

EXPERIMENTAL DATA ON LIGHT HYDROCARBONS CONTENTS IN DIFFERENT CLAYS AND THEIR CONTRIBUTION FOR HEADSPACE, BLENDER, PROBE AND ADSORBED SAMPLE INTERPRETATION IN SURFACE GEOCHEMISTRY SURVEY.

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This paper describes an experiment carried out by to study the behavior of light hydrocarbons with a known concentration that percolate a glass cylinder filled with distinct adsorption capacities: sodic bentonite and kaolinite. The main goal was to improve the interpretation of geochemistry prospecting that involves the search for surface or near-surface anomalies of hydrocarbons contents in soil samples, which could indicate the occurrence of petroleum accumulations in the subsurface of sedimentary basins. This experiment offers a new insight on gas contents in near-surface sediments which are later measured using traditional surface geochemistry techniques, comparing probe, headspace, blender and adsorbed gas.

Light hydrocarbon gases were injected in a chamber located at the bottom of a glass cylinder (figure 1). The glass cylinder has three sections united by clamps and o-rings. Each section is traversed by a perforated aluminum tube having a chromatograph septum in its end to collect the gases. Layers of glass spheres were arranged around the aluminum tube to facilitate the gas sampling (probe). The upper part of the cylinder consists of a Teflon cover with a gas exhaust pipe to collect the hydrocarbons. An artificial mixture of nitrogen and hydrocarbons was injected in $\mu\text{mol/mol}$ under a flow of $2\text{mm}^3/\text{s}$ during 10 days: Methane: 7615; ethane: 2072; ethene: 51; propane: 151; n-butane: 101; i-butane: 51; n-pentane 50. Gas samples were acquired using a syringe (probe) and analyzed by gas chromatography in different time intervals after the beginning of gas injection: 0, 2, 4, 8, 16, 32, 48, 64 and 72 hours. The gas composition, concentration and other properties were measured before and after the gas injection. At the end of the experiment clay samples of the three sections of the cylinder were collected for headspace (free gas sediment), blender (gas content in sediment interstices) and adsorbed for analysis.

Results were obtained for clays in natural state of humidity (1.5% for kaolinite and 11.6 % for smectite) as well as after induced humidity (8.2% for kaolinite and 13.2 % for smectite). Probe results which indicate the HC content in the free gas, for natural kaolinite

show that the differences in hydrocarbon concentration of in the three sections of the cylinder decrease and equalize after 32 hours. For the humid kaolinite equalization occurs after 48 hours, indicating slower gas diffusion. For smectite in natural and induced humidity, the difference of concentration ends after 72 hours. The difference between smectite and kaolinite is probably due to the higher expansion rate of smectite.

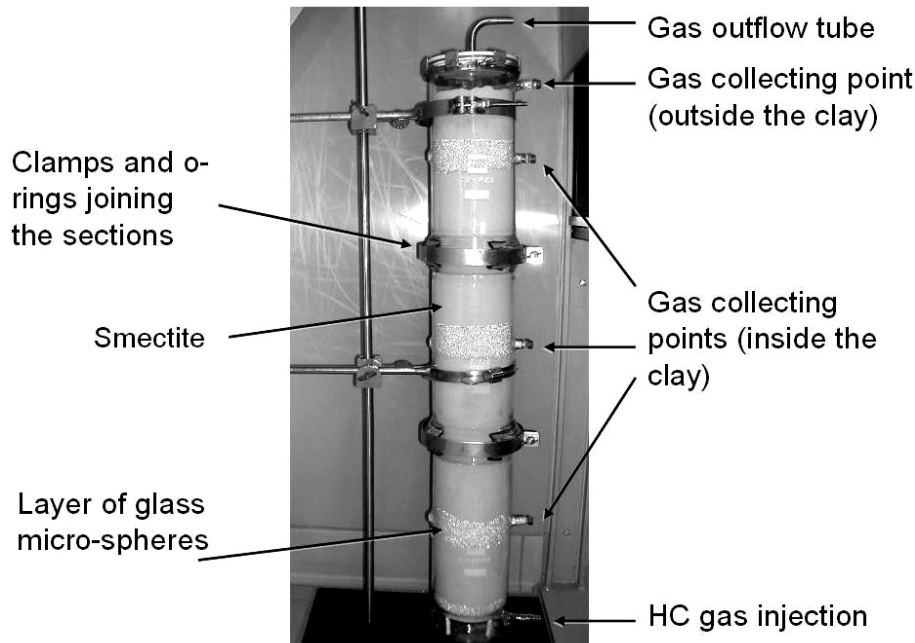


Figure 1. Glass cylinder containing smectite for gas hydrocarbon injection

For natural and induced humidity for smectite and kaolinite, the blender concentration values were a little greater than headspace ones. For natural humidity the adsorbed average concentrations were 7.3% for smectite and 6.1% for kaolinite. For induced humidity the adsorbed average concentration were 3.3% for smectite and 2.3% for kaolinite (Cordeiro et al., 2006).

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