

ISSN 2181-8622

Manufacturing technology problems



Scientific and Technical Journal Namangan Institute of Engineering and Technology

INDEX  COPERNICUS
INTERNATIONAL

**Volume 8
Issue 3
2023**



Smolyakova, V.L. // - 2018. Journal of Engineering and Applied Sciences 13(Special Issue 10), c. 8292-8299

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19. GOCT 10840-64 grains. Method for determining nature (unit 1, 2).

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CLEANING NATURAL AND ASSOCIATED GASES FROM SULFUR COMPOUNDS

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Abstract:

Purpose: To develop innovative methods of cleaning natural and associated gas from sulfur compounds.

Methods: Studying the positive and negative aspects of using physical, chemical and combined methods in cleaning natural and associated gases and developing new innovative methods.

Results: Today, physical, chemical, combined methods are used to purify gases from sulfur compounds. Sorbents are imported from abroad. When sorbents are developed in local conditions, their price can be 3-5 times cheaper.

Conclusion: Localizing the production of sorbents will benefit the economy of our country.

Keywords: chemisorption, physical absorption, combined method, catalytic method.

Introduction. Natural gas is cleaned from sulfur compounds and carbon dioxide before sending it to the consumer. That's because, these gases cause corrosion of main pipelines and production equipment. Currently, the following methods are used to purify gases from H₂S and CO₂:

Chemosorption method. This method is based on the chemical interaction of H₂S and CO₂ with the active part of the absorbent.

Physical absorption. This method is based on the dissolution of H₂S and CO₂ in organic solvents.

In the combined method, physical and chemical absorption are used together.

In the oxidation method, H₂S is oxidized and converted into sulfur.

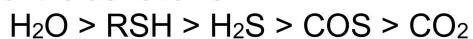
Gas purification methods are selected according to the composition of the gas and the field of use of the purified gas.

Process	Absorbent	Equipment quantity
Chemosorption		
With Amines	Alkanolamine + water	More than 1000
Amine+gard	Diethanolamine(monoethanolamine) + water	375
Adip	Diisopropanolamine(methyldiethanolamine) + water	370
Ekonomin	Diglycolamine + water	30
Benfield	Potassium carbonate+water+benfield	600
Katakarb	Potash solution + corrosion inhibitor+catalysator	100
Sulfureks	Alkali + water	40
Sodali bishofit	Alkali + water + catalysator "antisera"	2
Seroks-1 yoki seroks-2	Aqueous alkali catalyst complex	2
Physical absorption		
Rektizol	Cold methanol	70
Purizol	N-methylpyrrolidone	5
Flyuor	Propylene carbonate	12
Seleksol	Polyethylene glycol dimethyl ether	50
Sepasolv-MPE	Polyethylene glycol dialkyl ether	4
Physico-chemical method and cleaning with mixed absorbents		
Sulfinol	Diisopropanolamine (methyl-diethanolamine) + water + sulfolane	180
Optizol	Amine + solvent + water	6
Fleksorb	Spatially modified amine + water	30
Ukarsol	Secondary or tertiary amine + solvent + water	6
Adsorption processes		
GIAP-10	Adsorbent GIAP-10	
Oxidation processes		
Skrubber Venturi	Zinc ammonia complex	

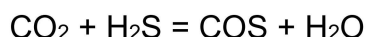
Adsorbed sulfur is converted into elemental sulfur during the regeneration process and is used for further purposes.

Activated carbon (AP-3, SKT-1 and etc.) and coal-alkali mixture are used as adsorbents. During the cleaning process, benzene and toluene are separated along with sulfur.

Molecular mesh zeolites (CaA and NaX type) are also widely used as adsorbents. The sorption of gases to the adsorbent is as follows:



The main problem in gas purification with zeolites is the formation of COS.

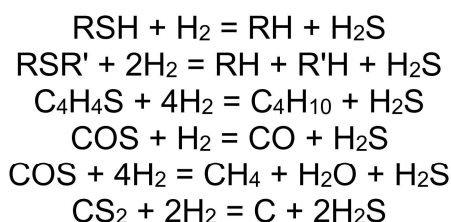


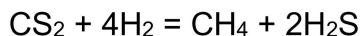
Bauxite and aluminosilicates are also used as sorbents. Cleaning efficiency is reduced by CO₂, H₂O and high molecular hydrocarbon vapors in the gas.

Disadvantages of absorption and adsorption methods require the use of chemisorption and catalytic methods.

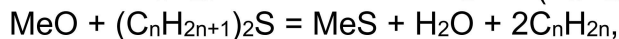
In the catalytic method, the sulfur-containing organic compound is hydrolyzed and converted to C_nH_{2n+2} and H₂S, then via cracking to C_nH_{2n+2} and H₂S, after that H₂S is hydrolyzed and SO₂ is obtained by oxidizing it.

In the catalytic method, the temperature of Ni, Mo, Co, W and other metal catalysts should be 300-4500C since catalysators are used. Here the following reactions occur:





In the **chemisorption** method, sulfur-containing compounds react with metal and metal oxides and are converted into metal sulfides.



The sorbents based on MoO₃ and TiO₂, developed in the laboratory of Hitachi, are unusual and can be used at 100-300C and are easily regenerated.

Currently, the scientific research on obtaining a water-soluble sorbent based on formaldehyde and ethanolamine has

been started at the Department of Chemistry of Namangan Institute of Engineering and Technology. This sorbent replaces imports and is 5-7 times cheaper than them. Soluble in water and is used at normal temperature.

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