Chapter (4)
Results and Discussion

CHAPTER 4

RESULTS and DISCUSION

4.1.Refractive index measurements:

4.1.1.Introduction:

In this chapter we devoted to the experimental measurements of the refractive index and it's variation with pressure and temperature for carbon dioxide (CO_2) and freon$_{12}$ (R_{12}) gases.

From our measurements we can illustrate the dispersion curves for the two gases (carbon dioxide and freon$_{12}$). Also the measured data for carbon dioxide gas is used to determine some physical constants, which are related to the refractive index.

4.1.1.Determination of the Refractive Index of CO_2 and Freon$_{12}$ Gases:

We have used our experimental technique to determine the refractive index of CO_2 and freon$_{12}$ gases. At constant temperature, Any change of the pressure of the gas in the gas cell leads to a path difference between the two interfering beams of Mach-Zehnder interferometer, and a number of circular fringes start to cross the field of view.

By counting this number which depends on the pressure , one can get the relation between them.

Figure (4.1) show the dependence of the number of fringes ΔN on the pressure Δp at constant temperature and at 488 nm wavelength for carbon dioxide gas.

This process is repeated over a range of temperatures from 308 up to 358 °K ,and curves like that of Figure (4.1) are obtained. From these figures we calculated $(\Delta N/\Delta p)$ at constant temperatures.

The values of the refractive index can be calculated from the relation

$$n(p_s) = \frac{\lambda}{t}\frac{\Delta N}{\Delta p} p_s + 1$$

Where

n : is the refractive index;

$(\Delta N/\Delta p)$: is the slope of the curve;

λ : is the wavelength used

p : is the pressure.