

PHYSICAL AND THERMODYNAMIC PROPERTIES OF WATER IN THE LIQUID PHASE

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Keywords: Compressibility, Dielectric, Fugacity, fusion, Specific heat, Surface tension, Viscosity

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Summary

Several thermodynamic and transport properties of pure water are referenced. Properties of the compressed liquid phase are tabulated at various temperatures and pressures.

1. The Phases of Pure Water

At atmospheric pressure, depending on temperature, water may exist as solid (ice), liquid (water) or gas (water vapor/steam). In desalination, thermodynamic properties of the three phases at different pressures and temperatures are important properties, as are the transport properties in the liquid and vapor phases.

2. Properties of Saturated Water and Steam

The *PVT* data of H₂O and the derivation of thermodynamic properties and the correlating equations for thermodynamic properties are attributed to Keenan and Keyes (1936). Today the thermodynamic and transport properties of the pure substance are available up to 1 kbar and 1000K by equations, tables, charts and computer programs in many references. The ASME steam tables (1983 and updated in 1994) is a comprehensive reference.

An overview of all the thermodynamic properties are shown in a classical *T-S* diagram, by Reynolds (1979), showing the three phases of H₂O and mapping:

Pressure .0001-100 MPa, Temperature 240-1000K, Specific Volume .004-40 m³ kg⁻¹, Enthalpy 0-4000 kJ kg⁻¹, Entropy - 1-10 kJ kg⁻¹ - K.

Any two properties determine the rest of properties.

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Bibliography and Suggestions for further study

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