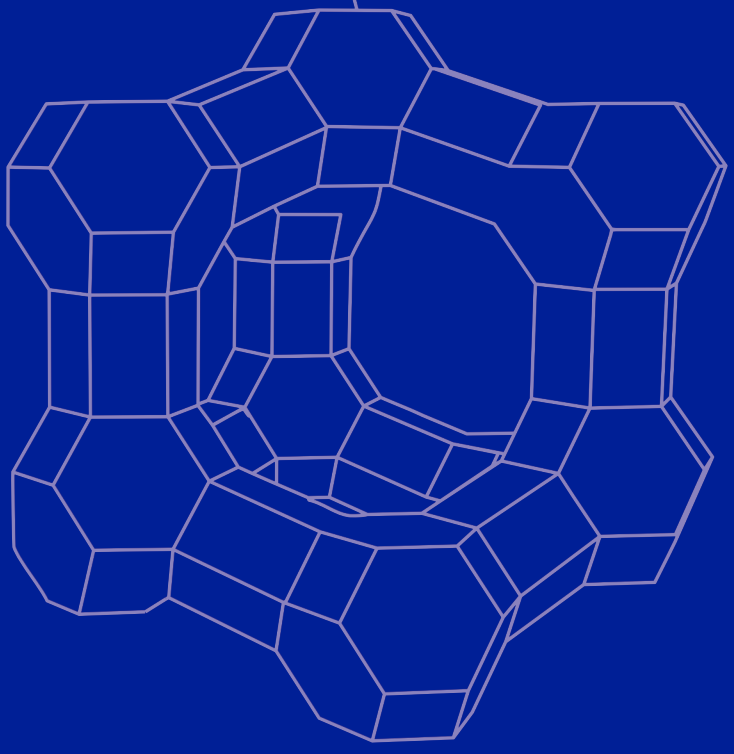
KNT group

production of sorbents and catalysts

ADVANCED TECHNOLOGIES
ПРОГРЕССИВНЫЕ ТЕХНОЛОГИИ



Sorbents
Сорбенты

KNT group
production of sorbents and catalysts

Тел./Tel. +7 (34794) 6-34-20, +7 (3473) 303-184
e-mail: info@kntgroup.ru, www.kntgroup.ru

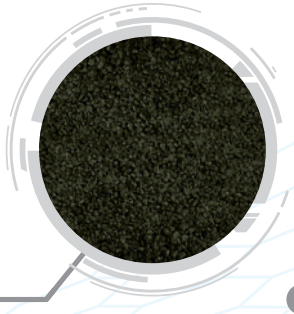
KNT group is the largest manufacturer of synthetic zeolites (molecular sieves) and adsorbents in Russia

- **Zeolite KA-U (improved)**
  molecular sieve 3A
- **Zeolite NaA-U (improved)**
  molecular sieve 4A
- **Waterproof zeolite NaA-U, brand VST**
  molecular sieve 4A
- **Zeolite CaA-U (improved)**
  molecular sieve 5A

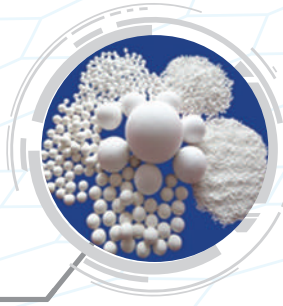
Activated alumina -
gas adsorbent and catalyst carrier

- **Zeolite NaX**
  molecular sieve 13X
- **Zeolite NaX-K (oxygen)**
  molecular sieve (for air separation units)
- **Zeolite NaX GDO**
  molecular sieve 13X-GDO

Hydrogen Chloride Adsorbent KNT-HCA-02M - purification of gases from hydrogen chloride impurities



Adsorbent A-4M - purification of aromatic hydrocarbons



«Porcelain (ceramic) balls»
flow distribution, protection of adsorbents and catalysts.

Catalyst components:
- Ultra stable zeolite Y type
- Pseudoboehmite
- Pentasilic zeolite type ZSM-5

Adsorbent KNT-COS - fine purification of gas and liquid streams from COS, H_2S, CS_2, CO_2, H_2O molecules.

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The main types of molecular sieve pellets

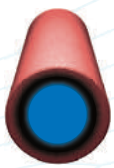
KNT group company produces all main types of molecular sieve pellets:
1. Spherical granules (ball)
2. Cylindrical granules (extrudate).
3. Complex pellets forms :
   3.1. The extrudate – tri-lobe;
   3.2. The extrudate – quadri-lobe (quatrefoil).

Ball	Cylinder	Tri-lobe	Quadri-lobe
			

Features of standard pellets forms:
1. Spherical granules (the ball):
   - Easy loading and unloading from the adsorber;
   - Excessive bed mobility and as a result high attrition of pellets;
   - High specific pressure of pellets to each other at contact points.
2. Extrudates (cylinder, tri-lobe, quadri-lobe):
   - The minimum mobility of the adsorbed bed;
   - The ability to use the technology of uniform load;
   - Pellets minimal pressure on each other in contact along the generatrix.

