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Organic-rich Albian deposits as the origin of hydrocarbon-contaminated phosphates, southeastern Constantine Basin, Algeria

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Abstract

The southeastern Constantine Basin, from its phosphatic layers (Djebel Onk, Bled El Hadba, Negrine) and its hydrocarbon resources, constitutes a promising area for mining and oil research of northern Algeria. The presence of organic matter (OM), micro-organisms and phosphate particles in the Upper Albian deposits would correspond to layers of source rock for hydrocarbons. The facies characterizing this stage correspond to marine deposits of which OM related to the formation of these hydrocarbons in a relatively reducing environment. Such layers, with TOC rates varying from 0.50% to 11.53%, seem comparable to Paleocene-Eocene phosphatic layers, and thus economically exploitable with an average content of P₂O₅ of 16%. A stratigraphic, structural and paleogeographic overview are based on geochemical and petrographic data. Such data were analyzed and indicate that Albian layers are at the origin of a phosphate layer with organic support, e.g. radiolarians and diatoms, covered by a sedimentation inducing hydrocarbon production. They are found at subsurface among the Upper Cretaceous sedimentary pile, as it can be mentioned in several oil exploration wells. This is related to their lower location compared to the northern part of the basin where the Upper Cretaceous formations are eroded, suggesting maturation temperatures much higher southwards, and thus corroborating the link with burial sedimentary levels.

Keywords : micro-organisms, organic matter, phosphate, hydrocarbon, Albian deposits.

1. Introduction

In southeastern Constantine, two layers of principal bedrocks were evidenced; they are primarily made up by dolomites and limestones. They are Albian-Cenomanian and Cenomanian-Turonian in age according to the geochemical analyses (Arab et al., 2008). Three stratigraphic levels identified in the capacity as secondary bedrocks are located within Kimmeridgian-Tithonian, Aptian and Coniacian-Santonian, and in the Paleocene-Eocene layers. The Algerian phosphates, rich in organic matter, are Paleogene in age (Chabou-Mostefai, 1998). A paleontological study, carried out by the Research Centre and Development of Sonatrach Company, showed the presence of radiolarians. Phosphate traces were also located in the Albian deposits (Kracha, 2000). It was

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