MATERIAL SAFETY DATA SHEET

(Safety Data Sheet)

Listed in the Register

MDS No. 5 2 4 7 0 1 7 5 2 4 4 4 3 6 4

from November, 21, 2016

Valid until November, 21, 2021

Rosstandard

research and information center "Safety of substances and materials" FSUE VNII SMT"

Manager _____ /A.A. Toporkov/

NAME

technical (according to ND)	**Polyglycols**
chemical (according to IUPAC)	**None**
Commercial	**Polyglycols**
synonyms	**None**

RKP code 2 4 2 2 2 9

FEACN code 2 9 0 9 4 9 1 8 0 0

Symbol and name of a regulatory, technical or information document for products (GOST, TU, OST, STO, (M) SDS)

TU 2421-057-52470175-2005
Polyglycols

Hazard statement

Signal word **CAUTION**

Brief (verbal): Moderately dangerous product according to the degree of impact on the human body in accordance with GOST 12.1.007. Causes skin irritation and severe eye irritation. Flammable liquid May pollute the environment.

Detailed: in the 16 attached sections of the safety data sheet

MAIN HAZARDOUS COMPONENTS	TLV, 1'1g/m^3	Hazard class	CAS No.	EC No.
Components of polyglycols: Triethylene glycol	10	3	112-27-6	203-953-2
Tetraethylene glycol	10	3	112-60-7	203-989-9
Pentaethylene glycol	10	3	4792-15-8	225-341-4

APPLICANT **"SIBUR-NEFTEKHIM" JSC** (name of company) **Dzerzhinsk** (city)

Applicant Type Manufacturer, Supplier, Seller, ~~Exporter, Importer~~

RKP code 5 2 4 7 0 1 7 5

Head of the applicant company

Emergency telephone (8313) 27-51-71
A.I. Proskurin

Safety Data Sheet (SDS) complies with UN Recommendations ST / SG / AC.10 / 30 «GHS»

IUPAC	–	International Union of Pure and Applied Chemistry
GHS	–	UN Recommendations ST / SG / AC.10 / 30 “Globally Harmonized System of Classification and Globally Harmonized System of Classification and Labeling of Chemicals (GHS)”
RCP	–	All-Russian classifier of products;
RNCBO	–	All-Russian Classifier of Enterprises and Organizations
FEACN	–	Foreign Economic Activity Commodity Classification
CAS No	–	substance number in the registry of the Chemical Abstracts Service
EC No.	–	substance number in the registry of the European Chemicals Agency
TLV	–	maximum permissible concentration of a chemical substance in the air of the working area, mg / m^3
Safety Data Sheet	–	Russian translation: material safety data sheet (substance, mixture, material, industrial waste)
Signal word	–	the word used to emphasize the degree of chemical products hazard and selected in accordance with GOST 31340-2013

1. Identification of chemical products and information about the manufacturer and / or supplier

1.1. Identification of chemical products

1.1.1. Technical name:	Polyglycols /1/
1.1.2. Brief recommendations for use: (including restrictions on use)	Poly-glycols are used as a means to prevent the bulk materials from freezing (sintering ore) and as a dust suppressor in the production of potash fertilizers. /1/

1.2. Information about the manufacturer and / or vendor

1.2.1. Full official name of company:	Joint Stock Company "Sibur-Neftekhim"
1.2.2. Address (postal and legal):	606000 Nizhny Novgorod Region, Dzerzhinsk, Eastern Industrial Zone, block 390.
1.2.3. Telephone, incl. emergency consultations and time limits:	(8-313) 27-51-71 (24 hours and in the event of an accident).
1.2.4. Fax:	fax (8313) 27-59-99
1.2.5. E-mail:	E-mail:infosnh@sibur-nn.ru