2.1 For the tri-lobe and quadri-lobe pellet-types:
   - Greater availability of internal volume, high saturation limit of pellets;
   - Diffusion of hydrocarbons through the adsorbent bed takes place easier, the pressure does not increase;
   - The dynamic capacity for removing a component (H_2O, H_2S, etc.) is higher for 15% than that of other types of granules.

The saturation limit for different zeolite types.

Ball	Cylinder	Tri-lobe	Quadri-lobe
			

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Molecular Sieve 3A

Formula $mK_2O \times nNa_2O \times Al_2O_3 \times 2SiO_2 \times H_2O$

Principal applications:

- drying of easily polymerized hydrocarbon streams, in particular, drying of pyrogas, EEF, PPF, propylene;
- concentrating of alcohol solutions;
- natural and oil gas dehydration;
- organic gases and liquids dehydration.

Manufactured according to Technical Specification 2163-006-15285215-2006

Parameters		Brand A		Brand T		Brand Q	
		Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters
Appearance		Extrudate		Tri-lobe		Quadri-lobe	
Bulk density, g/cm³		0,72 ≤	0,75÷0,85	0,7 ≤	0,75÷0,85	0,7 ≤	0,75÷0,85
Granules size, mm		Ø4,5±0,5 Ø3,6±0,4 Ø2,9±0,3 Ø2,2±0,2 Ø1,6±0,2		Ø4,5±0,5 Ø3,6±0,4 Ø2,9±0,3 Ø2,2±0,2 Ø1,6±0,2		Ø4,5±0,5 Ø3,6±0,4 Ø2,9±0,3 Ø2,2±0,2 Ø1,6±0,2	
Crushing strength, kg/mm², For granules, mm	Ø4,5±0,5	1,5 ≤	1,5÷2,5	1,5 ≤	1,5÷2,5	1,5 ≤	1,5÷2,5
	Ø3,6±0,4	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0
	Ø2,9±0,3	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0
	Ø2,2±0,2	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0
	Ø1,6±0,2	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0	1,8 ≤	1,8÷3,0
Dynamic water capacity, mg/cm³ For granules, mm	Ø4,5±0,5	125 ≤	125÷140	127 ≤	127÷140	130 ≤	130÷142
	Ø3,6±0,4	135 ≤	135÷155	137 ≤	137÷155	140 ≤	140÷155
	Ø2,9±0,3	140 ≤	140÷160	142 ≤	142÷160	145 ≤	145÷160
	Ø2,2±0,2	150 ≤	150÷170	152 ≤	152÷170	155 ≤	155÷170
	Ø1,6±0,2	155 ≤	155÷180	157 ≤	157÷180	160 ≤	160÷180
Dynamic CO_2 capacity, mg/cm³ For granules, mm	Ø4,5±0,5	0,40≥	0,01÷0,3	0,40≥	0,01÷0,3	0,40≥	0,01÷0,3
	Ø3,6±0,4	0,45≥	0,01÷0,3	0,45≥	0,01÷0,3	0,45≥	0,01÷0,3
	Ø2,9±0,3	0,55≥	0,01÷0,3	0,55≥	0,01÷0,3	0,55≥	0,01÷0,3
	Ø2,2±0,2	0,60≥	0,01÷0,4	0,60≥	0,01÷0,4	0,60≥	0,01÷0,4
	Ø1,6±0,2	0,65≥	0,01÷0,4	0,65≥	0,01÷0,4	0,65≥	0,01÷0,4
Mass fraction of water resistance, %		99,0 ≤	99,0-99,9	99,0 ≤	99,0-99,9	99,0 ≤	99,0-99,9
Ignition loss ,%		not more than 4,3					

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Molecular Sieve 4A

Formula $Na_2O \times Al_2O_3 \times {}_2SiO_2 \times H_2O$

Principal applications:
- drying of natural and oil gases;
- drying of process and instrumentation air;
- drying of reforming and cracking gas;
- drying and regeneration of transformer oil;
- drying and recovery of freon-oil cooling agents for refrigerating plants (NaA-2KT is produced upon the request of a Customer);
- as the filter for drying and recovery of motor oils, diesel and gasoline type fuels;
- etc.

Manufactured according to Technical Specifications 2163-003-15285215-2006
It is recommended by the All-Russian Power-Engineering Scientific Research Institute of «RAO UES Russia» to use at the power enterprises for drying «crude transformer oils».

