



Verification of suggested formula (ADJ) by water at different temperatures

S. S. Andher

Department of Chemistry, The H. N. S. B. Ltd. Science College, Himatnagar, Gujarat, India

ABSTRACT

Refractive indices and Densities of water have been studied at different temperatures. The data obtained is utilized to determine specific refraction. On comparison the specific refraction values with suggested formula (ADJ) gives nearly to the Lorentz and Lorenz formula.

Key words: Refractive Indices, Densities, Specific Refraction

INTRODUCTION

Refractive index and density are important parameters of organic liquids [1]. Earlier many scientists have been studied the various formulae [2-4]. The present work deals with the study of specific refraction at different temperatures.

EXPERIMENTAL SECTION

For density measurement, all the weightings were made on Contech balance having accuracy (0.001gm). The refractive indices of water at different temperatures were measured using by Abbe's Refractometer ranging reading from 1.3000 to 1.7000. The temperature of prism box was maintained constant by circulating water from thermostat at 20°C-30°C ($\pm 0.1^\circ\text{C}$). The Refractometer was calibrated using glass test pieces of known refractive index supplied with the instrument. The Specific Refraction of water at different temperatures were determined using Lorentz-Lorenz [7] equation and Andher Desai and Joshi's [8] Formula.

$$R = \frac{n^2 - 1}{n^2 + 2} \cdot \frac{1}{d} \dots\dots\dots(1)$$

$$R = \frac{1}{9} \left[\frac{3n - 2.47}{d} + 0.557 \right] \dots\dots\dots(2)$$

The calculated values of specific refraction are shown in Table 1

Table 1: Experimental Refractive Index (n), Densities (d), Specific Refraction(R) at various temperatures

Temperature °c	Refractive index(n)	Density (d)	Specific Refraction Lorentz & Lorenz	Specific Refraction Andher Desai & Joshi	Differences L&L-ADJ
20	1.333	0.9982	0.2061	0.2321	-0.026
21	1.3329	0.9981	0.2061	0.2321	-0.026
22	1.3358	0.9978	0.206	0.2321	-0.026
23	1.3327	0.9976	0.206	0.2321	-0.0261
24	1.3326	0.9973	0.206	0.2321	-0.0261
25	1.3325	0.9971	0.206	0.2321	-0.0261
26	1.3324	0.9969	0.206	0.2321	-0.0261
27	1.3323	0.9965	0.206	0.2321	-0.0261
28	1.3322	0.9963	0.206	0.2321	-0.0261
29	1.3321	0.996	0.206	0.2321	-0.0261

RESULTS AND DISCUSSION

The present investigation considers the refractive indices and densities measurement of water at different temperatures. The results obtained of specific refraction are reported in Table 1. From the results it may be observed that the suggested formula (ADJ) gives nearly values to the Lorentz and Lorenz formula.

CONCLUSION

Densities and Refractive Index of water were measured at different temperatures. Specific refraction was calculated using Lorentz and Lorenz and Andher Desai and Joshi's formula. It can be concluded that the specific refraction values for the water at different temperatures are between 0.02060 to 0.02061 with Lorentz and Lorenz formula and 0.0231 within Andher Desai and Joshi's Formula.

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