

**Production Association Belorusneft  
Belarusian Gas Processing Plant**

**MATERIAL SAFETY  
DATA SHEET**

**Normal pentane fraction**

# Material Safety Data Sheet

Safety Data Sheet MSDS BGPP:	<b>400051902</b>	<b>013</b>	<b>2015</b>	APPROVED Director General RUE Production Association Belorusneft <i>/signed/</i> A.A. Lyakhov 01.10.2015 L.S.
Valid until: 01.10.2020				
				<i>/SEAL/</i> "Republic of Belarus * Republican Unitary Enterprise * Production association * BELORUSNEFT"

### NAMES:

technical (as per TNLA)	Normal pentane fraction
chemical (as per IUPAC)	Hydrocarbons C4-C6
trade name	Normal pentane fraction of Grades A and B
synonyms	None

### IDENTIFICATION AND NAME OF NORMATIVE DOCUMENTS (STB, GOST, TU, etc.)

TU BY 400051902.019-2015 Normal pentane fraction. Specification.

OKP RB Code:	FEACN Code:	Register of Hazardous Chemical and Biological Substances No. and date:
<b>241411200</b>	<b>2901100002</b>	

### HAZARD CHARACTERISTICS:

Signal word: Danger
Brief description (in words): flammable liquid, fire and explosion hazardous, with specific characteristic odor. Easily ignited by sparks and flames. Vapors may form explosive mixtures with air. By level of effects on the human body is referred to low-hazard substances.
Detailed description: see 16 sections of this MSDS

### MAIN HAZARDOUS COMPONENTS:

	CAS No.	EC No.	MPC <sub>d.a./o.t.</sub> , mg/m <sup>3</sup> :	Hazard Class:
Normal pentane	109-66-0	203-692-4	300/900	4
Normal butane	106-97-8	203-448-7	300/900	4
Isopentane	78-78-4	201-142-8	300/900	4
Hexane	110-54-3	203-777-6	300/900	4

Applicant (approving organization): RUE Production Association Belorusneft.  
(full name of organization)

9, Rogachevskaya St., Gomel 246003.  
(organization address)

Type of applicant: producer, supplier, distributor, exporter, importer  
(strike out whichever does not apply)

Emergency phones: (+375232) 71-25-45 (24-hour); (+3752340) 2-22-78

Developer enterprise: BelNIPIneft of RUE Production Association Belorusneft, Gomel

**TNLA** – Technical Normative Legal Acts (STB, GOST, TU, etc.).

**IUPAC** – Nomenclature of Organic Compounds of International Union of Pure and Applied Chemistry.

**OKP RB** – State Classification of Products of the Republic of Belarus.

**FEACN** – Foreign Economic Activity Commodity Nomenclature.

**RHCBS** – Register of Hazardous Chemical and Biological Substances

**MPC** <sub>d.a./o.t.</sub> – Maximum Permissible Concentration (daily average/one-time) in the air of work area.

**CAS No.** – substance number in the index of Chemical Abstracts Service

**EC No.** – substance number in the index of European Chemicals Agency

## 1. IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

Product name: Normal pentane fraction

Components: Butane, pentane (isomers mixture), hexane (isomers mixture) [1]

Source materials used: Wide fraction of light hydrocarbons

Product Use: Intended for further processing in petrochemical industry or for use as a fuel component [1]

Manufacturer/Supplier full name: Republican Unitary Enterprise Production Association Belorusnef, Belarusian Gas Processing Plant

Mailing address: 9, Rogachevskaya Street, Gomel, 246003, Republic of Belarus

Director General: Alexander Andreevich Lyakhov  
(+375232) 71-25-23

Chief Engineer: Vladimir Davidovich Goshkis  
(+375232) 79-35-60

Emergency telephone numbers: (+375232) 71-25-45  
(+3752340) 2-22-78

Fax number: (+375232) 79-34-35


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## 2. HAZARDS IDENTIFICATION

General hazard statement: Normal pentane fraction is flammable, fire and explosion hazardous liquid; it is a low-hazard product having specific characteristic odor and by level of effects on the human body is referred to Hazard Class 4 [1], [2].

