CUTTINGS GAS ANALYSIS AND ITS APPLICATION IN PETROLEUM GEOCHEMISTRY

K. LE TRAN, Societe Nationale Elf Aquitaine (Production), France

Gaseous hydrocarbons are ubiquitous in sedimentary rocks. They are generated by organic matter undergoing either bacterial degradation at shallow depths or thermal maturation by combined effect of time and temperature at greater depths. Thermal maturation encompasses the oil generation phase (oil window) and the main gas phase which are the usual stages in the maturation pathway.

Both the quantity of gas and its composition reflect the richness of organic matter and the degree of maturation of the Kerogen. Therefore gas parameters measured on cuttings in exploratory wells are a most useful tool for determining source rock potential for either oil or gas and possible petroleum reservoirs. Furthermore such measurements are relatively rapid and inexpensive.

The analytical procedure developed in our laboratory is based on mechanical extraction of the gas by grinding the rock in water with specially coated blades rotating at high speed. The main parts of the apparatus embody a specially designed blending jar equipped with a rock sampling system and a gas sampling system altogether with a slurry evacuation device. The whole analytical cycle is carried out automatically within sixteen minutes so that adequate conditions are available for good analytical reproducibility. The C_1 to C_5 hydrocarbons are measured by FID gas chromatography.

Analyses are generally performed on unwashed cuttings collected fresh at the well-site and stored wet in cans or plastic bags. The spacing between samples varies from ten metres to fifty metres but is generally twenty metres. Interpretation of the results involves the logging of the gas amount and its composition or wetness and the iso-butane over normal-butane ratio. Plotted versus the depth of burial and in stratigraphic cross section, these parameters help in delineating the most prospective intervals within a basin. Applications of this method in petroleum exploration are presented to illustrate its main features.

*****

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 7, No. 6, November-December 1981