

Basic Characteristics of Shale Oil Reservoir

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Abstract: Similar to shale gas, shale oil is a free, adsorption and dissolution state and so on in many ways, such as the effective hydrocarbon shale layers, and is a nongaseous hydrocarbon with exploration and development significance. Oil shale is generated by the shale formation oil failed to completely discharged and stranded or only after a very short distance migration and local aggregation of results, which belongs to the typical antigenic reservoir in situ type aggregation type of oil and gas. The main medium of the occurrence of oil shale is had a history of source or are still in the oil shale formation, including shale formation may folder some tight sandstone, carbonate rock and volcanic rock are thin.

Keywords: Shale gas; Shale oil; Shale formation.

INTRODUCTION

Shale oil is mainly derived from the organic matter thermal evolution of hydrocarbon generation process, including 2 types of pyrolysis origin and thermal cracking origin. The former is the organic matter pyrolysis mature oil, and the latter is formed by the pyrolysis of the cheese or high molecular hydrocarbon in the high mature stage, which is a low molecular high mature oil (including condensate). Oil shale in the free, dissolved or adsorbed occurrence in effective hydrocarbon generating shale formations, mainly occurs in mud shale matrix (micro pore and micro fractures), other lithologic interlayers and shale fractures, its occurrence is mainly affected by the medium conditions, physical properties of crude oil and gas, oil ratio control [1].

Formation conditions: formed in the deep sea, bathyal environment with rich organic matter shale dominated by Sandberg oil I and type II kerogen, when the thermal evolution degree of moderate, suitable for the formation of oil shale. Large scale, low oil abundance, recovery limited is the basic characteristics of oil shale.

Accumulation models: crude oil without migration, only has the feature of the second migration of primary migration or a very short distance, belong to typical in situ or in-situ reservoir accumulation model. Oil shale with active rock layer, the densification of the gas reservoir, gathered in situ, complex mechanism and scale of the distribution, small basin is expected to

become distribution and exploration and discovery of oil shale development an important place

RESERVOIR CHARACTERISTICS OF SHALE STRATA

The characteristics of organic matter and its control effect on shale oil reservoir

China's continental shale oil are mainly developed in the semi deep lake deep lake facies sedimentary environment, organic matter is mainly composed of type I and type II kerogen with, moderate maturity, RO value in 0.5% - 1.1%, shale organic matter abundance of medium to high, total organic carbon content in general more than 2.0%. And the United States Marine shale oil, the kerogen type II, relatively higher abundance of organic matter, organic carbon content general in more than 3%, RO value in 0.6% - 1.5%, the higher maturity [2].

Organic matter is the material basis for the formation of shale oil, the study shows that when the TOC₀ (original organic carbon) value is low, the source rock is mainly used to meet the needs of organic matter and mineral adsorption. When TOC increases to a certain value, oil generation began to a lot in the free state in the filled shale matrix pore and migration of discharge, and can be mined. Reservoir organic geochemical data also show that the chloroform bitumen "a" and "S1" content are and TOC have good positive correlation (Figure 1).