Allowable workplace exposure limits: MPC<sub>d.a./o.t.</sub>: 300/900 mg/m<sup>3</sup> [32]

Hazard labels:

Symbols	Signal word	Hazard statement
	Danger	Extremely flammable liquid. Vapors form explosive mixtures with air. May cause sleepiness and dizziness.

[7]

Safety measures: Keep away from sources of ignition, heat, sparks, open fire. No smoking. Use explosion-proof equipment and illumination. Avoid vapors inhalation [7].

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name (acc. to IUPAC): Hydrocarbons C4 – C6

Chemical formula: Mixture of hydrocarbons, with normal pentane (C<sub>5</sub>H<sub>12</sub>) being major component

General composition characteristics:

(with regard to grades range and statement of impurities and functional additives influencing hazardous characteristics of the product)

Parameter description	Standard content, %	
	A	B
1 Mass fraction of components, %:		
sum of C <sub>4</sub> hydrocarbons, max.	0.2	1.0
normal pentane, min.	96.5	93.5
isopentane, min.	not reg.	not reg.
sum of cyclopentanes with C <sub>6</sub> and higher hydrocarbons, max.	3.0	4.5
Incl. sum of C <sub>6</sub> and higher hydrocarbons, max.	1.5	2.0
Sum of unsaturated hydrocarbons, max.	0.3	0.5
2 Mass fraction of sulfur compounds, %, max.	0.01	0.01
3 Free alkali content	None	None
4 Free water and mechanical impurities content	None	None

Components:

Component Description	Number		MPC <sub>d.a./o.t.</sub> mg/m <sup>3</sup> :	Hazard Class:
	CAS	EN		
normal pentane	109-66-0	203-692-4	300/900	4
normal butane	106-97-8	203-448-7	300/900	4
isopentane	78-78-4	201-142-8	300/900	4
hexane	110-54-3	203-777-6	300/900	4
sum of cyclopentane with C <sub>6</sub> and higher hydrocarbons	-	-	300/900	4

Hazard identification:

EC Classification (Directive 67/548/EEC) F+; R8/11/38

Hazard characteristics: Normal pentane fraction vapors cause irritation or (at high concentrations) narcotic effect, headache, sleepiness and dizziness [1], [2].

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#### 4. FIRST AID MEASURES

Routes of exposure: High concentrations of normal pentane fraction vapors in the air are dangerous when inhaled or contacting with skin and eyes [1], [3].

Signs and symptoms observed: A person staying in the environment where normal pentane fraction vapors are present will experience headache, sleepiness, dizziness, weakness, coughing, throat irritation, nausea, as well as skin dryness, redness and itching. Normal pentane fraction vapors cause lacrimation, smarting eyes, pain in the abdominal region [1].

First aid measures: Call an ambulance. Fresh air, recovery position, warming, fresh clothes. Flush skin and eyes with water [22].

- intoxication after inhaling: Remove victim from contaminated area, put in dorsal position, remove clothing which hampers breathing. Provide fresh air. Keep warm. Use cotton soaked with liquid ammonia to bring to consciousness. Give hot drinks. If breathing has altered, apply artificial respiration. Seek urgent medical advice. [1], [10], [15], [22].

- contact of normal pentane fraction with clothing: In case of contact with clothing, change into fresh clothing. Remove contaminated clothing immediately to prevent the human body from contacting with material [1].

- skin contact: After skin contact, immediately rinse the affected area with plenty of running water. Seek medical assistance if necessary.

- burns: Apply aseptic bandage. Take the victim to healthcare center [10].

- eye contact: Rinse immediately with running water, while keeping eye fissures wide open. Seek medical assistance immediately [10].

- after entering the stomach orally (accidental ingestion) Give plenty of water to drink, activated carbon, salt-based purgative. Keep at rest, call an ambulance.

