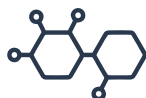


## RUTILE CONCENTRATE

**Other names:** Rutile sand, Rutile  
**CAS number:** 1317-80-2  
**Formula:** TiO<sub>2</sub>

**Specifications:** TU-U 14-10-016-98  
**Harmonized Commodity Code:** 2614009000



### Chemical analysis

CONTENTS, %	STANDARD	GRADE "G"	NORMAL
TiO <sub>2</sub> min	94	94	95-96
Al <sub>2</sub> O <sub>3</sub> max	0,6	0,6	0,3-0,5
Fe <sub>2</sub> O <sub>3</sub> max	2,8	1,5	1-1,5
SiO <sub>2</sub> max	1,5	1,5	1,5
ZrO <sub>2</sub> max	1,0	1,0	1,0
P <sub>2</sub> O <sub>5</sub> max	0,07	0,07	0,07
SO <sub>3</sub> max	0,05	0,05	0,05
Cr <sub>2</sub> O <sub>3</sub> max			0,2
CaO max			0,05
U+Th max	70 ppm	70 ppm	70 ppm
Moisture max	0,5	0,5	0,1

### Physical description and properties:

**Appearance:** Dark brown to black dry free running sand. Grain shape: elongated, rolled. Grain color: red (different tints), brown, black.

Minerals	Contents, %
Rutile + Leucoxene	92-97
Zircon	0,2 -1,5
Ilmenite	1,5-6,0
Kyanite	0,1 - 0,5
Quartz	0,1 - 0,2

**Note:** We can supply rutile flour. Usually Mesh Residue (100 µm) for flour is not less 5%.  
 We are ready to consider the possibility of improved quality concentrate supplies.

**End use:** Rutile concentrate is used in production of welding electrodes, pigment titanium dioxide, titanium sponge and metal titanium.

**Shipment:**

- Bulk in railway cars or vessel holds;
- 50 kg bags;
- Soft containers (big bag) 1 t net.

### Storage:

in closed containers or bags, protect from physical damage.  
 Terms of storage unlimited.

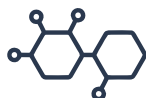
Melting point	1850 °C
Specific Gravity	4150 - 4300 kg/m <sup>3</sup>
Bulk density	2300 - 2400 kg/m <sup>3</sup>
Grain size	63 -160 µm
Flammability	Nonflammable
Solubility in Water	Insoluble
Angle of friction	30°
Hardness	6

Sieve Aperture (µm)	Cumulative retained, %
+ 180	1
+ 150	4
+ 125	14
+ 106	46
+ 75	98
- 75	100

## RUTILE FLOUR

**Other names:** Rutile sand, Rutile  
**CAS number:** 1317-80-2  
**Formula:** TiO<sub>2</sub>

**Specifications:** TU-U 14-10-016-98  
**Harmonized Commodity Code:** 2614009000



### Chemical analysis

CONTENTS, %	RUTILE FLOUR 325 MESH	RUTILE FLOUR 200 MESH
TiO <sub>2</sub> min	94	94
Al <sub>2</sub> O <sub>3</sub> max	0,6	0,6
Fe <sub>2</sub> O <sub>3</sub> max	1,5	1,5
SiO <sub>2</sub> max	1,5	1,5
ZrO <sub>2</sub> max	1,0	1,0
P <sub>2</sub> O <sub>5</sub> max	0,07	0,07
SO <sub>3</sub> max	0,05	0,05
Moisture max	0,5	0,5
Residue on sieve №0045 max	5	
Residue on sieve №0063 max		3

### Physical description and properties:

**Appearance:** Brown odorless powder.

Minerals	Contents, %
Rutile + Leucoxene	92-97
Zircon	0,2 -1,5
Ilmenite	1,5-6,0
Kyanite	0,1 - 0,5
Quartz	0,1 - 0,2

**End use:** Rutile concentrate is used in production of welding electrodes, pigment titanium dioxide, titanium sponge and metal titanium.

**Shipment:**

- Bulk in railway cars or vessel holds;
- 50 kg bags;
- Soft containers (big bag) 1 t net.

### Storage:

in closed containers or bags, protect from physical damage. Terms of storage unlimited.