Parameters		Brand A		Brand T		Brand Q	
		Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters
Appearance		Extrudate		Tri-lobe		Quadri-lobe	
Bulk density, g/cm³		0,66 ≤	0,75÷0,85	0,66 ≤	0,70÷0,85	0,66 ≤	0,70÷0,85
Granules size, mm		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2	
Crushing strength, kg/mm²	Ø 4,5 ± 0,5	1,8 ≤		1,5 ≤		1,5 ≤	
	Ø 3,6 ± 0,4	1,8 ≤		1,5 ≤		1,5 ≤	
	Ø 2,9 ± 0,3	2,0 ≤	2,0÷3,0	1,8 ≤	1,8÷2,8	1,8 ≤	1,8÷2,8
	Ø 2,4 ± 0,2	2,0 ≤		1,8 ≤		1,8 ≤	
	Ø 2,0 ± 0,2	2,0 ≤		1,8 ≤		1,8 ≤	
	Ø 1,6 ± 0,2	2,0 ≤		1,8 ≤		1,8 ≤	
Dynamic water capacity, mg/cm³ For granules, mm	Ø 4,5±0,5	125 ≤	125÷140	130 ≤	130÷145	132 ≤	132÷145
	Ø 3,6±0,4	135 ≤	135÷145	137 ≤	137÷150	140 ≤	140÷150
	Ø 2,9±0,3	140 ≤	140÷160	145 ≤	145÷165	147 ≤	147÷165
	Ø 2,4±0,2	145 ≤	145÷165	150 ≤	150÷165	152 ≤	152÷170
	Ø 2,0±0,2	150 ≤	150÷170	155 ≤	155÷175	157 ≤	157÷175
	Ø 1,6±0,2	155 ≤	155÷180	160 ≤	160÷185	162 ≤	162÷185
Mass fraction of water resistance, %		99,0 ≤	99,0-99,9	99,0 ≤	99,0-99,9	99,0 ≤	99,0-99,9
Ignition loss ,%		Not more than 5					

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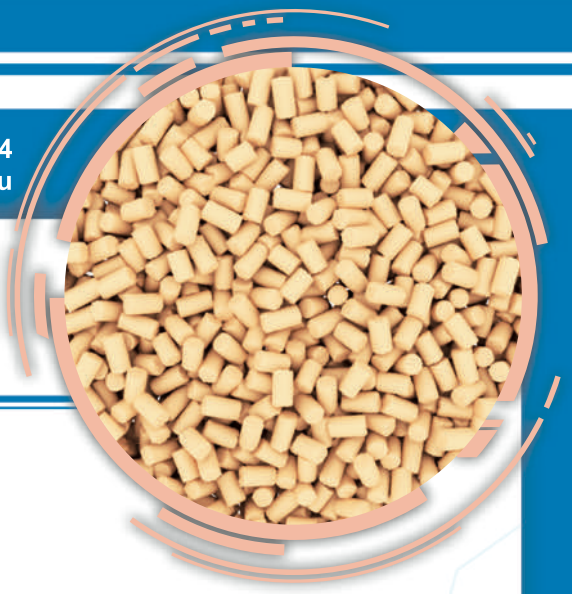

Synthetic zeolite NaA-U, brand VST (water-resistant)

Principle application:
- as a protective front bed resistant to effect of condensed moisture;
- dehydration of natural and associated petroleum gas;
- etc.

Manufactured according to Technical Specifications 2163-003-15285215-2006

Parameters	Standards acc. to TS	Actual parameters
Appearance	Extrudate of cylindrical shape	
Bulk density, g/cm³	0,66 ≤	0,75÷0,88
Granules size, mm	4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2	
Crushing strength, kg/mm²	1,8 ≤	2,0÷3,0
Dynamic water capacity, mg/cm³ For granules, mm Ø 4,5±0,5 Ø 3,6±0,4 Ø 2,9±0,3 Ø 2,4±0,2 Ø 2,0±0,2 Ø 1,6±0,2	 120 ≤ 126 ≤ 135 ≤ 140 ≤ 150 ≤ 155 ≤	 120÷140 126÷150 135÷155 140÷160 150÷165 155÷175
Mass fraction of water resistance, %	99,0 ≤	99,0-99,9
Ignition loss,	Not more than 5	
Destruction level (% of damaged granules after 600 cycles of water supply at t=120 0C), %, not more than	2,0 ≥	0,01 – 1,5

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Molecular Sieve 5A

Formula $mCaO \times nNa_2O \times Al_2O_3 \times 2SiO_2 \times H_2O$

Principal application:

- drying and purification of natural and petroleum gas from hydrogen sulfide, carbon dioxide, methanol and some mercaptans;
- isolation and purification of normal paraffin hydrocarbons from a mixture with branched and cyclic hydrocarbons;
- etc.