First aid supplies: First aid kit shall include: ammonia (liquid ammonia) – 25 ml, bandages – 5 pcs., Vaseline – 1 tube, absorbent cotton – 150 g, Epsom salt – 300 g, iodine tincture – 20 ml, activated carbon – 100 mg, potassium permanganate – 20 g, hydrogen peroxide (3% solution) – 100 g, sodium bicarbonate – 200 g, boric acid – 20 g [10].

## 5. FIRE-FIGHTING MEASURES

General description: Highly flammable, fire-hazardous and explosive liquid [1], [3], [4], [14]. Easily ignited by spark and flame. Vapors form explosive mixtures with air. Residues may form explosive mixtures in empty vessels. [4], [5].

Fire and explosion characteristics:	Parameter description	Butane	Pentane (isomers mixture)	Hexane (isomers mixture)
	Flash point, °C:	minus 60	minus 40	minus 21
	Autoignition temperature, °C	372	258	233
	Flame propagation limit in the air, % (vol.):			
	upper	1.4	1.4	1.0
	lower	9.3	7.8	8.4
	Mixture explosiveness group	T2	T3	T3
	Mixture explosiveness category	IIA	IIA	IIA

Suitable extinguishing media: In case of ignition the following extinguishing media should be used:

- extinguishing powder, carbon dioxide (CO<sub>2</sub>) – in enclosed spaces;
- for smothering in case of fire apply air-filled and chemical foams [1].

Unsuitable extinguishing media: No data [4].

Special protective equipment for fire fighters: Fire-fighting suit with SPI-20 self-rescuer. Fire-entry suit [13], [23].

Specific extinguishing methods: Do not approach the containers. To cool the containers, use water at a maximum possible distance [4].

## 6. ACCIDENTAL RELEASE MEASURES

General measures:	Use fireproof, explosion-proof, leak-proof and antistatic equipment. Ensure compliance with operating procedures. Use spark-proof tools. Working areas must be equipped with supply-and-exhaust blast-proof ventilation. Ensure monitoring of hydrocarbons content in the working area using portable or automatic devices. Analysis of industrial effluents for petroleum products content [1], [3], [15].
Personal protection in case of fire or leakage:	At low concentrations of normal pentane fraction vapors (up to 0.5 per cent by volume), use RPG-67 Gas Filtering Respirator with A cartridge. At high concentrations, use self-contained hose gas masks with blowers or use breathing apparatuses [1], [22]. Use respirators, safety goggles with side shields, gloves [10].
Operating procedure in case of leak/spillage:	Stop work in hazardous area. Small leak/spillage: eliminate observing safety precautions. Do not touch spilled material. In case of normal pentane fraction spillage, cover spillage area with sand, then place the sand with collected oil product into a sealed metal container. Dike spillage area and prevent the material from entering water reservoirs. Use personal protective equipment [16], [17].
Environmental precautions:	Ensure maximum sealing of containers, utility lines, pumps and other equipment, adhere strictly to operating procedures. Ensure periodic monitoring of hydrocarbon vapors content in the working area, analysis of industrial effluents for petroleum products content [1], [3]. Ensure leak-proof loading and unloading, provide stationary hosing devices, automation systems for loading and unloading operations [1], [3]. All places where entry of normal pentane fraction into water reservoirs is possible must be provided with catching facilities and devices for containment and collection of spilled material.
Firefighting procedure:	Do not approach burning containers. Cool containers with water at a maximum possible distance. Use water mist, air-filled or chemical foam to extinguish at a maximum possible distance [4], [9].
Containment and clean up:	Cover spillage area with sand, place the sand with collected oil product into a sealed metal container [6], [9].



