SAFETY DATA SHEET OF CHEMICAL PRODUCT

Entered in Safety Data Sheet Register

Registration No 1 3 6 5 7 8 4 2 . 1 9 . 8 9 6 9 0 dated «20» June 2024

Valid until «20» June 2029

Association Non-commercial Partnership
Coordination and Information Centre of CIS member-states
for alignment of regulatory practices

NAME

technical (as per regulatory document)	Hard coal foundry coke
chemical (as per IUPAC)	Hard coal coke
commercial	Hard coal foundry coke of KL-1, KL-2, KL-3 grades
synonyms	Metallurgical fuel, hard coal foundry coke

OKPD 2 Code 1 9 . 1 0 . 1 0 . 1 1 0

HS Code 2 7 0 4 0 0 1 9 0 0

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

GOST 3340-2023 Hard coal foundry coke. Specifications

HAZARD STATEMENT

Signal word: **Warning**

Brief (word) **description**: It is a low hazardous substance by impact on the body according to GOST 12.1.007. May cause damage to organs (lungs) through prolonged or repeated exposure. Combustible substance. May pollute the environment.

Detailed description: in 16 sections of the enclosed Safety Data Sheet

MAIN HAZARDOUS INGREDIENTS	MAC w.z., mg/m^3	Hazard category	CAS No.	EC No.
Hard coal coke (by carbon dust**)**	-/6	4	65996-77-2	266-010-4

APPLICANT: JSC Ural Steel, (name of organization) Novotroitsk (city)

Applicant type: manufacturer**,** ~~supplier, seller, exporter, importer~~ (strike out whichever is not applicable)

OKPO Code: 1 3 6 5 7 8 4 2 **Emergency telephone:** **(3537) 66-65-88, 66-46-22**

Chief engineer of JSC Ural Steel _____ (signature) / **A.I. Bedrinov** (full name) /

stamp here

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 Labelling of Chemicals
OKPD 2	–	Russian Classification of Products by Economic Activities
OKPO	–	Russian Classifier of Enterprises and Organizations
HS Code	–	Foreign Economic Activity Commodity Nomenclature
CAS No.	–	substance number in the Register of Chemical Abstracts Service
EC No.	–	substance number in the Register of European Chemicals Agency
MAC w.z.	–	Maximum allowable concentration of chemical substance in the air of working zone, mg/m^3
Signal word	–	a word used for drawing attention to the hazardous level of the chemical product and chosen in accordance with GOST 31340

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

1.1 Identification of chemical product

1.1.1 Technical name	Hard coal foundry coke. [1]
1.1.2 Brief recommended use (including restrictions on use)	Intended for use in cupola furnaces and other applications. There are no restrictions on use. [1]

1.2 Information about the manufacturer and/or supplier

1.2.1 Full legal company name	Joint Stock Company Ural Steel (JSC Ural Steel)
1.2.2 Address (postal and legal)	1, Zavodskaya str., Novotroitsk, Orenburg region, 462353
1.2.3 Tel., incl. for emergency consultations and hours of work	(3537) 66-65-88, 66-46-22 (from 06.15 to 15.15 Moscow time)
1.2.4 E-mail	m.mishchenko@uralsteel.com

2 Hazard(s) identification

2.1 Hazard level of chemical product in general (information on hazard classification in accordance with the RF laws (GOST 12.1.007-76) and GHS (GOST 32419-2022, GOST 32423-2013, GOST 32424-2013, GOST 32425-2013)	It is a low hazardous substance by impact on the body according to GOST 12.1.007, hazard category 4 [2,4]. GHS hazard classification: – chemical products with specific target organ and/or system toxicity through prolonged or repeated exposure: category 2 [5]

2.2 Information on the warning marking as per GOST 31340-2022

2.2.1 Signal word	Warning [9]
2.2.2 Hazard symbols (pictograms)	 **"Health hazard"**
2.2.3 Hazard statement(s) (H-phrases)	H373: May cause damage to organs (lungs) through prolonged or repeated exposure. [9]

3 Composition (information on ingredients)

3.1 Information on the product in general

3.1.1 Chemical name (as per IUPAC)	Hard coal coke [4].
3.1.2 Chemical formula	C [4].
3.1.3 General description of composition (taking into account the grade range; production method)	Coke is a hard porous residue obtained in coke ovens during high-temperature processing of coal without air access (900 – 1050) °C. Depending on the weight percent of sulfur, coke is divided into grades: KL-1, KL-2, KL-3, and depending on the lump size it is divided into classes: 40 mm and more; 60 mm and more. It mainly consists of carbon and ash. The ash content is formed from the mineral part of hard coal. [1,10]