2. Hazard Identification

2.1. Hazard degree of chemical products in general: (information on the classification of hazard in accordance with the legislation of the Russian Federation (GOST 12.1.007-76) and GHS (GOST 32419-2013, GOST 32423-2013, GOST 32424-2013, GOST 32425-2013)	In accordance with GOST 12.1.007, the components of the polyglycols (triethylene glycol, tetraethyl glycol, pentaethylene glycol) are classified as hazard class 3 (moderately hazardous) according to the degree of their effect on the human body. /1,3/ According to the GHS: - chemical products with acute toxic effects upon ingestion, 4 grades, - contact with eyes causes severe irritation, grade 2A, - skin contact causes skin irritation, grade 2 /12,30/

2.2. Information about the warning marking in accordance with GOST 31340-2013

2.2.1. Signal word:	"Caution"
2.2.2. Danger symbol:	"Exclamation mark",
2.2.3. Hazard statement: (Phrases)	 - H-302 Harmful if swallowed. /8/ - H-315 Skin contact causes skin irritation, /8/ - H-319 Eye contact causes severe eye irritation. /8/

3. Composition (information on ingredients)

3.1. General product information

3.1.1. Chemical name: (according to IUPAC) None /1/

3.1.2. Chemical formula None /1/

3.1.3. General characteristics of the composition:
(taking into account brand assortment and an indication of impurities and functional additives that affect on the products hazard; production process)

Polyglycols are a by-product of the production of glycol and are a mixture of triethylene glycol, tetraethylene glycol and pentaethylene glycol. /1/

3.2. Components

(Name, CAS and EU numbers (if available), mass fraction, TLV или SRLI, hazard classes, references to data sources)

Components (name)	Mass fraction, %	Hygienic standards in the air of the working area		CAS No.	EC No.
		Work area TLV mg / m^3 (mp / s.s.)	Hazard class		
Triethylene glycol	up to 64	10 n+ a	3	112-27-6	203-953-2
Tetraethylene glycol	25-45	10 n+a	3	112-60-7	203-989-9
Pentaethylene glycol	1.5-4.0	10 n+n	3	4792-15-8	225-341-4

/1,9,10/

4. First aid measures

4.1. Symptoms

4.1.1. In case of poisoning by inhalation (by inhalation): Due to the low vapor pressure, polyglycols do not pose a danger of acute inhalation poisoning. /1,12/
Inhalation - cough, shortness of breath, sore throat, difficulty breathing, heartbeat, dizziness, in severe cases - loss of consciousness, convulsions /18/

4.1.2. Skin contact: Redness of the skin, pain, swelling. /18/

4.1.3. Eye contact: Pain, redness, epiphora, exophthalmos /18/

4.1.4. In case of poisoning by oral route (ingestion): Abdominal pain, nausea, vomiting, diarrhea, haematuria /18/

4.2. First Aid Measures for Victims

4.2.1. In case of poisoning by inhalation:	Fresh air, warmth, peace /2/
4.2.2. Skin contact:	Wash under running water with soap. /11,18/
4.2.3. Eye contact:	Wash under running water. If necessary, seek medical attention. /11,18/
4.2.4. In case of poisoning by oral route	Rinse the mouth, drink plenty of water, activated carbon. /1,11,18 / Give to drink 30 ml of 30% ethyl alcohol every 3 hours, alkaline drinking (2% solution of baking soda). Provide the victim with rest, warm and immediately deliver to the medical unit. /18/
4.2.5. Counterindications:	Not available.

5. Measures and means of fire and explosion safety

5.1. General properties of fire and explosion hazards (according to GOST 12.1.044-89):	Flammable explosion-proof liquid. /1/
5.2. Fire/explosion hazards: (list of indicators according to GOST 12.1.044-89 and GOST R 30852.2002)	Self-ignition temperature: 350 ° C. /1/ Flash point of vapor, 170 ° C. /1/
5.3. Products of combustion and / or thermal destruction and the hazard they cause:	Triethylene glycol, which is the main component of polyglycols, is subject to thermal decomposition. /11/ During combustion, carbon oxides are formed. Carbon monoxide affects the respiratory tract, causes choking, headache, dizziness, tinnitus, shortness of breath, palpitations, blinking шт eyes, reddening of the face, general weakness, nausea, and sometimes vomiting; in severe cases, convulsions, loss of consciousness, coma. /31,14/
5.4. Recommended fire extinguishing agents:	Total flooding in premises. In case of small fires - air-mechanical foam, sprayed water. For large fires - sprayed water, foam, dry powders, the minimum fire extinguishing concentration of nitrogen is 44% by volume, carbon dioxide is 33% by volume. /1,15/
5.5. Prohibited Extinguishing Media:	There are no recommendations prohibiting the use of certain fire extinguishing agents.
5.6. Personal protective equipment for extinguishing fires: (firefighters PPE)	In case of fire outbreak — fire-resistant suit in a set with a self-contained self-rescue device SPI-20. /18/
5.7. Specificity of extinguishing:	Do not approach the vessels. Cool down the vessels with water while standing as far from them as possible. /18/

