MATERIAL SAFETY DATA SHEET

Registered

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Rosstandard

Information Analytical Center
"Substance and Material Safety" Chief _____ / A. D. Kozlov /
Federal State Unitary Enterprise "VNITSMB" L.S.

Seal: Federal State Unitary Enterprise Primary State Registration Number 1027700169144 * Moscow * All-Russian Scientific Research Center of Standardization * Information and Certification of Raw Materials, Materials, and Substances * Federal Agency for Technical Regulation and Metrology * Information Analytical Center "BV&M" Federal State Unitary Enterprise "VNITSMB"

NAME:

Technical (ND):	**Ferrochromium**
Chemical (IUPAC):	N/A
Trade:	**Ferrochromium of various grades**
Synonyms:	**Alloy of Iron and Chromium**

Code of All-Russian Classification of Product:
0 8 4 2 0 0

Code of Harmonized Commodity Description and Coding System:
7 2 0 2 4 0 0 0 0 0

Product Registration Information

Not to be registered

Reference Identification and Name of Basic Normative, Technical or Informational Document for Products (GOST, Specifications, Industrial Standards, Proprietary Standard, (M)SDS, etc.)

GOST 4757-91 (ISO 5448-81). Ferrochromium.
Specification Requirements and Terms of Delivery.

HAZARD IDENTIFICATION:

Signal Word: Warning

Brief (in words): Product is moderately hazardous for the organism. Dust has fibrogenic effect, and its contact with skin can cause allergic reactions. It can cause cancer diseases of skin.

Detailed: in the 16 attached sections of MSDS.

BASIC HAZARDOUS COMPONENT	MPC_{wz}, mg/m^3	Class of Hazard	CAS No.	EC No.
Ferrochromium	6/2	3	11114-46-8	No

APPLICANT: "Chelyabinsk Electrometallurgical Integrated Plant joint-stock company", Chelyabinsk
(Organization Name) (City)

Type of Applicant: manufacturer, supplier, seller, exporter, ~~importer~~
(Strike out unnecessary item)

Code of All-Russian Classifier of Enterprises and Organization: 00186507 **Hotline:** (351) 772-66-09

Head of Applicant Organization: /signature/ / A. V. Sheykin /
Signature L.S. (Clarification of signature)

Seal: Russian Federation Chelyabinsk Open Joint Stock Company Chelyabinsk Electrometallurgical Integrated Plant

IUPAC	International Union of Pure and Applied Chemistry
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
ARCP	All-Russian Classification of Products
ARCEO	All-Russian Classifier of Enterprises and Organization
HCDCS	Harmonized Commodity Description and Coding System * This code is not indicated for the Russian Federation internal market.
CAS No.	Number of the Chemical Abstract Services
EC No.	Number of the European Chemical Agency
MPC_{wz}	Maximum Permissible Concentration of Chemical Substance in Working Zone Air, mg/m^3 (maximum one-time/average for shift)
MSDS	Material Safety Data Sheet is used for the Russian Title: "Passport of Chemical Products' Safety" (substance, mixture, material, waste of industrial production)

Material Safety Data Sheet meets:

- Recommendations of the UN ST/SG/AC.10/30 "GHS";
- The EC regulations "Regulation No. 1907/2006 concerning Registration, Evaluation, Authorization and Registration of Chemicals", Attachment II.

Signal Word:	Indicates one of two words "**Danger**" or "**Warning**" (or "**Absent**") according to GOST 31340-2007 "Labeling of Chemicals. General Requirements."

Product Registration Information (*for pesticide, agrochemical, disinfectant, food additive, individual chemical, etc.*) includes: Number and Date of the State Registration; Certificate Number; and the Number of the State Registration (if available)/PHCBSR Number for the Potentially Hazardous Chemical and Biological Substances Register of Russian Federation (PHCBSR).

1. Chemical Product Identification and Information on Manufacturer and/or Supplier

1.1 Chemical Product Identification

1.1.1 Product Name:	Ferrochromium [1].
1.1.2 Brief Recommendations for Use: (including the restrictions for use)	It is used in metallurgic and foundry industry [1].

