

## Mineralogical and rheological characterization of bentonites in Momen Abad Area, Eastern Iranian bentonite zone, to be Used in Drilling Industry

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**Abstract:** Momen Abad mining district is a part of Eastern Iranian bentonite zone, located in Eocene-Oligocene volcanic belt. Mineralogical study of bentonites by XRD method introduced smectite and cristobalite as major mineralogical phases and plagioclase, alkali feldspar, paragonite, zeolite (heulandite and clinoptilolite), mica-illite, and quartz as minor phases. SEM imaging of bentonites shows that platy particles of bentonites form flocculated aggregates and occur as rounded and angular particles with cornflakes texture. Energy-dispersive X-ray spectroscopy indicates that bentonite aggregates are of Na-montmorillonite type. The rheological test results reveal that the apparent viscosity, plastic viscosity, yield point, and gel strength of simple bentonites of 30.4 g weight is higher than that of samples with 10.8 and 22.4 g weight; however it is not in accordance with API standard therefore is not appropriate for drilling industry. Rheological characteristics and gel strength for activated samples are better than the simple samples. It is noteworthy that fluids containing carboxymethyl cellulose polymer is the best material to increase the rheological characteristics of bentonites among the polymers due to high ionic properties of particles and they are applicable in oil drilling industry (samples B02 and B04). However, sample B07 with all additives is not compatible with API standard of drilling qualification. Among three bentonite samples, the rheological properties of apparent viscosity, plastic viscosity, yield point, and gel strength in 10 seconds and 10 minutes in simple bentonite of B02 with 30.4g weight are 8.5, 5, 7, 5 and 5 respectively and will be increased to 25, 9, 32, 14 and 11 respectively with carboxymethyl cellulose polymer showing the highest quality in accordance with API standard and is appropriate for drilling industry.

**Keywords:** *viscosity; drilling; bentonite; Momen Abad; East Iran.*

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