Melting point	1850 °C
Specific Gravity	4150 - 4300 kg/m <sup>3</sup>
Bulk density	2300 - 2400 kg/m <sup>3</sup>
Grain size	63 -160 μm
Flammability	Nonflammable
Solubility in Water	Insoluble
Angle of friction	30°
Hardness	6

Sieve Aperture (μm)	Cumulative retained, %
+ 180	1
+ 150	4
+ 125	14
+ 106	46
+ 75	98
- 75	100

## ZIRCON CONCENTRATE

**Other names:** : Zirconium Silicate, Zircon sand, Zircon  
**CAS number:** 14940-68-2  
**Formula:** Zr[SiO<sub>4</sub>]

**Technical Condition of Ukraine:** 14-10-015-98  
**Harmonized Commodity Code:** 2615100000



### Chemical analysis

СОДЕРЖАНИЕ, %	STANDARD	GRADE T	TYPICAL
ZrO <sub>2</sub> +HfO <sub>2</sub> min	65	65	65-66
TiO <sub>2</sub> max	0,4	0,2	0,2
Al <sub>2</sub> O <sub>3</sub> max	2	2	1,0-1,8
Fe <sub>2</sub> O <sub>3</sub> max		0,1	0,08
P <sub>2</sub> O <sub>5</sub> max			0,12
SiO <sub>2</sub> max			32
Th+U max	320 ppm	320 ppm	320 ppm
Aef, kBq/kg, max	4,0	4,0	< 3
Residue on sieve №0315	None	None	None

### Physical description and properties:

**Appearance:** Light pink free running sand. Grain shape: rolled, elongated. Grain color: pink, purple, red-brownish.

Melting point	2200 °C
Specific Gravity	4650 - 4750 kg/m <sup>3</sup>
Bulk density	2650 - 2740 kg/m <sup>3</sup>
Grain size	63 -160 µm
Flammability	Nonflammable
Solubility in Water	Insoluble
Angle of friction	30°
Hardness	7-8
MINERALS	CONTENTS, %
Zircon	98-99
Rutile/ Ilmenite	0,1-0,3
Monazite	0,02
Kyanite	0,5-2,5
Quartz	0,05 - 0,2

### Storage:

in closed containers or bags, protect from physical damage. Terms of storage unlimited.

SIEVE APERTURE (µm)	CUMULATIVE RETAINED, %
+ 200	0,1
+ 160	0,7
+ 100	42
+ 63	99

**Note:** We are ready to consider the possibility of improved quality concentrate supplies.

**End use:** Raw material for steelmaking, refractories, glassmaking, traditional ceramics, zirconia manufacture, zirconium manufacture, glass additive and foundry uses.

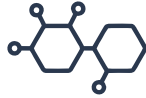
**Shipment:**

- Bulk in railway cars or vessel holds;
- 50 kg bags;
- Soft containers (big bag) 1 t net.

## ZIRCON FLOUR

**Other names:** Zirconium Silicate, Powdered Zircon  
**CAS number:** 14940-68-214940-68-2  
**Formula:** Zr[SiO<sub>4</sub>]

**Technical Condition of Ukraine:** 14-10-015-98  
**Harmonized Commodity Code:** 2615100000



### Chemical analysis

CONTENTS, %	ZIRCON FLOUR 200 MESH	ZIRCON FLOUR 325 MESH	TYPICAL
ZrO <sub>2</sub> +HfO <sub>2</sub> min	65	65	65-66
TiO <sub>2</sub> max	0,3	0,3	0,2
Al <sub>2</sub> O <sub>3</sub> max	1,8	1,8	1-1,8
Fe <sub>2</sub> O <sub>3</sub> max	0,09	0,09	- 0,08
SiO <sub>2</sub> max	not defined	not defined	- 32
Residue on sieve №0063	3	not defined	< 3
Residue on sieve №0045	not defined	5	< 3
Moisture (105-110 °C)	0,5	0,5	- 0,1
Th+U max	not defined	not defined	320 ppm
Aef, kBq/kg, max	4,0	4,0	< 3

