

## Performance improvement in mobile air conditioning system using Al<sub>2</sub>O<sub>3</sub> /PAG nanolubricant

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### ABSTRACT

This paper presents the investigation of Al<sub>2</sub>O<sub>3</sub>/PAG nanolubricant performance for a compact vehicle mobile air conditioning (MAC) system. The Al<sub>2</sub>O<sub>3</sub>/PAG nanolubricant in this study is prepared by using two-step preparation method and stabilized using 4-Step UV–Vis Spectral Absorbency Analysis. An enhancement in the coefficient of performance (COP), reduction in compressor work, and enhancement in the cooling capacity of MAC employing Al<sub>2</sub>O<sub>3</sub>/PAG nanolubricant are recorded up to 31%, 26% and 32%, respectively, for 0.010% volume concentration. The current MAC performance is compared with MAC employing SiO<sub>2</sub>/PAG nanolubricant from previous study. The comparison shows that the Al<sub>2</sub>O<sub>3</sub>/PAG nanolubricant has better performance in term of cooling capacity, compressor work, and COP at an average of 6%, 8%, and 33%, respectively. Therefore, the finding from this study suggests Al<sub>2</sub>O<sub>3</sub>/PAG nanolubricant with a volume concentration of 0.010% as an optimum and best performance nanolubricant for MAC systems.

### KEYWORDS

Nanolubricant; Air conditioning; Cooling capacity; Heat absorb; Compressor work; Coefficient of performance (COP)