1.2 Information on Manufacturer and/or Supplier

1.2.1 Full Legal Name of Organization:	"Chelyabinsk Electrometallurgical Integrated Plant joint-stock company" (OAO "ChEMK")
1.2.2 Address (Postal and Legal):	454081, Chelyabinsk, Geroev Tankograda Street, 80-P, Bld. 80.
1.2.3 Telephone, including phone for special consultation and convenient time:	(351) 772-66-09
1.2.4 Fax:	(351) 772-96-19
1.2.5 E-mail:	info@chemk. ru

2. Hazard (hazards) Identification

2.1 Level of chemical product hazard as whole: (Information about classification of hazard according to the RF legislation (GOST 12.1.007) and GHS (after approval))	It is moderately dangerous substance concerning the extent of effects on the human organism, the class of hazard – 3 [3]. It is toxic substance, irritates skin integument and conjunctiva, and it may have a carcinogenic effect [13]. Dust of ferrochromium has fibrogenic effect [1]. The impurities of ferrochromium (slag, oxide coating) may contain the chromium compounds. The trivalent chromium compounds cause the allergic diseases in the industrial conditions. The hexavalent chromium compounds are extremely dangerous [1, 2].
2.2 Hygiene regulations for product, as whole, in the working zone air (MPCwz or SRLlwz)	The hygiene regulations for the working zone air are not specified [2].
2.3 Labeling Information (GOST 31340-07)	Symbols:  Exclamation mark **Signal word:** WARNING **Hazard characteristics:** contact with skin may cause allergic reaction. **Danger preventive measures:** Avoid inhaling dust. Use gloves. Do not bring the overalls out of workplace. After contacting with skin, wash with large amount of running water with soap. When the irritation or reddening occurs, appeal for medical aid. Before repeated use, launder the dirty overall [17].

3. Content (Information about Components)

3.1 General Information about Product

3.1.1 Chemical name: (IUPAC) — Ferrochromium [1].

3.1.2 Chemical formula: — No, this is an alloy of given composition [1].

3.1.3 General characteristics of composition: (considering the grade assortment, the impurity indications, and functional additives which influence on the product hazard; production process) — Alloy of iron and chromium with minimum content of chromium 45.0% of mass and maximum content – 95% of mass, which is produced by reduction of the relevant raw materials or their concentrates [1].

Ferrochromium is also produced as prills with maximum size up to 50 mm [1].

Ferrochromium is supplied as lumps having mass not more than 20 kg or as crushed and screened particles. The high-carbon ferrochromium is permitted to be produced as pigs with mass not more than 30 kg. When ferrochromium is manufactured as lumps or pigs, the amount of small material, screened through screen openings 20 x 20 mm, shall not exceed 10% of the batch mass for the high-carbon ferrochromium, and 5% - for the low- and medium-carbon ferrochromium [1].

3.2 Ingredients

(name, CAS No., EC No. (if available), weight percent, MPCwz, classes of hazard, references for data sources)

Ingredients [1]	Weight percent, % [1]	MPCwz, mg/m^3 [2]	Class of hazard	CAS No. [2]	EC No. [19]
Ferrochromium, including:	Up to 100	6/2	3	11114-46-8	No
- chromium	45-95 (depending from grade)	Not determined	No	7440-47-3	231-157-5
- iron	Rest	10/-	4	7439-89-6	231-096-4
Note: Depending from the grade, ferrochromium contains the controlled impurities: 0.8-10.0% silicon, 0.01-10.0% carbon, 0.02-0.0.08% sulphur, 0.02-0.05% phosphorus [1].					

4. First Aid Measures

4.1 Observed symptoms:

4.1.1 Inhalation poisoning: — Dyspnea, chest pain, cough, dust bronchitis, disorder of breathing regulation, complaints about weakness, rapid fatigability, hyperhidrosis, and lymphadenopathy [12].