3.2 Ingredients

(name, CAS and EC numbers, weight percentage (must be 100% in total), MAC w.z. or ASLI w.z. (Approximately Safe Level of Impact in the working zone), hazard categories, references to data sources)

Table 1 [1,10,11]

Ingredients (name)	Weight percentage, %	Hygienic standards in the air of working zone		№ CAS	№ EC
		MAC w.z., mg/m^3	Hazard category		
Hard coal coke (by carbon dust), including:	100	-/6 (a)	4 (Ф)	65996-77-2	266-010-4
Ash content, maximum	11-12	-	-	-	-
It also contains mineral impurities and inorganic components.					
Notes: (a) – aerosol; (F) – aerosols of mainly fibrogenic action.					

4 First aid measures

4.1 Symptoms

4.1.1 In case of inhalation — Runny nose, cough or sore throat. [4,6,7]

4.1.2 In case of skin contact — Dryness, cracking, peeling and flaking of the skin, swelling. Thermal burns may occur if hot product comes in contact with skin. [4,6,7]

4.1.3 In case of eye contact — Lacrimation, redness, conjunctivitis may develop. [4,6,7]

4.1.4 In case of ingestion — No cases of impact on the body have been observed when swallowing dust. [4,6,7]

4.2 First aid measures for the injured persons

4.2.1 In case of inhalation — Remove person to fresh air, keep at rest, gargle throat and rinse nose with water. If condition worsens, get medical attention. [4,6,7]

4.2.2 In case of skin contact — Rinse and then wash skin with warm water and soap. If redness occurs, apply a fattening cream or paste.
In case of a thermal burn, immerse the affected area in cold water and wrap it in a clean cotton cloth, and go to the first aid center. [4,6,7]

4.2.3 In case of eye contact — Rinse immediately with plenty of water while opening the eyelids widely for several minutes. Remove contact lenses if easy to do. Get medical attention. [4,6,7]

4.2.4 In case of ingestion — Rinse out mouth thoroughly with plenty of water. Seek medical aid [4,6,7]

4.2.5 Contraindications — In case of burns, do not remove the material from the skin, as this may damage living tissue. Do not use solvents when cleaning the skin. [12]

5 Measures and means of fire and explosion safety

5.1 General characteristic of fire and explosion hazards (as per GOST 12.1.044-89) — Combustible substance. [13]

5.2 Indices of fire and explosion hazards (list of indices as per GOST 12.1.044-89)	Auto-ignition temperature is 800 °C. Flash point is 500 °C – 600 °C. [4,14].
5.3 Hazards caused by combustion products and/or thermal decomposition products	Sulfur dioxide irritates ocular mucous membranes and respiratory tract and can cause bronchospasm. Acute fatal poisonings are rare. Nitrogen oxides cause irritation of the respiratory tract, oxygen deficiency, severe cough, headache, and vomiting. At high concentrations, pulmonary edema and fatality are possible. Carbon oxide causes oxygen deficiency, headache, dizziness, blurred vision, nausea, and loss of consciousness. Carbon dioxide under fire conditions causes increased breathing, headache, dizziness, drowsiness, loss of consciousness, and fatality at high concentrations. [21]
5.4 Suitable extinguishing media	In case of product fire – water mist, mechanical (air) foam, powders, carbon dioxide. In case of product dust fire water mist, mechanical (air) foam. At the initial stage of extinguishing by personnel – sand, hand-held fire extinguishers. [4,14,17]
5.5 Unsuitable extinguishing media	In case of dust fire – water jet streams [14,17,18].
5.6 Personal protective equipment for fire-fighting (PPE of fire-fighters)	Fire-entry suit (jacket and trousers with detachable heat-insulating lining) complete with fire-fighter's rescue belt, mittens or gloves, fire helmet, special safety footwear, compressed air breathing apparatus. [27,38-40,44].
5.7 Special fire fighting procedures	Extinguish from maximum distance. [14,15]

6 Accidental release measures

6.1 Precautions against harmful effects on people, environment, buildings, structures etc. in case of emergencies

6.1.1 General emergency response measures	Isolate the hazardous zone. Keep unauthorized people away. Enter the hazardous zone using protective equipment. No smoking. Follow the fire safety measures. Give first aid to the injured. Water nearby buildings and structures with jet streams. [18]
6.1.2 Personal protective equipment in emergency situations (PPE of emergency response teams)	For chemical reconnaissance and incident commander – Protective breathing device PDU-3 (for 20 minutes). For emergency response teams – insulating protective clothing KIKH-5 complete with self-contained gas mask IP-4M or breathing apparatus ABC-2. In case of fire - fire retardant clothing complete with self-rescuer SPI-20. In case of absence of the specified samples: military protective clothing L-1 or L-2 complete with industrial gas mask of the RPG brand with cartridges A and E.

