Sheet # _____

LGS GROUP OF COLLEGES
A PROJECT OF LAHORE GRAMMAR SCHOOL

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Subject: Chemistry Test No. _____ Date: 21-Nov-2024

	A	B	C	D		A	B	C	D		A	B	C	D		A	B	C	D
1	○	●	○	○	6	○	○	○	○	11	○	○	○	○	16	○	○	○	○
2	●	○	○	○	7	○	○	○	○	12	○	○	○	○	17	○	○	○	○
3	●	○	○	○	8	○	○	○	○	13	○	○	○	○	18	○	○	○	○
4	○	○	●	○	9	○	○	○	○	14	○	○	○	○	19	○	○	○	○
5	○	○	●	○	10	○	○	○	○	15	○	○	○	○	20	○	○	○	○

Marks Obtained

Subjective type

Question: 2 (Short)

(i)

Why:- Positive rays consist of proton and Cathode rays consists of electrons. mass of electron is less than of proton because proton is 1836 times greater than of electron. So e/m value of positive rays will be 1836 times less as compared to cathode rays.

(ii)

Production of Cathode rays:- gases are conductor only at very low pressure. At ordinary pressure, gas molecules hinder the movement of electrons. therefore pressure inside the discharge tube is reduced to 0.01 torr.

Difference (iii):-

Frequency	wave number
The number of wave cycles that pass a given point in space per unit time. The SI unit for frequency is hertz (Hz).	The number of waves per unit distance. wave number can be measured in cycles per unit distance or radians per unit distance.

Question:3 (Long)

millikan's oil drop method:- In 1909, millikan determined charge on an electron.

Construction of apparatus:- The apparatus consists of a metallic chamber, having two windows W and W'. one is used to illuminate the field of view by arc lamp while other is used for passing X-rays to ionize the gas and to introduce a microscope. The chamber is filled with a gas whose pressure can be adjusted by vacuum pump.

Two electrodes A and A' are used to generate electric field in the space between two electrode. The upper [and A] [air] electrode 'A' has hole in the centre.

Working:

Experiment proceed as follows::

1. A fine spray of oil droplets is created by an atomizer. Friction of narrow nozzle ionize droplets. As few droplets pass through the hole "O" the opening is closed. The field of view is illuminated by means of an arc lamp. The velocity of droplet is determined by noting the time taken by the velocity of droplet v_1 for downward motion depends upon its weight.

Freefall velocity $u \propto mg$ ... (1)

where v = velocity of droplet

m = mass of droplet

g = Acceleration due to gravity

2- The air between the electrodes is ionized by x-rays. The droplet under observation takes up an electrode and gets charged, if not charged already.

3. The electrodes A and A' are connected to a battery to generate the electric field of strength 'E'. The droplets start moving upward under the action of electric force and against the action of force of gravity mg with velocity v_2.

$$v_2 \propto Ee - mg \quad (2)$$

Dividing the eq (1) by (2)

$$\frac{v_1}{v_2} = \frac{mg}{Ee - mg} \quad \ldots (3)$$

v_1, v_2 and H are known. Mass of droplet is determined by varing the electric field in such a way that the droplet remains suspended in the chamber. The smallest charge found to be 1.59×10^{-19} coulombs, is equal to recent value of charge 1.6022×10^{-19} coulombs which

is considered to be negative.

(b) mass of electron:

$e^- = 1.6022 \times 10^{-19}$ coulombs

$e/m = 1.7588 \times 10^{11}$ Coulombs kg^{-1}

$$\frac{1.6022 \times 10^{-19}}{m} = 1.7588 \times 10^{11}$$

$$m = \frac{1.6022 \times 10^{-19}}{1.7588 \times 10^{11}}$$

$m = 9.1095 \times 10^{-31}$ kg

The mass of electron is 9.1095×10^{-31} kg.