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The Application of SEM analysis technique in studying pore structure of tight reservoirs

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A large area of tight reservoirs distributed is a essential factor for hydrocarbon accumulation.With the rise of unconventional oil and gas exploration ,the research of microscopic pore for tight reservoir has gathered more and more attention in recent years.For this reason, researching on pore structure has become the primary task.

The objective interval is the tight reservoirs Of Xiagou formation,Jiuquan Basin. The main composition of the tight reservoirs in the region is dolomite rock. Experiments used two devices on 28 core experiments.One of thedevices is Helios NanoLab ™ 650 Scanning Electron Microscope of American FEI Company,another is JSM-6610LV Scanning Electron Microscope of Janpan JEOL Company.

The Helios NanoLab™ 650 features FEI's highly engineered advances in field emission SEM (FESEM) and focused ion beam (FIB) technologies and their combined use. Samples were argon ion-milled backscatter polishing before the experiment.Date from a long-term experiment were analysed in order to observe pore morphology and strcture of pore and throat of dolomite reservoirs. 294 FESEM images improved that the main type of pores in this region are intergranular pore-space and emposieu,organic and fractured pores number are few. In addition , the vast majority of irregular pore throat morphology resulted in the poor connectedness of the isolated pores.The JSM-6610LV low vacuum SEM is equipped with a tungsten filament, large chamber for observation of specimens up to 200mm in diameter and a point-to-point resolution of 3 nm at 30kV in high vacuum mode. The data by this facility used to quantify the pore size,it was investigated a wide range from 0.082 um to 5.569um, 86% of the 30 diameter data were less than 2.5um,most are micron-sized pores. The SEM images also can provide a evidence that intergranular pore-space and emposieu are the main pore types.

The two facilities of SEM have their own advantages.Combining with them while making full use of them own characteristics could provide a more comprehensive approach to research pore structure.

Keywords: SEM ,pore structure , tight reservoir, pore throat morphology