	In case of low concentrations in the air (exceeding the MAC up to 100 times) – protective clothing, industrial gas mask of small size PFM- 1 with a universal protective cartridge PZU, an self-contained protective individual equipment with forced supply of purified air to the breathing zone. Safety glasses, protective gloves, protective clothing, special footwear. [17,18].

6.2 Emergency Response Procedure

6.2.1 Spill, leakage, overflow response procedure (including response measures and precautions for environment protection)	Collect the product into a container using dry means and return to the process cycle. Wash the area with water; sending the wash-off to effluent treatment plant. When hot coke is spilled at the production site, start cooling it with water, then collect it and return it to the process cycle. In case of spillage outside the production site, notify the sanitary and epidemiological supervision authorities, cut off the surface layer of contaminated soil, collect the coke and, subject to approval by the manufacturer, send it for the purpose intended or remove for disposal. Fill the cuts with a fresh layer of soil. [18].
6.2.2 Fire response procedure	Call the fire brigade and remove people from the fire area; enter the emergency area in protective clothing and breathing apparatus (see section 5 of the SDS). Start extinguishing the fire eliminating the fire sources, if possible. Extinguish by water mist, mechanical (air) foams and inert gases [17,19].

7 Handling and Storage

7.1 Safety Precautions for Handling Chemical Products

7.1.1 Systems of engineering safety measures	Availability of general and supply and exhaust ventilation. Sealing and automation of equipment and apparatus. Use of dust suppression and dust catching means. Installation of backup fans with automatic switching-on in case of emergency (accidental) ventilation shutdown and the impossibility of stopping the production process. When producing and using the product, it is necessary to comply with the Building Code that ensure fire safety of buildings and structures (fire alarms, fire extinguishing systems, cleaning of building roofs, building protection from direct lightning stroke, static electricity) [1,20,21].
7.1.2 Environmental precautions	Monitoring of the content of harmful substances, sealing of equipment. Atmospheric industrial emission treatment and wastewater treatment. Dust-free coke pushing. Landscaping and infrastructure development of the company premises. Prevent product spills. [1,20,22]
7.1.3 Recommendations on safe handling and transportation	When transporting, use electric loaders and autocars. When transporting on conveyor belts, avoid overloading and the possible falling of lumps from the belt. Install safety fencing and walkways in places where personnel walk.

When several conveyors are operating simultaneously, sequentially transporting material, their electric drives shall be interconnected.

When transported by rail (in bulk), it is transported as a non-hazardous cargo. When transporting in open-top wagons, they shall be filled taking into account the full use of capacity (carrying capacity). When shipping product with moisture content more than 10% in the period from October 1 to April 15, the supplier shall apply preventive measures to prevent freezing (filling the wagon floor with lime, sawdust or dry coke, oiling the wagon walls). See Section 14 of the SDS [1,23].

7.2 Storage Precautions

7.2.1 Safe storage life and conditions:
(including guaranteed shelf life, expiry date; substances and materials incompatible for storing)

Storage at the manufacturer is not provided for. Storage at the consumer – it shall be stored in open specially equipped areas or under shelter. Upon production, it is immediately transferred to the consumer. Short-term storage shall be in bins.
The safe storage period is not limited.
There is no guaranteed shelf life.
Substances and materials incompatible for storage: flammable gases, extremely flammable liquids, spontaneously combustible substances, substances that emit flammable gases, acids, alkalis. [1,4].

7.2.2 Containers and packing
(including materials they are manufactured from)

The product is not packaged. Transported and stored in bulk. [1].

7.3 Household precautions

It is not used in the household. [1].

8 Exposure Controls and Personal Protection

8.1 Working zone exposure limits subject to obligatory control (MAC w.z. or ASLI w.z.)

Maximum allowable concentration of coke (by carbon dust) in the working zone is -/6 mg/m^3. [1,4].