Manufactured according to Technical Specifications 2163-004-05766557-97

Parameters	Brand A		Brand T		Brand Q	
	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters
Appearance	Extrudate		Tri-lobe		Quadri-lobe	
Bulk density, g/cm³	0,68 ≤	0,68÷0,85	0,68 ≤	0,68÷0,85	0,68 ≤	0,68÷0,85
Granules size, mm	3,6±0,4 2,9±0,3 1,6±0,2		3,6±0,4 2,9±0,3 1,6±0,2		3,6±0,4 2,9±0,3 1,6±0,2	
Mechanical crushing strength, kg/mm², for granules, mm Ø3,6±0,4 Ø2,9±0,3 Ø1,6±0,2	 1,8 ≤ 2,0 ≤ 2,0 ≤	2,0÷3,0	 1,8 ≤ 2,0 ≤ 2,0 ≤	2,0÷3,0	 1,8 ≤ 2,0 ≤ 2,0 ≤	2,0÷3,0
Dynamic water capacity, mg/cm³ For granules, mm Ø3,6±0,4 Ø2,9±0,3 Ø1,6±0,2	 115 ≤ 120 ≤ 130 ≤	 115÷125 125÷145 135÷160	 120 ≤ 125 ≤ 127 ≤	 120÷140 130÷150 140÷165	 122 ≤ 127 ≤ 137 ≤	 122÷145 130÷155 137÷170
Dynamic n-Heptanie capacity, mg/cm³ For granules, mm Ø3,6±0,4 Ø2,9±0,3 Ø1,6±0,2	 50 ≤ 60 ≤ 65 ≤	 50÷60 60÷70 65÷75	 50 ≤ 60 ≤ 65 ≤	 50÷60 60÷70 65÷75	 50 ≤ 60 ≤ 65 ≤	 50÷60 60÷70 65÷75
Mass fraction of water resistance, %, not less than	99,0 ≤	99,0÷99,9	99,0 ≤	99,0÷99,9	99,0 ≤	99,0÷99,9
Ignition loss ,%	Not more than 5					

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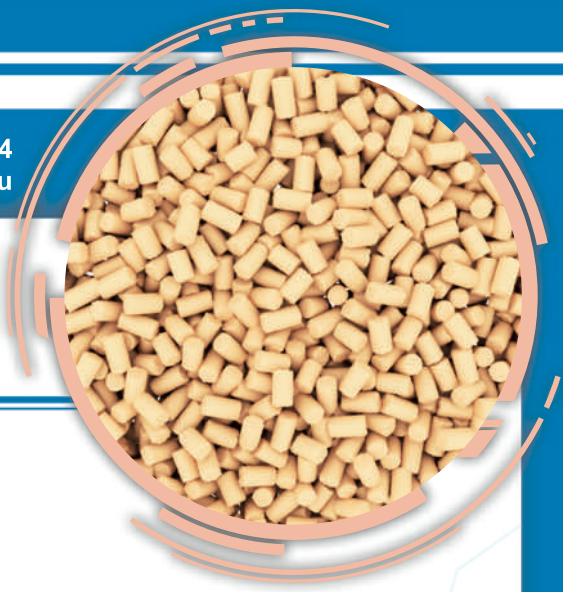

Molecular Sieve 13X

Formula $Na_2O \times Al_2O_3 \times 2{,}5SiO_2 \times H_2O$

Principal applications:

- purification of air and nitrogen from hydrocarbons, oxides and oils;
- purification of natural and associated petroleum gas from water, sulfur compounds and mercaptans;
- removal of radionuclides from liquid waste from nuclear power units;
- drying and purification of hydrogen-containing gas.
- etc.

Manufactured according to Technical Specifications 38.10281-88.

Parameters		Brand A		Brand T		Brand Q	
		Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters
Appearance		Extrudate		Tri-lobe		Quadri-lobe	
Bulk density, g/cm³		0,6 ≤	0,6÷0,8	0,6 ≤	0,6÷0,8	0,6 ≤	0,6÷0,8
Granules size, mm		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2	
Crushing strength, kg/mm²		1,0 ≤	1,1÷2,0	1,0 ≤	1,1±2,0	1,0 ≤	1,1÷2,0
Dynamic water capacity, mg/cm³							
For granules, mm	Ø 4,5±0,5	115 ≤	115÷130	130 ≤	130÷140	132 ≤	132÷142
	Ø 3,6±0,4	120 ≤	120÷135	135 ≤	135÷150	137 ≤	137÷152
	Ø 2,9±0,3	125 ≤	125÷145	145 ≤	145÷155	147 ≤	150÷165
	Ø 2,4±0,2	130 ≤	130÷150	147 ≤	147÷157	149 ≤	149÷164
	Ø 2,0±0,2	135 ≤	135÷160	148 ≤	148÷163	150 ≤	150÷165
	Ø 1,6±0,2	140 ≤	140÷170	150 ≤	150÷165	152 ≤	152÷167
Dynamic Benzole capacity, mg/cm³							
For granules, mm	Ø 4,5±0,5	53 ≤	53÷59	55 ≤	55÷65	57 ≤	57÷67
	Ø 3,6±0,4	66 ≤	66÷70	68 ≤	68÷72	70 ≤	70÷75
	Ø 2,9±0,3	67 ≤	67÷71	69 ≤	69÷73	71 ≤	71÷76
	Ø 2,4±0,2	68 ≤	68÷73	70 ≤	70÷75	72 ≤	72÷77
	Ø 2,0±0,2	69 ≤	69÷75	71 ≤	71÷77	73 ≤	73÷78
	Ø 1,6±0,2	80 ≤	80÷85	81 ≤	81÷87	82 ≤	82÷88
Mass fraction of water resistance, %,		99,0 ≤	99,0 – 99,9	99,0 ≤	99,0 – 99,9	99,0 ≤	99,0 – 99,9
Ignition loss ,%		Not more than 5					

