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Investigation the Effect of Different Fraction EG:H_2O Composition and pH of Base Fluid on the Stability of TiO_2 Nanofluid

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Abstract

Numerous studies show that a tiny quantity of nanoparticles that have been added to conventional fluids improves thermo-physical properties significantly. This research focuses on improving and evaluating thermal fluid stability and thoroughly investigates various factors contributing to the enhancement of the thermophysical properties of the base fluid. The initial stage of the preparation of nanofluid is the synthesis of nano-sized solid particles using a suitable technique, and these particles then are dispersed in base fluids such as Ethylene Glycol, and distilled water. This research focuses on the sonication process and pH modification as two strategies for maintaining the stability of nanofluids. Visual observation of base fluid composition (EG: H_2O), zeta potential analysis, and UV-Vis spectroscopy are frequently used methods to analyze the stability of nanofluids. Previous research discovered that types of nanoparticle, particle volume concentration, pH, temperature, and base fluids all have a major influence on the stability of nanofluid properties. The preceding mass ratios are as follows: 20:80, 40:60, 60:40, 80:20, and 100, and the weight of TiO_2 is 0.077 g with a volume fraction of 0.1 %. When the EG and distilled water ratios reached 80:20 and 100 EG at pH 5, the particle size of TiO_2 was 21nm and the stability of TiO_2 was substantial. Finally, this research also presented the findings and strategies to enhance the stability of the properties as well as the factors influencing TiO_2 nanofluid stability.

Keywords: Titanium dioxide; Ethylene glycol; Nanoparticle; Nanofluids; Stability; UV-Vis Spectroscopy; Zeta potential.