

TOPICS FOR THE APRIL MEETINGS

ABSTRACT

NATURAL GAS: OIL'S PRINCIPAL COMPETITOR

by

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Petroleum gases and liquids, often occurring together, are found in the same types of traps by the same exploratory methods and are exploited and produced in the same manner. Moreover, all crude oil contains some natural gas, but nearly 75 percent of all natural gases are not associated with crude oil in the reservoir. The two phases of petroleum are highly competitive.

There are important differences in the physics and chemistry of natural gases and crude oil. Natural gases are a mixture of various organic compounds, usually accompanied by smaller amounts of inorganic elements and compounds. Natural gases of commerce are petroleum natural gases, although helium and hydrogen sulfide, also natural gases, may be valuable components. Even carbon dioxide, also a natural gas, finds markets. Physically, natural gases are highly mobile, difficult to contain, and are soluble in both crude oil and water, particularly under pressure.

Chemically, there are marked differences between petroleum natural gases and crude oil. Methane is the simplest, most ubiquitous and principal component of petroleum natural gases. It is often accompanied by much smaller quantities of heavier hydrocarbons. Natural gases are alkanes: paraffinic, saturated, straight chain hydrocarbons. The division between petroleum natural gases and the somewhat more complex heavier alkanes occurring with them as vapors, is between propane and butane. Butane and heavier paraffinic hydrocarbons can be found both as normal, saturated straight chain or as isomers; saturated, branched chain hydrocarbon compounds. The substantial chemical differences between the simple compounds of petroleum gases and the far more complex crude oils suggest somewhat different modes of origin. An early and multiple origin for methane seems probable, inasmuch as substantial quantities are found in youngest Recent sediments in swamps and drift, and its presence as part of the atmosphere of several of the planets.

The vastly different physical and chemical characteristics of petroleum gases and crude oil have a great bearing on economics of exploring for, developing and producing them. The phenomenal growth in production and the use of natural gas as a form of primary energy have been major factors in decline in growth in need for crude oil. The two substances are directly competitive for space heating, for domestic uses, and for generation of electricity. Liquefied petroleum gases ("natural gasolines") and lease condensate have further supplanted crude oil. Production of petroleum natural gases, wet, increased from 4,423 trillion BTU in 1945 to 20,121 trillion BTU in 1967, and in 1967 amounted to 36.4 percent (excluding lease condensate) of production of primary energy, compared to 32.6 percent for crude oil (including lease condensate). Moreover, according to Winger et al dry natural gas yields less than four cents of every dollar of income from a representative group of companies, financial characteristics of which have

been studied for years by the Chase Manhattan Bank. Although natural gas liquids and lease condensate add somewhat to this amount, natural gas is a much less attractive exploration objective than crude oil

Most of the natural gases found in the past have been found as a result of the search for crude oil. Under present economic conditions, natural gases alone are not a t t r a c t i v e exploration objectives in most areas of the United States. Hence, as demand h a s continued t o accelerate, drilling o f gas wells has declined sharply, a n d ratio of annual production t o annual additions to reserves has declined to a dangerous point. Unless this trend is reversed, the next few years may see a shortage of available natural gases, when none exists in nature, simply because of lack of incentive to search for and develop natural gasses in the quantities which will be needed.