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Gas Hydrates as a New Type of Fuel

For millions of years the nature has accumulated a huge amount of mineral deposits that are successfully used by the humanity as energy sources during many centuries. But recently, an acute question concerning the length of the period of time during which such resources as coal, oil and natural gas will be enough for further development has risen. Many countries, having insignificant reserves of classic kinds of energy-carriers, are totally dependent on the conjuncture of the energy raw materials on the world market. Nowadays, according to the opinion supported by a great majority of the scientists and experts, gas hydrates are considered to be as the most perspective alternative source of energy on the planet.

Gas hydrate is a crystalline compound-clathrate in which gas molecules are trapped in cavities that are located in so-called “carcasses” formed by water molecules and connected between each other by firm hydrogen bonds. Water molecules in such compounds are called “hosts” and molecules of other matters stabilizing the crystalline lattice – “guests” (hydrate formers). Gas molecules (guests) are located in internal cavities of crystalline lattice of water and are held by Van der Waals forces. Formation of natural gas hydrates requires such conditions: pressure should be from 1 to 200 atmospheres, temperature is from 30 degrees below zero Celsius to 40 degrees Celsius, depending on the conditions of the formation.

Gas hydrates are formed in continental shelf zones of the Earth because 90 percent of all oceanic organic matters can be found exactly there and their decomposition products are source of methane formation.

Currently, three main methods of extracting natural gas from gas hydrate deposits are being considered worldwide: *depressurization* (lowering the pressure below the equilibrium pressure of the stable existence of gas hydrates); *thermal stimulation* (heating hydrate-containing rocks or the hydrate itself above equilibrium temperature); *chemical inhibition* (injection of inhibitors into the gas hydrate reservoir). All of them are based on the application of dissociation – a process in which the hydrate is decomposed into natural gas and water. The choice of the most suitable technology for the development of gas hydrate deposits depends on the conditions of occurrence of this deposit, as well as its physical, chemical and mechanical properties.

So, the development of gas hydrate deposits is a perspective way to increase hydrocarbon crude volume. Present scientific trend development in the world is an extremely current task taking into account the tendency of increasing energy resource consumption rates with each year.