The Identification Mark and Present Situations of Marine Hydrate

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1 Abstract

Gas hydrates receive serious attention around the world as a potential energy in the future. The breakthrough of hydrate formation, kinetics of hydrates decomposition, solid gas storage, using kinetic inhibitor to replace traditional thermodynamical inhibitors and the relation between gas hydrate and global environment change forms a research pattern based on the basic research, pipeline hydrate inhibition technology, solid gas storage, hydrate separation of gas mixture, gas hydrate exploration and development, greenhouse gas hydration capture and storage. Even though, there’re still some shortcomings in the identification of marine hydrates. This article proposed a method combined seismology, geology and geochemical analysis to predict gas hydrate distribution quantitatively. First, we use some geological phenomena like pits, cold seep carbonates, chemosynthesis biota to set the favorable zone for hydrate accumulation. Next, according to typical geophysical methods like Bottom-simulating reflector (BSR), gas chimney, AVO bright spot, seismic inversion technology, we judge the rich hydrate accumulation zone qualitatively. We analyze gas hydrate sediments and thickness, porosity, saturation, fluid property of sediments with free gas, the relation between the composite construction change and seismic reflection features to predict hydrate enrichment zone. Taking the South China Sea as example, the gas hydrate there has three characteristics: ① Gas hydrate bearing sediments is clay with forams or silty clay with forams. And high saturation hydrate is evenly distributed in sediments. ② Gas hydrates are vertically distributed in BSR, about 25m in depth. ③ Gas hydrates are consistent with strong BSR reflection seismic. The horizon of gas hydrates has good BSR indication. And we use logging geophysical characteristics to judge the physical parameter of hydrates. Using conventional resistivity logging to estimate hydrate saturation. We combined NMR logging with carbon-oxygen spectral logging to calculate marine hydrate saturation. It’s worth mentioning that carbon-oxygen spectral logging offers most elements information, and establishes detailed mineral model. Therefore, using carbon-oxygen spectral logging can evaluate the saturation of gas hydrate in layers quantitatively. And last, combine the gas hydrate main components (methane and hydrocarbon) geochemical anomaly analysis which includes submarine methane abnormal, pore water chloride ions abnormal, pore water δ18O ions abnormal, pore water δ18O ions abnormal, sediment geochemistry abnormal to evaluate the prospect of gas hydrate in researched area. Present popular exploitation method includes thermal excitation, depressurization, chemical injection method, conditions exploitation method, directly gain seabed method and CO2 displacement method. Each gas hydrate exploitation method has advantages and disadvantages, due to the complicated geological conditions, none is really into production in China until now. Only combining the advantages of different methods can exploit hydrate economically and effectively.

References

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