is pass through beam expander to improve beam quality and split by the beam splitter in to two beams, these two beams were reflected back by two mirrors. The cell with the water sample was place in one of the two interferometer arms, at the exit of the interferometer the in interference fringes it observation shown in figure (2) and we can counted it's with changing a temperature.

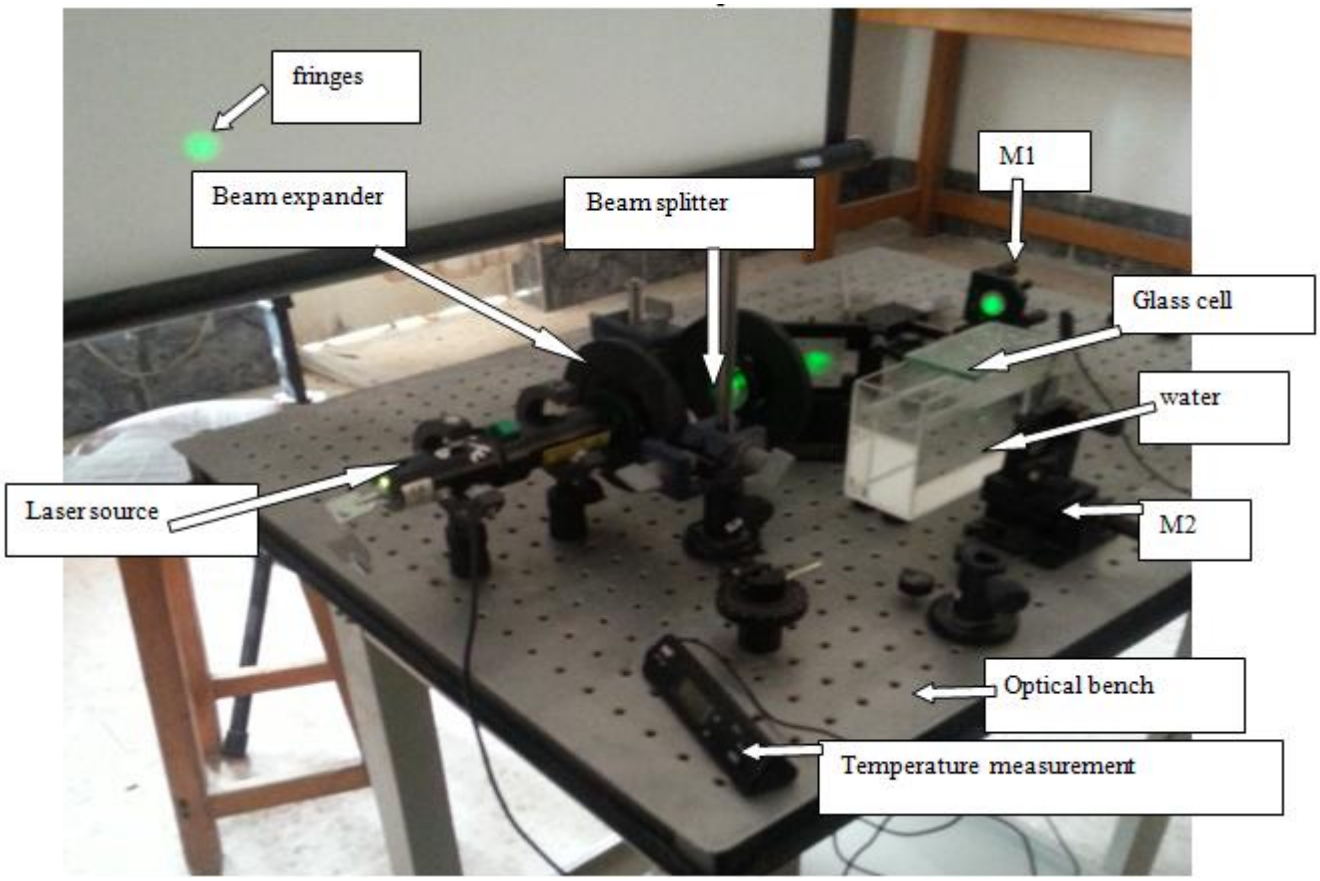

Figure 1: Experimental setup to measure the refractive index of water as a function of temperature

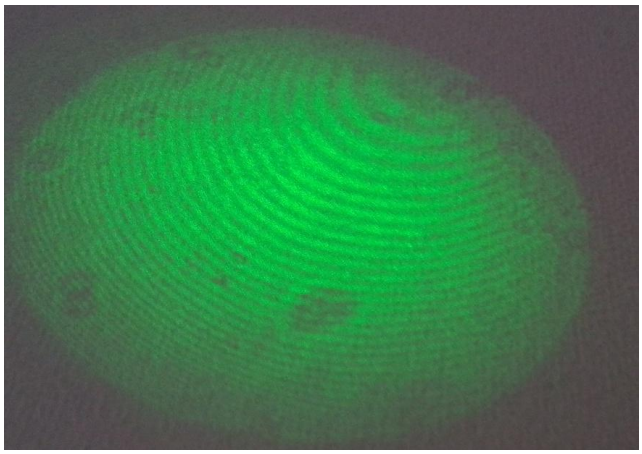

Figure 2: Produce Fringes

Another a glass cell with dimensions d1=10mm and d2 =20mm used for this experiment is placed on the rotation stage it rotating in order to select the desired angle of incidence. A photograph of the experiment setup used is show in figure (3).