4.1.2 Skin exposure: — Dust has the irritating action [12].

4.1.3 Eye exposure: — Dust has the irritating action [12].

4.1.4 Per oral poisoning (ingestion): — Poisoning is highly unlikely. Under the accidental ingestion, symptoms are as the same ones as the inhalation poisoning has [12].

4.2 First aid measure for exposed one

4.2.1 For inhalation poisoning: — Fresh air, full rest, warm, strong tea or coffee.

	Acute poisoning by the ferrochromium dust does not arise [12].
4.2.2 For skin exposure:	Wash with running water, dub skin with liquid petrolatum [12].
4.2.3 For eye exposure:	Urgently wash the eyes with the large amount of running water for 15 minutes, while the palpebral fissure is widely open. If there is steady reddening or pain, consult the physician [12].
4.2.4 For per oral poisoning:	While the ferroalloy is being used, the acute poisoning is impossible [12].
4.2.5 Contraindications:	There is no data [1, 12].
4.2.6 First aid kit:	The first aid kit shall include the medicines and medications approved by the Public Health Bodies for using in the first aid help at this industry [12].

5. Fire and explosion fighting measures and equipment

5.1 General characteristics of fire and explosion risks:	Ferrochromium as lumps, prills, and crushed one is incombustible, fire- and explosion-safe [1].
5.2 5.2 Characteristics of fire and explosion risk: (List of characteristics according to GOST 12.1.044 and GOST R 51330.0)	Ignition temperature in air – 670°C (when particle sizes are less than 74 μm) [13]. Minimum explosive oxygen concentration in mixture diluted with CO_2 – 19 volume percent. [13]. Ignition of powders with fineness less than 50 μm is at the temperature more than 1000°C. Explosive concentration of powder is more than 5000 g/m^3 [9].
5.3 Hazard of combustion products and/or thermodestruction:	Ignition of dust/powders may cause the formation of the iron and chromium oxides.
5.4 Recommended extinguishing means:	Powder mixes [15. 20].
5.5 Prohibited extinguishing means:	There is no data [15, 20].
5.6 Personal protective gear for extinguishing the fire: (Personal protective gear of fire-fighters)	Fire-protection suit with escape hood SPI-20 [16].
5.7 Specific character of fire-extinguishing:	N/A.

6. Activities to prevent and eliminate accidents, emergencies, and their consequences.

6.1 Activities to prevent the hazardous effects on human beings, environment, buildings, constructions, etc, during accidents and emergencies.

6.1.1 General required activities:	Isolate the danger zone. Evacuate unauthorized persons. Enter the danger zone only in the protective gears. Perform the first aid measures for injured persons [16].
6.1.2 Personal protective gears: (emergency crew and staff)	When the dust content in the air is high, apply the dust mask RU 60. Overalls made of the dust-protective cloth, moleskin, gauntlet, special shoes, and protective spectacles PO-2 [18].

6.2 Procedures for activities to eliminate accidents and emergencies

6.2.1 Activities for leak, overflow, and spill: (including precautions providing the protection of environment)	Cleaning the working premises from dust shall be made with the vacuum cleaners. The products spilled on the ground shall be collected in the special vessels and transported for reprocessing or for eliminating at the industrial disposal or places coordinated with the local sanitary services and environmental protection bodies [3, 16].
6.2.2 Fire-fighting measures:	Product is incombustible. Extinguish according to the recommendations for a basic ignition source.

7. Storage and handling rules for chemical products during handling operations

7.1 Safety measures while handling the chemical products

7.1.1 Safety measures and collective protection gears: (including the measure system for fire-explosion fighting)	The production facilities shall have the general, combined extract and input ventilation or the local aspiration hoods. Dust control and localization of dust release. [12]. Apply the individual protection gears for working (see Section 8).
7.1.2 Environment protection measures:	Exclude the uncontrolled discharge of ferrochromium and its dust in the environment.
7.1.3 Recommendations for transportation safety:	It is transported without package in clear transport or in specialized containers. When several batches of unpacked ferrochromium is shipped in one transport vehicle, it should be provided the separation of the batches by partitions that exclude the possibility of their mixing [1]. Under the transportation in bulk, the angle of natural slope is about 40-45° [22, 23].

