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SYSTEMS OF COLLECTION AND PREPARATION OF WELL PRODUCTS

The article is devoted to the analysis of well production collection and preparation systems. The main characteristic features of various systems are given. A typical collection and preparation system is considered. The basic equipment involved in such systems is characterized.

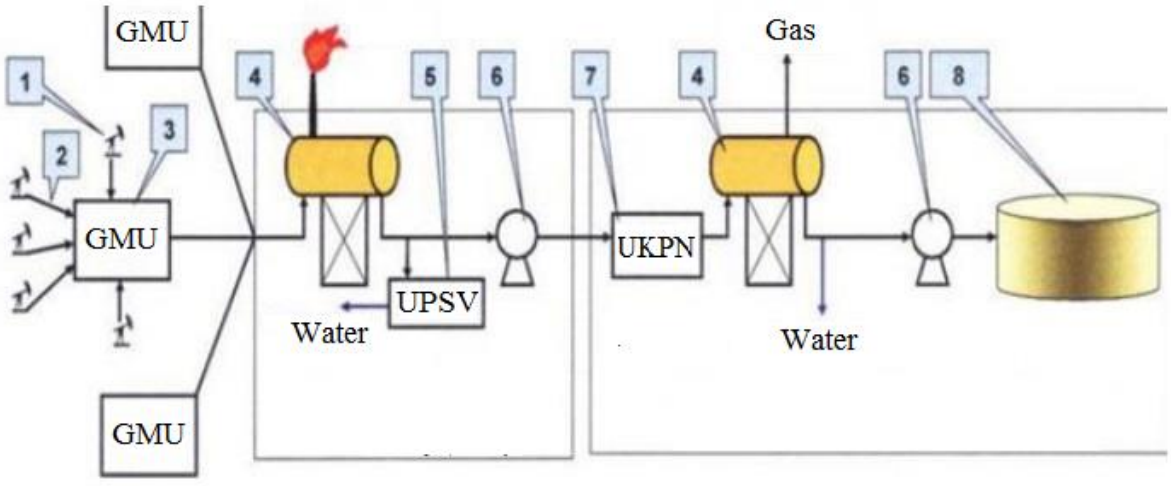
The oil collection and preparation system includes a complex of industrial technical means and installations. The following industrial collection systems are used:

- gravity two-pipe collection system - well production is divided at a pressure of 0.6 MPa. The released gas is transported under its own pressure to the compressor station or to the gas refinery. The liquid is sent to the second stage of separation. Oil and water by gravity (due to the difference in height) enter the tanks of the collection point, from where it is pumped into the tanks of the central collection point (CCP).

- high-pressure single-pipe collection system - this system allows you to transfer the oil separation process to the CPS. The maximum concentration of technological equipment is achieved, the metal capacity of the oil and gas collection network is reduced, the need for the construction of pumping and compressor stations in the field is eliminated, and the possibility of utilizing associated oil gas is ensured from the very beginning of field development.

- pressure collection system - in this system, single-pipe transport of oil and gas to district separation units located at a distance of up to 7 km from the wells, and transport of gas-saturated oils in a single-phase state to the CPS at a distance of 100 km or more takes place. Usually, deposits use a pressure system for collecting and preparing well products, which almost completely eliminates hydrocarbon losses [1].

In fig. 1 shows a typical scheme for collecting and preparing oil, gas and water.



1 – wells; 2 – throwaway lines; 3 – group measurement setup; 4 – separators;
5 – installation of preliminary water discharge; 6 – pumps;
7 – installation of complex oil preparation; 8 – reservoir park
Figure 1 – Schematic diagram of the well production collection and preparation system

From the wells, the gas-liquid mixture is sent to automated group measuring units (AGMU, GMU), which record the amount of well production. After the AGZU, the liquid

goes to booster pumping stations (BPS) or water pre-discharge facilities (UPSV). The first stage of separation is carried out at the BPS, after which the gas is delivered via the gas line to the consumer or to the gas processing plant (GPP). Partially degassed liquid is supplied to the UPSV or the central collection point (CCP) using centrifugal pumps.

At the pre-discharge water installation, the liquid passes through two stages of separation in succession. Before the first stage of separation, to prevent the formation of emulsions, a demulsifier is added to the liquid. The gas, after both stages of separation, is supplied to the gas drying unit, and then to the consumer or to the HPP.

The liquid from the second stage of separation enters the reservoir park, where mechanical impurities are partially separated from it and the water is previously discharged with a supply to the block bush pumping station (BKNS) for further pumping into the reservoir. After DNS or UPSV, the oil is sent for preparation.

Technological processes of oil preparation are carried out at an oil preparation plant (UPN) or a central oil preparation point (CPPN), and include the following processes:

– separation (1.2 degree) and phase separation;

- dehydration of products;

- desalination;

- stabilization of oil.

At the oil preparation plant, the liquid enters the separation unit. After that, it is sent to the furnace for heating the emulsion with the reagent. It is heated to 50ºC and enters the sedimentation tanks, where the emulsion is separated into oil and water. The water is discharged into the treatment tanks and then sent to the BCNS. Oil from settling tanks is sent to process tanks, where further separation of oil from water takes place.

Oil with a water content of more than 10% from water pre-discharge facilities is supplied by pumps to oil preparation facilities in heating furnaces. A demulsifier is metered into the oil flow, at the reception of the pumps. Heating in the furnaces is carried out to 45-50 °C, after which the oil enters the electrodehydrators, where dehydration and desalination of the oil takes place. Oil, with a water content of up to 1% and a temperature of 44-49 °C, enters the "hot separation" separators for further degassing (stabilization), from there it goes into the commodity tanks (RVS).

Oil tanks are containers designed for the accumulation, short-term storage and accounting of crude and commercial oil. For storage, tanks of the RVS type (vertical steel tank) are used.

Commodity oil is tested for quality using laboratory methods and is supplied by CNS pumps through the oil accounting unit to the central commodity park or to the main oil pipeline. From the CTP, oil is sent for final processing to an oil refinery (refinery).

The following equipment is used for oil preparation:

– separation units - two-phase separators of the NGS type, separators of the 2nd stage. For a deeper separation of oil, a two-stage separation is used at UPSV - the mixture passes through two separators sequentially;

– furnaces are designed for heating oil emulsions before dehydration and desalination units, to improve the process of emulsion separation into oil and water;

– heating unit – intended for heating oil emulsions before dehydration and desalination units. In addition to separation, the oil preparation process includes cleaning oil from free water, mechanical impurities and salts. This process is carried out in settling tanks. Settlers are designed for the settling of oil emulsions in order to separate them into oil and formation water;

- electrode dehydrators - for deep dehydration and desalination.

References

1. Stewart M., Arnold K. Gas sweetening and processing field manual. – Gulf Professional Publishing, 2011.