Asexual state: *Histoplasma capsulatum* Darling, 1906.

Habitat: Soil.

Holotype: Formalin treated and dried agar cultures of BPI 71811 (my designation of T-3-1 × T-4-2); paratypes: BPI 71812 (T-3-1) and BPI 71813 (T-4-2) have been deposited in the Herbarium, National Fungus Collection, U.S. Department of Agriculture, Beltsville, Maryland.

Living cultures of T-3-1 (ATCC 22635) and T-4-2 (ATCC 22636) have been deposited in the American Type Culture Collection, Rockville, Maryland, and with the Centraalbureau voor Schimmelcultures, Baarn, The Netherlands: CBS 136.72 (T-3-1), DBS 137.72 (T-4-2).

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Limitations of the Hildebrand-Batschinski Shear Viscosity Equation

Hildebrand (*1*) recently reviewed and extolled the merits of an empirical viscosity equation originally proposed by Batschinski (*2*) for simple liquids. The equation is of the form

$$\phi \equiv \frac{1}{\eta} = a_1V + a_2 \qquad (1)$$

where a_1 and a_2 are empirical constants and V is the molar volume of the liquid with shear viscosity η or fluidity ϕ.

The apparent simplicity of a volume dependence for fluidity is most appealing in practice, particularly for correlations of molecular structure with fluidity.

In our analysis of the validity of the Batschinski equation we were interested primarily in its usefulness in fitting and smoothing empirical data and less in its theoretical implications and foundations. In selecting relevant viscosity data for liquids from the open literature we adopted the following criteria: (i) Selected data were of the highest precision and accuracy consistent with relatively wide pressure and temperature ranges. (ii) We examined data for key liquids representative of types of substances that cover a wide range of intermolecular forces, namely, simple van der Waals fluids, such as the normal alkanes; and at the other extreme, for substances with specific interactions, such as the hydrogen-bonded liquid, normal pentanol.

Ordinarily, high-precision viscosity measurements at ambient pressure are made with capillary viscometers for which the measured variables are temperature and kinematic viscosity, $\nu = \eta/\rho$, the ratio of the shear viscosity and density. For this reason, Eq. 2 was used for the analysis:

$$\nu^{-1} = a_3\rho + a_4 \qquad (2)$$

Equation 2 is equivalent to Eq. 1 with $a_4 = Ma_1$ and $a_3 = a_2$, where M is the molecular weight.

Table 1 is a comparison of the deviations (d) for values of ν^{-1} calculated from Eq. 2 (by using values of a_3 and a_4 determined by the method of least squares) with the estimated experimental uncertainties for the selected kinematic viscosity data.

It can be seen that the simple form of Eq. 1 or Eq. 2 will not satisfactorily represent the experimental data for the four substances, *n*-hexane, *n*-decane, *n*-heptadecane, or 1-pentanol over reasonable temperature ranges, within experimental uncertainties. In each case the deviations of the calculated reciprocal viscosities are both systematic and in excess of experimental uncertainty.

The Newtonian shear viscosity at zero shear rate may reasonably be regarded as an intensive thermodynamic variable of state. From this point of view it is not at all surprising that the viscosity or fluidity is not a function of a single thermodynamic variable, such as the volume.

Table 1. Comparison of the estimated experimental uncertainties (U) with the deviations (d) for values of ν^{-1} calculated from Eq. 2 with a_3 and a_4 determined by the method of least squares.

U (%)	d (%)	t (°C)	P (atm)	Ref.	U (%)	d (%)	t (°C)	P (atm)	Ref.
		n-*Hexane*					n-*Decane*		
0.4	4.26	45.23	1	(*3*)	1.5	−6.5	37.8	13.6	(*6*)
0.3	3.63	36.86	1	(*3*)	1.5	−7.4	37.8	68.0	(*6*)
0.2	2.31	23.11	1	(*3*)	1.5	1.1	37.8	272	(*6*)
0.2	2.19	20.91	1	(*3*)	1.5	6.4	37.8	544	(*6*)
1.0	2.87	20.0	1	(*4*)	1.5	−6.1	71.1	13.6	(*6*)
0.2	0.09	4.24	1	(*3*)	1.5	−3.8	71.1	54.4	(*6*)
0.2	−0.71	−2.37	1	(*3*)	1.5	−2.1	71.1	136	(*6*)
0.2	−1.44	−6.45	1	(*3*)	1.5	1.5	71.1	476	(*6*)
1.0	−0.80	−20.0	1	(*4*)	1.5	−2.3	104	13.6	(*6*)
1.0	−2.77	−40.1	1	(*4*)	1.5	0.5	104	54.4	(*6*)
1.0	−5.47	−60.1	1	(*4*)	1.5	1.7	104	204	(*6*)
1.0	−6.32	−80.2	1	(*4*)	1.5	1.4	104	408	(*6*)
1.0	−2.41	−90.3	1	(*4*)	1.5	2.2	137	13.6	(*6*)
1.0	−0.66	−92.3	1	(*4*)	1.5	0.6	137	136	(*6*)
1.0	0.11	−94.3	1	(*4*)	1.5	0.6	137	408	(*6*)
1.0	1.31	−95.7	1	(*4*)	1.5	5.8	171	13.6	(*6*)
1.0	1.32	−96.3	1	(*4*)	1.5	7.4	171	54.4	(*6*)
1.0	3.11	−96.8	1	(*4*)	1.5	4.4	171	68.0	(*6*)
1.0	4.35	−97.5	1	(*4*)	1.5	1.0	171	340	(*6*)
1.0	5.61	−98.5	1	(*4*)			*1-Pentanol*		
		n-*Heptadecane*			0.1	15.8	−18.27	1	(*3*)
0.2	4.07	22.00	1	(*5*)	0.1	−6.05	−10.25	1	(*3*)
0.2	−7.98	50.00	1	(*5*)	0.1	−14.2	−0.90	1	(*3*)
0.2	−2.17	99.71	1	(*5*)	0.1	−12.1	9.963	1	(*3*)
0.3	6.28	149.97	1	(*5*)	0.05	−1.00	25.000	1	(*3*)
0.5	13.01	201.26	1	(*5*)	0.05	2.70	29.575	1	(*3*)
0.6	16.52	248.46	1	(*5*)	0.1	11.8	40.000	1	(*3*)
0.8	19.20	300.6	1	(*5*)	0.4	27.1	60.000	1	(*3*)
					1.2	38.5	79.147	1	(*3*)

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