7.2 Chemical product storage regulations:

7.2.1 Conditions and safe storage life: (including guaranteed storage life, expiration time)	The packed alloy is stored in the closed premises in stacks according to grades, size grades, and year of manufacture. The alloys transported in bulk as well as in specialized containers, are stored on the areas under the shelter or in the closed premises in stacks, bins, or bowls according to types of alloy, grades, and years of manufacture. The premises may be any construction with the concrete or asphalt-concrete floors and the natural ventilation. The areas shall have the hard coverage and be even with small slope to the edges (1:100) [6].
7.2.2 Substances and material incompatible for storage:	Moisture, acids, alkalis.

7.2.3 Materials recommended for tares and package:	When the sizes of lumps are less than 5 mm, apply steel drums or specialized containers. When the size of lumps are more than 5 mm, apply steel drums, wooden boxes, and specialized containers [6]. Ferroalloys with lump sizes more than 5 mm are permitted not to be packed [6].
7.3 Safety measures and storage regulations in private life:	It is not used in the private life conditions.

8. Monitoring means for hazardous effects and individual protection gears

8.1 Working zone criteria, that shall necessarily be monitored (MPCwz or Safe Reference Levels of Impact in Working Zone (SRLIwz)):	MPCwz = 6/2 mg/m^3 [2, 21].
8.2 Safety measures to keep the hazardous substance contents in the permissible concentrations:	Dust- and gas-purifying facilities. Forced and exhaust ventilation. Monitoring of MPCwz [1, 12].

8.3 Individual protection gears for personnel:

8.3.1 General recommendations:	Avoid the direct contact with the products; and use the protection overall. The routine cleaning of premises and industrial area by the dry method from dust and spilling. Observe the personal hygiene regulations; do not smoke and do not eat at the workplace. Take shower after work. All staff working with the ferrochromium shall have the preliminary medical examination before taking on job and the periodical medical examinations according to the Orders of the RF Ministries of Health and Social Development, which are approved in the established procedures [12].
8.3.2 Protection of respiratory apparatus: (types of Individual Protection Gears of Respiratory Apparatus)	Dust respirators [12, 18].
8.3.3 Protection clothes (material and type):	**Protection overall**: special suit made of dustproof tissue. **Eye protection**: protective spectacles closely fitting the face (e.g., protective spectacles of hermetic type G) or protective faceshield. **Foot protection**: special shoes. **Hand protection**: tarpaulin gauntlet, gloves [12, 18].
8.3.4 Individual protection gear in private life	It is not use in the private life conditions.

9. Physicochemical properties:

9.1 Physical state: (aggregate state, color, odor)	Solid substance, grey color, and temper colors at fracture and dark green surface. There is no odor.

9.2 Criteria defining the basic properties of chemical products, first of all the hazardous ones:

Density, g/cm^3 [9]:	Apparent: 6.90 (for high-carbon ferrochromium); 7.06 (for medium-carbon ferrochromium); 7.13 (for low-carbon ferrochromium) Real: 7.46 (for high-carbon ferrochromium); 7.16 (for medium -carbon ferrochromium); 7.18 (for low-carbon ferrochromium)
Melting temperature, °C [9]:	1500 … 1660 (for high-carbon ferrochromium); 1400 … 1580 (for medium -carbon ferrochromium); 1500 … 1625 (for low-carbon ferrochromium)
Solubility:	Insoluble in water

10. Stability and chemical reactivity

10.1 Chemical stability: Material is stable under the normal conditions, there is no hazardous polymerization.

10.2 Chemical reactivity: It reacts with strong acids [9].

10.3 Conditions that shall be avoided: (including dangerous behavior under the contact with the incompatible substances and materials) Grinding and transporting the grinded products may cause dusting in the air.

11. Toxicity information

11.1 General effect characteristics: (evaluation of hazard (toxicity) extent for the organism effects) Product is moderately hazardous substance concerning the effects on human organism [1].