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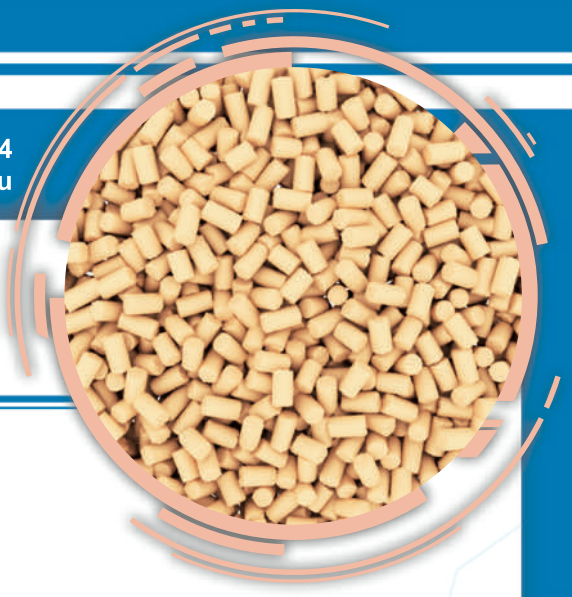

Molecular Sieve NaX-GDO (13X)

Formula $Na_2O \times Al_2O_3 \times 2{,}5SiO_2 \times H_2O$

Principal applications:
- fine gas and liquids purification from hydrogen sulfide, mercaptans and other sulfur compounds as well as deep dehydration and fine purification from carbon dioxide
- etc..

Manufactured according to Technical Specifications 2163-017-94262278-2011
Molecular sieve 13X - GDO has an extended mercaptan adsorption dynamic capacity.

Parameters	Brand A		Brand T		Brand Q	
	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters
Appearance	Extrudate		Tri-lobe		Quadri-lobe	
Bulk density, g/cm³	0,60 ≤	0,65÷0,85	0,60 ≤	0,65÷0,85	0,60 ≤	0,65÷0,85
Granules size, mm	4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2	
Crushing strength, kg/mm²	1,3 ≤	1,5-2,5	1,3 ≤	1,5-2,5	1,3 ≤	1,5-2,5
Dynamic water capacity, mg/cm³ For granules, mm Ø 4,5±0,5 Ø 3,6±0,4 Ø 2,9±0,3 Ø 2,4±0,2 Ø 2,0±0,2 Ø 1,6±0,2	 140 ≤ 145 ≤ 150 ≤ 152 ≤ 154 ≤ 158 ≤	 140÷150 145÷155 150÷160 152÷162 154÷165 158÷170	 140 ≤ 145 ≤ 150 ≤ 152 ≤ 154 ≤ 158 ≤	 140÷150 145÷155 150÷160 152÷162 154÷165 158÷170	 140 ≤ 145 ≤ 150 ≤ 152 ≤ 154 ≤ 158 ≤	 140÷150 145÷155 150÷160 152÷162 154÷165 158÷170
Dynamic Benzole capacity, mg/cm³ For granules, mm Ø 4,5±0,5 Ø 3,6±0,4 Ø 2,9±0,3 Ø 2,4±0,2 Ø 2,0±0,2 Ø 1,6±0,2	 70 ≤ 75 ≤ 80 ≤ 81 ≤ 83 ≤ 87 ≤	 70÷75 75÷80 80÷85 81÷86 83÷88 87÷92	 70 ≤ 75 ≤ 80 ≤ 81 ≤ 83 ≤ 87 ≤	 70÷75 75÷80 80÷85 81÷86 83÷88 87÷92	 70 ≤ 75 ≤ 80 ≤ 81 ≤ 83 ≤ 87 ≤	 70÷75 75÷80 80÷85 81÷86 83÷88 87÷92
Mercaptan dynamic capacity, mg/cm³ For granules, mm	105 ≤	105±115	110 ≤	110±125	115 ≤	115±130
Mass fraction of water resistance, %, not less than	98,0 ≤	99,0 – 99,9	98,0 ≤	99,0 – 99,9	98,0 ≤	99,0 – 99,9
Ignition loss ,%	Not more than 5					

