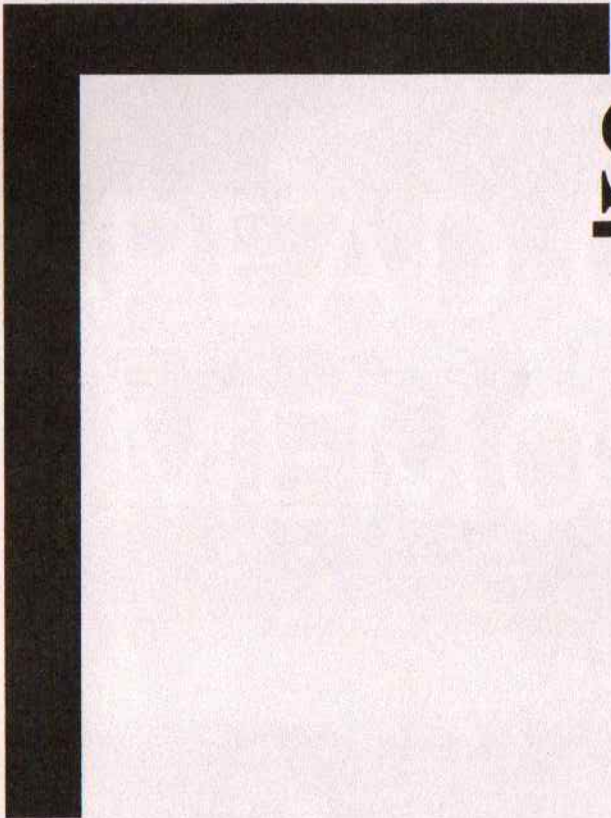
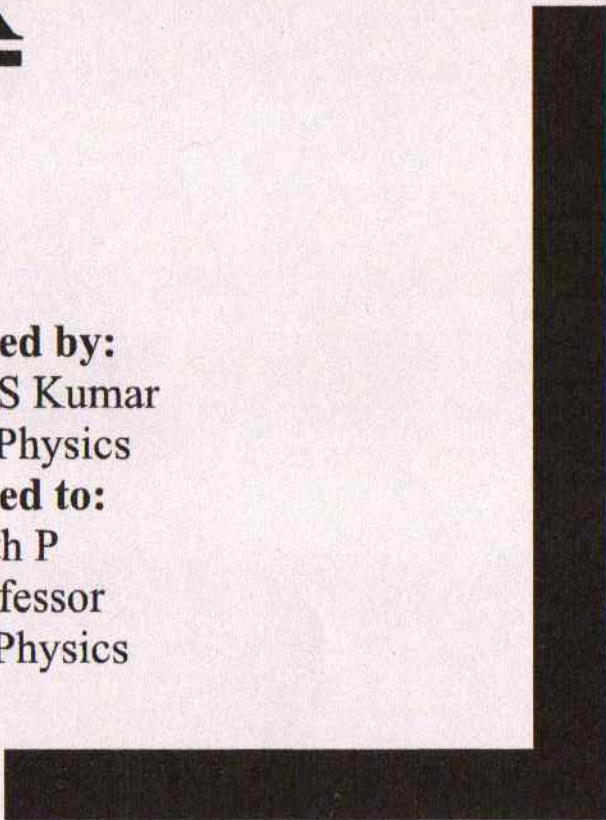




SEMINAR **REPORT**

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READ ONLY MEMORY

KRISHNA S KUMAR

1ST MSC PHYSICS

Read Only Memory(ROM)

- ❑ As the name suggests , Read Only Memory or ROM , stores information that can only be read. Modifying it is either impossible or very difficult.
- ❑ It is a type of non-volatile storage, which means that the information is maintained even if the component loses power.
- ❑ It is located on the motherboard .
- ❑ Firmware of the computer
- ❑ BIOS
- ❑ CD-ROM

ADVANTAGES

- ❏ Permanent and secure data storage
- ❏ More reliable than RAM since ROM is non-volatile and cannot be altered or accidentally changed.
- ❏ Less expensive than RAM
- ❏ Easy to test

DISADVANTAGES

- ❏ Slower type of memory
- ❏ Once the data is stored in ROM , you cannot modify, delete or overwrite it

ASSIGNMENT

- Spectroscopy -

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Microwave Spectroscopy

1. What is the change in the rotational constant B when hydrogen is replaced by deuterium in the hydrogen molecule?

→ Isotopically substituted hydrogen is denoted by primes,

$$\frac{B}{B'} = \frac{I'}{I} = \frac{\mu'}{\mu}$$

$$\mu = \frac{m_H}{2}, \quad \mu' = \frac{m_D}{2} = m_H$$

$$\frac{B}{B'} = \frac{2m_H}{m_H} = 2$$

$$B' = \frac{B}{2}$$

$$\therefore \text{change in rotational constant, } B - B' = B - \frac{B}{2} = \frac{B}{2}$$

