

Impacts of the Mineralogical Composition on the Petrophysical Behavior of the Amygdaloidal and Vesicular Basalts of Wadi Wizr, Eastern Desert, Egypt

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Abstract : This paper gives an account of the petrophysical characteristics and the petrographical descriptions of Tertiary vesicular and amygdaloidal olivine basalt samples from Wadi Wizr in the central Eastern Desert of Egypt. The petrographical studies indicated that the studied vesicular basalt is rich in calcic-plagioclase, augite and olivine in addition to numerous amounts of fine opaque minerals and vesicles filled with carbonate and quartz amygdales. The degree of oxidation and alteration of magnetite and ilmenite were discussed in details. Petrophysically, the studied samples can be grouped into two main groups; the first group of samples is amygdaloidal basalt as the second group is vesicular. The vesicular group (the permeable one) is characterized by fair to very good porosity ' Φ ', good to very good permeability ' k ', very low true formation factor ' F ' and micro to ultra micropores. On the other hand, the amygdaloidal basalt group (impermeable group) is characterized by very low storage capacity properties, fair porosity, negligible permeability, medium to high true formation factor and ultra micropores. It has been found that; the petrophysical behavior is strongly dependent on the degree of oxidation and alteration; and in particular on the rate of cooling and oxidation of the ore minerals which caused filling in the primarily produced vesicles by low temperature secondary minerals.

Keywords : vesicular, amygdaloidal, basalt, petrophysics, Egypt

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