6. Measures for the prevention and elimination of emergency situations and their consequences

6.1. Measures for the prevention of adverse effects on people, environment, buildings, structures, etc. during emergency situations

6.1.1. Necessary general actions in emergency situations:	- Take the vehicle to a safe place. - Isolate the dangerous zone within a radius of at least 200 m. - Correct the specified distance according to the results of chemical intelligence. - Evacuate all unauthorized persons. - Comply with fire safety measures. - Do not smoke. - Remove fire and spark sources. - Only enter the danger zone when wearing protection equipment. - Provide first aid to victims. /18/
6.1.2. Personal protective equipment in emergency situations: (emergency teams PPE)	All-service protective suit L-1 or L-2 completed with industrial gas mask and cartridges A, B. Overall Oil and petrol resistant gloves, gloves of butyl-rubber dispersion, protective footwear. In case of fire outbreak—fire-resistant suit in a set with a self-contained self-rescue device SPI-20. /18/

6.2. Procedure for liquidation of emergency situations

6.2.1. Actions in case of leakage, spill, spreading: (including measures for their elimination and precautionary measures ensuring environmental protection)	- Report to the sanitary and epidemiological inspection bodies. - Do not touch the spilled substance. - Eliminate the leakage in compliance with precautionary measures. - Protect the spills with earth mound, fill with inert material, collect in containers. - Avoid the substance entry into water bodies, basements, sewage systems. /18/ <u>Neutralization:</u> - Fill up with sand or other inert material. - Burn out the territory (separate areas) in case of thread of penetration into underground water. - Call experts for neutralization: /18/
6.2.2. Actions in case of fire:	- enter in the accident zone with protective clothing and breathing apparatus. - To extinguish from the maximum distance with water mist, air-mechanical foam, other means. - Cool down the vessels with water while standing as far from them as possible. - Organize the evacuation of people from nearby buildings, taking into account the direction of movement of toxic products of combustion. /18/

7. Rules for storage of chemical products and handling it during loading and unloading operations

7.1. Safety measures for handling chemical products

7.1.1. Security Engineering Systems:	- Supply and exhaust, local emergency ventilation. - Equipment should be sealed. - Fire Extinguishing System Means uninterrupted power means. - Detectors of smoke, flame, pre-explosive concentrations. - Loud-speaking and telephone communication. - Remote shutdown of the main process equipment from the central control panel. - Use of equipment in fire, explosion-proof, sealed design. - Grounding of electrical equipment and communications. - Exclusion of sources of open flame. - Use of non-sparking tools. - Safety signs /1,26/
7.1.2. Environmental Protection Measures:	Use sealed equipment, follow the rules of storage and transportation. /1/ It is necessary to prevent the ingress of the product into the soil, water, sewage, drainage systems and water supply /1,26/ In order to protect the atmospheric air, constant monitoring of compliance with maximum permissible emissions should be organized.
7.1.3. Recommendations for safe movement and transportation:	Polyglycols are transported by motor transport in accordance with the rules for the carriage of goods operating on this type of transport. The tanker filling level is calculated taking into account the full utilization of the carrying capacity (capacity) and the volume expansion of the product with possible temperature differences on the way. Any type of container during transportation must be sealed. /1/

