ARJUNA NEET BATCH

Structure of Atom
DPP-02

Q. The charge to mass ratio of electron was found to be

(A) 1.6022×10^{-19} C kg^{-1} (B) 1.925×10^{12} C kg^{-1}

(C) 1.758×10^{11} C kg^{-1} (D) 1.869×10^{13} C kg^{-1}

J.J. Thomson → cathode ray experiment → Electrical field, Magnetic field.

Electric, magnetic field and path of electron are ⊥ (perpendicular)

He experimentally calculated $\frac{\text{charge}}{\text{mass}}$ ratio of electron.

also called specific charge

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

Q. The ratio of mass of an electron to that of the mass of hydrogen atom is

$1u = 1.66 \times 10^{-27}$ kg

(A) 1:3871

(B) 1:1837

(C) 1:1296

(D) 1:3781

mass of electron $\longrightarrow$ $0.0005u = \frac{1}{1837}u$

9.1×10^{-31} kg

mass of hydrogen $= 1u$

$$\frac{\text{mass of electron}}{\text{mass of hydrogen}} = \frac{1}{1837 \times 1} \Rightarrow 1:1837$$

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Q. The radius of nucleus is approximately _____times smaller than the radius of atom.

(A) 1,00,000 (B) 5,000

(C) 10,000 (D) 200

Radius of nucleus $= 10^{-15}$ m

Radius of atom $= 10^{-10}$ m

Radius of nucleus < Radius of atom

$$\frac{\text{Radius(atom)}}{\text{Radius(nucleus)}} = \frac{10^{-10}}{10^{-15}} = 10^{-10+15} = 10^{5} = 1,00,000$$

Ans

Rutherford (α-rays scattering experiment)

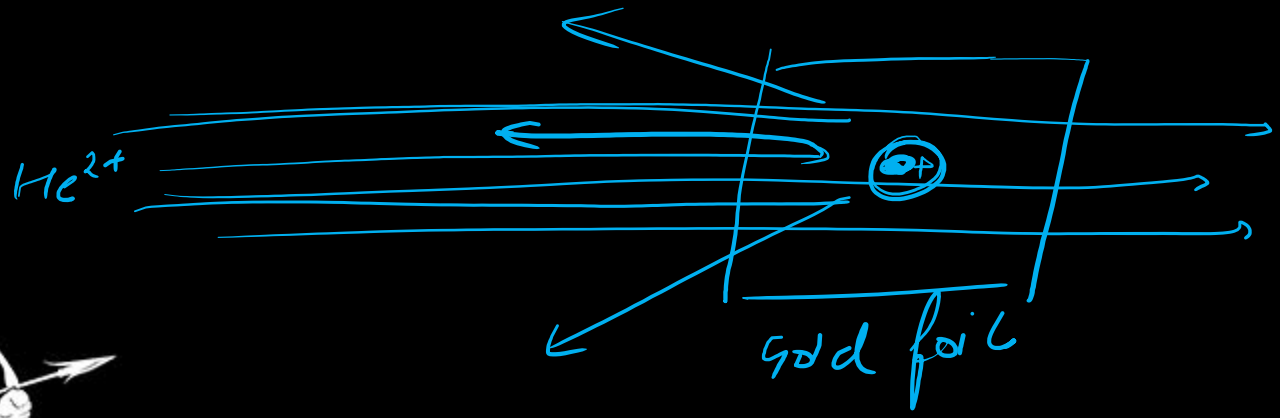
Q. When α-rays strike a thin gold foil then

(A) Most of the α-rays do not pass through the gold foil ✗

(B) Most of the α-rays get deflected back ✗ (only some are deflected)

(C) Most of the α-rays get deflected through small angles ✓

(D) Most of the α-rays pass through without any deviation



Some alpha particles are deviated through small / large angles.

some deflected back.

Large no. of α particles passes through foil with out deviation i.e. most of the space of atom is empty.

