Refractive Index of Some Alcohols and Saturated Hydrocarbons at 6328 A.

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Refractive index changes with temperature of pure liquids, specifically alcohols and alkanes, are presented for the gas laser frequency, 6328 A.

THE REFRACTIVE INDICES of a homologous series of alcohols, normal and branched-chain, have been taken at the gas laser frequency 6328 A. in 5° C. temperature steps near room temperature and for normal alkanes from pentane to decane. Long-path laser interferometry has been made possible by the gas laser. Published refractive index data at the most common continuous laser wave length 6328 A. are sparse. The data were obtained for use in diffusion and thermal conductivity by interferometry.

Table I. Source of Materials

1-Propanol	Fisher certified reagent, catalog No. A414		
2-Propanol	Fisher certified reagent, Catalog No. A416		
1-Butanol	Fisher certified reagent, suitable for fluorometric use, Catalog No. 399	Hexyl alcohol	Eastman Organic Chemicals, practical
2-Methyl-1-propanol	Shawinigan, suitable for fluorometric use	Pentane, Hexane, Heptane, Octane, Nonane, Decane	Phillips Petroleum Special Products Division, pure grade (99 mole % minimum purity)
n-Amyl alcohol (1-pentanol)	Fisher certified reagent, Catalog No. A394		
Isoamyl alcohol (3-methyl-1-butanol)	Analar analytical reagent, suitable for milk analysis		

Table II. Refractive Index of Some Alcohols

λ = 6328 A.

Temp., ° C.	1-Propanol	2-Propanol	1-Butanol	2-Methyl-1-propanol	*n*-Amyl alcohol	Isoamyl alcohol	Hexanol
5.4	1.39110	1.38359	1.40474	1.40178	1.41525	1.41318	1.42393
10.0	1.38905	1.38100	1.40249	1.39960	1.41325	1.41115	1.42205
15.0	1.38747	1.37959	1.40112	1.39807	1.41174	1.40957	1.42046
20.0	1.38575	1.37763	1.39939	1.39616	1.40998	1.40780	1.41878
25.0	1.38382	1.37560	1.39748	1.39437	1.40822	1.40598	1.41704
30.0	1.38196	1.37362	1.39562	1.39244	1.40645	1.40415	1.41524
35.0	1.38023	1.37164	1.39382	1.39063	1.40468	1.40237	1.41349
40.0	1.37854	1.36972	1.39207	1.38885	1.40296	1.40064	1.41191
45.0	1.37653	1.36774	1.39026	1.38692	1.40118	1.39885	1.41004
50.0	1.37474	1.36580	1.38844	1.38510	1.39945	1.39694	1.40833

Table III. Refractive Index of Saturated Hydrocarbons

Temp., ° C.	Pentane	Hexane	Heptane	Octane	Nonane	Decane
5.0	1.36605	1.38253	1.39460	1.40403	1.41162	1.41780
10.0	1.36337	1.38021	1.39244	1.40200	1.40975	1.41599
15.0	1.36099	1.37793	1.39032	1.40004	1.40780	1.41413
20.0	1.35802	1.37553	1.38807	1.39778	1.40568	1.41197
25.0	1.35575	1.37313	1.38581	1.39574	1.40373	1.40998
30.0	1.35247	1.37046	1.38332	1.39339	1.40141	1.40786
35.0	1.35031	1.36848	1.38143	1.39153	1.39969	1.40615
40.0	1.34803	1.36580	1.37892	1.38942	1.39754	1.40403
45.0	...	1.36350	1.37659	1.38723	1.39544	1.40200
50.0	...	1.36111	1.37455	1.38510	1.39327	1.39992

EXPERIMENTAL

A Pulfrich refractometer, whose accuracy specified by the manufacturer was ±0.00002, was used throughout. The thermostating liquid was controlled to ±0.1° C. and the effluent temperature was monitored. No readings were taken until the effluent temperature was within 0.5° C. of the thermostat temperature. The inlet temperature was set 0.25° C. above the quoted temperature and the 0.5° C. temperature drop assumed to be symmetrical around the cell. It is believed that this is within 0.1° C. of the correct temperature. Each reading was checked by a different operator. The refractometer was standardized against freshly boiled quadruple-distilled water before each series of experimental runs.

DATA

The purity of the materials used is listed in Table I.

Table II gives the refractive index of the straight-chain alcohols from propanol to hexanol plus some of the branched-chain alcohols in the series at temperatures from 0° to 50° C. in 5° increments.

Table III gives the refractive index of the saturated hydrocarbons from pentane to decane over the same range of temperature.

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