7.2. Chemical storage rules

7.2.1. Terms and conditions of safe storage (including guaranteed storage life, shelf life; substances and materials incompatible with storage)	Storage tanks shall have thermal insulation and heating device due to the high viscosity of glycols at low temperatures and the resulting difficulties in pumping them. /26/ The guaranteed storage life for polyglycols is 1 year from the date of manufacture. /1/ Open warehouses must comply with fire safety regulations for the storage of combustible substances

(embankment around the warehouse with the removal of vegetation inside it) provided with all necessary fire extinguishing agents. /12/
Storage of the product together with oxidizing agents, acids, alkalis is not allowed. /11/

7.2.2. Package and packaging (including the materials from which they are made): For polyglycols packaging, aluminum barrels according to GOST 21029 or barrels made from steel grade 12X18H10T, according to GOST 26155 are used.
Barrel necks shall be hermetically sealed. Barrels before filling the product must be clean - steamed, washed and dried. /1/

7.3. Security measures and storage rules in household use: Does not applied in household use.

8. Exposure controls and personal protective equipment

8.1. Working area parameters subject to mandatory control (work area TLV or SRLI): General pygienic standards for products in the air of the working area: not regulated.
TLV in the air of working area:
triethylene glycol - 10mg / m^3,
tetraethylene glycol - 10mg / m^3,
pentaethylene glycol - 10mg / m^3. /1,9,12/

8.2. Measures to ensure the content of harmful substances in acceptable concentrations: Control of the air environment composition.
Sealing of production equipment.
Use of working and emergency vents. /1,4/

8.3. Personal Protective Equipment

8.3.1. General recommendations: - Keep overalls and protective equipment in good condition.
- Preliminary and periodic medical examinations.
- Personal hygiene:
- Regularly wash contaminated clothes;
- Do not eat, do not smoke in the workplace. /1/

8.3.2. Respiratory protection (types of RPE): Industrial filter respirators DOT 600 A283E3AHR3 (D), when working in confined spaces - hose gas mask PSh-1 or PSh-2 or other isolating means of individual respiratory protection. /1/

8.3.3. Protection means (material, type) (overalls, safety shoes, hand protection, eye protection: Production personnel must be provided with special clothing in accordance with the typical industry standards approved in the prescribed manner: /3,22/
- suit to protect against general industrial pollution and physical impact;
- knitted gloves with a point coating or gloves with a polymer coating;

- leather shoes with protective sockets.

8.3.4. Personal protective equipment for domestic use: The product is not intended for domestic use.

9. Physico-chemical properties

9.1. Physical condition (physical state, color, smell): Viscous dark brown liquid without mechanical impurities. /1/

9.2. Parameters characterizing the general properties of the product: (temperature, pH, solubility, coefficient n-octanol / water and other parameters specific to this type of product)

Flash point, °C	170	/1/
Auto-ignition temperature °	350	/1/
Boiling point, °	250	/1/
Density at temperatures g/cm^3	1,10-1,20	/1/

10. Stability and reactivity

10.1. Chemical stability: (for unstable products specify decomposition products) Highly stable 30 -7 days. /11/

10.2. Reactivity: According to the main component (triethylene glycol) it is oxidized, esterified, restored. /11/

10.3. Conditions to avoid: (including dangerous manifestations due to contact with incompatible substances and materials) Incompatibility with substances by the main component (triethylene glycol): oxidizing agents, acids, alkalis. /11/

11. Toxicological information

11.1. General characteristics of the impact: (potential health effects and the most characteristic manifestations of hazard)

The components of polyglycols (triethylenglycol, tetraethylene glycol, pentaethylene glycol) are moderately hazardous substances of hazard class 3 according to the degree of impact on the body according to GOST 12.1.007-76 /1,3,9,12/
Due to the low vapor pressure, polyglycols do not pose a danger of acute inhalation poisoning. /1,12/
Polyglycol vapors have a weak narcotic effect, high concentrations of polyglycol vapors in the air can cause changes in the kidneys. /1/
Components of polyglycols: triethylene glycol and tetraethylene glycol have low chronic toxicity. /12/
But chronic poisoning seems to be possible. /12/
When polyglycols directly enter the human body, it causes poisoning, acting on the nervous system and kidneys. /10,11,20
There are indications of the possibility of a mutagenic effect when injected into the stomach. has a skin resorptive effect. /10/
Irritating to skin and eyes. /11/

