

Geochemical Characteristics and Sedimentary Paleo-environment of Organic Matter-rich Mudrock of Paleogene Dongying Formation in Nanpu Sag

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According to the geochemical analysis of organic matter-rich sediments, element geochemical and organic geochemical characters of mud rocks of Paleogene Dongying Formation in Nanpu Sag were detailed studied. The results show that the 3rd member of Dongying Formation (Ed₃) develop a set of source rock, characterized by relatively high TOC(0.92%), which was mainly developed in the lacustrine depositional environment. Ro ranges from 0.41% to 1.28%, with the average of 0.71%, showing the low mature – mature stage. HI index is relatively low, referring to the type II2 and III kerogen. The $\delta^{13}C$ value ranges from -29.70 ‰ to -23.48‰, with the average of -26.41‰, indicating the mixed origin of higher plants and aquatic organism. Moreover, the ratio of Pr/Ph is 0.94~1.00, revealing the dysoxic to relatively anoxic depositional environment. Medium gammacerane index mirrors the brackish depositional environment, corresponding to the inorganic geochemical characteristics of w(Sr)/w(Ba) (0.13) and w(B)/w(Ga) (2.5). The ratios of w(V)/w(V+Ni) ranges from 0.48 to 0.80, with the average of 0.69, reflecting the weak water column delamination of dysoxic to relatively anoxic depositional environment. In addition, obvious gravity flow deposits and bioturbation can be observed through core observation, which can increase the oxygen content of water column, leading the oxidization of organic matter. The burial history map shows that the depositional rate of Ed₃ formation reaches 250m/MA. In all, the dysoxic to relatively anoxic depositional environment is favorable to the preservation of organic matter, however, such fast depositional rate and obvious gravity flow deposits result in the general quality of source rock of Paleogene Dongying Formation in Nnapu Sag.

Funded by National Science and Technology Major Project-Key techniques for precise exploration of Bohai Bay Basin—Petroleum accumulation law and reserves-increase area of Nanpu Sag (2016ZX05006-006)