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Characteristics of Micro-Pore Structure of Tight Sandstone Reservoir: A Case Study from ImsarSag Tight Oil Reservoirs

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Abstract: Jimusaer sag Lucaogou Formation tight oil reservoir lithology is changeable, diverse mineral elements and clastic rock and carbonate rock of the transitional rocks. Dense oil in the region to the source of various storage and source reservoir interbedded characteristics, forming a good source reservoir relationship was set up. In this paper, the study area reservoir pore types in intergranular pore, mainly. Secondly, dissolution pores and micro cracks. According to pressure mercury data can be reservoir pore structure is divided into micro fine throat and throat, but overall has pore throat radius is too small, poor connectivity, strong microcosmic heterogeneity characteristics.
Keywords: Tight oil; Jimsar sag; pore structure.

Type of tight reservoir and pore size

In general, the rock particles surrounded by a larger space of the pore and only in two inter particle connectivity the narrow part of the said as throat or between two larger pore space connected part of the throat[1-2]. The pore is a basic storage space that fluid occurs in the rock and the throat is an important channel to control the flow of fluid in the rock seepage[3]. Fluid in complex natural pore system flow, through a series of alternating pore and throat.

Pore type and pore size interval of tight reservoir

According to the statistics of 78 cast thin section samples, a total of 14 types of pore types were identified in the well 1,the main are the dissolution pore and intragranular dissolved pores; statistical analysis of the pore diameter, the pore size range is given priority to with less than 25 micrometer, next 25 to 50 micrometers of well[4]. (Figure 1)