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Q. The general representation of the symbol of elements 'X' is (Z = Atomic number, A = Mass number)

(A) ${}^{A}_{X}Z$

(B) ${}^{A}_{Z}X$

(C) ${}^{A+1}X^{z+1}$

(D) ${}_{x}A^{Z}$

Mass number, Atomic number → Element ⟹ ${}^{A}_{Z}X$

correct representation

Q. Isotopes have

(A) Same number of protons

(B) Same number of neutrons

(C) Different number of electrons

(D) Different atomic numbers

Isotopes → same Atomic number but different mass number

Atomic no. = no. of protons = no. of electrons

Isotopes: same atomic no or protons or electrons but different mass number.

Eg: $^{12}_{6}C$ $^{13}_{6}C$ $^{14}_{6}C$ → different mass number. → same atomic number/electrons/protons.

Q. **The number of neutrons present in deuterium is**

(A) 0 **(B)** 1

(C) 2 **(D)** 3

Deuterium → isotope of hydrogen = $_{1}^{2}D$

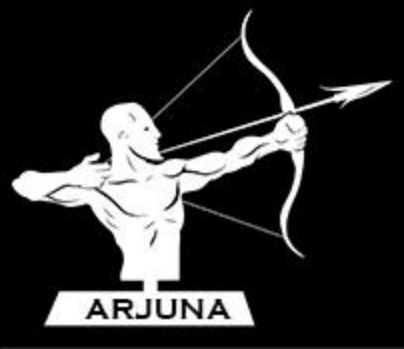
Atomic no. = 1 = no. of protons.

Mass no. = 1

No. of neutrons = Mass no. − no. of protons

= 2 − 1

= 1



Q. Metal of which foil was used in Rutherford experiment ?

(A) Silver

(B) Gold

(C) Platinum

(D) Iron

α particles $\rightarrow [He^{2+}]$ $\rightarrow$ They are allowed to fall on thin sheet of Gold i.e. gold foil.

Q. Calculate the number of protons, neutrons and electrons in $^{39}_{19}K$.

Mass number

$^{39}_{19}K$

Atomic no. = 19

↳ Atomic number

Atomic no. = no. of protons = no. of electrons = 19

Mass no. = 39

No. of neutrons = Mass no. − Protons

= 39 − 19

= 20

Number of electrons = 19

Number of protons = 19

" " Neutrons = 20

Q. Calculate the number of electrons, protons and neutrons in (i) phosphorus atom (ii) phosphate ion.

Mass numbers: P = 31, O = 16

Atomic numbers: P = 15, O = 8

(i) Phosphorus atom (P)

no. of electrons = no. of protons = Atomic no. = 15

no. of neutrons = Mass number − Atomic no.

= 31 − 15

= 16

(ii) Phosphate Ion PO_4^{3-}

O, no. of electrons = no. of protons = Atomic no. = 8

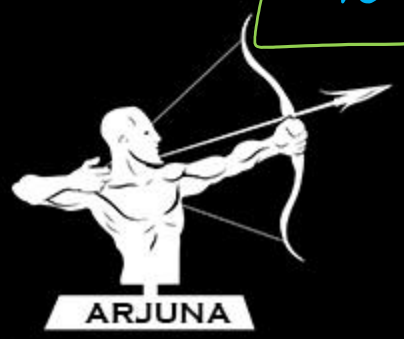
no. of neutrons = mass no. − Atomic no.

= 16 − 8 = 8

P, no. of electrons = no. of protons = Atomic no. = 15

no. of neutrons = mass no − Atomic no.

= 16



PO_4^{3-}

negative charge

No of electrons = $15 + (4 \times 8) + 3$

$= 15 + 32 + 3$

$= 50$

No. of protons = $15 + (4 \times 8) = 15 + 32 = 47$

No. of neutrons = $16 + (4 \times 8) = 47$

Thank You