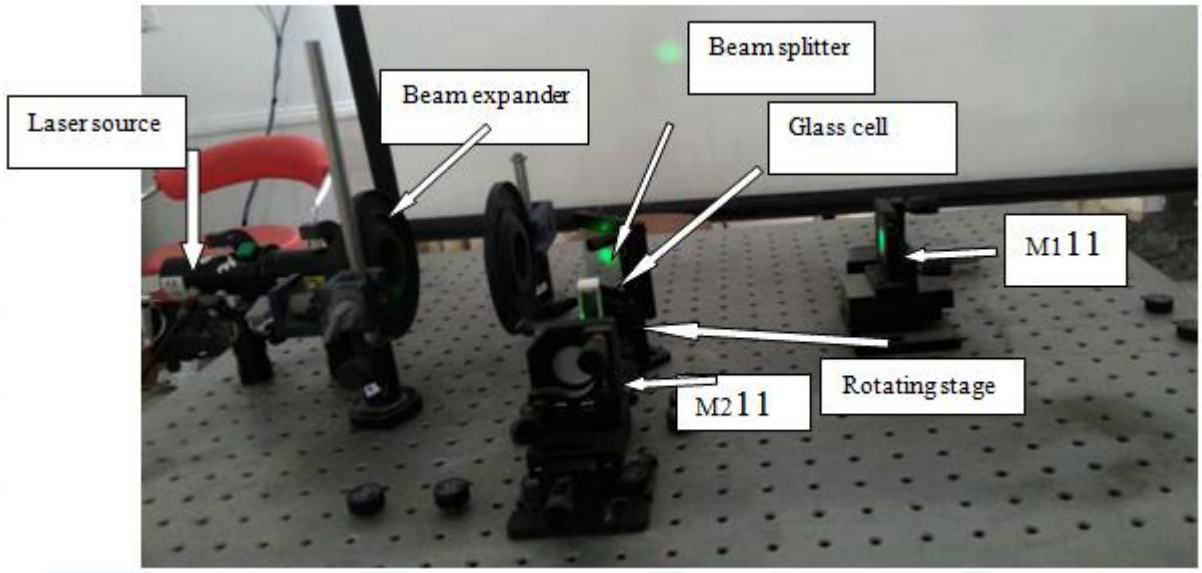

Figure 3: experiment setup of measure the Refractive index of water as a function of potassium chloride solution concentration

Also the rotating stage with glass cell was place in one of the two interferometer arms, then the laser beam must be perpendicular with walls of cell (θ=0). this was checked by rotation of the cell and observation of the interface fringes. After this step we can change the concentration of water sample and observation the changing in interference fringe also counted.

4. Result and Discussions

4.1-Effect of Temperature on Refractive Index of pure Water

To determined the refractive index of pure water, a temperature is gradually reduce until reach laboratory temperature, during this process the interference fringes draw together and alternating darkness and light is observed at the center. The number of (N) appearing is plotted against the corresponding values of pure water temperature is shown in figure (4).

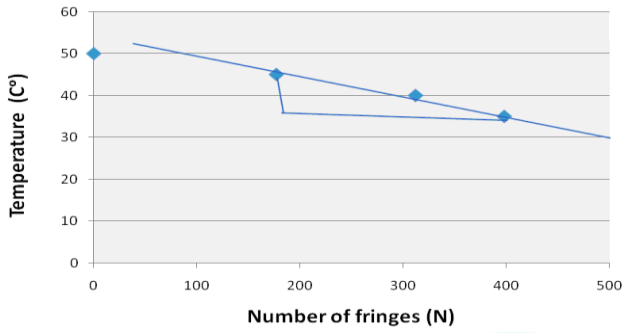

Figure 4: Number of N changes as a function of temperature

From the above figure we found the straight line (ΔN/ΔT) is equal (0.045), also Using equation (1) (with L= 55 mm, λ= 532 nm and n1 [T30 ^{o}C= 1.331) to found the change of refractive index related degree of temperature (dn/dT) is equal (2.1×10-4 c^{-1}) Corresponding the values found and used equation (2), plotted the changes of refractive index as a function of temperature is shown in figure (5).The result shows a linear dependence of refractive index of water on temperature in the range (30-50 C^{0}). For temperature 50 C^{0} refractive index is lower value (1.317) which greater to (1.325) at temperature 30 C^{0}.The change in refractive index corresponding the change of density of water at change the temperature.