## 7. STORAGE AND HANDLING

Protective measures and equipment:	<p>Equip industrial premises with supply-and-exhaust ventilation system. Do not use open fire inside any premises relating to production, storage and pumping of normal pentane fraction; artificial lighting must be blast-proof. Use personal protective equipment, exercise proper personal hygiene.</p> <p>Conduct regular monitoring of hydrocarbons content in the air of working area [1], [3].</p>
Environmental exposure controls:	<p>Ensure maximum sealing of containers, utility lines, pumping units and other equipment, adhere strictly to operating procedures. In production facilities and open spaces, ensure periodic monitoring of hydrocarbon content in the air of working area, using portable or automatic devices (analyzers, detectors) allowed for use according to the established procedure. Perform analysis of industrial effluents for petroleum products content in accordance with the Guidelines for Analysis of Industrial Effluents of Petroleum-Processing, Gas-Processing and Petrochemical Plants, approved in accordance with the established procedure [1].</p>
Precautions for safe transportation:	<p>By rail and road transport in accordance with Dangerous Goods Regulations in force for the relevant kind of transport, as well as the regulations on construction and safe operation of pressure vessels [1], [3], [9], [19].</p>
Storage and handling conditions:	<p>Store in horizontal and spherical high-pressure sealed metal vessels, both fixed and portable. Vessels must not contain bottom water above the minimum level ensured by design of water drainage device [1], [4], [22].</p> <p>Normal pentane fraction must be dispensed into tanks, steel cylinders and other containers certified in accordance with Regulations on construction and safe operation of pressure vessels [1], [33]. Store cylinders (containers) away from open flames [23]. Normal pentane fraction in containers must be stored on racks, pallets or stacks, in covered storage areas, under a canopy or on graded sites protected from direct sunlight and precipitation [1], [4].</p>
Warranty period:	<p>6 months from the date of shipment [1].</p>

Materials used for tanks, vessels and containers:	Metal (steel) [6], [9]. Newly made metal containers must have oil-resistant and vapor-resistant protective internal coating complying with electrostatic sparking safety requirements [6], [9].
Incompatible materials:	Do not store together with the following materials: explosive materials capable of exploding and causing fire with explosive action; gases: non-flammable & non-toxic, toxic, flammable, flammable & toxic; flammable solid substances capable of igniting easily by external ignition sources and burn actively; substances liable to spontaneous combustion or capable of self-heating and self-igniting under normal storage and transportation conditions; substances disengaging flammable gases upon interaction with water; oxygen-containing substances, which are not flammable themselves but contribute to flammability of other substances and disengage oxygen during combustion; organic peroxides and hydroperoxides which are flammable and may act as oxidizing agents, interact dangerously with other substances; toxic substances; radioactive materials; acids; alkalis; various caustic and corrosive substances; solid and liquid combustible substances with flash point above 61°C; substances which become caustic and corrosive in the presence of moisture; low-toxic substances and substances which become toxic and irritant in case of fire or upon interaction with other substances [4].
Additional information:	Cargo containers must be sealed. Artificial lighting and all electric equipment used must be blast-proof. Containers, utility lines, truck tanks and pumping units must be grounded [1], [3].

## 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Parameters subject to mandatory monitoring (MPC <sub>d.a./o.t.</sub> ):	300/900 mg/m <sup>3</sup> [1], [32].
Measures to ensure and control the specified parameters:	Maximum sealing of containers, utility lines and other equipment, strict adherence to operating procedures. Supply-and-exhaust ventilation of industrial facilities. Use portable and fixed automatic devices (analyzers, indicators) to monitor the air in working areas [1].
Personal protective equipment:	Working clothes and footwear according to industry standards for free provision of personal protective equipment [13].

Respiratory and eye protection:

At low concentrations slightly above the MPC (up to 0.5 per cent by volume), use small-size filtering gas masks (PFMG) with DOT-460AH filters, and filtering gas masks SR-200 with SR-298AX filters. At high concentrations and during work in closed containers, vessels, wells etc., use self-contained hose gas masks PSH-1, PSH-2, as well as breathing apparatuses ASV-2, AP-96 and AIR-5500 [1].  
Use respirator, safety goggles, hard hat and gloves [6], [9], [10].

Hand protection:

Gloves: combined, canvas cloth and rubberized, oil-and-frost resistant [14].

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state:

Liquid [1], [2], [12].

Color:

Colorless [2], [12].

Odor:

Specific characteristic [2].