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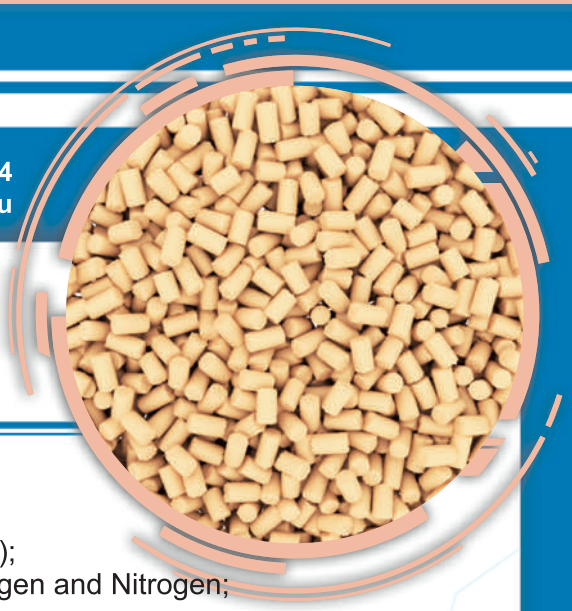

Molecular Sieve 13X-K

Formula $Na_2O \times Al_2O_3 \times 2{,}5SiO_2 \times H_2O$

Principle applications:

- purification of air from water, Carbon Dioxide, Acetylene in oxygen installations, fractionation;
- air drying in compressors (condensate removing at low temperatures);
- purification of air from Carbon Dioxide prior to its separation into Oxygen and Nitrogen;
- production of Oxygen from air by a short-cycle adsorption technique.

Manufactured according to Technical Specifications 2163-009-05766557-2000
Molecular sieve 13X-K has a high dynamic Carbon Dioxide capacity and is specially produced for air-separation units.

Parameters	Brand D		Brand T		Brand Q	
	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters	Standards acc. to TS	Actual parameters
Appearance	Extrudate		Tri-lobe		Quadri-lobe	
Bulk density, g/cm³	0,65 ≤	0,65÷0,8	0,6 ≤	0,6÷0,8	0,6 ≤	0,6÷0,8
Granules size, mm	4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2		4,5±0,5 3,6±0,4 2,9±0,3 2,4±0,2 2,0±0,2 1,6±0,2	
Crushing strength, kg/mm²	1,0 ≤	1,3÷2,0	1,0 ≤	1,3÷2,0	1,0 ≤	1,3÷2,0
Dynamic water capacity, mg/cm³ For granules, mm						
Ø 4,5±0,5	120 ≤	120÷130	130 ≤	130÷145	132 ≤	132÷147
Ø 3,6±0,4	125 ≤	125÷135	135 ≤	135÷150	137 ≤	137÷152
Ø 2,9±0,3	135 ≤	135÷145	145 ≤	145÷160	147 ≤	147÷162
Ø 2,4±0,2	140 ≤	140÷150	147 ≤	147÷162	149 ≤	149÷164
Ø 2,0±0,2	142 ≤	142÷160	148 ≤	148÷163	150 ≤	150÷165
Ø 1,6±0,2	145 ≤	145÷170	150 ≤	150÷165	152 ≤	152÷167
Dynamic Benzole capacity, mg/cm³ For granules, mm						
Ø 4,5±0,5	50 ≤	50÷60	52 ≤	52÷62	54 ≤	54÷64
Ø 3,6±0,4	58 ≤	58÷70	60 ≤	60÷72	62 ≤	62÷74
Ø 2,9±0,3	66 ≤	66÷75	70 ≤	70÷80	72 ≤	72÷82
Ø 2,4±0,2	67 ≤	67÷77	72 ≤	72÷82	74 ≤	74÷84
Ø 2,0±0,2	69 ≤	69÷80	75 ≤	75÷85	77 ≤	77÷87
Ø 1,6±0,2	70 ≤	70÷82	77 ≤	77÷87	79 ≤	79÷89
Dynamic CO_2 capacity, mg/cm³	45 ≤	45÷60	47 ≤	47÷65	49 ≤	49÷67
Mass fraction of water resistance, %	99,0 ≤	99,0-99,9	99,0 ≤	99,0-99,9	99,0 ≤	99,0-99,9
Ignition loss ,%	Not more than 5					

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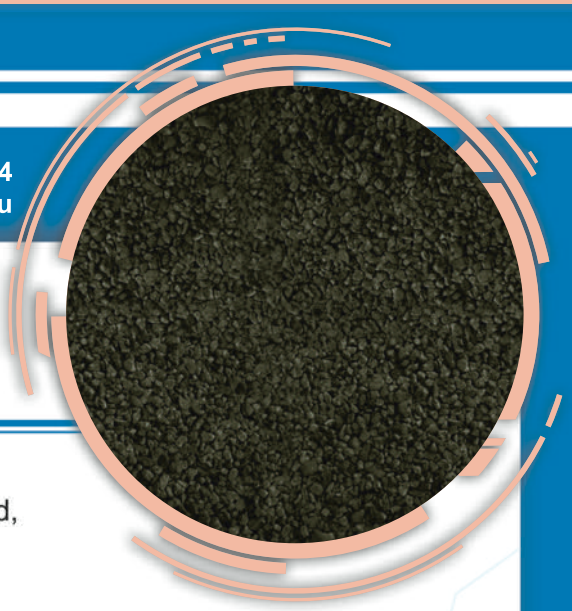

Adsorbent A-4M (microspherical)
Bleaching clay

Principal applications:
- purification of aromatic and paraffin hydrocarbons from unsaturated, resinous and coloring compounds.

