PHYSICAL CHEMISTRY

DPP
DAILY PRACTICE PROBLEMS

DPP No. 11

Total Marks : 25

Max. Time : 26 min.

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]

1. 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

2. 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

3. 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 $_6C^{12}$ would be approximately :

   (A) Same   (B) Doubled   (C) Halved   (D) Reduced by 25%

4. 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.

5. Calculate the number of protons, electrons and neutrons in $_8^{15}O^{2-}$.

6. The total number of electrons in a nitrate ion is :

   (A) 31   (B) 62   (C) 32   (D) 63

7. 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

8._ 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

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

Hints & Solutions

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1. Mass of a neutron = 1.675×10^{-24} g mass of a proton = 1.672×10^{-24}

2. Carbon is $_6C^{12}$ and silicon is $_{14}Si^{28}$.

3. 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%.

4. $_ZX^A$, A = N + P

6. $NO_3^- = 7 + 8 \times 3 + 1 = 32$

7. fraction = $\dfrac{\text{vol. of nucleus}}{\text{vol. of atom}}$ = $\dfrac{\frac{4}{3}\pi (10^{-13})^3}{\frac{4}{3}\pi (10^{-8})^3}$ = 10^{-15}.

8._ $2 (p + n) + 3p = 140$ $\therefore 7x = 140$ $\therefore x = 20$
$\therefore \quad p = e = n = 20$ $\therefore$ Total number of nucleons = n + p = 40
$\therefore \quad$ Element = Calcium