### Physical description and properties:

**Appearance:** Light grey odorless powder.

Melting point	2200 °C	
Specific Gravity	4550 - 4650 kg/m <sup>3</sup>	
Bulk density	ZIRCON FLOUR 200 MESH	ZIRCON FLOUR 325 MESH
	1750 - 2200 kg/m <sup>3</sup>	1650 - 2100 kg/m <sup>3</sup>
Grain size	ZIRCON FLOUR 200 MESH	ZIRCON FLOUR 325 MESH
	98% less than 63 µm	98% less than 45 µm
Flammability	Nonflammable	
Solubility in Water	Insoluble	

MINERALS	CONTENTS, %
Zircon	98 - 99
Rutile/ Ilmenite	0,1 - 0,3
Monazite	0,02
Kyanite	0,5-2,5
Quartz	0,05 - 0,2

### Storage:

in closed containers or bags, protect from physical damage.  
 Terms of storage unlimited.

ZIRCON FLOUR 200 MESH	
SIEVE APERTURE (µm)	CUMULATIVE RETAINED, %
+ 63	2
+ 40	6-10
+ 20	18-22
+ 5	50-60

ZIRCON FLOUR 325 MESH	
SIEVE APERTURE (µm)	CUMULATIVE RETAINED, %
+ 45	0-2
+ 30	2-5
+ 20	4-10
+ 5	40-45

On a basis of the customer's order product can be done with 325 mesh particle size min 95 %.

**Note:** We are ready to consider the possibility of supplies of improved quality concentrate as well as with different requirements for granulometric composition.

**End use:** Raw material for steelmaking, refractories, glassmaking, traditional ceramics, zirconia manufacture, zirconium manufacture, enamel, glass additive and foundry uses.

#### Shipment:

- 50 kg bags;
- Soft containers (big bag) 1 t net.

## STAUROLITE CONCENTRATE

**Other names:** Staurolite sand, Staurolite  
**CAS number:** 12181-56-8  
**Formula:**  $\text{Fe}_2\text{Al}_9[\text{SiO}_4]_7(\text{OH})$

**Technical Condition of Ukraine:** 14-10-022-99  
**Harmonized Commodity Code:** 2617900000



### Chemical analysis

CONTENTS, %	GUARANTEED	TYPICAL
Al <sub>2</sub> O <sub>3</sub> +TiO <sub>2</sub> min	45,5	49
SiO max	29	27
Residue on sieve №04, max	1,0	1,0
Moisture, max	0,5	0,5

### Physical description and properties:

**Appearance:** Brown to black free running sand. Grain shape: irregular angle. Grain color: yellow (different tints), black.

Specific Gravity	3600 - 3750 kg/m <sup>3</sup>
Bulk density	1980-2040 kg/m <sup>3</sup>
Grain size	63 - 200 μm
Flammability	Nonflammable
Solubility in Water	Insoluble
Angle of friction	32°
Hardness	7-7,5

MINERALS	CONTENTS, %
Staurolite	75-81
Kyanite-sillimanite	1-3
Ilmenite	5-11
Zircon	1-2
Turmaline	7-11

### Storage:

in closed containers or bags, protect from physical damage. Terms of storage unlimited.

SIEVE APERTURE (μm)	CUMULATIVE RETAINED, %
+200	7
+160	37
+106	98
+63	100

**Note:** We are ready to consider the possibility of staurolite briquette supplies (made by pressing of the staurolite concentrate and clay).

**End use:** Additive for slag fluidifying in open-hearth furnances.

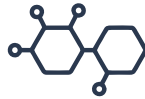
#### Shipment:

- Bulk in railway cars or vessel holds;
- 50 kg bags;
- Soft containers (big bag) 1 t net.

## KYANITE-SILLIMANITE CONCENTRATE

**Other names:** Kyanite-sillimanite sand,  
Disthene-sillimanite sand  
**CAS number:** 1302-76-7  
**Formula:**  $Al_2[SiO_4]O$

**Technical Condition of Ukraine:** 14-10-017-98  
**Harmonized Commodity Code:** 2606000000



### Chemical analysis

CONTENTS, %	GUARANTEED	TYPICAL
Al <sub>2</sub> O <sub>3</sub> min	57	57-60
TiO <sub>2</sub> max	2,5	1,2-2,0
Fe <sub>2</sub> O <sub>3</sub> max	0,8	0,8
CaO max	0,2	0,1
MgO max	0,4	0,2
Moisture, max	0,5	0,1

### Physical description and properties:

**Appearance:** Dirty-white free running sand. Grain shape: platelet, oblong, irregular angle. Grain color: colorless, light blue, light grey.