11.2. Routes of exposure:
(inhalation, oral, skin contact, eye contact)

Inhalation (by inhalation), by ingestion, skin contact, eye contact. /18/
Because of the low vapor pressure polyglycols do not pose a danger of acute inhalation poisoning. /1/

11.3. Affected human organs, tissues and systems :

The most affected organs and systems according to the main component (triethylene glycol): central nervous and respiratory systems, liver, kidneys, spleen, morphologists morphological composition. /11/

11.4. Information on hazardous health effects in direct contact with the products and consequences of these effects: (irritating effect on upper respiratory tract, eyes, skin, including skin resorptive and sensitizing actions)

According to the main component (triethylene glycol)
Irritant effect:
eyes applicable;
skin applicable;
Skin resorptive effect applicable;
Sensitizing effect not applicable. /11/

11.5. Information about the dangerous long-term effects of product exposure on the body:
(influence on the function of reproduction, carcinogenicity, mutagenicity, cumulativeness and other chronic effects)

According to the main component (triethylene glycol):
Embryotropic effect applicable.
Mutagenic effect not studied.
Carcinogenic effect:
on animals not studied.
per person not studied.
Gonadotropic effect applicable /11/

11.6. Acute Toxicity Indicators:
(DL50 (LD50), route of entry (oral, dermal), animal specimen; CL_{50} (LC50), exposure time (h), animal specimen)

DL_{50}(mg/kg)	**Exposure route**	**Specimen**
15000-17000	in stomack	rat

12. Information on the impact on the environment

12.1. General characteristics of the impact on the environment:
(atmospheric air, water, soil)

According to the main component of the product (triethylene glycol):
At concentrations up to 1 g / l does not change color, odor and taste of water, up to 500mg / l does not affect foaming/ /13/
The threshold concentration on the impact on the sanitary regime of the reservoir of the total TC>1 mg/l. /11/
For tetraethylene glycol and pentaethylene glycol: at a concentration of up to 500 mg / l does not affect the organoleptic properties of water. /16/

12.2. Ways of environmental impact:

In case of violation of the rules of application, storage and transportation; in case of unorganized incineration or burial of waste; as a result of emergency situations and emergencies. /26/

12.3. The most important characteristics of the impact on the environment

12.3.1. Hygienic standards:

(permissible concentrations in ambient air, water, including fishery waters, soil)

Components	TLV of atmosferic air mg / m^3 (LHI[1], hazard class)	Water TLV[2] or APL mg/l (LHI, hazard class)	TLV[3] or APL for fisheries mg / l (LHI, hazard class)	TLV or TAC for soils, mg / kg (LHI)
triethylene glycol	SRLI, atm. air = 1,0 (м.р.)	TLV, water -0,5 total. 3rd hazard class	No data	No data
The sum of the mass fractions of tetra- and penta-ethylene glycol	Tetralylene glycol, and pentaethylene glycol; TLV in atm. air - 1.0 s.-t. 3rd hazard class	Tetralylene glycol, and pentaethylene glycol: No data	Tetralylene glycol, and pentaethylene glycol: No data	Tetralylene glycol, and pentaethylene glycol: No data

12.3.2. Ecotoxicity indicators:
(CL, EC, NO EC for fish, daphnia magna, algae, etc.)

According to the main component of the product (triethylene glycol):

Quantity CL_{50} mg/l	**Time of Exposure, hours**	**Animal specimen**
>5000	24	Carassius auratus (Prussian carp)
>10000	96	Lepomis macrochirus (bluegill sunfish)
69800	96	Pimephales promelas (fathead minnow)

Acute toxicity for Daphnia

Quantity	**Time of**	**Animal specimen**
EC_{50} mg/l	**Exposure, hours**	
EC_{50}>10000	24	Magna

Quantity	**Time of**	**Animal specimen**
CL_{50} mg/l	**Exposure, hours**	
52400	48	Magna

Identified effects on model ecosystems:
In the water of a model reservoir at a concentration of 1000 mg / l, oxidability on 10 day - 140 mgO2/l; on the 20th day - 72 mgO2/l. /11/

12.3.3. Migration and transformation in the environment due to biodegradation and other processes (oxidation, hydrolysisetc.)