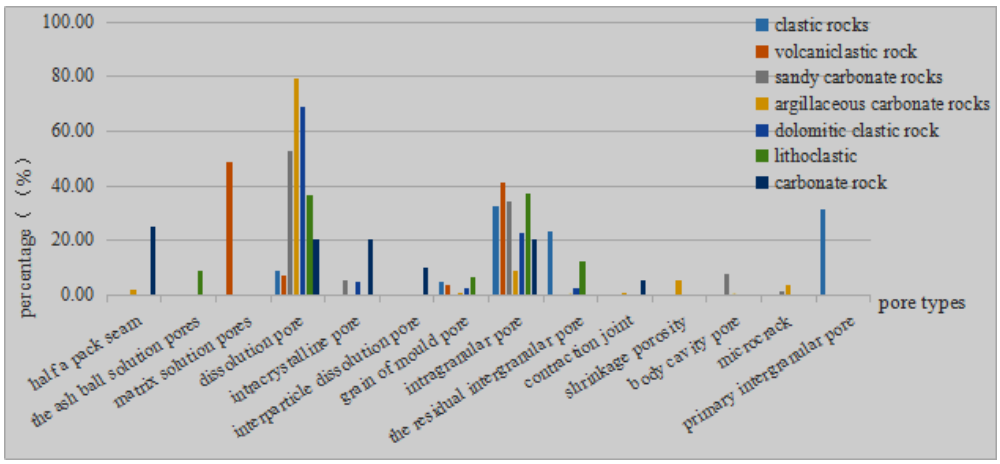

Fig.1: Distribution histogram of pore type of each rock

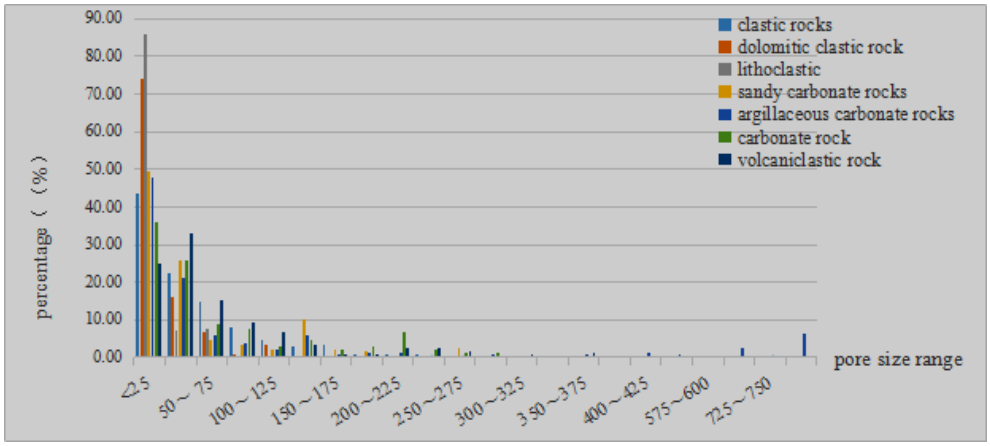

Fig.2: Histogram of pore area ratio distribution of each rock type

Pore type and pore diameter distribution of clastic rock

There are 8 types of clastic rocks in this area, which are all the tight pores.Intragranular dissolved pores, solution pores and residual intergranular pores are given priority to, the grain of mouldpores are less[5].The pore size range is given priority to with less than 25 micrometer, the maximum aperture range of 50-75 micrometer, the reservoir lithology is density. For all the pores, in less than 25 micrometer range of aperture accounted for 79.37%, 17.64% distributes between 25 and 50 micrometer, 2.99% distributes between 50-75 micrometer. For pore types, dissolved pore accounts for 24.38%, the grain of mould pore accounts for 4.38%, the intragranular dissolved pore accounts for 55.63%.

Pore types and pore diameter distribution of carbonate rocks

There are 4 kinds of the carbonate rock types in this area, pore types are mainly with half filled gap, dissolved pore, intercrystal pore, intragranular dissolved pore and also develops a small number of intergranular dissolved pore and shrinkage joint[6].The pore diameter mainly distributes in less than 25 micrometer,the maximum pore size range for 275-300 micrometer,the reservoir lithology is density. Among them, 35.88% of the pore size distributes in less than 25 micrometer,25-50 micrometer interval accounts for 25.60%, 50-75 micrometer range accounts for 8.55%, 75-100 micrometer range accounts for 7.49%, 100-125 micrometer range accounts for 2.85%, 125-150 micrometer range accounts for 4.43%, 150-175 micrometer range accounts for 1.95%, 175-200 micrometer range accounts for 2.74%, 200-225 micrometer range accounts for 6.52%, 225-250 micrometer range accounts for 1.79%, 250-275 micrometer range accounts for 1% and 275-300 micrometer range accounted for 1.22%. For pore types, half filled gap accounts for 25%, dissolved pore accounts for 20%, intergranular pores accounts for 20%, intergranular dissolved pore accounts for 10%, intragranular pore accounts for 20%, shrinkage joint accounts for 5%.

Pore type and pore diameter distribution of volcanoclastic rock

There is 1 kind of the volcanoclastic rock types in this area, pore types are mainly with dissolved pore, other pore types are less developed. The pore diameter mainly distributes in less than 25 micrometer, the maximum pore size range for 25-50 micrometer, the reservoir lithology is density.Among them, 94.02% of the pore size distributes in less than 25 micrometer, 25-50 micrometer interval accounted for 5.98%. For pore types, dissolved pore accounts for 100%.

Pore types and pore diameter distribution of transition rocks

In this area, the pore diameter mainly distributes in less than 25 micrometer, pore types are mainly with dissolved pore and intragranular dissolved pore.

①The main difference between dolomitic clastic rock and lithoclastic is pore type, the content of dolomitic clastic rock dissolution pore is greater than intragranular dissolved pore, the content of lithoclastic intragranular dissolved pore is greater than dissolved pore. There are 21 types of dolomitic clastic rock in this area, all of them are tight pore. Among them, dolomitic clastic rock mainly contains dissolved pore and intragranular dissolved pore, fewer intergranularpore, residual intergranular pore and the grain of mould pore. The pore diameter mainly distributes in less than 25 micrometer, the maximum pore size range for 100-125 micrometer.Among them, 73.872% of the pore size distributes in less than 25 micrometer, 25-50 micrometer interval accounts for 15.78%, 50-75 micrometer interval accounts for 6.58%, 75-100 micrometer interval accounts for 3.26%. For pore types, dissolved pore accounts for 68.62%, intercrystal pore accounts for 4.67%, the grain of mould pore accounts for 2.0%, intragranular dissolved pore accounts for 22.30% and the residual intergranular pore accounted for 22.30%.