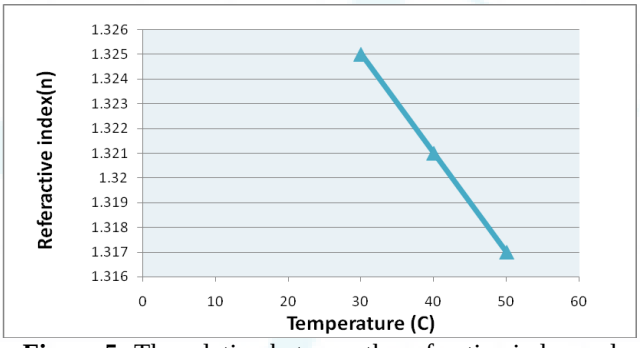

Figure 5: The relation between the refractive index and temperature

4.2- Effect of concentration on Refractive Index of Water

The Refractive Index of Water at different concentration of potassium chloride has been measured using the Michelson interferometer. The value of (N) is counted for different angle of incident is shown in table (1), from this table we observed the number of fringes (N) is nearly equal at nearly incident angles with different concentrations of NaCl.

Table 1: Number of fringes with differ concentration and incident angles

Concentrations of water (%)	*Number of fringes(N)*	*Angle incident in degree*
5	49.5	1
10	49	1
15	47	1
20	48	1

Figure (6) draw by used the information in table (1) and equation (3) is depict the dependence of refractive index of water on the concentration of NaCl, for 20% solution

refractive index is a high (1.38) which reduces to (1.3)when the solution is a concentration (5%), this result is nearly the same of pure water. The density of the solution is increased with concentration increased also increased in refractive index.

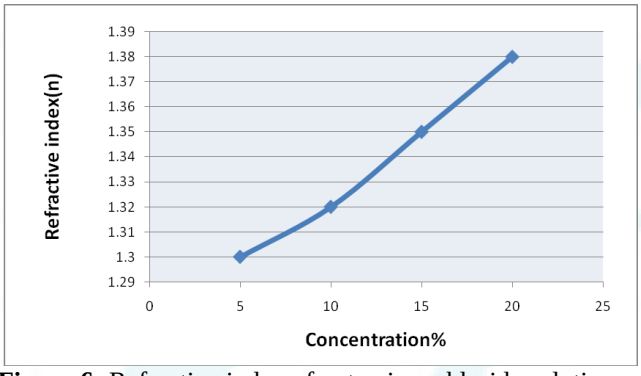

Figure 6: Refractive index of potassium chloride solution as a function of its concentration expressed in percentage

5. Conclusion

The value of refractive index measured by used the Michelson interferometer is a good agreement with their stander values.

References

[1] Jassim. M. J., R. N. Ali and Hawraa H. K., 2015, Determine the optical turbulence parameter (Cn) in Babylon City-Iraq, International journal of current engineering and technology, Vol. 5, No. 1. PP 211-226
[2] Schiebener, P., Straub, J., Sengers, J.M.H.L, Gallagher J.S., 1990, 'Refractive index of water and steam as function of wavelength, temperature and density, J. Phys. Chem, pp 677 – 71
[3] Austin R. W. and Halikas G., 1976, The index of refraction of seawater, Scripps Institution of Oceanography
[4] Stanley E.M. (1971), Refractive index of pure water for wavelength of (6328 Ä)at high pressure and moderate temperature, J. Chem. Eng. Data 16, 454 – 457
[5] Fardad K., 2013, Refractive Index and Its Application, Islamic Azad University, Babol, Iran
[6] Andy T., 2010, Measuring the Change in the Refractive Index of Water with a Michelson Interferometer, University of British Columbia Vancouver, Canada
[7] Miller, A., Hussmann, E. K., McLaughlin, W. L., 1975, Interferometer for measuring fast changes of refractive index and temperature in transparent liquids, Review of Scientific instruments, 46, 1635
[8] Ariponnammal S., 2012, A Novel Method of Using Refractive Index as a Tool for Finding the Adulteration of Oils Research Journal of Recent Sciences, 1(7), 77-79
[9] Subedi, D.P., Adhikari, D.R., Joshi, U.M., Poudel, H. N., Niraula, B. 2006 "study of temperature and concentration dependence refractive index of liquids using a novel technique" Kathmandu University Journal of science engineering and Technology Voll. II, No.1, February
[10] Satheesh K. and Abdullakutty, 2009, Determination of refractive index of mirror substrate using laser beam interferometry, Physics Education, 231