Solubility:

Insoluble in water

Physical & chemical characteristics of components being parts of normal pentane fraction [4], [12], [22]:

Parameter description	Butane	Pentane (isomers mixture)	Hexane (isomers mixture)
Flash point, °C	minus 60	minus 40	minus 21
Autoignition emperature, °C	372	258	233
Flame propagation limit in the air, % (vol.): lower	1.4	1.4	1.0
upper	9.3	7.8	8.4
Molecular weight	58.123	72.15	86.177
Density, kg/m <sup>3</sup>	578.9 (at 20°C)	621.4	654.81
Vapor viscosity, Pa·s	73.9·10 <sup>-5</sup> (at 20°C) 2.5·10 <sup>-5</sup> (at -20°C)	240 (at 20°C)	
Melting point, °C	-138.35	-	-95.32
Boiling point, °C	-0.5	36	68.74
Formation heat, kJ/mol	-126	-146.4	-167.2
Combustion value, kJ/mol	-2657	-3272	-3887
Minimum ignition energy, mJ	0.25	0.22	0.25
Maximum explosion pressure, kPa	843	850	850

-- no reference data available

## 10. STABILITY AND REACTIVITY

Chemical stability:	Chemically stable [12].
Reactivity:	May be oxidized, halogenated, sulfonated and nitrated. Under normal conditions – chemically inert to water, acids and other substances [12].
Conditions to avoid:	Exposure to open fire [1]. Heating during storage and transportation [10], [22].
Incompatible substances (materials):	Explosive materials; gases: non-toxic & non-flammable, toxic, flammable & toxic; flammable liquids; flammable solid substances, spontaneously igniting materials; oxidizing substances and organic peroxides; toxic substances; radioactive materials; caustic and corrosive substances; substances presenting relatively low risk during storage [4].
Useful life:	6 months from date of shipment [1].

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## 11. TOXICOLOGICAL INFORMATION

General characteristics:	Normal pentane fraction is a low-hazard product and by level of effects on the human body is referred to Hazard Class 4 [1]. Toxicity of products resulting from incomplete combustion of gases [1]. Toxicity under normal conditions is basically determined by oxygen debt. At high concentrations, normal pentane fraction vapors cause narcotic effect and irritation of respiratory tract and eyes [1].
Routes of exposure:	Inhalation, skin and eye contact, ingestion.
Affected organs, tissues and systems of the human body:	Nervous, respiratory and cardiovascular systems; eyes; skin.
Information on toxic effects during direct contact with the substance, as well as consequences thereof:	

- inhalation:	Vapors inhalation is associated with anoxia and causes narcotic effect. High concentrations may cause serious injuries to nervous system and impair cardiac activity.
- eye contact:	Lacrimation and photophobia.
- skin contact:	Causes skin irritation. Frequent or prolonged contact with the skin causes skin dryness, which may result in skin diseases, dermatitis.
Data concerning long-term adverse effects on the human body: Percutaneous action; carcinogenicity; mutagenicity; embryotropic, gonadotrophic, teratogenic effect:	Not studied [21].
Sensitizing effect:	Not studied [21].
Cumulative effect:	Weak [21].
Acute toxicity:	CL <sub>50</sub> >50000 mg/m <sup>3</sup> , 2±4 hours, inhalation (mouse) [2]. DL <sub>50</sub> >2500 mg/kg, cutaneous application (animals) [2]. DL <sub>50</sub> >5000 mg/kg, intragastric application (animals) [2]. Index of potential inhalation toxicity < 3 (at 20°C), mice [2].

## 12. ECOLOGICAL INFORMATION

Ways of release in the environment:	Failure to comply with requirements of the rules for handling and storage; as a result of emergency situations [21].
Observable environmental impact:	Slight smell; creates film on water surface [21].
Transformation in the environment:	Biodegradable [10].
Environmental toxicity factors	No data
Hygienic standards in the environment:	Pentane: MPC <sub>atm. air d.a./o.t.</sub> = 25/100 mg/m <sup>3</sup> [1], [10], [29], [30]. Butane: MPC <sub>atm. air d.a./o.t.</sub> = 80/200 mg/m <sup>3</sup> [1], [10], [29], [30]. Hexane: MPC <sub>atm. air d.a./o.t.</sub> = 25/60 mg/m <sup>3</sup> [1], [10], [29], [30].

