Designation: D 4651 – 93 (Reapproved 1998)

Standard Specification for Isobutane Thermophysical Property Tables[1]

This standard is issued under the fixed designation D 4651; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 The isobutane thermophysical property tables are for use in the calculation of the pressure-volume-temperature (PVT), thermodynamic, and transport properties of isobutane for process design and operations. Tables are provided for gaseous and liquid isobutane at temperatures between 135 and 600K at pressures to 35 MPa. These tables were developed by the National Institute of Standards and Technology (formerly the National Bureau of Standards) upon culmination of four years of effort in acquiring available physical properties data, performing experimental measurements, and in formulating these tables for use in thermal computations.

2. Sponsorship

2.1 The preparation of the tables and supporting work was done by the National Institute of Standards and Technology (NIST) under the sponsorship of the Gas Research Institute, the American Gas Association, and the Standard Reference Data Program of NIST.

3. Applicability

3.1 These tables apply directly only to pure gaseous and liquid isobutane. However, it is expected that they will find substantial use in mathematical models and tables for the thermophysical properties of mixtures containing isobutane, such as natural gas.

4. Tables

4.1 These thermophysical property tables[2] are:

4.1.1 *Thermophysical Properties of Coexisting Gaseous and Liquid Isobutane*, in SI units (Table in Appendix H, pp. 722–724).[3]

4.1.2 *Thermophysical Properties of Isobutane*, along isobars, in SI units (Table in Appendix H, pp. 725–757).[3]

4.2 These tables were produced by equations from a computer package. "NIST Thermophysical Properties of Fluids Database 12" (also designated MIPROPS) of the Standard Reference Data Program of NIST.[4] A wide selection of units (SI units, engineering units, chemical units) are available with this program.

5. Additional Information

5.1 These tables were originally published by the American Chemical Society and the American Institute of Physics for the National Institute of Standards and Technology in a comprehensive report titled "Thermophysical Properties of Fluids. II. Methane, Ethane, Propane, Isobutane and Normal Butane."[5] This report also contains the following:

5.1.1 Properties and uncertainties data.

5.1.2 Correlation equations for isobutane.

5.1.3 Description of the research study culminating in the tables.

5.1.4 References to properties data.

5.1.5 Computational methods used.

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[1] This practice is under the jurisdiction of ASTM Committee D-3 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.08 on Thermophysical Properties.

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[2] Supporting data are available from ASTM Headquarters. Request RR:D03-1005.

[3] *Journal of Physical and Chemical Reference Data*, Vol 16, 1987.

[4] Available from Standard Reference Data, National Institute of Standards and Technology (NIST), Bldg. 221, Room A320, Gaithersburg, MD 20899.

[5] Younglove, B.A., and Ely, J.F. *Journal of Physical and Chemical Reference Data*, Vol 16, 1987, pp. 577–798. Available from the American Chemical Society, Distribution Office, 1155 Sixteenth St., N.W., Washington, DC 20036-9976.