According to the main component of the product (triethylene glycol):
Transformed in the environment.
Transformation Products: formic acid, formaldehyde, ethylene glycol, diethylene glycol, glycolic aldehyde, glyoxal. /11/
According to the main component of the product (triethylene glycol) stable in abiotic conditions (tl / 2) - highly stable 30–7 day. /11/

13. Recommendations for waste (residues) disposal

[1] LHI is a limiting harmful index (org. - organoleptic; refl. - reflex; fish. - fisheries (change in commodity quality of aquatic organisms); gen. - general sanitary).
[2] Water of water objects of drinking and cultural and domestic water use
[3] Water of water bodies of fishery importance (including marine ones)

13.1. Safety measures for handling of waste generated during the application. storage, transportation:	Sealing of production equipment. /1/ Use of working and emergency vents. /26/ Use of collective personal protective equipment. /2/ More information is provided in sections 5,6,7,8 of this safety data sheet.
13.2. Information about the places and methods of neutralization, recycling or disposal of waste products, including packaging:	In case of spillage product shall be washed off with plenty of water. Waste generated during production goes to incineration. /26/
13.3. Recommendations for the disposal of waste generated during domestic use of products:	Does not applied in household use.

14. Information for transportation

14.1. UN number :	N/A /17,25/
14.2. Proper shipping name	Shipping name: Polyglycols /1/
14.3. Used types of transport:	Polyglycols are transported by motor transport in accordance with the rules for the carriage of goods operating on this type of transport. Boilers for tank trucks and tank containers should be made of stainless steel of 12XI 8H10T grade. /1/
14.4. Cargo hazard classification according to GOST 19433-88: - class - subclass - Classification Code (according to GOST 19 433-88 and for transportation by rail)	N/A /7/
- hazard sign (s) drawing (s) number (s)	No /7/
14.5. Hazard Classification of Cargo according to the UN Recommendations on the Transport of Dangerous Goods: class or subclass additional hazard UN packing group	Not classified /25/
14.6. Shipping marking: (manipulation signs according to 14192-96)	"sealed package" /1,6/ 

14.7. Emergency cards (for rail, sea and others transportation)	N/A

15. Information on national and international legislation.

15.1. National legislation

15.1.1. Laws of the Russian Federation:	Federal Law "On Environmental Protection". Federal Law “On Sanitary and Epidemiological Welfare of the Population”, Federal Law “On Industrial Safety of Hazardous Production Facilities”, Federal Law “On Production and Consumption Wastes”, Federal Law “On Air Protection” Federal Law “On Fire Safety”. Law of the Russian Federation "On Technical Regulation".
15.1.2. Information about the documentation governing the requirements for the humans and the environment protection:	Information card of potentially hazardous chemical and biological substances.3, b-Dioxaoctane-1,8 diol. Certificate of state registration of BT series No. 000449 dated April 21, 1995; TU 2422-057-52470175-2005 technical conditions; Technological regulations for the production of ethylene oxide and glycols. /1,2,3/
15.2. International conventions and agreements (whether products are regulated by the Montreal Protocol, the Stockholm Convention, etc.)	Not regulated. /33,34/

16. Additional information

16.1. Details of the revision (reprint) of PU:	Repl. MDS No. 52470175.21.26721 dated November 16, 2011 due to expiration

16.2. List of data sources used for preparation of the safety data sheet

1. TU 2422-057-52470175-2005. Polyglycols

2. GOST 12.1.004-91. Occupational Safety Standards System. Fire safety. General requirements. - M .: Izdatel'stvo standartov, 1992

3. GOST 12.1.007-76. Harmful Substances. Classification and General Safety Requirements. M.: Izdatel'stvo standartov? 1976.