### 13. DISPOSAL CONSIDERATIONS

Waste transportation:	In a specially equipped transport, which prevents loss of waste and contamination of the environment on the route [16].
Measures for safe handling of waste:	Keep away from open flames. [10] Keep away from heat during storage and transportation, prevent cylinders from dropping and hitting [16], [17].
Information on removal, recycling and/or disposal of waste:	Waste material must be placed in sealed metal containers and sent for neutralization/burying to a specialized enterprise according to the established procedure. If necessary, perform controlled burning on fire locations or centralized burning.
Containers treatment (neutralization methods, possibility of reuse):	Contaminated containers must be washed using hot water with petroleum solvent, or steamed and dried [9], [16], [17].

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### 14. TRANSPORT INFORMATION

Proper shipping name:	Normal pentane fraction. Normal pentane fraction of A and B Grades [1].
UN No.	1265 [9].
Types of transport:	Road and rail transport [1].
Dangerous goods classification:	Class 3, classification code F1, classification reference 3011 [6], [8], [9].
Hazard labels:	Drawing No. 3 [9].



Flammable liquid;  
Symbol (flame): black or white;  
Background: red;  
Figure "3" in bottom corner.

Hazard Identification No.	33 [6], [9].
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Package group	II [9]
Emergency card number	301 [22]
Recommendations on transportation:	In truck-mounted tanks with oil-resistant and vapor-resistant protective internal coating complying with electrostatic sparking safety requirements [1], [6], [19]. In specialized rail tank cars of the consignor (consignee), designed to withstand pressures. Rail tank cars, railcars and truck-mounted tanks with gas must be sealed in accordance with the Regulations on carriage of goods applicable for rail and road transport [6], [9].
General cargo prohibited from carriage together with the material:	Transportation must be carried out in accordance with Dangerous Goods Regulations in force for the relevant kind of transport [6], [9].

## 15. REGULATORY INFORMATION

Law of the Republic of Belarus "On Environmental Protection" (Rev. No.225-3 dd. 30.12.2014).  
Law of the Republic of Belarus "On Waste Management" (Rev. No. 130-3 dd. 04.01.2014).  
Law of the Republic of Belarus "On Protection of Consumers' Rights (Rev. No. 106-3 dd. 04.01.2014).  
Law of the Republic of Belarus "On the Sanitary-Epidemiological Welfare of Population".  
GOST 30333-2007 Material Safety Data Sheet. General Requirements.  
Hazardous Substances Directives: Directive 67/548/EEC; Directive 1999/45/EC

## 16. OTHER INFORMATION

This is the first edition of Material Safety Data Sheet.

### REFERENCES

1. TU BY 400051902.019-2015. Normal Pentane Fraction. Specification.
2. GOST 12.1.007-76 Occupational Safety Standards. Noxious Substances. Classification and General Safety Requirements.
3. GOST 1510-84 Petroleum and Petroleum Products. Marking, Packing, Transportation and Storage.
4. Korolchenko A.Y., Korolchenko D.A., Fire-and-explosion hazard of substances and materials and suppressants. 2 parts. Moscow, Pozhnauka, 2004, pp. 713, 775.
5. Fire Safety Regulations of the Republic of Belarus. FSR of Belarus 01-2014, approved by Resolution of Ministry of Emergency Situations of the Republic of Belarus of 15.03.2014 No.3 (as amended by MES Resolution of 26.08.2014 No.25).