Melting point	1850 °C
Mullite transformation	1350 - 1550 °C
Specific Gravity	3200 - 3500 kg/m <sup>3</sup>
Bulk density	1860 -1920 kg/m <sup>3</sup>
Grain size	63 - 200 µm
Flammability	Nonflammable
Solubility in Water	Insoluble
Angle of friction	32°
Hardness	6,5-7

MINERALS	CONTENTS, %
Kyanite-sillimanite	93-97
Rutile/ Ilmenite	0,2-1,0
Zircon	1,0-1,5
Turmaline	0,5-1,5
Staurolite	0,2-0,5
Quartz	1-3

### Storage:

in closed containers or bags, protect from physical damage.  
Terms of storage unlimited.

SIEVE APERTURE (µm)	CUMULATIVE RETAINED, %
+ 200	5
+ 160	37
+ 106	97
+ 63	99,7

**End use:** Raw material for steelmaking, refractories, glassmaking refractories, ceramics coating, glass additive, mullite manufacture and foundry uses.

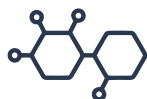
#### Shipment:

- Bulk in railway cars or vessel holds;
- 50 kg bags;
- Soft containers (big bag) 1 t net.

## KYANITE-SILLIMANITE FLOUR

**Other names:** Kyanite-sillimanite,  
Disthene-sillimanite  
**CAS number:** 1302-76-7  
**Formula:**  $Al_2[SiO_4]O$

**Technical Condition of Ukraine:** 14-10-017-98  
**Harmonized Commodity Code:** 2606000000



### Chemical analysis

CONTENTS, %	GUARANTEED	TYPICAL
Al <sub>2</sub> O <sub>3</sub> min	57	58
TiO <sub>2</sub> max	2,0	1,3-1,8
Fe <sub>2</sub> O <sub>3</sub> max	0,8	0,8
CaO max	0,2	0,1
MgO max	0,4	0,2
Na <sub>2</sub> O+K <sub>2</sub> O max		0,1
Th+U max		70 ppm
Moisture, max	0,5	0,1
ZrO <sub>2</sub> max		0,8
Residue on sieve N°005	3	<3

### Physical description and properties:

**Appearance:** Dry powder of light grey color.

Melting point	1850 °C
Mullite transformation	1350 - 1550 °C
Specific Gravity	3200 - 3500 kg/m <sup>3</sup>
Bulk density	960 kg/m <sup>3</sup>
Grain size	63 - 200 μm
Flammability	Nonflammable
Solubility in Water	Insoluble
Angle of friction	32°
Hardness	6
pH:	6,5 -7,0

MINERALS	CONTENTS, %
Kyanite-Sillimanite	93-94
Rutile/ Ilmenite	1-2
Zircon	1-1,5
Quartz	1-3

### Storage:

in closed containers or bags, protect from physical damage.  
Terms of storage unlimited.

SIEVE APERTURE (μm)	CUMULATIVE RETAINED, %
+ 40	0,5
+ 20	15
+ 5	75

**Note:** We are ready to consider the possibility of concentrate supplies with different requirements for granulometric composition.

**End use:** Raw material for steelmaking, refractories, glassmaking refractories, ceramics coating, glass additive, mullite manufacture and in production of silumine.

**Shipment:**

- Bulk in railway cars;
- 30 kg bags;
- Soft containers (big bag) 0,4 t net.

