Study on the preparation and measurement of properties of oil-base magnetic fluids

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ABSTRACT

Magnetic fluid is a suspension of nano-sized magnetic particles which coated surfactant, dispersed in carrier such as water or organic solvents.When magnetic field is applied to magnetic fluid, the magnetic particles along with carrier will move in the direction of magnetic field. Therefore magnetic fluid is the suspension solution holding properties of magnetism and fluid. In this research, the preparation of nanometer Fe3O4 particles by co-precipitation method used concentrated ammonia water as alkaline fluid. Powder X-ray diffraction (XRD) is used to identification crystal structure of Fe3O4, and vibration sample magnometer (VSM) is used to verify superparamagnetism of Fe3O4 particles. The low-volatility oils are selected to prepare high quality magnetic fluids as surfactant and carrier. The optimal conditions of synthesis such as reaction temperature and time, proportion of ingredients, and other parameters were determined. The stability of magnetic fluid was tested by TGA and volatility test. Also magnetic fluid was applied to magnetic fluid seal to pressure resistance. Key Words: Magnetic fluid, co-precipitation method, Fe3O4 particles, low-volatility oils, magnetic fluid seal.

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