8.2 Measures aimed at keeping harmful substances within the exposure limits

Installation of dedusting, ventilation and dust suppression systems that ensure the removal of harmful substances and dust from the emission sources. Continuous or periodic removal of dust from dust collecting devices. Compliance with sanitary standards for microclimate, noise and vibration, taking into account the characteristics of the work performed. Indoor cleaning on a shift basis [20,21].

8.3 Personal protective equipment for personnel

8.3.1 General recommendations

Preliminary (upon hiring) and periodic medical examinations (check-up). Employees must be trained and certified for the occupational health and safety rules and fire safety rules. Pregnant and lactating women are not allowed to work. Workplaces and conditions for work experience internship for under-18s shall comply with hygienic standards.

	Weekly washing and replacing PPE sets. Daily PPE dedusting. Mending and centralized laundry of protective clothing only in production conditions at the scheduled time. Sanitary facilities and amenities shall be equipped for eating and ensuring personal hygiene of workers; there shall also be drinking water supply facilities, water supply, sewerage and heating systems. Workers involved in the production and use of the product shall be informed about its hazardous properties. Production premises shall be equipped with emergency firefighting equipment. Arrangement and furnishing of first aid centres. [1,15,19,24,46].
8.3.2 Respiratory protection (types of respiratory protective equipment)	Aerosol, gas, gas-aerosol (combined) respiratory personal protective equipment with an insulating face piece (half mask, mask and quarter mask). When working in confined spaces, use fresh-air hose breathing apparatus with a mask. [24,26,28,29,31,32,33]
8.3.3 Protective equipment (material, type) (protective clothing, protective footwear, hand protection, eye protection)	Protective clothing against general industrial pollution. Foot protection: shoes or boots protecting feet against mechanical impacts. Hand skin protection: mittens made of thick fabric, gloves made of cotton fabric, protective and preventive dermatological products, fattening creams, ointments and pastes. Eye protection – closed type safety glasses with symbol 4. [1,34,35,36]
8.3.4 Personal protective equipment for household use	It is not used in the household [1].

9 Physical and chemical properties

9.1 Physical state (aggregate state, colour, odour)	Solid porous lumps of light grey or dark grey colour. [1,10,37]
9.2 Parameters characterizing the product basic properties (temperature indicators, pH, solubility, n-octanol / water factor and other parameters specific to this type of product)	Indices of fire and explosion hazards – See clause 5.2 of the SDS. Total moisture content is maximum 5 %. Ash content is maximum 11-12 % [1]

10 Stability and reactivity

10.1 Chemical stability (specify decomposition products for unstable products)	Stable subject to proper handling and storage conditions. [1]

10.2 Reactivity

At ambient temperature it does not interact with other chemicals. It interacts with fluorine, forming fluorides, sulfur (at temperature range from 700 °C to 800 °C), reacts slowly with hydrogen, it is resistant to concentrated acids and alkalis, it is oxidized with a chromic mixture at temperature range (from 180 to 230 °C). It reduces carbon dioxide. [4,6,7]

10.3 Conditions to Avoid
(including hazardous manifestations upon contact with incompatible substances and materials)

Open flame, contact with incompatible substances. [4,14]

11 Toxicological information

11.1 General description of effects (evaluation of a level of hazardous (toxic) effects on the body and the most typical manifestations of hazard)

It is a low hazardous product by impact on the body. May cause damage to lungs through prolonged or repeated exposure. [2,11,12]

11.2 Routes of exposure
(inhalation, ingestion, skin contact and eye contact)

Inhalation, ingestion, skin contact and eye contact. [4,7].

11.3 Target human organs, tissues and systems

Respiratory system, gastrointestinal tract, liver, central nervous system. [4,7].

