MATERIAL SAFETY DATA SHEET

Entered into Register

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Rosstandart

Information and analytical center "Safety of substances and materials"
Federal State Unitary Enterprise "VNII SMT"

Manager _____/A.A. Toporkov/
Stamp

NAME

technical (as per normative documents)	**IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade**
chemical (as per IUPAC)	Not available
commercial	**IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade**
Synonyms	Not available

OKP (Russian Classification of Production) Code: 2 1 7 5 9 0

TN VED (Trade classification for foreign economic activities) Code: 3 8 1 5 9 0 9 0 0 0

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

TU 2175-002-09742619-2016 IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade

HAZARD CHARACTERISTICS

Signal word **Hazardous**

Brief (verbal): by severity of exposure on the human body the product relates to low hazard substances (Hazard class 4) in accordance with GOST 12.1.007-76. In case of contact with skin and eyes causes irritation. Can cause drowsiness and dizziness. Can contaminate the environment.

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

MAIN HAZARDOUS COMPONENTS:	$MPC_{w.z.}$, mg/m^3	Hazard class	CAS No.	EC No.
Tri (2-hydroxyethyl) amine	5 (SRLI)	Not available	102-71-6	203-049-8
alpha-Hydro-omega-hydroxy poly (oxy-1,2-etanediyl)	10 (a)	4	25322-68-3	500-038-2

APPLICANT: ZAO IVKAZ (company name) Kazan (city)

Applicant type: manufacturer, ~~vendor~~, ~~seller~~, exporter, ~~importer~~

OKPO Code 0 9 7 4 2 6 1 9 **Emergency phone No.:** (843) 2125146

Applicant's Manager _____ / I.R. Aslyamov /
(signature) (name)

1 Chemical product identification; Manufacturer and/or vendor information

1.1 Chemical product identification

1.1.1 Technical name	**IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade** [1].
1.1.2 Brief recommendations for application(including application restriction)	IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade is designed for refining of oil and gas condensates, liquefied gases and light oil products as well as for local treatment of sulphurous alkaline wastes, household sewage, aqueous technological condensates and formation water for sulphur compounds (hydrogen sulphide, mercaptans, sulphide-, hydrosulphide- and mercaptides) [1].
1.2 Manufacturer or vendor information	
1.2.1 Full official name of the Company	Closed Stock Corporation “IVKAZ”
1.2.2 Address (postal and legal)	Postal address: 20095, the Republic of Tatarstan, Kazan, post office box 121 Legal address: 420095, the Republic of Tatarstan, Kazan,Vosstanya str.,100
Phone number, including that for emergency calls, time limits	8 (843) 212-51-46
1.2.4 Fax	8 (843)212-51-46
1.2.5 E-mail	tio.zao@mail.ru

2 Hazard (hazards) identification

2.1 The degree of hazard of chemical products in general (information on the hazard classification in accordance with the legislation of the Russian Federation (GOST12.1.007-76) and GHS(GOST32419-2013,GOST32423-2013, GOST32424-2013, GOST32425-2013)	Low-hazard product by its effect on human body according to GOST12.1.007–hazard class 4[1, 3, 4]. Hazard classification of products in correspondence with GHS: - Products causing skin irritation: class 2 - Products causing eyes irritation: class 2B - Products having sensibilizing effect at contact with skin [3, 5, 7-11].

2.2 Warning marking information as per GOST 31340-2013

2.2.1 Signal word	**Caution**
2.2.2 Hazard symbols	
2.2.3 Brief characteristics of a hazard (H-phrases)	H315: in case of contact with skin causes irritation H317: in case of contact with skin causes allergic reaction H320: in case of contact with eyes causes irritation H336: can cause drowsiness and dizziness [6].

3 Composition (information about components)

3.1 Product general information

3.1.1 Chemical name (as per IUPAC) — None, prescribed formulation mixture [1].

3.1.2 Chemical formula — None, prescribed formulation mixture [1].

3.1.3 General characteristic of content (including brand assortment; method of production) — IVKAZ composition of "IVKAZ-VAR" grade is an aqueous solution of halogen substituted derivatives of cobalt phthalocyanine with addition of multifunctional additives [1].

