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**Experimental investigation on abosrption performance of nanofluids for CO2 capture**

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**Abstract**

Lately, absorption of carbon dioxide using nanofluids has gained more attention as this acidic gas creates global warming effect. The absorption test was conducted in a custom designed high-pressure vessel made up of stainless steel 316 L, where CO2 and nanofluid are in direct contact at static state. The type of nanoparticles and influence of its concentration on absorption of carbon dioxide are analyzed. TiO2 and Al2O3 nanofluids at 0.02–0.14wt.% concentrations are prepared by dispersing in DI water. The CO2 absorption tests were carried out for the above-mentioned nanofluids at said concentrations with operating conditions being an initial pressure of 3 bar and initial temperature of 302K. The results show that relative absorption index (RAI) of CO2 absorption has increased to a maximum and then decreased with increase in nanoparticle concentration. The aqueous-based TiO2, Al2O3 nanofluids are found to be most effective at 0.1 and 0.14wt.%, respectively, with RAI showing 39.81% and 22.3% increase in CO2 absorption as compared to basefluid, respectively. The absorption test has also been conducted for saline-based TiO2 and Al2O3 nanofluids at 1, 2, 3 and 3.1wt.% of salt concentration. The stability of saline-based nanofluids was analyzed using turbidity meter. It was found that increase in salt concentration decreases the stability of nanofluids and also decreases the CO2 absorption rate because of unstability of nanoparticles in salt solutions. Absorption decreased by 11.93% for TiO2, and 5.68% for Al2O3, when salt concentration was increased from 1 to 3.1wt.%.

**Keywords:**

[CO2 absorption](https://www.worldscientific.com/keyword/CO2%2BAbsorption), [nanofluids](https://www.worldscientific.com/keyword/Nanofluids), [relative absorption index](https://www.worldscientific.com/keyword/Relative%2BAbsorption%2BIndex), [stability of saline water nanofluids](https://www.worldscientific.com/keyword/Stability%2BOf%2BSaline%2BWater%2BNanofluids), [direct contact system](https://www.worldscientific.com/keyword/Direct%2BContact%2BSystem)

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