

Name: Maria Adnan Class: 1st Year (FSC-M) Date: 21-Nov-24

Test/Assignment: 5

Chemistry Question #1

- 1) Ans B ~~HA~~
- 2) Ans A
- 3) Ans A
- 4) Ans C
- 5) Ans A

Part - I Question #2

(i)

The e/m value for the positive rays is always smaller than that of electrons. It depends upon the gas used in the discharge tube. Hence heavier the gas, ^{smaller} ~~heavier~~ the e/m value ~~is~~. The positive particles of hydrogen are found to be the lightest and hence has the highest e/m value, ^{being} ~~As protons~~ are 1836 times heavier than that of electrons hence ~~being~~ have 1836 times less e/m value.

(ii)

Decrease of pressure in discharge tube for cathode ray

It has been observed the current does not flow through a gas at ordinary pressure ~~wh~~ even when 5000 volts of voltage is applied. Hence the pressure is reduced ~~th~~ by which the gas present inside the tube allows current to pass through. When voltage of 5000-10000 volts is applied. The pressure is further reduced to 0.01 torr, the original glow disappears.

(iii)

Frequency

- Frequency is the number of waves passing through a point per second
- $E \propto \nu$

Wave Number

- Wave number ($\bar{\nu}$) is the number of waves per unit length, and is reciprocal to wavelength
- $\bar{\nu} = 1/\lambda$

Part - II

Measurement of charge on Electron - Millikan's Oil Drop Method

Introduction:

In 1909, Millikan determined the charge on electron by a simple arrangement.

Apparatus:

The apparatus consists of a metallic chamber with two ports. The chamber is filled with air and the pressure is adjusted by a vacuum pump. There are two electrodes A and A'. These electrodes are used to generate an electrical field. The upper electrode has a hole in it.

Process:

A fine spray of oil droplets is created by an atomizer. A few droplets pass through the hole in the top plate and into the region between the charged plates, where one of them is observed through a microscope. This droplet, when illuminated perpendicularly to the direction of view, appears in the microscope as a bright speck against a dark background. The droplet falls under the force of gravity without applying the electric field. The velocity of the droplet is determined.

Velocity (V_1) of the droplet characteristics of droplets

- The velocity of the droplet (V_1) depends upon its weight, mg .

$$V_1 \propto mg$$

• Where 'm' is the mass of the droplet and 'g' is the acceleration due to gravity. After that the air between electrodes is ionized by X-rays. The droplet under observation takes up an electron and gets charged, if not charged already.

The electrodes A and A' are connected to a battery generate the electric field of strength 'E'. The droplet starts moving upward under the action of electric force as against the action of force of gravity mg with velocity.

$$V_2 \propto Ee - mg$$

Dividing the eq (1) by (2)

$$\frac{V_1}{V_2} = \frac{mg}{Ee - mg}$$

~~Mass of~~ Mass of droplet:

Mass of droplet is determined by varying the electric field in such a way that the droplet remains suspended in the chamber. The smallest charge found to be 1.59×10^{-9} coulombs, is equal to recent

value of charge 1.6022×10^{-19} which is considered to be unit negative charge.