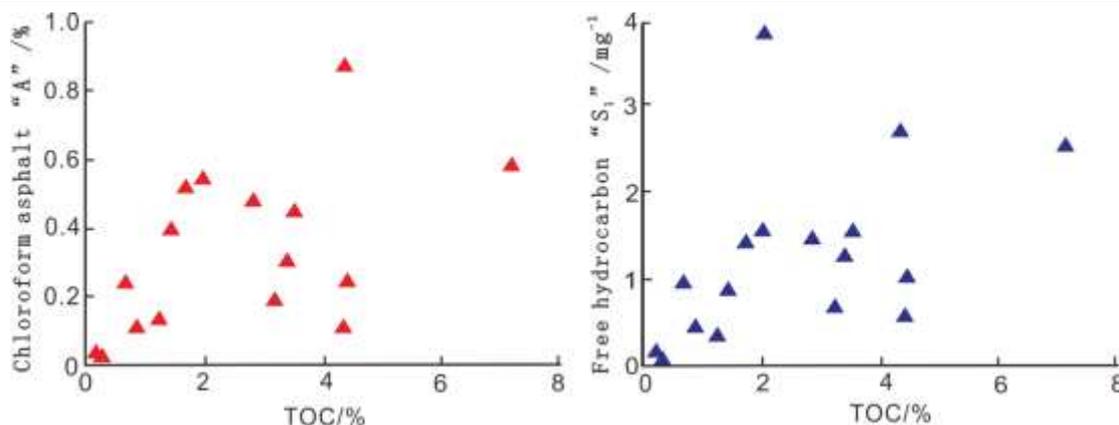


Fig-1: Shale oil content and TOC relationship

Characteristics of the mineral composition of shale

Different mineral composition, shale pore types and structure. Quartz minerals of the rigid, conducive to the preservation of intergranular pore; feldspar as unstable mineral, easy along the cleavage formation solution pore and fracture; carbonate minerals are easily dissolved form particle occasionally intragranular dissolved pore, and easy to re crystallization to form intergranular pore. Clay minerals is curl slice, intergranular pore is widely developed [5]. Composed of different minerals also control shale brittleness, late effects of storage layer modification effect. Quartz, calcite, brittle mineral content is high, more prone to natural fracture, fracturing in late, but also easy to form complex induced crack and cause the extension of the fracture network and connectivity. The clay mineral is

easy to plastic deformation, easy to plug the flow channel, is not conducive to the transformation of the late reservoir.

Characteristics of shale reservoir permeability space

Domestic and foreign scholars in the shale reservoir in space and shale pore evolution do a lot of research, it is considered that the shale reservoir space can be summarized into four categories: intergranular pore, intragranular pore, organic matter of pore and fracture. Pore network development depending in mineral composition and structure, and organic matter content and types is crucial to the development of organic pore, pore types and diagenesis are closely related [3].

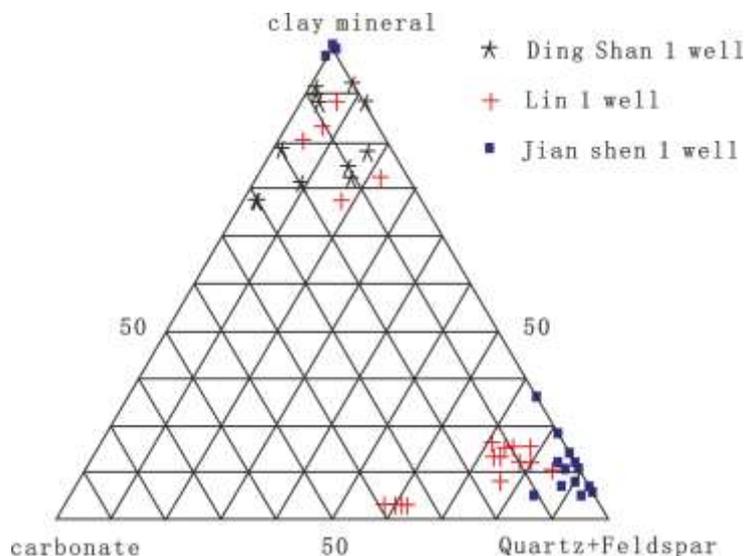


Fig-2: Mineral composition triangle

ACCUMULATION MECHANISM OF SHALE OIL

Shale oil is a stranded aggregation cause is shale rocks not discharge or expulsion after the residual crude oil, crude oil is not by migration or having only primary migration is typical authigenic reservoir accumulation model [4]. In organic rich shale last stage of oil generation, oil in the shale reservoir layer stranded

aggregation, affected by reservoir space structure, pro medium oil / water and crude oil properties of different factors control, oil shale mainly in free, adsorption and dissolution of occurrence in shale formations of large cracks, matrix porosity and micro cracks or other lithologic interlayers. In the oil window rich organic shale may gather shale oil, oil-bearing area, the

reservoir continuous distribution is the characteristics of shale reservoir oil by rich organic shale distribution control.

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