3 or TDL water, mg/l (LHI, hazard class)	MAC or TAC soil, mg/kg (LHI)

[1] LHI is limiting harmful index (tox. - toxicological; s.-t. (san. -tox.) – sanitary-toxicological; org. - organoleptic with deciphering of the nature of changes in the organoleptic properties of water (sm. - changes water smell, turb. - increases water turbidity, dye. – dyes the water, foam – causes foam formation, film - forms a film on water surface, taste - gives the water a taste, op. - causes opalescence); refl. - reflex; res. - resorptive; refl.-res. - reflex-resorptive; com.fish. - commercial fishing (change of commercial aquatic organisms commodity qualities); gen. - general sanitary).

[2] Water from water objects of drinking and cultural and domestic water use

[3] Water from water bodies of fishery importance (including marine ones)

Paraformaldehyde	Not determined	Not determined	Not determined	Not determined

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

Table3 [6]

Component	Parameter	Value, mg/l	Type	Exposure time, h.
Paraformaldehyde	CL_{50}	60	Rainbow trout (Salmo gairdneri)	96

12.3.3 Migration and transformation in the environment through biodegradation and other processes (oxydation, hydrolysis etc.)

Transforms in the environment. Biological disassimilation 50-90% (light) [6].

13 Recommendations for the disposal of wastes (residues)

13.1 Safety measures for handling of wastes, formed during use, storage, transportation

Safety measures when handling wastes (residues) are similar to those used when handling paraformaldehyde (Refer to the Sections 7 and 8 of the MSDS).

13.2 Information on the places and methods of neutralization, disposal or liquidation of product wastes, including containers (packaging)

Disposal of waste materials and packaging shall be carried out in accordance with SanPiN 2.1.3684-21. Collect wastes, spoiled product in a sealed container, mark and transfer for destruction (thermal neutralization) either at the industrial (toxic industrial or household solid) landfills or places, agreed with the local sanitary authorities. Irrevocable or obsolete packing to be disposed as the main wastes. Responsibility for wastes disposal (use, neutralization, liquidation, burial) lies with their owner [11].

13.3 Recommendations for the disposal of wastes, formed during the use of products in the houswhold.

Not applicable in the household. [1].

14 Transportation information

14.1 UN Number
(in accordance with the UN Recommendations for transportation of dangerous goods)

2213 [14].

14.2 Proper shipping and transportation name

PARAFORMALDEHYDE [10].
Paraformaldehyde, grades A,B [1].

14.3 Applicable transportation modes

Paraformaldehyde to be transported by all transportation means in accordance with the transportation rules of goods, valid for this type of transportation[1].

14.4 Cargo hazard classification as per GOST 19433-88:

- class: 4
- sub-class: 4.1
- Classification Code (as per GOST 19433-88 and by railway transportation): 4113 (GOST 19433); 4113 (railway transport)

- number(s) of drawing(s) of danger sign(s)	4a
14.5 Classification of cargo hazard according to the UN Recommendations for the Transportation of Dangerous Goods:	
- class or sub-class	4
- additional hazard	no
- UN packaging group	III [14].
14.6 Shipping marks (manipulation signs as per GOST 14192-96)	"Protect from moisture", "Keep away from heat" [1].
14.7 Emergency cards (ailway, sea and other modes of transportation)	Emergency card No. 402 - when transported by rail way [10].

15 Information on national and international legislation

15.1 National legislation

15.1.1 RF legislation	"On Protection of Environment", "On Sanitary and Epidemiologic Well-Being of the Population", "On Production and Consumption Wastes", "On Technical Regulation", "On Protection of Atmospheric Air", "On Industrial Safety of Hazardous Production Facilities", "Concerning Fire Safety".
15.1.2 Information on the documentation regulating the requirements for the protection of humans and the environment	Not available
15.2 International conventions and agreements (whether products are subject to the Montreal Protocol, the Stockholm Convention, etc.)	Not subject to international conventions and agreements.

16 Additional information

16.1 Information on the revision (re-edition) of the MSDS (to be specified either: "MSDS is developed first time" or "MSDS is re-registered upon validity expiration. Previous MSDS No. …" or "Amedments are made in the points …, entry date …")	MSDS is developed first time. The amendment was made on 14.10. 2023 of the subpoints 14.3. and 16.2.1 due to the issuing of Amendment №1 to the TU 20.14.61-044-00203803-2021 Paraformaldehyde. Technical conditions.

16.2 List of data sources used in the preparation of the Material Safety Data Sheet[4]

1. TU 20.14.61-044-00203803-2021 Paraformaldehyde. Technical conditions with amendment 1.
2. GOST 12.1.007-76 Occupational safety standards system. Noxious substances. Classification and general safety requirements.
3. GOST 32419-2013 Classification of chemicals. General requirements
   GOST 32424-2013 Classification of chemicals for environmental hazards. General principles.
4. GOST 31340-2013 Labelling of chemicals. General requirements.

[4] Serial numbers of data sources are given in each paragraph of the MSDS as references.

5. SanPiN 1.2.3685-21 "Hygienic standards and requirements for ensuring the safety and (or) harmlessness of environmental factors for humans".
6. Information card of a potentially hazardous chemical and biological substance Paraformaldehyde. State registration certificate, series BT No. 000737-M.: Potentially hazardous chemical and biological substances register of RF (РПОХБВ).
7. N.V. Lazarev. Harmful substances in industry. Reference book. Vol.I, vol.III –L.: Chemistry, 1977.
8. A.Ya. Korolchenko, D.A. Korolchenko, Fire and explosion hazard of substances and materials and means of extinguishing them. Reference book, part 2 – M., "Pozhnauka" Association, 2004.
9. GOST 30852.19-2002 Electrical apparatus for explosive gas atmospheres. Part 20. Data for flammable gases and vapours, relating to the use of electrical apparatus
10. Emergency cards for dangerous goods, transported by railways in the CIS countries, the Republic of Latvia, the Republic of Lithuania, the Republic of Estonia, approvedby the Council for Railway Transportation of the Commonwealth Member States (revised as of 27.11.2020). Emergency card No. 402.
11. Temporary process regulation No.18 of the paraformaldehyde production plant Gubakha
12. Transportation rules of dangerous goods by railway, approved by the Council for Railway Transport of the member states of the Commonwealth of Independent States, revised as of 16.10.2019.
13. Water quality standards for water objects of commercial fishing importance, including standards for maximum permissible concentrations of harmful substances in the waters of water objects of commercial fishing importance, approved by the order of the Federal Agency for Fishery No. 552 m. 13.12.2016 revised as of 10.03.2020.
14. UN recommendations for the transportation of dangerous goods. Modal rules.
15. Technical regulation on fire safety requirements dd. 22.07.2008 No.123-FZ. Section V. Chapter 27.
16. IPCS-INCHEM - Data base of the International program for chemical safety (http:// www.inchem.org/documents/icsc/icsc/eics0767.htm).
17. A. K. Chernyshov and others. Hazard indicators of substances and materials. Vol-4, – M.:Fund named after I.D. Sytin, 1999.
18. SanPiN 2.2.0.555-96 Occupational health hygienic requirements for women's working conditions.
19. GESTIS – open information data base (https://gestis-database.dguv.de/data?name=014070)