3.2 Components

(name, CAS and EC numbers, mass fraction (100% shall be totally), $MAC_{wa.}$ or Safe Reference Level of Impact (SRLI), hazard classes, references to data sources)

Table1[1,2,4,12,37-39]

Components (designation)	Mass fraction, %	Hygienic regulations in working zone air		No. CAS	No. EC
		MAC w.a., mg/m^3	Hazard class		
Dichlorosulphonic acid of cobalt phthalocyanine or Dibromdisulphonic acid of cobalt phthalocyanine	15-25	Not determined	No	No	No
Tri (2-hydroxyethyl) amine	4.7-13.3	5 (SRLI)	No	102-71-6	203-049-8
alpha-Hydro-omega-hydroxypoly (oxy-1,2-etanediyl)	0.45-8	10 (a)	4	25322-68-3	500-038-2
Water	to 100	Not determined	No	7732-18-5	231-18-5

4 First aid measures

4.1 Observed symptoms

4.1.1 In case of poisoning by inhalation (breathing-in) — At inhalation of the product vapors headache, vomiting, abdominal pains, cough, throat irritation, psychomotor agitation, sluggishness are possible [1, 2, 18, 20].

4.1.2 Skin contact — Redness, dryness, desquamation in a case of a long-term contact [1, 2, 18, 20].

4.1.3 Eye contact — Sharp edema and conjunctival hyperemia, corneal caligo are observed [1, 2, 18, 20].

4.1.4 Ingestion (if swallowed) — Abdominal pain, nausea, vomiting, head ache[1,2,18,20].

4.2 First aid measures for affected persons

4.2.1 when poisoning via inhalation — Remove the affected person to the out-of-doors, release from clothes hindering breath, keep the affected person at rest, warmth. Provide medical assistance by means of agents normalizing cardiac function and functional state of nervous system [1, 2, 18, 20].

4.2.2 Skin contact — Immediately remove contaminated clothes, wash skin with plenty of warm running water and soap [1, 2, 18, 20].

4.2.3 Eyes contact — Immediately wash eyes with large amount of running water with half-open eye lids. Take out contact lenses and if it easy to do continue eyes washing. If necessary seek medical assistance [1, 2, 18, 20].

4.2.4 When poisoning by peroral way	Drinking large amount of water, warming of body, drinking diluted1% solutions of baking soda, activated carbon [1, 2, 18, 20].
4.2.5 Contraindications	No data available

5 Fire and explosion fighting measures

5.1 General characteristic of fire and explosion hazard (per GOST12.1.044-89)	Non-combustible substance [1, 2].
5.2 Fire/explosion hazards indexes(indexes range per GOST12.1.044-89 and GOST30852.0-2002)	Not attained [1, 2].
5.3 Combustion and/or thermal destruction products and hazards caused by them	No data available [1, 2, 18]
5.4 Recommended fire extinguishing means	Fire-extinguishing means are recommended to apply by the main source of ignition [1, 23].
5.5 Forbidden fire extinguishing means	Fire-extinguishing means are recommended to apply by the main source of ignition [1, 23].
5.6 Personal protective equipment for fire-fighters(PPE for fire-fighters)	Fire protection suit completed with self-rescue device SPI-20 [1, 22, 25].
5.7 Special firefighting procedures	No data available

6 Measures for preventing and elimination of emergency situations and consequences

6.1 Measures for preventing hazardous effects on humans, environment, buildings, structures in case of accidents and emergency situations

6.1.1 Necessary general actions in emergency situations	Hazardous zone should be isolated. Unauthorized persons not involved in emergency response to be removed out of the area. Hazardous zone should be entered with personal protection equipment. Windward side should be kept. Low places should be avoided. Injured persons should be administered with first medical aid. Persons from affected area to be sent for medical examination. All emergency situations should be reported to local bodies of Rospotrebnadzor, regional committee of environment protection and natural recourses as well as regional committee for civil defense and emergency situations [24].
6.1.2 Personnel protection equipment in emergency situations (PPE for emergency teams)	In case of combustion - fire-protection suit completed with self-rescue breathing apparatus SPI-20 [24, 25].