11.4 Information on dangerous to health effects from direct exposure to the product, as well as consequences of this exposure:
(irritation of upper respiratory tract, eyes, skin, including skin resorptive and sensitizing effects)

Product dust is abrasive and may cause irritation to the skin and ocular mucous membranes. Skin resorptive effect has not been determined. Skin contact with product may cause sensitization, however data for classification are insufficient. [4,7,12]

11.5 Information on long-term dangerous to health effects from exposure to the product
(influence on reproduction function, carcinogenicity, mutagenicity, cumulativeness and other chronic effects)

The product (hard coal coke) effect on the reproductive function of humans and animals and the carcinogenic effect on humans and animals have not been studied, the mutagenic effect has not been determined. Cumulativeness is weak. With long work experience, diseases of the upper respiratory tract (fibrosis) may occur. It has a fibrogenic effect. [4,7]

11.6 Values of acute toxicity
(DL_{50}, route of entry (intragastric, cutaneous), animal; CL_{50}, exposure time (h), animal)

Table 2 [4]

Material	Effect	Value, mg/kg	Route of entry	Type of an animal
Hard coal coke	DL_{50}	more than 5000	intragastric	rats
		more than 2500	cutaneous	rats

12 Ecological information

12.1 General description of effects on environment
(air, water bodies, soil including observable symptoms of exposure)

Product dust can be present in the air in the form of particles. The absorption of particles by aerosols reduces the atmosphere transparency, which reduces the number of sunny days and influence on the regional climate. After dust catching, small amounts get into the air. Part of the dissolved carbon from water bodies settles down to the bottom in the form of carbonates. Product dust, settling on water

surfaces in large quantities, can be harmful to water bodies, reducing the supply of oxygen. Product dust is not dangerous for soils.
Observable features. If dust gets into atmospheric air, it can settle on plant leaves slowing down their growth. In case of getting into water bodies can form a film on the water surface, make water turbid and cause changing of sanitary conditions of water bodies. [16]

12.2 Environmental exposure routes — In case of violation of handling, storage and transportation rules, in case of uncontrolled waste dumping, as a result of accidents and emergency situations.

12.3 The most important characteristics of environmental impact

12.3.1 Hygienic regulations
(allowable concentrations in atmospheric air, water, including fishery water bodies, soil)

Table 2 [11,41]

Ingredients	MAC (maximum allowable concentration) in atm. air or ASLI (approximately safe level of impact) in atm. air, mg/m^3 (LHI[1], hazard category)	MAC in water[2] or Approximate Allowable Level in water, mg/l (LHI, hazard category)	MAC in fishery[3] or ASLI in fishery, mg/l (LHI, hazard category)	MAC in soil or Approximate Allowable Concentration in soil, mg/kg (LHI)
Hard coal coke	0,15/0,05, (res.), hazard category – 3 (by carbon)	Not determined		

12.3.2 Ecotoxicity values
(CL, EC, NOEC etc. for fish (96 hours), daphnia (48 hours), algae (72 or 96 hours), etc.) — Not investigated [4].

12.3.3 Migration and transformation in the environment due to biodegradation and other processes (oxidation, hydrolysis or similar) — Product is not transformed in the environment. [4,12].

13 Disposal considerations

13.1 Safety precautions for handling waste generated during use, storage, transportation — Safety precautions for waste handling are similar to those used when handling the product (see sections 7, 8 of the Safety Data Sheet. Use PPE (see cl. 8.3 of the Safety Data Sheet), equipment and methods that ensure the minimum use of manual labour. [1,2,21,42].

13.2 Information on locations and methods of neutralization, recovery or disposal of waste, including containers (packing) — Waste disposal is carried out in specially designated places, the location of which shall be agreed with the regional sanitary and environmental supervision authorities.
Disposal method is combustion or screening to any size, internal use at the enterprise for energy purposes or as an

[1] LHI – limiting hazard index (tox. – toxicological; s.-t. – sanitary - toxicological; org. – organoleptic with indication of changes in organoleptic properties of water (od. – changes water odour, tur. – increases water turbidity, col. – colours water, foam – causes foaming, film – creates film on the water surface, taste – changes water flavour, op. – causes opalescence); refl. – reflective; res. - resorptive; refl.-res. - reflective-resorptive, fishery – fish industry (change of commercial qualities of aquatic organisms) ; gen. – general sanitary).
[2] Water of water bodies for household and community use
[3] Water of water bodies for fish industry (including seas)

	additive to the coal charge, or shipment outside the enterprise as commercial products. Gaseous waste is neutralized by adsorption cleaning followed by combustion of vapours, condensing cleaning, catalytic post combustion, and combustion in furnaces. If sufficiently cleaned, they can be returned to the pipeline. Wastewater is subjected to mechanical treatment with or without coagulants and (or) chemical treatment (ozonation or chlorination) in combination with physical-and-chemical treatment (sorption) and biological treatment [1,10,42].
13.3 Recommendations on disposal of waste from household use	It is not used in household [1].