## MOLDING QUARTZ SAND

**Other names:** Quartz sand  
**CAS number:** 7631-86-9  
**Formula:** SiO<sub>2</sub>

**Technical Condition of Ukraine:** 14.2-00201081-056.2007  
**Harmonized Commodity Code:** 2505100000



### Chemical analysis

CONTENTS, %	GUARANTEED	TYPICAL
SiO <sub>2</sub> min	98,0	98-99
Banding clay, max	0,5	0,1-0,3
Fe <sub>2</sub> O <sub>3</sub> max	0,2	0,2
I Na <sub>2</sub> O + K <sub>2</sub> O + CaO + MgO, max	0,4	< 0,1
Lol	0,5	0,5
Moisture, damp sand, max	6,0	4,0
Moisture, dry sand, max	0,5	0,2
pH, max	6,2-9,0	6,2-8,0
Gas permeability, m <sup>2</sup> /Pa*s	150-300	170-230
UC, %, min	80,0	> 80,0
Grain size, mm	0,14-0,28	0,14-0,28

### Physical description and properties:

**Appearance:** White dry free running sand. Grain shape: spherical, good rolled. Grain color: colorless, white.

Refractory	1645 -1770 °C
Specific Gravity	2650 kg/m <sup>3</sup>
Bulk density	1500 kg/m <sup>3</sup>
Grain size	140-280 μm
Specific surface, max	10 m <sup>2</sup> /kg
Flashing point	Nonflammable
Solubility in Water	Insoluble
Angle of friction	33°
Gas permeability	100-350 m <sup>2</sup> /Pa*s
Hardness	7

MINERALS	CONTENTS, %
Quartz	97-99
Rutile	0,4
Zircon	< 0,1
Ilmenite	0,2-1,0
Kyanite	< 0,4
Clay	0,5

### Storage:

at unequipped spaces. Terms of storage unlimited.

SIEVE APERTURE (μm)	CUMULATIVE RETAINED, %	
	Dry Sand	Damp Sand
+ 400	1	2
+ 315	7	25
+ 200	52	70
+ 160	90	95
+ 100	98	99
+ 63	99,8	100

**End use:** Molding sand is used in foundry production.

### Shipment:

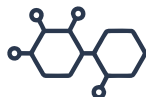
- Bulk in railway cars or vessel holds;
- Soft containers (big bag) 0,4 t net.



## NATURAL DENSE SAND

**CAS number:** 7631-86-9  
**Formula:** SiO<sub>2</sub>

**State standards of Ukraine:** B V.2.7-32-95  
**Harmonized Commodity Code:** 2505100000



### Chemical analysis

CONTENTS, %	GUARANTEED	TYPICAL
SiO <sub>2</sub> min	50 or 70	98-99
Fineness Modulus, max	Not rated	1,0-1,3
Slime & clay particles	5	< 0,3
Specific activity of the natural radionuclides, kBq/kg	Not rated	< 0,01
Moisture, max	Not rated (usually 0,5 according to the contract)	Not rated

### Physical description and properties:

**Appearance:** White dry free running sand. Grain shape: spherical, good rolled. Grain color: colorless, white.

Refractory	1645 -1770 °C
Specific Gravity	2650 kg/m <sup>3</sup>
Bulk density	1500 kg/m <sup>3</sup>
Grain size	63-600 μm
Specific surface, max	10 m <sup>2</sup> /kg
Flashing point	Nonflammable
Solubility in Water	Insoluble
Angle of friction	33°
Gas permeability	100-350 m <sup>2</sup> /Pa*s
Hardness	7

MINERALS	CONTENTS, %
Quartz	99
Rutile	< 0,05
Zircon	< 0,05
Ilmenite	< 0,05
Kyanite	<0,1
Clay	<0,5

### Storage:

at unequipped spaces. Terms of storage unlimited.

SIEVE APERTURE (μm)	CUMULATIVE RETAINED, %
+ 400	1
+ 315	7
+ 200	52
+ 160	90
+ 100	98
+ 63	99,8

**End use:** Molding sand is used in foundry production.

**Shipment:**

- Bulk in railway cars or vessel holds;
- Soft containers (big bag) 0,4 t net.