6.2 Sequence of activities during elimination of accidents and emergency situations

6.2.1 Required activities in case of leakage, dumping or spillage (including recovery measures and safety measures providing environment protection)	Inform local Rospotrebnadzor office. Do not touch the spilled material. Eliminate the leakage observing the safety precautions, pump the content into a tank that is in good order. Prevent the substance from leaking into water reservoirs, basements and sewage facilities. Isolate spillage with earth banks, backfill with inert material (sand, soil), collect with upper layer of soil to tanks, close tightly, put the label on and remove for disposal. Places of cut to be filled with fresh layer of soil. Contaminated surfaces after removal of the product with the sorbent agent to be washed with water and wiped dry with rag

[1, 26].

6.2.2 Firefighting procedure — Act in accordance with recommendations stated in section 5. Extinguish and cool-down tanks from maximum distance. Arrange evacuation of people from neighboring buildings taking into account moving direction of toxic combustion products [23].

7 Rules of storage and handling chemical products

7.1 Safety measures when handling chemical products

7.1.1 Engineering safety measures systems — Input-exhaust and natural ventilation of working rooms, local suctions in places of intensive vapors emission. Manufacturing equipment and communication lines should be pressure tight, products storage containers should be tightly sealed [1, 25, 26].

7.1.2 Environment protection measures — Basic requirements ensuring preservation of natural environment are as follows:

– Maximum sealing of tanks, communication lines and other equipment;
– Periodic monitoring of harmful substances content in working area air;
– Analysis of industrial effluents for hazardous substances within permissible concentrations;
– Air treatment in working areas to permissible levels of harmful substances content before discharge into the atmosphere [1].

7.1.3 Recommendation for safe transportation and handling — IVKAZ composition of IVKAZ-VAR grade should be transported by means of any type of transport in accordance with shipping rules acting on this type of transport [1].

7.2 Storage rules for chemical products

7.2.1 Safe storage life and conditions (including warranty period of storage, shelf life, incompatible substances and materials when storing) — Гарантийныйсрокхранения–1годсдатыизготовления. Guaranteed storage life is 1 year from manufacture date. IVKAZ composition of IVKAZ-VAR grade should be stored in original containers in well ventilated areas or on a planned site protected against direct sun rays and atmospheric precipitations [1].

7.2.2 Tare and package (including materials they are made of) — IVKAZ composition of IVKAZ-VAR grade is to be poured into polymer canisters and cans with screw cap with volume from 5 to 30 liters as per GOSTP51760 [1]. Not used [1].

7.3 Safety measures and storage precautions in household use

8 Exposure control measures and personal protection equipment

8.1Work place area parameters subjected to obligatory control (MACw.z. or temporary SRLIw.z.) — Under working conditions control of working zone parameters should be performed on basic hazardous components:

SRLI w.z. = 0.04mg/m3 (Tri (2-hydroxyethyl) amine)

MACw.z. = 10 mg/m3 (alpha-Hydro-omega-hydroxypoly (oxy-1,2-etanediyl)) [1,2,12].

8.2 Measures to ensure content of harmful — Input-exhaust and natural ventilation of working rooms, local

substances within permissible concentrations	exhaust systems. Periodic monitoring of harmful substances content in working area air. Use of sealed equipment and tightly sealed tare [1].

8.3 Individual protective equipment for personnel

8.3.1 General recommendations	Avoid direct contact with the product, use personal protective equipment; smoking and eating only in specially intended places. Wash hands with warm water and soap before meal and smoking. Take shower after work. Clean and wash clothes thoroughly. Personnel working with the product should undergo preliminary medical examination upon entering employment as well as go through periodic medical examinations [1, 25].
8.3.2 Protection of respiratory organs (Types of respiratory protective equipment)	Breathing masks U-2K, F-62Sh, ShB-1, "Lepestok" and others[1].
8.3.3 Protective equipment (material, type) (Special clothing, footwear, hand protection, eye protection)	Special clothes, personal protection equipment (PPE) in accordance with standard regulations as per GOST 12.4.103, GOST12.4.011and "Typical industrial standards of free distribution of special clothes, shoes and other personal protection equipment to employees" approved in accordance with the established procedure. All applied personal protection equipment should correspond to "TR CU 019/2011.Technical Regulations of the Customs Union. Safety of personal protection equipment" [1].
8.3.4 Personal protection equipment in household use	Not used [1].

9. Physical and chemical properties

9.1 Physical state (aggregate state, color, odor)	Solution of dark blue to blue green color with specific odor [1].
9.2 Parameters characterizing the main properties of the product (temperature indexes, pH, solubility, n-octanol/water coefficient, and other parameters specific to this type of product)	Constant of sodium mercaptide oxidation reaction rate (K*O4), c-1, not less than: 35 pH: from 7.0 to 10.0 [1].

