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Thermophysical Properties of Heavy Water and Pertinent Calculations

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Heavy water consists of molecules of deuterium oxide. Heavy water is used in applications that require the special nuclear properties of a deuterium (hydrogen-2) atom. These applications have included solar-neutrino detectors and nuclear-fission reactors. The thermophysical properties of heavy water have been considered in such applications. Since the mass of a deuterium-oxide molecule is about 11% greater than the mass of a typical hydrogen-oxide molecule, the thermophysical properties of heavy water differ significantly from the thermophysical properties of ordinary water ("light water"). The present study involved two fluids: heavy water and ordinary water. The liquid-vapour coexistence curves of the two fluids were compared. The accuracy of empirical formulations and theoretical expressions for thermophysical properties was examined. Thermophysical properties, such as specific volume, specific heat capacities, thermal conductivity and viscosity, were studied. Calculations for heavy-water systems ought to be based on information for heavy water.

Author: Dr VARTY, Robert L. (Consultant in Engineering Science)

Presenter: Dr VARTY, Robert L. (Consultant in Engineering Science)

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