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CLASSIFICATION OF GASES PURIFICATION METHODS FROM HYDROGEN SULPHIDE

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Abstract
This scientific article describes the role of the gas industry in the economy of our country. The classification and description of sour components in gases and the processes and methods of purification of gases from sour components are explained.

Keywords: natural gases, absorption, adsorption, hydrogen sulfide, carbon dioxide, glycols, amine solution.

Introduction

REVIEW OF LITERATURE

Uzbekistan is the main exporter of polymer, polymer products and natural gas in Central Asia. Export value of Uzbekistan's natural gas to China is 8 billion. cubic meters, 4.5 billion to Russia. cubic meters, 2.5 billion to the southern regions of Kazakhstan. cubic meter, 500-550 million to other countries of Central Asia. is a cubic meter.

Establishing strict standards for quality indicators of commodity gas in gas processing and transmission to consumers, modernization and reconstruction of technologies in gas preparation and purification devices, reducing the amount of sour components in gaseous raw materials to the requirements of international standards, gas it is necessary to reduce the cost of the commodity gas produced due to the improvement of the cleaning system, to localize the sorbents, inhibitors and other types of reagents used in the gas cleaning and drying processes. Gas raw materials (natural and satellite petroleum gases) contain, in addition to hydrocarbon compounds in the form of gas and steam, moisture formed due to formation water vapors, mechanical inclusions due to crushing, breaking, crushing, fragmentation of the productive layer, and the name of sour components stores sulfur, oxygen and nitrogen compounds represented by.

Examples of acidic gas components are hydrogen sulfide and carbon dioxide, as well as other compounds of sulfur: mercaptans ($R-SH$), carbonyl oxide (COS), carbon sulfide (CS_2) and so on. The amount of these substances in different gas fields varies in wide ranges from small shares to several percent. Natural gas containing hydrogen sulfide must be cleaned of sulfur compounds in accordance with the requirements of environmental protection, to protect pipes and devices from corrosion, to protect the population from toxic effects, to prevent poisoning of most industrial catalysts, before being transferred to the main gas pipeline transmitter. At the same time, the hydrogen sulphide obtained during gas purification is processed into sulfur, which reduces gas purification costs and provides valuable raw materials for agriculture. Mercaptans, carbonyl oxides and other sulfur compounds in the gas cause corrosion of equipment and poisoning of catalysts (in synthesis processes) and form sulfur dioxide when burned. Carbon dioxide is a ballast that increases gas transportation costs.

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In some cases, the presence of CO_2 in the gas complicates its further processing (ethane, helium release, and other processes associated with deep cooling of the gas). The maximum amount of hydrogen sulphide, which causes chemical and electrochemical corrosion of metals in the presence of water such as carbon dioxide, is regulated and strictly controlled. The process of gas purification from sulfur compounds is determined economically and depends on a number of factors. The main factors are: the composition and parameters of raw gas, the required level of purification of gas products and the field of application, the availability and parameters of energy resources, production waste, etc. According to the composition of gas raw materials and the target product to be obtained, the system of its preparation (gas drying, cleaning of acidic components and mechanical additives) and processing (fractionation, separation into components, conversion, pyrolysis, etc.) is designed. Absorption processes of cleaning gas from sour components are divided into three groups depending on the nature of the interaction of sour components of gas with the absorbent active part.