Manufactured according to Technical Specifications 2163-002-05766557-95

Parameters	Standards acc. to TS	Actual parameters
Bulk density, g/cm³	0,5 – 1,0	0,8 -1,0
Fractional content, % Mass fraction within 0,2-1,2 mm Mass fraction within 0,2-0,315 mm	not less 95 not more 28	
Specific surface, m²/g	125	130 - 160
Specific quantity of the purified aromatic feed, g/g, not less than	10	15-30
Water content, %, not less than	15	5-10

Note: at the request of the consumer, adsorbent A-4M can be supplied in the form of extrudates of cylindrical shape of the desired diameter.

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Hydrogen chloride adsorbent KHT-AXB-02M

Principal application:
Designed for drying and purification of hydrogen-containing gases, as well as other hydrocarbon streams from impurities of hydrogen chloride and other hydrogen halides in reforming, isomerization, hydrogenation processes.

Manufactured according to TS 2163-003-73770384-2010

Parameters	Standard	
	Brand P	Actual parameters
Appearance	Extrudate of cylindrical shape	
Zinc oxide mass fraction (expressed as Zn, at 550 °C), %	42 - 50	42 - 50
Sodium oxide mass fraction Na_20, %, not more than	0,15	0,05 – 0,15
Bulk density, gr/cm^3	0,8-1,2	0,8 – 1,0
Diameter, mm	1,0-2,5 2,5-3,5 3,5-5,0	1,0-2,5 2,5-3,5 3,5-5,0
L.O.I. at 550°C, %, not more than	3,0	1,0 – 3,0
Mechanical crushing strength, kg/mm², not less than	1,1	1,1 - 1,8
Mass fraction of particles less than 1 mm in size,%, not more than	0,3	0,05 – 0,3
Surface area, m^2/gr, not less than	80	85 - 115
Chlorine capacity, wt %, not less than	29	35 - 45

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Activated Alumina - gas dryer

Principal application:
- grades A1 and B are used for drying and cleaning gases and liquids
- grades A2, T and Q are used as catalysts carriers

Produced according to TU 2163-015-94262278-2009

Parameters	Standards				
	Grade A1	Grade A2	Grade T	Grade Q	Grade B
Appearance	White, cream or pink cylindrical extrudates		White, cream or pink extrudate in a form of tri-lobe	White, cream or pink extrudate in a form of quadri-lobe	Spherical granules of white, cream or pink color
Bulk density, g/cm^3	0,40 - 0,70	0,40 - 0,70	0,40 - 0,70	0,40 - 0,70	0,70-0,80
Granules size, mm:	1,3±0,8 3,0±1,0 5,0±1,0	1,3±0,8 3,0±1,0 5,0±1,0	1,3±0,8 3,0±1,0 5,0±1,0	1,3±0,8 3,0±1,0 5,0±1,0	1,5 – 3,0 3,0 - 5,0 4,0 – 6,0 6,0 - 8,0 2,8 – 8,0
The size of the granules in length, mm, not more than	18	18	18	18	-
LOI, % not more than	5,0	5,0	5,0	5,0	7,0
Attrition index, %, not less than	65,0	65,0	65,0	65,0	95,0
Dust and fines mass fraction, %, not more than	0,5	0,5	0,5	0,5	0.5
Surface area, m^2/g, not less than	200	200	200	200	200
Total pore volume, cm^3/g, not less than	0,65	0,65	0,65	0,65	0,50
Static activity on adsorption of water vapor from air at (20-25)°C, g of water per 100 g of desiccant, not less: - at relative humidity of 10% - at relative humidity of 60%	 3,0 9,0	 - -	 - -	 - -	 4,5 14,0
Sodium mass fraction, %, not more than	-	0,03	0,05	0,05	-
Iron mass fraction, %, not more than	-	0,03	0,05	0,05	-

