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INTERNATIONAL
FUEL CONGRESS
Congress book

15-17th October 2019

IFNTUOG
Ivano-Frankivsk, Ukraine



Ivano-Frankivsk National
Technical University of Oil and Gas
SPE Student Chapter

Innovative technology for producing of gas hydrates from coal mines methane

Kateryna Sai

Dnipro University of Technology (Ukraine), Ukraine

During the development of coal deposits there is an intensive emission of associated hydrocarbon gases in the environment. With the purpose of disposal and storage of methane from the coal mines in Ukraine, a method for converting them into the gas hydrate state can be used.

It is proved that advantage of gas hydrates is possibility of storage of gas at temperatures, significantly higher, than storage temperature of the liquefied gas. Also gas, which is transported in a gas hydrate form, doesn't detonate that is advantage in the direction of development of gas hydrate formation technologies. For this reason, creation of gas hydrates is highly relevant, and creation of the appropriate technological schemes and installations is rational.

Considering properties of artificially formed gas hydrates and feature of the method of their creation, process of gas hydrate formation will consist of the following main technological operations:

- initial formation of gas hydrates;
 - increase of the specific content of gas in its composition by the method of separation and drying by removing intercrystalline water and increase of filling level of a crystalline grid with gas molecules;
 - formation of created gas hydrate in the units suitable for transportation and long storage;
 - forced conservation of the received gas hydrate units for the increase of their stability.
- It is possible to make transportation of gas hydrate units in case of atmospheric pressure and temperature in the range of $-15...-20^{\circ}\text{C}$. Therefore, it is necessary to apply the active cooling of space, in which there are gas hydrates for maintenance of the necessary temperature.

The proposed technological solution is implemented in several stages. At the first stage methane, which coming out from degasification well, is captured and with the pressure of 5 MPa and temperature $+8...+9^{\circ}\text{C}$ is transferred in the solid gas hydrate state. At the second stage gas hydrate is compulsorily preserved by lowering of the temperature to -20°C and pressure to 1 atm. Further obtained gas hydrate is transported to the bunker location for storage of a ready-made product. Gas hydrate is stored in the bunker due to effect of self-preservation in case of the thermobaric parameters specified earlier. For the methane release from gas hydrate it is enough to increase temperature in the bunker, whereby the hydrate is decomposed into water and gas.

So, the comprehensive approach will allow to integrate mining technology of coal and methane in a single system.