4. GOST 12.1 .010-76. OSSS. Explosion Safety. General requirements. - M.: Izdatel'stvo standartov, 1987

5. GOST 12.3.002-75 OSSS. Production processes. General safety requirements. M.: Izdatel'stvo standartov, 1983

6. GOST 14192-96. Marking of goods. - M.: Izdatel'stvo standartov, 1996.

7. GOST 19433-88 Dangerous Goods. Classification and marking. - M .: Izdatel'stvo standartov, 1988

8. GOST 31340-2013 Warning labeling of chemical products. General Requirements. M.: Standartinform. 2014

9. GN 2.2.5.1313-03 "Maximum Permissible Pollutant Concentrations (MPC) in Working Zone Air".

10. Information database of registered substances of the European Chemicals Agency (Echa). Access mode: http://echa.europa.eu/info nnation-on-chemicals

11. Information card of potentially hazardous chemical and biological substances. 3,6-dioxaoctane-1,8 diol. Certificate of state registration series BT No. 000449 dated April 21, 1995

12. Glycols and other derivatives of ethylene and propylene oxides. Under the general editorship of ON. Dyment - M .: Khimiya, 1976.

13. Guide V. O. Sheftel. Harmful substances in plastics. - M .: Khimiya, 1991

14. A.L. Bandman, G.A. Gudzovsky Harmful chemicals. Inorganic compounds of 1-4 groups. - L .: Khimiya, 1998

15. A.Ya. Korolchenko, D.A. Korolchenko "Fire and explosion hazards of substances and materials and their means of extinguishing". - M.: Reference book: in 2 parts -2nd ed., revised. And amend. - M.: Acc. "Pozhnauka", 2004. – Part 2 – 774 p.

16. Reference book under the editorship of V.A Filon. Harmful chemicals. Halogen and oxygen-containing organic compounds. - SP .: Khimiya, 1994.

17. Rules for the transportation of dangerous goods by rail (as amended with amendments and supplements dated November 23, 2007, May 30, 2008, May 22, 2009, November 5, 2015).

18. Safety rules and emergency liquidation procedure emergency situation for dangerous goods during transportation by rail. Emergency card No. 904. - M .: MPS, 1997.

19. Standard norms for the free distribution of special clothing, special footwear and other personal protective equipment for employees of chemical plants engaged in work with harmful and (or) hazardous working conditions, as well as at work performed in special temperature conditions or associated with pollution. Order of the Ministry of Healthcare and Social Development No. 906n dated August 11, 2011.

20. TU 2422-055-52470175-2014 “ technical triethylene glycol ”. Specifications.

21. Regulation of Fire Safety in the Russian Federation PPB 01-93. - M .; 1994.

22. GN 2.1.7.2041-06 "Maximum permissible concentration (MPC) of chemicals in soil."

23. SP 2.2.2.1327-03 Hygienic Requirements for the Organization of Industrial Processes, Production Equipment, and Working Tools.

24. SanPiN 2.1.7.1322-03 Hygienic Requirements for Placement and Decontamination of Production and Consumption Wastes;

25. Recomendations for transportation of hazardous goods. Model rules. Записка.Volume 1 Nineteenth revised edition. United Nations New York and Geneva, 2015.

26. Technological regulations for the production of ethylene oxide and polyglycols. Approved 09/24/2015

27. Stockholm Convention on Persistent Organic Pollutants.

28. Montreal Protocol on Substances that Deplete the Ozone Layer.

29. GN 2.1.5.1315-03 "Maximum Allowable Concentrations (MACs) of Chemical Substances in Water of Water Bodies for Drinking, Cultural, and Domestic Use"

30. Globally Harmonized System of Hazard Classification and marking of Chemical Products (GHS). Fourth revised edition. UN, New York and Geneva, 2011.

31. Paramedic Handbook, edited by A. N. Shabanov. - M.: «Meditsina», 1984.

32. GOST 32419-2013 Hazard Classification of Chemical Products. General requirements

33. 33.GOST 32423-2013 hazard classification of mixed chemical products by effects on the body (with amendment)

34. GOST 32424-2013 Hazard Classification of Chemical Products by Environmental Impact. General Provisions

35. GOST 32425-2013 Classification of the hazard of mixed chemical products by environmental impact