14 Transport information

14.1 UN number (according to UN Recommendations on the Transport of Dangerous Goods)	None [43]
14.2 Proper shipping name and name while in shipment	Hard coal foundry coke of KL-1, KL-2, KL-3 grades. [1]
14.3 Applicable means of transport	Railway transport [1]
14.4 Cargo hazard classification according to GOST 19433-88:	Not classified as hazardous cargo. [30]
14.5 Cargo hazard classification according to the UN Recommendations on the Transport of Dangerous Goods:	Not classified as hazardous cargo. [43]
14.6 Transport Labels (handling signs according to GOST 14192-96)	Handling signs are not applied. [1,3]
14.7 Emergency cards (if shipped by rail, sea etc.)	None [1,19].

15 Regulatory Information

15.1 National Regulations

15.1.1 Russian Federation laws	Federal Law On Environmental Protection; Federal Law On Industrial Safety of Hazardous Production Facilities; Federal Law On the Protection of Atmospheric Air; Federal Law On Fire Safety; Federal Law On Production and Consumption Waste.
15.1.2 Documentation regulating man safety and environmental protection requirements	Not required [45]
15.2 International conventions and agreements (whether or not the product is regulated by the Montreal Protocol, Stockholm Convention etc.)	Not subject to international conventions and agreements.

16 Additional information

16.1 Information on SDS revision (re-edition) (the following is specified: "SDS is drawn up for the first time" or "SDS is re-registered upon expiry. Previous SDS registration number..." or "Amendments made in clauses…, amendment date…")

SDS is drawn up for the first time.

16.2 List of information sources used to draw up the SDS[4]

1. GOST 3340-2023 Hard coal foundry coke. Specifications.
2. GOST 12.1.007-76 Occupational safety standards system. Noxious substances. Classification and general safety requirements.
3. GOST 14192-96 Marking of cargoes.
4. Information card of potentially hazardous chemical and biological substance. Hard coal coke. State Registration Certificate BT No. 003098 dated 30.06.2009 – M. : RPOKhBV (Potentially hazardous chemical and biological substances register of RF).
5. GOST 32419-2022 Hazard classification of chemicals. General requirements.
6. Hazardous chemicals. Natural organic compounds. Reference and encyclopaedic publication, ed. Filov V.A. Vol.7. – St. Petersburg. SPKhFA, NPO "Peace and Family", 1998.
7. Hazardous substances in industry. Handbook for chemists, engineers and doctors. 7th ed., revised and enlarged: in 3 vol. Vol. I. Organic substances. ed. N.V. Lazarev and E.N. Levina – L., Chemistry, 1976.
8. Data from information system (eChemPortal) [Electronic resource] : Available at – http://www.echemportal.org/echemportal/.
9. GOST 31340-2022 Labelling of chemicals. General requirements
10. Handbook of Coke Chemical Engineer. ed. Shelkov A.K., Vol.2,3 - M.,: Metallurgy, 1966.
11. SanPiN 1.2.3685-21 Hygienic standards and requirements for ensuring safety and (or) harmlessness to humans from environmental factors
12. Harmful chemicals. Hydrocarbons. Halogen derivatives of hydrocarbons. Handbook ed. Filov V.A. – L. : Chemistry, 1990.
13. GOST 12.1.044-89 (ISO 4589-84) Occupational safety standards system. Fire and explosion hazard of substances and materials. Nomenclature of indices and methods of their determination.
14. Korolchenko A.Ya. Fire and explosion hazard of substances and materials and means of their extinguishing. Book 1. - M.,: Association "Pozhnauka", 2000.
15. Order of the Ministry of Health of Russia No. 29n dated 28.01.2021 "On the approval of the Procedure for conducting mandatory preliminary and periodic medical examinations of employees, provided for in part four of Article 213 of the Labour Code of the Russian Federation, a list of medical contraindications to work with harmful and (or) hazardous production factors, as well as work in which mandatory preliminary and periodic medical examinations shall be carried out".
16. Harmful chemicals. Inorganic compounds of elements of I-IV groups: Handbook. ed. Filov V.A. – L. : Chemistry, 1988.
17. A.N. Baratov, A.Ya. Korolchenko, G.N. Kravchenko and others. Handbook. Fire and explosion hazard of substances and materials and means of their extinguishing – Moscow : Chemistry, 1990.
18. Emergency cards for hazardous cargoes transported by railways of the CIS, the Republic of Latvia, the Republic of Lithuania, the Republic of Estonia (approved by Council on Railway Transport of CIS, Minutes of Meeting dated 30.05.2008 No. 48) (as amended on 27.11.2020).
19. SP 2.2.3670-20 Sanitary and epidemiological requirements for working conditions.
20. Order of the Federal Service for Environmental, Technological and Nuclear Supervision No. 512 Federal norms and regulations in the field of industrial safety "Safety rules for processes of obtaining and application of metals"

