GAS DEHYDRATION BY ABSORPTION METHOD

Nematov H. I.
Karshi Engineering Economics Institute

Makhmudov M. J.
Bukhara Engineering and Technology Institute

Annotation: In modern industry and science, a special place among sorbents belongs to silica gel, which is a dried gel of silicic acid. The article describes the drying of gas by the adsorption method.

Key words: gas, adsorption, drying, silica gel.

Gas dehydration by the absorption method is based on the use of special liquid reagents that absorb water from the gas. This happens by direct contact inside a special installation [1].

In this method, solutions of diethylene glycol or triethylene glycol are most often used as reagents that absorb moisture. During absorption, the gas to be dried enters the lower part of the installation. At the same time, the absorber solution flows towards it from the top of the column. Then the desiccant, by that time already saturated with moisture, is fed into the separator. There, gas is first released from it, which is absorbed inside the installation [2].

Then ethylene glycol is heated and sent for regeneration, which is a rather complicated process (given the limited scope of the article, we will not dwell on it in more detail now).

The moisture absorbed by the desiccant is released there. Then the cycle is repeated. The indisputable practical advantages of the absorption method include the fact that it allows you to remove moisture from a gas mixture containing poisonous solid absorbers (primarily the very common hydrogen sulfide). In addition, it is easy to automate and allows drying to an acceptable dew point of -70 degrees Celsius in most cases [3-4].

The mention of solid moisture absorbers is no coincidence. On their use, another widespread technology for drying gases is built - the method of adsorption.

Here, the absorption of moisture is carried out by solid granular substances. Such adsorbents can be, in particular, alumina, zeolites, and silica gel. The moisture is subsequently removed from the pores using external influences.

The adsorption method has a number of undeniable advantages. In particular, it allows you to achieve a much lower "dew point": -90 degrees Celsius.

However, the choice of this method, as well as the specific adsorbent, strongly depends on the composition of the dried gas. As noted above, it may contain components that negatively affect the solid reagents of the installation.

In addition, there are also technical and economic difficulties. The adsorption process is much more difficult to automate than absorption. And the choice of this method means the need to incur significant additional capital costs [5].

In modern industry and science, a special place among sorbents belongs to silica gel, which is a dried gel of silicic acid. Chemical inertness, high thermal stability, ease of regulation of the porous structure - all this complex of properties makes it possible to prepare sorbents, catalysts and carriers with a high specific surface area on the basis of silica gel and with an optimal porosity of the structure.

One of the most practically important silicon compounds is silicon dioxide SiO2. A distinctive feature of silicon dioxide is the tendency to form colloidal solutions and form gels with water, called silica gels [6].

Silica gel is a dried silica gel of a porous structure with a highly developed inner surface. This feature determines the most valuable properties of silica gel - an adsorbent, a carrier of a catalytically active substance and a catalyst.

Silica gel always contains more or less adsorbed water. In addition, technical silica gel contains other oxides, primarily aluminum oxide, and iron, which gives technical silica gel a yellowish or even brown color.

Silica gel has a different surface, usually 100-600 m^2 / g, and a significant pore volume (0.5-1.2 ml / g) with a predominance of pores with a diameter of 5 to 15 nm. Silica gel moisture content 30%. Bulk density 0.9 g / cm3 Before use, silica gel should be dried in running hot air or gas at 180-200 for 3-4 hours.

Literature

1. https://edrid.ru/en/rid/218.016.9d75.html
2. Eldridge R.B. Olefin/Paraffin Separation Technology: A Review // Industrial & Engineering Chemistry Research. 1993. Vol. 32, No. 10. p. 2208–2212.
3. Laguntsov N.I., Kurchatov I.M., Karaseva M.D., Solomakhin V.I., Churkin P.A. Influence of membrane selectivity on helium recovery from natural gas // Petroleum Chemistry. 2016. Vol. 56. p. 344–348.
4. Lokhandwala K.A., Pinnau I., He Z., Amo K.D., DaCosta A.R., Wijmans J.G., Baker R.W. Membrane separation of nitrogen from natural gas: A case study from membrane synthesis to commercial deployment // Journal of Membrane Science. 2010. Vol. 346, No. 2. p. 270–279.
5. Yuan B., Sun H., Wang T., Xu Y., Li P., Kong Y., Niu Q.J. Propylene/propane permeation properties of ethyl cellulose (EC) mixed matrix membranes fabricated by incorporation of nanoporous graphene nanosheets // Scientific Reports. 2016. Vol. 6. 28509.
6. Maddox Rand., M.J. Gas conditioning and processing. Vol. 4 Gastreating and sulfur recovery. - 2008. -№3.