10 Stability and reactivity

10.1 Chemical stability (decomposition products should be indicated for non-stable products)	The product is stable under normal conditions of production, storage, transportation and application [1].
10.2Reactivity	No data available for the product in general. Information is provided for basic hazardous components. *Dichlorosulphonic acid of cobalt phthalocyanine*: Oxidizes, halogenates, forms salts. *alpha-Hydro-omega-hydroxypoly (oxy-1,2-etanediyl)*: oxidizes, halogenates, reacts with isocyanate. *Tri(2-hydroxyethyl)amine:* Oxidizes [2].

10.3 Conditions to be avoided (including hazards at contact with incompatible substances and materials)	Store away from heating, oxidizers, acids and alkalis [2].

11 Toxicity information

11.1 General characteristic of effect (evaluation of hazard (toxicity) effect level on human body and the outstanding features of hazard display)	In terms of severity of exposure to organism the product relates to low-hazardous substances (hazard class 4) in accordance with GOST12.1.007-76. In case of contact with skin and eyes causes irritation. Can cause drowsiness and dizziness [1, 3, 4].
11.2 Routes of exposure (inhalation, oral, skin and eyes contact)	If swallowed (orally), at inhalation, contact with skin and eyes[1, 2].
11.3 Affected human organs, tissues and systems	Central nervous system, gastrointestinal tract, liver, heart, kidneys, spleen, upper respiratory tracts, skin and eyes [2].
11.4 Information about effects hazardous for health upon direct contact with production; consequences of such exposures (irritation of the upper respiratory tracts, eyes, skin; skin-resorptive and sensibilizing effect)	In case of contact with skin and eyes causes irritation. No data available for products in general. Information is provided for basic hazardous components. *Dichlorosulphonic acid of cobalt phthalocyanine:* Skin-resorptive and sensibilizing effects are not determined. *alpha-Hydro-omega-hydroxypoly (oxy-1,2-etanediyl):* Skin-resorptive effect is determined, sensibilizing effect was not studied. *Tri(2-hydroxyethyl)amine:* Sensibilizing effect is determined. Skin-resorptive effect is not determined. *Mixture of alkylimidezolines of fatty acids of C_8-C_{12} fractions:* Skin-resorptive and sensibilizing effects were not studied. *Propane-2-ol:* Has skin-resorptive and sensibilizing effects[2].
11.5 Information on hazardous long-term effects of exposure to organism (effect on the reproductive function, carcinogenic activity, cumulative effects and other chronic effects)	No data available for the product in general. Information is provided for basic hazardous components. *Dichlorosulphonic acid of cobalt phthalocyanine:* Accessible domestic and foreign information sources do not contain any data concerning the influence on reproductive function, mutagenic and carcinogenic effects of the product. *alpha-Hydro-omega-hydroxypoly (oxy-1,2-etanediyl):* Embryotropic and gonadotropic effects are determined, however data for classification is not enough. Other consequences impacts have not been studied. *Tri (2-hydroxyethyl)amine:* Mutagenic effect has been determined. Other consequences impacts have not been studied [2].
11.6 Acute toxicity indexes (DL50, route of entry (intragastric, cutaneous), animal specimen; CL50, exposure time (hr), animal specimen)	For the product in general: DL50=10000 mg/kg, intragastric DL50=more than 2500 mg/kg, cutaneous, rabbits [40]. Basic hazardous components data: *Dichlorosulphonic acid of cobalt phthalocyanine:*

DL50=7940 mg/kg, intragastric, rats

DL50=more than 2500 mg/kg, cutaneous , rabbits

alpha-Hydro-omega-hydroxypoly (oxy-1,2-etanediyl):

DL_{50}= 30200 mg/kg, intragastric, rats

Tri(2-hydroxyethyl)amine:

DL_{50}= 2650 mg/kg, intragastric, rats [1, 2].

12 Environmental impact information

12.1 General characteristics of environmental objects effect (atmospheric air, basins, soils, including observed signs of exposure)

Can pollute the environment if handling rules are violated. When penetrated can break general sanitary condition of basins. When entering water modifies its organoleptic properties giving odor and taste [1, 2].