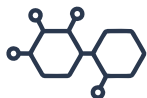
## QUARTZ SAND FOR GLASS INDUSTRY

CAS number: 7631-86-9

Formula: SiO<sub>2</sub>

All Union State standard: 22551-77

Harmonized Commodity Code: 2505100000



### Chemical analysis

CONTENTS, %	GUARANTEED			TYPICAL
	VC- 030 MO	VC-050-MO	VC-050-MOb	
SiO <sub>2</sub> , min	98,5	98,5	98,5	> 99
Fe <sub>2</sub> O <sub>3</sub> , min	0,034	0,054	0,054	At rates
Al <sub>2</sub> O <sub>3</sub> , min	0,6	0,6	0,6	0,1-0,4
Moisture, max	0,5	0,5	6,0	Not rated
Residue on sieve №08, max	0,5	0,5	0,5	None
Undersize №01, max	5,0	5,0	5,0	< 1

### Physical description and properties:

**Appearance:** White dry free running sand. Grain shape: spherical, good rolled. Grain color: colorless, white.

Refractory	1645 - 1770 °C
Specific Gravity	2650 kg/m <sup>3</sup>
Bulk density	1500 kg/m <sup>3</sup>
Grain size	63-600 µm
Flashing point	Nonflammable
Solubility in Water	Insoluble
Angle of friction	33°
Hardness	7

MINERALS	CONTENTS, %
Quartz	99
Rutile	< 0,01
Zircon	< 0,01
Kyanite	< 0,02

### Storage:

at unequipped spaces.  
Terms of storage unlimited.

SIEVE APERTURE (µm)	CUMULATIVE RETAINED, %
+ 400	1
+ 315	7
+ 200	52
+ 160	90
+ 100	98
+ 63	99,8

**Note:** Quartz sand for glass industry can be produced as well with another marks (VC-040-MO, C-070-MO, B-100-MO, PB-150-MO).

**End use:** Quartz sand for glass industry is used in the production of commercial plate glass, automobile glass, glass stones, glass cases, glass fiber for special products, medical glass, glass articles for electronics, bottles, alarm glass and sodium silicate (accelerants).

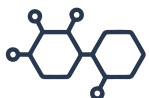
#### Shipment:

- Bulk in railway cars;
- Soft containers (big bag) 1 t net.

## ILMENITE CONCENTRATE (IRSHANSK)

**Other names:** Ilmenite sand, Ilmenite  
**CAS number:** 1317-80-2  
**Formula:** :  $\text{Fe}_2\text{O}_3 \cdot \text{TiO}_2$

**Technical Condition of Ukraine:** 14-10-009-97  
**Harmonized Commodity Code:** 2614001000



### Chemical analysis

CONTENTS, %	
TiO <sub>2</sub>	54,0-58,0
Al <sub>2</sub> O <sub>3</sub>	None
SiO <sub>2</sub>	0,60-2,00
Cr <sub>2</sub> O <sub>3</sub>	0,02-0,05
Moisture, max	1,5
Mesh Residue №04	None
Fe <sub>2</sub> O <sub>3</sub>	13,00-21,00
FeO	15,00-25,00
P <sub>2</sub> O <sub>5</sub>	0,100-0,190

### Physical description and properties:

**Appearance:** Dry grey- black metalescent free running sand.  
 Grain shape: angle, spherical.

MINERALS	CONTENTS, %
Ilmenite	94,5 min
Rutile	Traces
Zircon	0,05-0,40
Siderite	0,8-4,0
Hydroxides	0,1-0,5
Marcasite	0,1-3,0
Garnet, staurolite	Traces-0,5
Leucoxene	0,02-1,00
Apatite	Traces-0,1
Pyroxene	Traces
Mica	Traces
Quartz	0,2-3,00

**End use:** Ilmenite concentrate is used in production of synthetic rutile, pigment titanium dioxide, welding electrodes, titanium sponge, metal titanium and in steelmaking furnaces."

**Shipment:**

· Bulk in railway cars or 20-foot sea container.

### Storage:

Terms of storage unlimited.

Melting point	-1365 °C
Specific Gravity	4150 - 4250 kg/m <sup>3</sup>
Bulk density	2150 - 2350 kg/m <sup>3</sup>
Grain size	300 µm
Flammability	Nonflammable
Solubility in Water	Insoluble
Angle of friction	32
Hardness	5

SIEVE APERTURE (µm)	CUMULATIVE RETAINED, %
2,0	Traces
1,0	4
0,56	23
0,28	27
0,14	34
0,10	8
-0,10	4

# CONTACT INFORMATION

## **SALES DEPARTMENT**

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