Petrochemistry-2015
OMICS Group Conferences
Accelerating Scientific Discovery
3rd World Congress on
Petrochemistry and Chemical Engineering
Atlanta, USA November 30-December 02, 2015

Petrochemical model of vertical migration of gas in sedimentary basins

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Abstract

It is known, that the organic material in sedimentary basins after burial and gradual immersion experiences a series of continuous transformations (from diagenesis to metamorphism). As a result, at different levels of a section gases CO_2, CH_4, et al., are emitted simultaneously with different intensities. Typically, the gases migrate towards the surface by the system of pore channels and fractures. Comparing the duration of sedimentary basins existence (millions of years) with speed of gas migration, which was experimentally set, we can expect, that there are components formed at different times at any point of the section – syngenetic gases of deposits and gases received from ancient rocks lying below. The task of this study is creating an algorithm of petrochemical and petrophysical calculations for determination of gases concentrations at any given depth of a sedimentary, mainly terrigenous section. First, dynamics of quantitative relations of the unexpended organic material and the formed gases were defined. Second, the parameters determining the speed and concentration of gases during migration in homogeneous or stratified environments were considered. Third, specific object quantification was made. Thus the original amount of the buried organic substance was calculated from the content of sulfur that was associated with sulfides (mainly bio-chemogenic pyrite). Contents of hydrogen and carbon were determined by calculated mass of the primary cellular substance. The results are relevant for solving a number of problems: gas emissions in coalmines, natural and technogenic fluid-disruption in the rocks, global warming.

Biography

A A Zlobin is studying at the Novosibirsk State University, Department of Natural Science since 2014. Over the past 5 years, he has published 2 scientific works, participated in 2 international scientific conferences. His main research interests are CVD (chemical vapour deposition) processes and chemistry of gases.

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