6. Regulations for the Carriage of Dangerous Goods by Rail, approved by the Fifteenth Meeting of the Council for Rail Transport of 05.04.1996 (as amended in 2009).
7. GOST 31340- 2007. Precautionary Labeling of Chemicals. General Requirements.
8. GOST 19433-88 Dangerous Goods. Classification and Labeling.
9. Regulations for the Safe Carriage of Dangerous Goods by Road in the Republic of Belarus. Resolution of the Ministry of Emergency Situations of the Republic of Belarus of 08.12.2010 No.61 (as amended by MES Resolution of 12.03.2015 No.6).
10. Fire safety and industrial hygiene in the oil and gas production and gas processing industries. Rules and regulations, 1990.
11. GOST 12.4.011-89 Occupational Safety Standards. Means of Protection. General Requirements and Classification.
12. Petrochemist's Handbook. Vol 1&2. Ogorodnikov, S.K., Ed., Leningrad, Khimiya, 1978, 496 p.
13. GOST 12.4.103-83 Occupational Safety Standards System. Special Protective Clothes, Personal Means of Legs and Hands Protection. Classification.
14. Rudin M.G. Oil Refiner's Pocket Guide. Leningrad, Khimiya, 1989, 464 p.
15. V. N. Borisyuk, V. I. Ring et al. Safety rules and procedures for response to emergency situations involving dangerous goods carried by rail in the Republic of Belarus. Minsk, Tekhnalogiya, 1999, 429 p.
16. Procedure for accumulation, transportation, neutralization and burying of toxic industrial waste. Sanitary requirements. Moscow, 1985.
17. Safe handling of waste. Collection of normative and methodological documents. I.A.Kopaysov, Ed. Saint-Petersburg, REC Petrokhimtekhnologiya. Firm Integral Co., Ltd., 448 p.
18. GOST 12.4.034-2001 (EN 133-90) Occupational Safety Standards. Respiratory Protective Equipment. Classification and Marking.
19. Regulations for the Safe Carriage of Dangerous Goods by Rail in the Republic of Belarus. Minsk. 2004, 46 p.
20. GOST 12.4.068-79 Occupational Safety Standards. Dermatological Personal Protective Equipment. Classification and General Requirements.
21. Harmful Chemicals. Natural Organic Compounds. Reference edition. Vol. 7 / ed. by V.A.Filov, Y.I.Museychuk, B.A.Ivin. Saint-Petersburg, SPHFA Publ., SPA "Mir i Semya-85." 1998, 507 p.
22. Emergency cards for dangerous goods carried by railways of the CIS, Republic of Latvia, Republic of Lithuania, Republic of Estonia, adopted at the 48th session of the Council for Rail Transport of the Commonwealth of Independent States, as amended. 2008.
23. GOST 12.4.111-82 Occupational Safety Standards. Men's Overalls for Oil and Oil Products Protection. Specifications.
24. GOST 12.4.112-82 Occupational Safety Standards. Women's Overalls for Oil and Oil Products Protection. Specifications.
25. GOST 14192-96 Marking of Cargoes.
26. GOST 17.4.2.02-83 Nature Protection. Soils. Nomenclature of Suitability Characteristics of Disturbed Rich Soil Layer to be Backfilled.
28. Hygienic standards 2.1.5.10-20-2003 – Tentative Allowable Concentrations (TAC) of Chemicals at Domestic and Potable Water Bodies.
29. Hygienic standards 2.1.5.10-21-2003 – Maximum Permissible Concentrations (MPC) of Chemicals at Domestic and Potable Water Bodies.
30. Hygienic standards 2.1.5.10-29-2003 – Maximum Permissible Concentrations (MPC) and Tentative Safe Exposure Levels (TSL) of Chemicals at Domestic and Potable Water Bodies.



31. Hygienic standards 2.1.7.12-1-2004 – List of Maximum Permissible Concentrations (MPC) and Tentative Allowable Concentrations (TAC) of Chemicals in Soil.
32. Sanitary rules, regulations and hygienic standards "List of Regulated Workplace Air Pollutants" approved by the Decree of the Ministry of Health of the Republic of Belarus of 31.12.2008, No. 240.
33. TKP 238-2010 (02190) Organization and carrying out of work in case of emergencies involving dangerous goods during transportation thereof on the territory of the Republic of Belarus.
34. Rates of maximum permissible concentrations of pollutants in ambient air, approved by the Decree of the Ministry of Health of the Republic of Belarus of 30.12.2010 No. 186 (as amended on 08.08.2013, No.71).