11.2 Routes of entry: Dust inhalation, skin and conjunctiva contact with dust, ingestion.

11.3 Affected human organs, tissues, and systems: Upper air passages, lungs, skin, eyes [12].

11.4 Information on the hazardous effects of direct contact with substance on health, as well as consequences of such exposures: (irritating action for upper air passages, eyes, skin, including percutaneous action; sensibilization) The ferrochromium dust has the irritating action when it intakes the upper air passages, and it can cause the high sensitivity and the fibrogenic action. The long-term inhalation may cause fibrosis and/or silicosis of lungs [2, 12].

The contact of dust with skin integument may cause the high sensitivity and dermatitis [1, 12].

11.5 Information on long-term harmful effects for human organism: (Effects on reproduction function, carcinogenicity, cumulativeness, etc.) Cumulativeness is moderate.
It may cause cancer diseases of skin [12].

11.6 Criteria of acute toxicity: (DL_{50}, entry routes (internal, external), animal species; CL_{50}, exposure time (h), animal species) There is no data.

11.7 Doses (concentrations) having the minimum toxic effect: There is no data.

12. Information about effects on environment

12.1 General characteristic of effects on environment objects: (atmospheric air, water bodies, soil) When concentrations are large, it can contaminate various objects of environment, i.e., give an extraneous odor to the atmospheric air; change the organoleptic properties of water; have fatal effects on living organism of a water body; cause the inhibition of biochemical consumption of oxygen; and delay the plant growth [24].

12.2 Environment impact ways: Violation of storage and transportation regulations, unorganized waste treatment, throwing out on relief or in water bodies.

12.3 Observed features of impact: Extraneous odor to the atmospheric air; increased water turbidity and extraneous taste; bottom and waterside sediments [24].

12.4 Most important characteristics of effects on environment

12.4.1 Hygiene regulations:
(permissible concentrations in atmospheric air, water, including fishery waters, and in soil)

N/A for products as whole [1, 17].

When there are return water and wastes discharge by a water consumer and working on a water body and in foreshore zone, the content of suspended substances in the control station shall not increased in comparison with the natural conditions more than:

- 0.25 mg/dm^3 (for the highest and first categories of water bodies);
- 0.75 mg/dm^3 (for the second category of water bodies).

For the water bodies having more 30 mg/dm^3 of natural suspended substances during the normal water level, the content of such substances is permitted in the limit of 5%.
The return water (sewerage) having the suspended substances with the settling rate more than 0.4 mm/s is prohibited to be discharged in the watercourses, and the one with 0.2 mm/s – in water bodies [6].

Ingredient	$MPC_{atm.air}$, mg/m^3 (LHI[1], class of hazard)	MPC_{water}[2], mg/l, (LHI, class of hazard)	$MPC_{fishery}$[3], mg/l (LHI, class of hazard)	MPC for soil, mg/kg (LHI)	Data Sources
Iron	0.02 (Safe Reference Levels of Impact for ferroalloys' dust (iron – 51%, silicon – 47%)) /for iron/	0.3 (organoleptic, 3)	0.1 (toxicological, 4) For sea waters: 0.05 (toxicological, 2)	Unknown	[4, 5, 7, 12]
Chromium	-/0.0015 (recalculation for chromium VI oxide) (resorptive, 1)	0.5 (Cr^{3+}) 0.05 (Cr^{6+}) (sanitary-toxicological, 3)	0.07 (Cr^{3+}) (sanitary-toxicological, 3) For sea waters: 0.02 (Cr^{6+}) (toxicological, 2)	0.05 (Cr^{6+}) (general sanitary)	[4, 5, 7, 12]

12.4.2 Criteria of ecotoxicity:
(CL, EC for fishes, daphnia Magna, algae, etc.)

N/A [24]

12.4.3 Migration and conversion in environment due to biodegradation or other processes (oxidation, hydrolysis, etc.):

There is no conversion in environment [24].

[1]LHI – Limiting Harmful Index (toxicological, sanitary-toxicological, organoleptic, reflex, resorptive, reflex-resorptive, fishery (change of commercial quality for aquatic organisms), general sanitary)
[2]Water of water bodies for household and community water consumption.
[3]Water of water bodies having the fishery significance (including the marine ones).