In addition to the above dolomitic clastic rock, there are 9 kinds of lithoclastic in this area.The pore types of lithoclastic are mainly with dissolved pore and intragranular pore, the residual intergranular pore, the ash ball dissolved pore, the grain of mould pore are less developed. The pore diameter mainly distributes in less than 25 micrometer, the maximum pore size range for 50-75 micrometer. Among them, 85.57% of the pore size distributes in less than 25 micrometer, 25-50 micrometer interval accounts for 6.86%, 50-75 micrometer interval accounts for 7.57%. For pore types, the ash ball solution pore accounts for 8.64%, dissolved pore accounts for 36.55%, the grain of mould pore accounts for 6.18%, intragranular dissolved pore accounts for 36.82% and the residual intergranular pore accounted for 11.82%.

②The main difference between sandy carbonate rock and argillaceous carbonate rock is pore type, sandy carbonate rock mainly consists of dissolved pore and intragranular dissolved pore, dissolved pore takes absolute advantage in argillaceous carbonate rock. There are 15 types of sandy carbonate rock in this area. Among them, sandy carbonate rock mainly contains dissolved pore and intragranular dissolved pore, fewer intercrystal pore, body cavity pore and microfracture. The pore diameter mainly distributes in less than 50 micrometer, the maximum pore size range for 250-275 micrometer. Among them, 49.39% of the pore size distributes in less than 25 micrometer, 25-50 micrometer interval accounts for 25.80%, 50-75 micrometer interval accounts for 4.52%, 75-100 micrometer interval accounts for 3.31%, 100-125 micrometer interval accounts for 1.73%, 125-150 micrometer interval accounts for 9.90%, 150-175 micrometer interval accounts for 1.80%, 175-200 micrometer interval accounts for 1.34% and 250-275 micrometer interval accounts for 2.22%. For pore types, dissolved pore accounts for 52.50%, intercrystal pore accounts for 5.00%, intragranular dissolved pore accounts for 33.75%, body cavity pore accounts for 7.5% and the microfracture accounts for 1.25%.

In addition to the above sandy carbonate rock, there are 5 kinds of argillaceous carbonate rock in this area. The pore types of argillaceous carbonate rock are mainly with dissolved pore,next are the intragranular dissolved pore, shrinkage pore, body cavity pore and microfracture,last are the half filled gaps, shrinkage joint, the grain of mould pore and the residual intergranular pore develops less.The pore diameter mainly distributes in less than 50 micrometer, the maximum pore size is more than 875 micrometer. Among them, 48.16% of the pore size distributes in less than 25 micrometer, 25-50 micrometer interval accounted for 22.60%, 50-75 micrometer interval accounts for 5.4%, 75-100 micrometer interval accounts for 3.13%, 100-125 micrometer interval accounts for 1.75%, 125-150 micrometer interval accounts for 5.35%, 150-175 micrometer interval accounts for 0.70%, 175-200 micrometer interval accounts for 0.81%, 200-225 micrometer interval accounts for 0.82%, 225-250 micrometer interval accounts for 0.30%, 250-275 micrometer interval accounts for 0.22%, 275-300 micrometer interval accounts for 0.49%, 300-325 micrometer interval accounts for 0.05%, 325-350 micrometer interval accounts for 0.03%, 350-375 micrometer interval accounts for 0.48%, 375-400 micrometer interval accounts for 0.22%, 400-425 micrometer interval accounts for 0.76%, 425-450 micrometer interval accounts for 0.59%, 575-600 micrometer interval accounts for 0.10%, 700-725 micrometer interval accounts for 2.06%, 725-750 micrometer interval accounts for 0.29% and more than 875 micrometer interval accounts for 5.68%. For pore types, half filled gap accounts for 1.48%, dissolved pore accounts for 76.04%, the grain of mould pore accounts for 0.68%, intragranular dissolved pore accounts for 8.32%, the residual intergranular pore accounts for 0.2%, shrinkage joint accounts for 4.92%, body cavity pore accounts for 4.20% and the microfracture accounts for 3.48%.

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