12.2 Routes of impact on the environment

Violation of storage and transportation rules, unorganized waste placement and disposal, discharge to surface water basins; inappropriate use; in the result of emergency situations.

12.3 The most important characteristics of impact on the environment

12.3.1 Sanitary-hygienic standards
(MAC in atmosphere, water, incl. fish farms, soil)

Table 2 [2,14-17,39]

Components	MAC $_{atm. air}$ or SRLI $_{atm.air}$ mg/m^3 (LC[1], hazard class)	MAC $_{water}$[2] or SRLI $_{water}$, mg/l, (LC, hazard class)	MAC$_{fish\ farms.}$[3] or SRLI $_{fish\ farms}$, mg/l (LC, hazard class)	MAC or SRLI soil, mg/kg (LC)
Dichlorosulphonic acid of cobalt phthalocyanine	Not determined	Not determined	Not determined	Not determined
alpha-Hydro-omega-hydroxypoly(oxy-1,2-etanediyl)	0.15 (SRLI)	0.3, organic foam, Class 4	Not determined	Not determined
Tri(2-hydroxyethyl)amine	0.04 (SRLI)	1.0, organic taste, Class 4	Not determined	Not determined

12.3.2 Environmental toxicity indexes
(CL, EC, NOEC for fishes, Magna daphnia, algae,etc.)

No data is available for the product in general.
Information is provided for basic hazardous components.

Dichlorosulphonic acid of cobalt phthalocyanine: No data available.

alpha-Hydro-omega-hydroxypoly(oxy-1,2-etanediyl): No data available.

Tri(2-hydroxyethyl)amine: CL_{50}=more than 5 000 mg/l (crucian carp), 24hours.

CL_{50}=more than10 000 mg/l (brook trout), 48hours.

EC_{50}=1850mg/l (Magna daphnia), 24hours. [2].

12.3.2 Migration and conversions in environment due to biodestruction and other processes (oxidation, hydrolysis etc.)

No data is available for the product in general.
Information is provided for basic hazardous components.

[1]LHI–limiting harmful index (tox.–toxicological; s.-t. (san.-tox.)–sanitary-toxicological; org.–organoleptic with deciphering of nature of changes of water organoleptic properties (odour.–changes water odour, turb.–increases water turbidity, col.–gives colour to water, foam–causes foam formation, film.–forms film on the water surface, taste.–gives taste to water, op.–gives opalescence); refl.– reflectory; res.–resorptive; refl.-res.– reflectory resorptive; f.-fisheries (change of commodity qualities of commercial aquatic organisms); gen. san. –general sanitary),

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

[3]The water of water bodies having fishery importance (including marine ones)

Dichlorosulphonic acid of cobalt phthalocyanine:
No data available.
alpha-Hydro-omega-hydroxypoly(oxy-1,2-etanediyl):
Transforms.
Tri(2-hydroxyethyl)amine:
Transforms [2].

13 Recommendations on waste (residues) removal

13.1 Safety measures for handling wastes generated during consumption, storage, transportation	Safety measures to be taken during waste management are similar to those recommended for the product (see Sections 7 and 8).
13.2 Information on places and methods for neutralization, recycling or disposal of waste products, including wrapping materials (packing)	Product waste or spoiled product to be collected from the place of accident in a sealed container, marked and transported for disposal to industrial waste landfill, treatment facilities or to places agreed with territorial "Rospotrebnadzor" bodies. Disposal and neutralization of the product are carried out according to SanPin (Sanitary Rules and Regulations) 2.1.7.1322-03[26] and acting instructions of Federal or local executive authorities.
13.3 Recommendations on disposal of wastes formed during domestic use of the products	Not applicable in household use [1].

13 **Transportation information**

14.1 UN number (according to the UN Recommendations for transportation of dangerous goods)	UN serial number is not available [1, 28].
14.2 Proper shipping name and/or transportation name	IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade [1].
14.3 Applied modes of transportation	IVKAZ composition of IVKAZ-VAR grade shall be transported by any type of transport in accordance with shipping rules operating on a given type of transport [1].
14.4 Hazardous cargo classification as per GOST19433-88:	
- class	Not classified as hazardous cargo
- subclass	Not classified as hazardous cargo
- classification code (as per GOST19433-88 and rail transportation)	Not classified as hazardous cargo
- number(s) of drawing(s) of danger sign(s)	Not classified as hazardous cargo [1,30].
14.5 Hazard goods classification as per UN Recommendations on the transport of dangerous goods:	
- Class or subclass	Not classified as hazardous cargo
- Additional hazard	Not classified as hazardous cargo
- UN packing group	Not classified as hazardous cargo [1, 28, 29, 33, 34].
14.6 Transport marking (handling symbols according to GOST14192-96)	Transport marking is according to GOST 14192 with

	application of basic, additional and explanatory inscriptions and handling symbols “Top”, “Keep away from sunlight”[1, 31].
14.7 Emergency cards (under railway, sea and other transportations)	Not applicable [24].