2. The first line in the rotation spectrum of carbon monoxide has a frequency of 3.8424 cm^{-1} . Calculate the rotational constant and hence CO bond length in carbon monoxide. Avogadro number is $6.022 \times 10^{23} / \text{mol}$.

$$\Rightarrow 2B = 3.8424 \text{ cm}^{-1}$$

$$B = 1.9212 \text{ cm}^{-1}$$

$$I = \mu r^2 = \frac{h}{8\pi^2 Bc} \Rightarrow r^2 = \frac{h}{8\pi^2 \mu Bc}$$

$$\mu = \frac{m_1 m_2}{m_1 + m_2} = \frac{12 \times 16}{28 \times 6.022 \times 10^{23}}$$

$$= 1.138 \times 10^{-23} \text{ g}$$

$$r^2 = \frac{6.626 \times 10^{-34}}{8\pi^2 (1.138 \times 10^{-26}) \times (1.9212) \times (3 \times 10^8)} = 1.279 \times 10^{-20}$$

$$r = 1.131 \times 10^{-10} = \underline{\underline{1.131 \text{ \AA}}}$$

$$k = 4\pi^2 \times (3 \times 10^8)^2 (1.6261 \times 10^{-27}) (2995.2 \times 10^3)^2$$

$$k = \underline{\underline{517.8 \text{ Nm}^{-1}}}$$

5. Three consecutive lines in the rotational spectrum of a diatomic molecule are observed at 84.544 , 101.355 and 118.112 cm^{-1} . Assign these lines to their appropriate $J'' \rightarrow J'$ transitions and deduce values of B and D . Hence evaluate the approximate vibrational frequency of the molecule.

→ Frequency of $J \rightarrow J+1$ transition

$$\bar{\nu}_J = 2B(J+1) - 4D(J+1)^3$$

$$84.544 \text{ cm}^{-1} = 2B(J+1) - 4D(J+1)^3$$

$$101.355 \text{ cm}^{-1} = 2B(J+2) - 4D(J+2)^3$$

$$118.112 \text{ cm}^{-1} = 2B(J+3) - 4D(J+3)^3$$

From 1st 2 equations, $16.811 \text{ cm}^{-1} = 2B - 4D[(J+2)^3 - (J+1)^3]$

Neglecting term with D ,

$$16.811 \text{ cm}^{-1} = 2B \Rightarrow 84.544 \text{ cm}^{-1} = 16.811 \text{ cm}^{-1}(J+1)$$

$$J = \frac{84.544}{16.811} - 1 = 4.03 \approx \underline{\underline{4}}$$

∴ line at 84.544 cm^{-1} corresponds to transition from $J=4 \rightarrow J=5$.

and 101.355 cm^{-1} is due to $J=5 \rightarrow J=6$ and line at 118.122 cm^{-1} is due to $J=6 \rightarrow J=7$ transitions.

$$84.544 \text{ cm}^{-1} = 2B \times 5 - 4D \times 125 = 10B - 500D \quad \text{--- (1)}$$

$$101.355 \text{ cm}^{-1} = 2B \times 6 - 4D \times 216 = 12B - 864D \quad \text{--- (2)}$$

$$(1) \times 6 \Rightarrow 507.264 = 60B - 3000D$$

$$(2) \times 5 \Rightarrow 506.775 = 60B - 4320D$$

$$(1)-(2) \Rightarrow 0.489 = 1320D$$

$$\Rightarrow D = \frac{0.489}{1320} = \underline{\underline{3.7 \times 10^{-4} \text{ cm}^{-1}}}$$

$$\text{Substituting } D \text{ in (1)} \Rightarrow 84.544 = 10B - 500 \times 3.7 \times 10^{-4}$$

$$\Rightarrow \underline{\underline{B = 8.4729}}$$

$$\therefore \bar{\nu}^2 = \frac{4B^3}{D} = \frac{4(8.4729)^3}{3.7 \times 10^{-4}}$$

$$\Rightarrow \underline{\underline{\bar{\nu} = 2564.4 \text{ cm}^{-1}}}$$

Infrared Spectroscopy

The frequency of OH stretching vibration in CH_3OH is 3300 cm^{-1} . Estimate the frequency of OD stretching in CH_3OD .

$$\begin{aligned} \frac{\nu_{\text{OH}}}{\nu_{\text{OD}}} &= \sqrt{\frac{\mu_{\text{OD}}}{\mu_{\text{OH}}}} = \sqrt{\frac{16 \times 2}{18} \times \frac{17}{16 \times 1}} \\ &= \sqrt{\frac{34}{18}} = 1.3744 \end{aligned}$$

$$\begin{aligned} \nu_{\text{OD}} &= \frac{\nu_{\text{OH}}}{1.3744} = \frac{3300 \text{ cm}^{-1}}{1.3744} \\ &= \underline{\underline{2401 \text{ cm}^{-1}}} \end{aligned}$$