13. Recommendations for waste treatment

13.1 Safety measures for handling waste obtained during use, storage, and transportation, etc.	Safety measures for handling waste are analogical as those used for working with ferrochromium (see Section 7 and 8).
13.2. Information about places and ways to decontaminate, utilize, or eliminate the substance (material) waste, including tares (packages):	Wastes, substandard products, not subject to reprocessing, and non-returnable tares shall be destroyed at the landfill for industrial toxic wastes or at the places coordinated with the sanitary inspection and environmental organizations [11].
13.3 Recommendations for treatment of wastes obtained during use in the private life conditions:	There is no use in the private life conditions [1].

14. Transportation information

14.1 UN No.: (according to the UN recommendations for transportation of danger cargoes (typical rules), last edition)	N/A [1, 14, 22]
14.2 Appropriate shipping name:	Shipping name: Ferrochromium [1].
14.3 Types of used transports:	It is transported by all the types of transports according to the regulations and relevant agreements valid at that type of transport [6].
14.4 Danger classification of cargo: (GOST 19433 and the UN recommendations for transportation of danger goods)	According to GOST 19433: it is not classified as the dangerous cargo [1, 8]. The UN class of hazard: it is not classified as the dangerous goods [1, 14]. As to transportation by railways, it is not classified as the dangerous goods [16].
14.5 Shipping marking: (handling marks; basic, additional, and informational notices)	Shipping marking can be applied (handling marks and informational notices) according to GOST 14192-96 [1].
14.6 Packing group: (according to the UN recommendations for transportation of danger cargoes)	Not required [14].
14.7 Information about hazard for motor-vehicle transportation (Kemler code):	Kemler code is not applied [3].
14.8 Emergency cards: (For transportation by rail, sea, etc.)	They are not applied for transportation by railways [16].
14.9 Danger information for international freight transportation: (AIGTR, ADR, RID, IMDG Code, ICAO/IATA, etc., including the danger information for environment and “sea pollutants”)	For transportation by sea in bulk: it is included in the list of goods listed in the Attachment C of the IMSBC Code [22, 23].

15. Information about National and International Legislation
15.1 National Legislation

15.1.1 Russian Federation Laws:	Federal Law No. 89-FZ, 18 July 1998, “Wastes of Production and Consumption”. Federal Law No. 52-FZ, 30 March 1999, “Sanitary-epidemiological Welfare of Population”. Federal Law No. 7-FZ, 10 January 2002, “Environment Preservation”.
15.1.2 Documents, regulating the requirements for the population and environment preservation: (Certificates, Sanitation and Epidemiological Conclusions, Licenses, etc.)	N/A

15.2 International Legislation

15.2.1 International Conventions and Agreements: (Is product regulated by Montreal Protocol, Stockholm Convention, etc.?)	It is not covered by the actions of any international conventions and regulations.
15.2.2 Warning marking active in the EC countries: (Danger symbols, risk and safety phrases, etc.)	**Danger symbols**:  Xn – harmful **Risk phrase:** R38 – irritating the skin integument. **Precautions:** S24/25 – avoid the contact with skin and eyes; S 36/37/38 – it needs to use the proper individual protection gears, gloves, and protection means for eyes/face; S45 – Under the substance exposure or the feeling sick, urgently appeal for medical aid and have the product label [13, 19].

16. Additional information

16.1 Information about revision (republication) of MSDS:	The MSDS has been re-registered because of the expiration of its period of validity. This MSDS can be used for evaluating the hazard of ferrochromium, supplied according to Specifications TU 14-5-280-97 “High-carbon Ferrochromium for Export”, TU 14-5-282-97 “Low-carbon Ferrochromium for Export”, and TU 14-5-290-97 “Medium-carbon Ferrochromium for Export”, for human beings and environment.