[4] Order numbers of information sources are given in each clause of SDS as references

21. Hazardous substances in industry. Handbook ed. N.V. Lazarev, Vol.3 – L: Chemistry, 1977
22. Sorokin N. D. Environmental protection at works. – SPb, Integral.
23. Rules for the transportation of dangerous goods by rail (put into effect at the 15th Meeting of the Council on Railway Transport of the Commonwealth of Independent States) (as amended as of 20.11.2020).
24. Order of the Ministry of Labour of the Russian Federation No. 767n dated 29.10.2021 “On approval of the Uniform Standard Guidelines for issuing personal protective equipment and detergents”.
25. Federal Law No. 116-FZ dated 21.07.1997 “On industrial safety of hazardous production facilities” (edition as of 14.11.2023).
26. GOST 12.4.296-2015 Occupational safety standards system. Respiratory system protective devices. Filtering gas half masks. General specifications.
27. GOST R 53265-2019 Fire equipment. Personal protective means of fire-fighter's feet. General technical requirements. Test methods.
28. GOST 12.4.235-2019 (EN 14387:2008) Occupational safety standards system. Respiratory protective devices. Gas filters and combined filters. General technical requirements. Test methods. Marking.
29. GOST 12.4.246-2016 Occupational safety standards system. Respiratory protective equipment. Particle filters. General specifications.
30. GOST 19433-88 Dangerous goods. Classification and marking.
31. GOST 12.4.294-2015 (EN 149:2001+A1:2009) Occupational safety standards system. Respiratory protective devices. Filtering half masks to protect against particles. General specifications.
32. GOST 12.4.236-2012 (EN 138:1994) Occupational safety standards system. Respiratory protective devices. Fresh air hose breathing apparatus, used with masks and half masks. General technical requirements. Test methods. Marking.
33. GOST 12.4.238-2015 Occupational safety standards system. Respiratory protective devices. Closed-circuit breathing apparatus compressed air type. Technical requirements. Test methods. Marking. Sampling rules.
34. Personal Protective Equipment. Reference Book edited by S.L. Kaminsky M., : Chemistry, 1989
35. GOST 12.4.103-2020 Occupational safety standards system. Special protective clothes, personal means of hands and feet protection. Classification.
36. GOST 12.4.253-2013 (EN 166:2001) Occupational safety standards system. Personal eyes and face protection means. General technical requirements.
37. Gomelsky A.V. Operators of coke and by-product production. 2nd edition. Kharkov: – Metallurgizdat, 1953.
38. GOST R 53264-2019 Fire equipment. Special protective clothing for fire-fighter. General technical requirements. Test methods.
39. GOST R 53269-2019 Fire equipment. Helmets for fire-fighters. General technical requirements. Test methods.
40. GOST R 53268-2009 Fire equipment. Fire safety belt. General technical requirements. Test methods.
41. Order of the Ministry of Agriculture of the Russian Federation No.552 dated 13.12.2016 Concerning Approval of Water Quality Standards for Commercial Fishery Water Bodies, including Standards for Maximum Permissible Concentrations of Harmful Substances in Waters of Commercial Fishery Water Bodies.
42. SanPiN 2.1.3684-21 Sanitary and epidemiological requirements for the maintenance of the territories of urban and rural settlements, for water bodies, drinking water and drinking water supply, atmospheric air, soils, residential premises, operation of industrial and public premises, organization and implementation of sanitary and anti-epidemic (preventive) measures.

43. UN Recommendations on the Transport of Dangerous Goods. Orange book. Model Regulations on the Transport of Dangerous Goods, 2021.
44. GOST R 53257-2019 Fire fighting equipment. Face masks of personal respiratory protective devices. General technical requirements. Test methods.
45. Uniform list of products (goods) subject to state sanitary and epidemiological supervision (control) at the customs border and customs territory of the Eurasian Economic Union (as amended as of 23.01.2023).
46. Federal Law No. 123-FZ dated 22.07.2008 “Technical regulations for fire safety requirements”.