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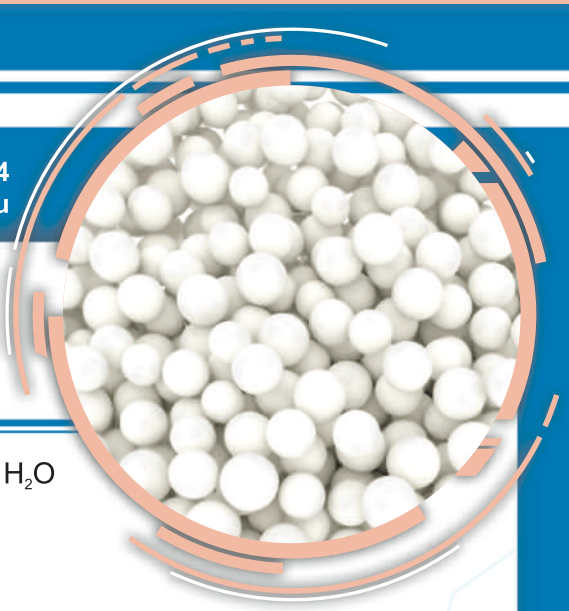

Adsorbent KNT- COS

Designed to remove gas and liquid streams from COS, H_2S, CS_2, CO_2, H_2O molecules from the composition.
It is used to clean easily polymerized hydrocarbon streams at petrochemical plants, for the treatment of LPG, etc.
It is an active alumina promoted by special additives.

Produced according to TS 2163-025-94262278-2014

Parameters	Value	
Appearance	White spherical granules	
Granule size, mm	2,0 ± 0,5	3,2 ± 0,8
Specific surface, m^2/g not less than	280	270
Total pore volume, cm^3/g not less than	0,5	0,5
Crushing strength kg/granule	4	14
Bulk density, kg/m^3, not less than	650	650
Chemical composition: Al_2O_3 + promoted additive, wt %	93,1	
SiO_2 (wt %)	0,02	
Fe_2O_3 (wt%)	0,02	
Na_2O (wt %)	0,30	
Ignition loss - LOI (250 - 1200°C) (wt%)	6,0	

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Ultra Stable Zeolite type Y

Principal application:
- component of the catalyst for FCC and hydrocracking.

Type	SiO_2/Al_2O_3 mole ratio	Unit cell size, Å	Nominal cation form	Surface area m^2/g
FAU	5,1-6,2	24,24-24,65	Na, H, NH_4	600-900

Pseudoboehmite, powder

Principal application:
- component of the catalyst.

Na_2O ≤	Al_2O_3 ≥	$Al_2O_3 \cdot 3H_2O$ ≤	Surface area, BET m^2/g ≥	Crystal size, Å
0,03	70	3	til 400	45-120

Pentasilic zeolites type ZSM-5

Principal application:
- a component of catalysts for catalytic cracking, hydrocracking, isomerization, alkylation, dewaxing, etc.

General formula: $Na_n [AlnSi_{96}–nO_{192}] \cdot 16H_2O$, where $(0 < n < 27)$

SiO_2/Al_2O_3 mole ratio	Cationic form	Specific surface area m^2/g	Na_2O content, %
30 - 300	Ammonium	Not less than 400	Not more than 0,05

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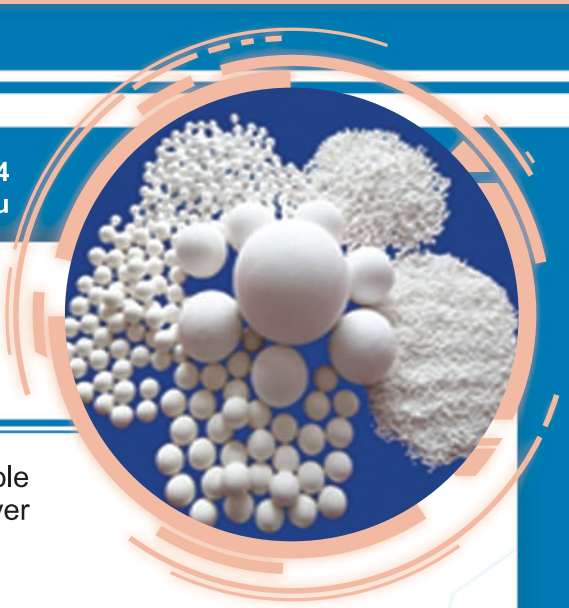

Porcelain (ceramic) balls

Principal application: filling the reaction apparatus - performing the role of a distributor of reagents and coolant, protection of the adsorption layer from temperature overheating.

Manufactured in accordance with TS 4328-004-73770384-2010

Parameters	Actual parameters
Balls diameter, mm	3, 4, 5, 6, 8, 10, 12, 13, 15, 16, 18, 19 20, 24, 25, 30, 35, 38, 40, 50, 70
Bulk density, MT/m^3	1,01 – 1,48 (depending on the diameter)
The number of heat cycles at a temperature difference of 700 ± 10 °C to 20 ± 2 °C	8 – 30 (depending on the diameter)
Compressive strength, Mpa	6 – 38 (depending on the diameter)
Temperature resistance, °C, not less than	1300
Acid resistance, %, not less than	99,0
Abrasion index, %/h, not more than	0,02
Water absorption, %, not more than	0,5
Mass fraction of defective products,% not more than	5

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