

RESEARCH OF THE PROCESS OF THE PROCESS OF REASONABLE DETERMINATION OF MOISTURE IN GAS CONTENT

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ABSTRACT: This article describes the method of mass determination of moisture in gas: determination of moisture in gas by absolute mass method is based on the adsorption of moisture in gas by certain substances. Such substances include: calcium chloride, silica gel, sulfuric acid, phosphoric anhydride, etc., information such as the scheme for determining the moisture content of gas by mass method is presented in the article.

АННОТАЦИЯ: В статье описан метод массового определения влаги в газе: определение влаги в газе методом абсолютной массы основано на адсорбции влаги в газе определенными веществами. К таким веществам относятся: хлорид кальция, силикагель, серная кислота, фосфорный ангидрид и др. В статье представлена такая информация, как схема определения влажности газа массовым методом.

KEY WORDS: gas conductor, filter sampling tube, thermometer, absorption drying, condensation, calcium chloride, silica gel, sulfuric acid, phosphoric anhydride.

КЛЮЧЕВЫЕ СЛОВА: газопровод, фильтровальная пробоотборная трубка, термометр, абсорбционная сушка, конденсация, хлорид кальция, силикагель, серная кислота, фосфорный ангидрид.

ВВЕДЕНИЕ: INTRODUCTION: Water vapor in gas can be separated by physical methods (adsorption, absorption, membrane, condensation) and chemical methods (using CaCl_2) and their hybrid combination methods. Today, oil and gas processing industries use the following traditional and modern gas drying methods [1]:

1. Absorption drying;
2. Adsorption drying;

3. Condensation. Spray cooling of hydrate inhibitors;
4. Membrane method. Using elastomers and glassy polymers.
5. Chemical method. Using hygroscopic salts. Metal chlorides are usually used.

Absorption and adsorption methods are widely used in the world.

Absorption drying of gases (Glycolic drying)[2]

Drying gases using glycols is one of the most common methods, allowing gases to be dried sufficiently for transmission or use as fuel.

Basic requirements for industrial consumers

In the absorption process, ethylene glycol, diethylene glycol and triethylene glycol are mainly used as absorbers. In desorption cycle drying processes and repeated application of the absorbent, almost no absorbent is consumed. Therefore, any substance capable of separating the absorbent from the extracted component can be used as an absorbent. However, in order to choose an absorber in the industry, it is necessary to take into account a number of the following requirements [3-4]:

- The absorbent must have a high absorption capacity relative to the component to be extracted from the gas. The use of an absorbent with a low absorption capacity leads to an increase in circulation of the circulating solution and an increase in the cost of desorption.
- Absorbent should be easily regenerated during desorption. For this, the component pressure in the absorbing solution must be high at the desorption temperature.
- The selectivity of the absorbing solution should be high, that is, it should absorb the desired component well and not absorb other substances in the gas.
- The absorption and desorption temperatures of the absorber should not have high vapor pressure. Otherwise, the quantitative loss of this absorbent may increase.

- The absorbent should be chemically stable under working conditions, and should not undergo structural changes. Chemical reactions should not occur between the gas and the absorbent.

- The absorber must be cheap and have a large resource.

- The absorbent should not have a corrosive effect on the equipment of the absorption process.

- The mass transfer coefficient must be sufficiently high [5].

RESULT: Determination of moisture in gas by absolute mass method is based on adsorption of moisture in gas by certain substances. Such substances include: calcium chloride, silica gel, sulfuric acid, phosphoric anhydride, etc. When choosing one of these dehumidifiers, it should be taken into account that some of them absorb SO₂, Cl₂, CO₂ and other gaseous compounds along with water vapor. Because it affects the final results obtained.