15 International and domestic legislation information

15.1 National legislation

15.1.1 RF laws	Federal law of December 27, 2002. No184-Federal Law “Concerning Technical Regulation”; Federal law dated January10, 2002. “Concerning Protection of Environment” No7-Federal law; Federal law dated July18, 1998. No 89-Federal Law “Concerning Production and Consumption Wastes”.
15.1.2 Information on documents regulating the requirements for protection of people and environment	Not available
15.2 International conventions and agreements (if the product is regulated by the Montreal Protocol, Stockholm Convention etc.)	Do not fall within.

16 Additional information

16.1 Information on revisions (re-edition) of MSDS (should be indicated:“MSDS is developed for the first time” or “MSDS is reregistered upon the expiration of period of validity. Previous Safety Data Sheet registration number …» or “Amendments were made into items …, date of amending…”)	The MSDS is developed for the first time with due regard to GOST30333-2007 requirements

16.2 List of data sources used to compile the Safety Data Sheet[4]

1. TU2175-002-09742619-2016 IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade
2. Information cards of potentially dangerous chemical and biological substance: *Dichlorosulfonic acid of cobalt phthalocyanine (IVKAZ desulfurization catalyst).*VT series No. 0002513.
   Tri(2-hydroxyethyl)amine. VT series 00013 dated 18.03.1994.
   *alpha-Hydro-omega-hydroxy poly (oxy-1,2-etanediyl).*VT series 001374 dated10.06.98.
3. GOST30333-2007. Interstate standard. Material Safety Data Sheet of chemical products. Basic requirements.
4. GOST 12.1.007. Hazardous substances. Classification and general safety requirements.
5. Globally Harmonized System of Classification and Labeling of Chemicals (GHS).Third revised edition. United Nations Organizations, New York and Geneva, 2009.
6. GOST31340-2013. Interstate standard. Warning marking of chemical products. General requirements.
7. GOST32419-2013. Hazard classification of chemical products. General requirements.
8. GOST32421-2013 Classification of chemical products danger of which is due to physical and chemical properties. Tests methods of explosive chemical products.
9. GOST32423-2013 Hazard classification of mixed chemical products in terms of effect on the human body.

[4] Serial numbers of data sources are given in every item of the Safety Data Sheet as references

10. GOST32424-2013 Hazard classification of chemical products in terms of effect to environment. Basic provisions.

11. GOST32425-2013Hazard classification of mixed chemical products in terms of effect to environment.

12. Sanitary-hygienic standard 2.2.5.1313-03 "Maximum permissible concentrations of hazardous substances in working zone air". Sanitary-hygienic standard 2.2.5.2308-07 " A pproximately safe impact levels (ASIL) of hazardous substances in working zone air". Sanitary-hygienic standards.-M.: Russian Register of Hazardous Chemical and Biological Substances of Ministry of Health of the Russian Federation, 2003, 2008.

13. Sanitary-hygienic standard 2.1.6.1338-03 "Maximum permissible concentrations (MPC) of pollutants in atmosphere of populated areas". Sanitary-hygienic standard 2.1.6.2309-07 "Reference impact safe level "Safe Reference Level of Impact (SRLI) of pollutants in atmospheric air of populated areas". Sanitary-hygienic standards.-M.: Russian Register of Hazardous Chemical and Biological Substances of Ministry of Health of the Russian Federation, 2003, 2008.

14. Sanitary-hygienic standard 2.1.5.1315-03 "Maximum permissible concentrations (MPC) of chemical substances in ambient waters of drinking and household water consumption".

15. Sanitary-hygienic standard 2.1.5.2307-07 "Approximate permissible levels (APL) of chemical substances in ambient waters of drinking and household water consumption". Sanitary-hygienic standards.- M.: Russian Register of Hazardous Chemical and Biological Substances of Ministry of Health of the Russian Federation, 2003, 2008.

