P52-MO

DISSOLUTION AND ALTERATION OF THE DEEP CARBONATE RESERVOIRS BY TSR

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Natural gas, involving H_2S, are mostly found in carbonate reservoirs throughout the world (Worden et al., 1995, 1996; Martin et al., 2004). This sort of gas has also been found in Sichuan Basin, Bohai Bay Basin, Ordos Basin and Tarim Basin in China. Generally, H_2S content in Sichuan Basin is more abundant; some medium-large scale gas fields/reservoirs are notarized including Sinian reservoir (Weiyuan gas field), Lower Triassic, Feixianguan Formation (Puguang, Luojiazai, Dukouhe, Tieshanpo, Maoba, Qingxi, Longgang, Qilibei gas field), Jianglingjiang Formation (Wolonghe gas field) and Middle Triassic, Leikoupo Formation (Moxi, Zhongba gas field), the total proven reserves is one thousand billion cubic meters circa. These gas reservoirs share a feature that deep-burial process has ever occurred in geological history and geotemperature should reach to a certain high degree (>120ºC) to estimation. Both of the gypsum rock imbedded reservoir as well as diversified gas source provide adequate material and thermodynamics which make TSR reaction qualified. Base on C,S carbon isotope and composition data, gases of TSR origin in middle-lower Triassic and Sinian Formation can be inferred (Cai, et al.,2004; Zhu et al.,2005).

The latest research shows that dissolution and alteration on reservoirs is another important effect in process of H_2S generating, which increases porosity and enhance reservoir to high rank consequently. By agency of qualitative comparison, we find that gypsum rock dissolution will improve porosity initially, then the hydrosulphuric acid, a high corrosive nature acid make pore-throat connectivity further developed by way of etching dolomite rock and form vuggy sponge-like system.

The artificial simulation on rock etching experiment favor the result that porosity, as well as permeability, are dramatically boosted. The porosity increases by 2% on average while the permeability value rises up even by two orders of magnitude. In the other aspect, bogaz can be clearly identified through EMS. The carbon isotope of authigenic carbonate is -10.3‰~-18.2‰ which differs from that +3.7‰~+0.9‰ in the strata, which manifest

organic-inorganic interaction present when TSR occurred, lead to C transition from organic matter to carbonate. In brief, high rank reservoir beds undergo the early erosion, later the TSR effect and acid fluid-carbonate rock interaction associated further improved the porosity (Williams et al., 2001; Heydary, 1997). In addition, on condition that the H_2S has large quantity accumulation beneath the earth, with increasing burial depth and temperature, more H_2S will be formed, which would result in more intense alteration and better reservoir bed, Thus the distribution and the content of H_2S can be used to evaluate secondary porosity rating and capacity of reservoir.

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