16.2 List of date sources used for compilation of MSDS

1. GOST 4757-91 (ISO 5448-81). Ferrochromium. Specifications and Conditions of Delivery.
2. MPC/SRLI for dangerous substances in the working zone air: Hygiene Regulations. GN 2.2.5.1313-03/ GN 2.2.5.2308-07. M.: Russian potentially hazardous chemical and biological substances register of the Russian Ministry of Health, 2003/2007.
3. Regulations for transportation of dangerous goods by road (Edition of the Orders of the RF Ministry of Transport No. 37, 11 June 1999, and No. 77, 14 October 1999), S-Pt.: “DEAN” Publishing House, 2002.
4. MPC/SRLI for polluting substances in atmospheric air of populated areas: Hygiene Regulations. GN 2.1.6.1338-03/ GN 2.1.6.2309-07. M.: Russian potentially hazardous chemical and biological substances register of the Russian Ministry of Health, 2003/2007

5. MPC/API of chemical substances in water of water bodies of household and community water consumption: Hygiene Regulations. GN 2.1.5.1315-03/ GN 2.1.5.2307-07. M.: Russian potentially hazardous chemical and biological substances register of the Russian Ministry of Health, 2003/2007
6. GOST 26590-85 with Amendments No. 1-3. Ferroalloys. Packaging, Transportation, and Storage. M.: Standard Publisher.
7. List of Fishery Standards: Maximum Permissible Concentrations (MPC) and Approximate Safe Reference Levels of Impact (ASRLI) of dangerous substances for water of the water bodies having the fishery significance. M.: "VNIRO" Publishing House, 1999.
8. GOST 19433-88. Dangerous goods. Classification and Marking. M.: Standard Publisher.
9. Ferroalloys. Handbook. M.: Metallurgy, 1992.
10. Ya. M. Grushko. Hazardous inorganic compounds in industrial sewerage. Handbook. L.: Chemistry, 1979.
11. SanPiN 2.1.7.1322-03. Hygiene requirements for disposal and sterilization of the industrial and consumption wastes.
12. Hazardous substances in industry. Handbook for chemists, engineers, and physicians. Under the editorship of N. V. Lazarev, etc. Volume 3. Inorganic and element-organic compounds. L.: Chemistry, 1977.
13. Criteria for hazard of substances and materials. V.1 / A. K. Chernyshev, B. A. Lubis, V. K. Gusev, B. A. Kurlyandsky, B. F. Yegorov. M.: Fund named after I. D. Sytin, 1999.
14. Regulations for transportation of dangerous goods by railways (Attachments 1 and 2) for the Agreement on International Goods Transport by Rail (SMGS), 2009.
15. A. Ya. Korolchenko, D. A. Korolchenko. Fire and explosion risk of substances and material and means to extinguish them. Handbook in two parts. 2nd Edition, reviewed and amended, M.: Ass. "Pozhnauka", 2004.
16. Emergency cards for dangerous cargoes transported by railways of CIS, Latvian Republic, Lithuanian Republic, and Estonian Republic, Approved by 48th Soviet on Railway Transport (Proceedings, 30 May 2008).
17. GOST 31340-2007. Labeling of chemicals. General requirements. M.: Standard Publisher.
18. Collective and individual protection gears. Monitoring of Protection Means. Encyclopedia "Ecometry", the series of handbook publications on ecological and medical measurements. M.: FID "Delovoy ekspress", 2002.
19. ECIS (European Chemical Information Substances). ecb.jrc.ec.europa.eu/esis/. (Visit date: 10 July 2011)
20. Fire risk of substances and material used in chemical industry. Handbook. / Under the editorship of I. V. Ryabov; M.: "Chemistry", 1970.
21. M. I. Gasik, etc. Theory and technology of ferroalloys' production. M.: Metallurgy, 1988.
22. Transportation features and characteristics of goods (Attachment to the Maritime transportation regulations for general, dangerous, food, and bulked goods). Handbook of Ship Surveyor. Book 3. 2nd Edition. S-Pt.: CJSC "TsNIIMF", 2002.
23. www.transrussia.net/CargoClassifier/. Transportation features and characteristics of goods (Attachment to the Maritime transportation regulations for general, dangerous, food, and bulked goods). (Visit date: 10 July 2011).