

Topic : Atomic Structure

Type of Questions		M.M., Min.
Single choice Objective ('-1' negative marking) Q.1 to 3,6,7	(3 marks, 3 min.)	[15, 15]
Subjective Questions ('-1' negative marking) Q.8	(4 marks, 5 min.)	[4, 5]
Short Subjective Questions ('-1' negative marking) Q.4,5	(3 marks, 3 min.)	[6, 6]

- The mass of a neutron is than the mass of a proton :
 (A) slightly less (B) slightly more
 (C) exactly equal (D) their masses cannot be compared
- The ratio of the number of neutrons present in one atom each of C and Si with respect to mass number of 12 and 28 respectively is :
 (A) 3 : 7 (B) 7 : 3 (C) 3 : 4 (D) 6 : 28
- An atom consist of electrons, protons and neutrons. If the mass attributed to neutron was halved and that attributed to the electron was doubled, the atomic mass of ${}_6\text{C}^{12}$ would be approximately :
 (A) Same (B) Doubled (C) Halved (D) Reduced by 25%
- There are 11 protons and 12 neutrons in the nucleus of an atom. Find the atomic number (Z), mass number (A), number of electrons and the symbol of the element.
- Calculate the number of protons, electrons and neutrons in ${}^{15}_8\text{O}^{2-}$.
- The total number of electrons in a nitrate ion is :
 (A) 31 (B) 62 (C) 32 (D) 63
- Atomic radius is of the order of 10^{-8} cm and nuclear radius is of the order of 10^{-13} cm. The fraction of atom that is occupied by nucleus is :
 (A) 10^{-5} (B) 10^5 (C) 10^{-15} (D) None of these
- If an atom of an element X contains equal number of protons, neutrons and electrons, and its atomic number (Z) and mass number (A) are related as : $2A + 3Z = 140$, then find the total number of nucleons present in one atom of element X. Also identify the element.

Answer Key

DPP No. # 11

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|-------------|--------|--------|--|
| 1. (B) | 2. (A) | 3. (D) | 4. 11, 23, 11, ${}_{11}^{23}\text{Na}$ |
| 5. 8, 10, 7 | 6. (C) | 7. (C) | 8._ 40, Calcium |

Hints & Solutions

DPP No. # 11

- Mass of a neutron = 1.675×10^{-24} g mass of a proton = 1.672×10^{-24}
- Carbon is ${}_6\text{C}^{12}$ and silicon is ${}_{14}\text{Si}^{28}$.
- No change by doubling mass of electrons, however by reducing mass of neutron to half total atomic mass becomes 6 + 3 instead of 6 + 6. Thus reduced by 25%.
- ${}_Z\text{X}^A, A = N + P$
- $\text{NO}_3^- = 7 + 8 \times 3 + 1 = 32$
- fraction = $\frac{\text{vol. of nucleus}}{\text{vol. of atom}} = \frac{\frac{4}{3}\pi (10^{-13})^3}{\frac{4}{3}\pi (10^{-8})^3} = 10^{-15}$.
- $$\begin{aligned}
 2(p + n) + 3p &= 140 & \therefore 7x &= 140 & \therefore x &= 20 \\
 \therefore p = e = n &= 20 & \therefore \text{Total number of nucleons} &= n + p &= 40 \\
 \therefore \text{Element} &= \text{Calcium}
 \end{aligned}$$