ARJUNA NEET BATCH

Structure of Atom

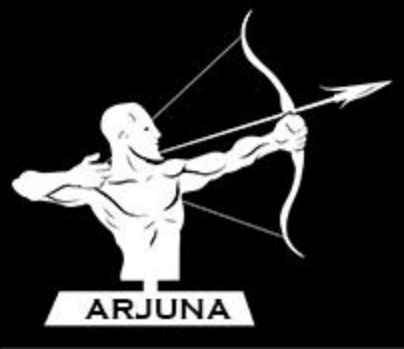
DPP-01

1. **Electron was discovered by**

(A) J.J. Thomson **(B) Rutherford**

(C) Madam Curie **(D) E. Goldstein**

Electron was discovered by J.J. Thomson in 1987 using Faraday study of electrical discharge in partially evacuated tube ie. cathode ray tube.



2. **Proton was discovered by**

(A) J.J. Thomson **(B) Rutherford**

(C) Madam Curie **(D) E. Goldstein**

When electrons were discovered, E. Goldstein brought the idea that there must be some positively charged particles that neutralise the negative charge of electron to maintain electrical neutrality of atom.

3. Nucleus was discovered by

(A) J.J. Thomson

(B) Rutherford

(C) Madam Curie

(D) E. Goldstein

Nucleus → proton + neutron

Discovered by Rutherford's alpha scattering experiment.

1. Sheet of Beryllium is bombarded by alpha particles. (He^{2+})

2. Sheet of thin gold i.e. gold foil is bombarded by alpha particles.

Neutron discovered by Chadwick in 1932

4. What is the specific charge on e^- ?

(A) 1.76×10^8 c/gm (B) 1.76×10^{11} c/kg

(C) Both A & B (D) 9.1×10^{-31} c/kg

Charge / mass ratio.

from cathode ray tube in presence of electric & magnetic field.

J. J. Thomson determine the charge to mass ratio of electron

$$\frac{e}{m_e} = 1.758820 \times 10^{11}\ C\,kg^{-1} \approx 1.76 \times 10^{11}\ C\,kg^{-1}$$

→ experimental value.

extra

oil drop experiment → charge on $e^- = -1.6 \times 10^{-19} C$

$$\text{mass of electron} = \frac{e}{e/m_e} = m_e = \frac{1.6022 \times 10^{-19} C}{1.75882 \times 10^{11}\ C\,kg^{-1}}$$

$$= 9.1 \times 10^{-31}\ kg$$

$$1.76 \times 10^{11}\ \frac{C}{kg} \Rightarrow \frac{1.76 \times 10^{11}\ C}{1000\ g}$$

$1 kg = 1000 g$

1.76×10^8 C/g

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5. What is mass of one e- in kg ?

(A) 9.1×10^{-31} kg

(B) 1.67×10^{-27} kg

(C) 1.66×10^{-27} kg

(D) 1.6×10^{-19} kg

mass of $e^- = \frac{e}{e/m_{e^-}} = \frac{1.6022 \times 10^{-19} C}{1.758820 \times 10^{11} C\,kg^{-1}}$

$$\boxed{m_e = 9.1 \times 10^{-31}\ kg}$$

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6. What is the charge of e^- ?

(A) -1.6×10^{-19} C
(B) $+1.6 \times 10^{-19}$ C
(C) Zero
(D) None of these

R. A. Millikan through oil drop experiment (1906 - 1914) was able to calculate charge on electron.

$$e = -1.6 \times 10^{-19} \text{ C}.$$

negative sign shows electron is negatively charge

7. What is the charge of 1 mole e^- ?

(A) -1.6×10^{-19} C
(B) 96500 C
(C) 1 Faraday
(D) Both B & C

Charge on 1 electron $= -1.6022 \times 10^{-19}$ C

1 mole electron $= N_A = 6.022 \times 10^{23}$

Charge on 1 mole $e^- = 1.6022 \times 10^{-19} \times 6.022 \times 10^{23}$

$\approx 9.65 \times 10^4$ C

$\simeq 96500$ C

96500 C = 1 Faraday

8. What is the mass of one proton?

(A) 9.1×10^{-31} kg mass of e⁻ (B) 1.66×10^{-27} kg

(C) 96500 kg (D) 1.6×10^{-19} kg

Mass of 1 proton = 1.66×10^{-27} kg

Charge of 1 proton = $+1.6 \times 10^{-19}$ C

9. What is the charge on one proton?

(A) $+ 1.6 \times 10^{-19}$ C
(B) Zero
(C) $- 1.6 \times 10^{-19}$ C
(D) 9.1×10^{-31} C

Magnitude of charge on proton and electron are equal.
They only differ in sign.
charge on proton = $+1.6 \times 10^{-19}$ C

10. What is the charge on Neutron?

(A) 1.67×10^{-27} C

(B) Zero

(C) -1.6×10^{-19} C

(D) $+1.6 \times 10^{-19}$ C

Neutron → electrically neutral → no charge

charge on neutron = zero

Thank You