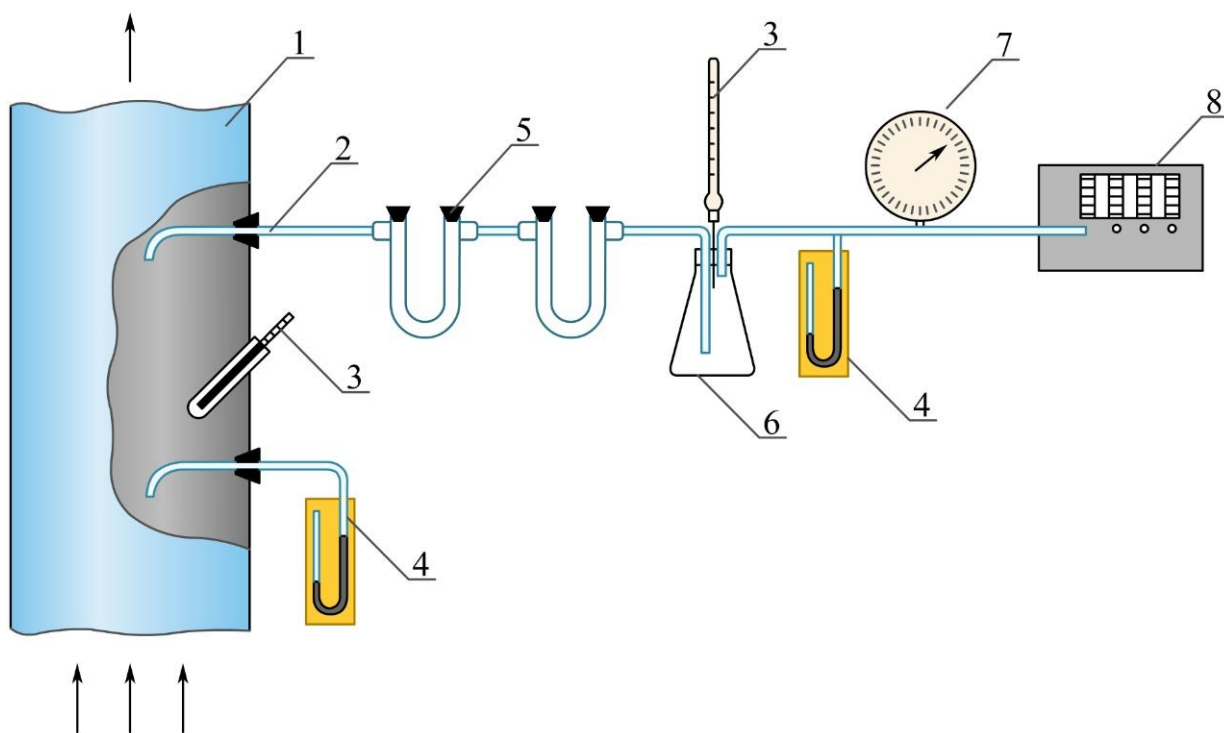
In order to determine the humidity in the mass method, a certain amount of gas is passed through an adsorber filled with a moisture absorbent and placed in series

(Fig. 1).

The tubes containing the absorber are weighed using analytical balances before analysis (m_1) and after analysis (m_2). Knowing the humidity and the amount of transferred gas (V_G), the absolute humidity index of the gas is calculated as follows:

$$f'' = \frac{m_2 - m_1 \cdot 1000}{\left(V_{\Gamma\tau} \frac{273}{273 + t_{\Gamma}} \frac{B - P_{II}}{760} \right) + \left(\frac{m_2 - m_1}{0,804} \right)}, \quad (1)$$

where: m_1 is the mass of the absorbent for water vapor adsorption, g; m_2 - the mass of the absorber after adsorption of water vapor, g; V_G - the volume of gas passed through the absorber tube, l/min; t is the transit time of the gas sample under study through the absorbent tube, min; t_G is the temperature of the gas measured after absorption of water vapor, °C; RP is the pressure of the gas sample after absorption of water vapor, mm.cm.ust.



1 – picture. Schematic of determination of moisture content in gas by mass method: 1 – gas conductor, 2 – sample tube with filter, 3 – thermometer, 4 – manometer, 5 – U-shaped absorber tube, 6 – hydraulic barrier (only liquid absorber, e.g. installed when sulfuric acid is used), 7 – gas meter, 8 – electric aspirator

A solid absorbent filter should not be allowed to drop in resistance during sampling, as this means that it is saturated with water vapor and the results obtained will be erroneous. In addition, the rate of sample gas extraction should be carefully controlled. Sample gas is taken at a rate of 0.5-1.0 l/min (sampling duration 10-15 minutes). If the gas is sampled at a rate of less than 0.5 l/min, water vapor in the gas may condense in the sampling tube. If it is taken at a speed higher than the given speeds, the hydraulic resistance in the system will increase and the results will not be accurate.

CONCLUSION: In researching the process of mass determination of moisture in gas, the following conclusions were reached: To determine moisture in mass method, a certain amount of gas is filled with a moisture absorber and passed through an adsorber located in series. was studied.

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