Separation of sour components of gas in the process of physical absorption is based on different solubility of gas components in absorbent. In these processes, dimethyl mixtures of polyethylene-glycol ("Selekhol" process), methanol ("Rectisol" process), propylene carbonate ("Fluor" process), N-methylpyrrolidone ("Purisol" process), tributyl phosphate (" Mixtures of methylisopropyl ethers of polyethylene glycols ("SepasolvMPE" process) are used. Chemical absorption processes are based on the chemical interaction of hydrogen sulfide and carbon dioxide with the absorbent active part. Alkalamines from chemical absorbents on an industrial scale: primary amines - monoethanolamine (MEA), secondary - diethanolamine (DEA) and tertiary - methyldiethanolamine, diisopropanolamine (MDEA), (DIPA); also alkalis, solutions of alkali metal salts (potash treatment - K_2CO_3 or 25-30% aqueous solution of Na_2CO_3) and iron hydroxide $Fe(OH)_3$ are widely used. Chemical absorption processes are characterized by high selectivity for sour components and provide a high level of gas purification from H_2S and CO_2. When amine solutions are used, sulfur-organic compounds are separated in small amounts only due to their dissolution in the liquid phase, and when alkaline solutions are used, fine purification from sulfur-organic compounds is achieved. In contrast to chemosorption processes, it is possible to extract carbon sulfur oxide, carbon sulfide, mercaptans together with hydrogen sulfide and carbon dioxide by the physical absorption method, and sometimes to carry out the cleaning process along with gas drying. Therefore, in some cases (especially at high partial pressures of sour components, and when there is no need for delicate cleaning), it is appropriate to use physical absorbents, which have lower regeneration costs compared to chemical absorbents. The limited use of these absorbents is due to the high solubility of hydrocarbons in them, which reduces the quality of sour gas, which is usually transferred to obtain sulfur. Combined absorbents - a mixture of physical and chemical absorbents are used in physical-chemical absorption processes. These absorbents are characterized by intermediate values of the solubility of sour gas components. These absorbents allow for fine purification of gas not only from hydrogen sulfide and carbon dioxide, but also from sulfur-organic compounds. "Sulfinol" absorbent is widely used on an industrial scale, it consists of a mixture of diisopropanolamine (30-45%), sulfolane (tetrahydrothiophene dioxide 40-60%) and water (5-15%). In recent years, the use of the absorbent "Ucarsol" developed by the company "Union Carbide" (USA), consisting of methyldiethanolamine, polyethylene glycol alkyl ethers and

water, as well as its national analogue "Ekosorb" is rapidly developing. This absorbent allows for selective purification of gas from hydrogen sulfide and at the same time from sulfur-organic compounds in the presence of CO_2.

DISCUSSION

Adsorption methods of gas purification are based on selective separation of compounds with solid absorbing adsorbents. In this case, the extractable component can enter into a chemical interaction with the adsorbent (chemical adsorption) or be held by the physical forces of interaction (physical adsorption). Due to the presence of a number of complications in the stage of regeneration of saturated adsorbent in gas processing, chemical adsorption is not widely used. Physical adsorption is characterized by adsorbent regeneration and is widely used in production processes for fine purification of gases from hydrogen sulfide, carbon dioxide, sulfur-organic compounds and moisture.

Activated carbons and synthetic zeolites are widely used as adsorbents. The advantage of adsorption methods compared to absorption methods of cleaning is that the adsorbents have a high absorption capacity even at low partial pressures of the extracted components.

RESULT

The disadvantage of the adsorption gas purification process is the relatively high operating costs and semi-periodicity of the process, therefore, these processes are used for fine purification of residual sour components after the initial gas purification by the absorption method, for example, before gas purification in zeolites, it is cleaned with amine solutions. Catalytic methods of gas purification from acidic components are used when there are compounds in the gas that cannot be completely removed by liquid absorbers or adsorbents (for example, hydrogen sulfide, carbon sulfur oxide, sulfides, disulfides, thiophene). is used.

The correct selection of the gas cleaning method and the absorbents used in it affects the efficiency of the cleaning process and depends on the following factors:

- The amount of water vapor and hydrogen sulfide in hydrocarbon gas raw materials;
- absorbent volatility;
- to the strength of the adsorbent;
- absorbent or, to the selectivity of the adsorbent;
- to regeneration conditions;
- price and duration of service.

Technical and economic indicators of the application of absorption, adsorption, membrane or combined methods in gas purification show the following conclusions: Absorption purification technology using ethanolamines is effective when the volume of the gas being purified is large and the concentrations of CO_2 and H_2S are low; Membrane purification technologies have advantages in cleaning low-volume gases containing a large amount of CO_2; Combined technologies show high efficiency in the treatment of large volumes of raw material streams containing a large amount of CO_2.

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