16. Water standards for fishery water bodies, including maximum permissible concentrations of hazardous substances in ambient waters of fishery, confirmed by the order No. 20 of the Federal Agency for fishery dated 18.01.2010

17. "Maximum permissible concentrations (MPC) of chemical substances in soil. Decision of Chief State Medical Officer of the Russian Federation dated 23.01.06, No1. Sanitary-hygienic standard 2.1.7.2041-06, approved on January 19, 2006.-M., Federal Hygiene and Epidemiology Centre of Rospotrebnadzor, 2006.

18. Hazardous chemical substances. Inorganic compounds of I-IV groups elements. Reference book. /Edited by V.A. Filov.–L.: Chemistry, 1988.

19. Y. M. Grushko. Hazardous Inorganic compounds in industrial waste waters. Reference book.-L.: Chemistry, 1979.

20. Hazardous substances in industry. Inorganic and element organic compounds. Reference book for chemists, engineers and doctors./Edited by N.V. Lazarev.-L.: Chemistry, 1971.

21. Hazardous substances in industry. Organic substances. Reference book for chemists, engineers and doctors. /Edited by N.V. Lazarev and E.N. Levina-L.: Chemistry, 1976.

22. A.Y. Korolchenko. Fire and explosion hazard of substances and materials and extinguishing agents. Reference book in two parts. Part P.–M.: Ass. "Pozhnauka", 2004.

23. Fire hazard of substances and materials used in chemical industry. Reference book./Edited by I.V. Ryabov.–M.:"Chemistry",1970.

24. Safety regulations and liquidation procedure of emergency situations with hazardous cargo in transportation by railroads "approved by Ministry of communication lines, Russia No CM–407 dated 25.11.96 and Ministry for Emergency Situations, Russia No9-733/3-2dated 31.10.96. M.: Ministry Of Communications of RF, 1997.

25. Collective and personal protective equipment. Protective equipment control: Encyclopedia "Ecometry" from the series of reference books on ecological and medical measurements.-M.: FID "Delovoy express", 2002.

26. Sanitary and epidemiologic rules and standards SanPiN 2.1.7.1322-03. Hygienic requirements to allocation and neutralization of production and consumption wastes.

27. Chemical encyclopedia. In 5 volumes: vol.2: Daffa-Medi./Editorial board. I.L. Knunyanz and et al.-M.: Sovetskaya encyclopedia, 1990.

28. UN Recommendations on transportation of dangerous goods. Typical rules. Volume I.-The sixteenth revised edition. United Nations Organization. New-York and Geneva, 2009.

29. European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).United Nations. New-York and Geneva, 2006.

30. GOST19433-88 "Hazardous cargoes. Classification and marking".-M.: Publishing house of standards, 1988.

31. GOST14192-96. Interstate standard. Marking of goods. Minsk, 1998.

32. Regulations for transport of hazardous cargoes by motor transport (in edition of the Ministry of Transportation orders of the Russian Federation dated 11.06.1999, No.37, dated 14.10.1999 No.77).-SPb.: Publishing house DEAN, 2002.
33. Regulations for transport of hazardous cargoes (attachment 1and 2) to Agreement on International Goods Transport by Rail (AIGTR), 2009.
34. International Maritime Code for Dangerous Goods. (IMDGC Code) - St. Petersburg.: ZAO Central Scientific Research Institute of Marine Fleet, 2007.
35. Regulations for transport of hazardous cargoes by railroads. Ministry Of Communication of RF. M.: Transport, 1997.
36. International Maritime Code for Dangerous Goods. IMDGC Code, volume 1, 2. – St. Petersburg.: ZAO Central Scientific Research Institute of Marine Fleet, 2007.
37. Global information portal about chemical substances eChemPortal.: Access mode- http://www.echemportal.org
38. European Chemicals Agency site.: Access mode -http://echa.europa.eu
39. Information about composition. IVKAZ catalytic desulfurization composition of IVKAZ-VAR grade. ZAO«IVKAZ»
40. Protocol of laboratory research (tests) No 90458 dated 13.12.2016. Federal State-Funded Healthcare Institution “Hygienic and Epidemiological Center in the Republic of Tatarstan (Tatarstan)”