SEMINAR REPORT

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READ ONLY MEMORY

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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 accidently 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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Date : 10/08/2022

Microwave Spectroscopy

1. What is the change in the rotational constant B when hydrogen is rep[laced] by deuterium in the hydrogen molecule?

→ Isotopically substituted hydrogen is denoted by prime,

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

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

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

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

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

2. The first line in the rotation spectrum of carbon monoxide has a freque[ncy] of 3.8424 cm⁻¹. Calculate the rotational constant and hence CO bond length in carbon monoxide. Avogadro number is 6.022×10^{23} /mol.

→ $2B = 3.8424 \text{ cm}^{-1}$

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

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

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

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

$$r^2 = \frac{6.626 \times 10^{-34}}{8\pi^2 (1.138 \times 10^{-26}) \times (192.12)(3 \times 10^8)} = 1.279 \times 10^{-20}$$

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

$$k = 4\pi^2 \times (3\times10^8)^2 (1.6261\times10^{-27})(2995.2\times10^2)^2$$

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

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 $J'' \to J'$ transitions and deduce values of B and D. Hence evaluate the approximate vibrational frequency of the molecule.

→ Frequency of $J \to J+1$ transition

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

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

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

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

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

Neglecting term with D,

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

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

∴ line at 84.544 cm^{-1} corresponds to transition from $J=4 \to J=5$ and 101.355 cm^{-1} is due to $J=5 \to J=6$ and line at 118.122 cm^{-1} is due to $J=6 \to J=7$ transitions.

$$84.544\ cm^{-1} = 2B\times5 - 4D\times125 = 10B - 500D \quad \text{—(1)}$$

$$101.355\ cm^{-1} = 2B\times6 - 4D\times216 = 12B - 864D \quad \text{—(2)}$$

$(1)\times6 \Rightarrow \quad 507.264 = 60B - 3000D$

$(2)\times5 \Rightarrow \quad 506.775 = 60B - 4320D$

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

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

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

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

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

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

Infrared Spectroscopy

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

$$\frac{\nu_{OH}}{\nu_{OD}} = \sqrt{\frac{\mu_{OD}}{\mu_{OH}}} = \sqrt{\frac{16 \times 2}{18} \times \frac{17}{16 \times 1}}$$

$$= \sqrt{\frac{34}{18}} = 1.3744$$

$$\nu_{OD} = \frac{\nu_{OH}}{1.3744} = \frac{3300\ cm^{-1}}{1.3744}$$

$$= \underline{\underline{2401\ cm^{-1}}}$$