

RACE # 2

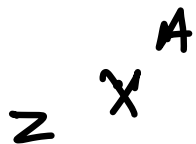
1. Number of protons, neutrons & electrons in the element ${}_{89}\text{X}^{231}$ is

(A) 89, 231, 89

(B) 89, 89, 242

☒ (C) 89, 142, 89

(D) 89, 71, 89



$$Z = 89$$

$$A = 231$$

$$p = 89$$

$$e = 89$$

$$n = A - Z = 231 - 89 = 142$$

2. The charge on the atom containing 17 protons, 18 neutrons and 18 electrons is

(A) +1

(B) -2

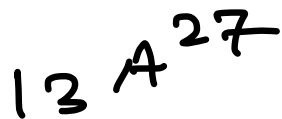
☒ (C) -1

(D) Zero

$$p(17) < e(18)$$

if electron will be more then -ve charge
if proton will be greater then +ve
charge.

3. In an atom ${}_{13}\text{Al}^{27}$, number of protons is (a) electron is (b) and neutron is (c). Hence ratio will be [in order c : b : a]
- (A) 13 : 14 : 13 (B) 13 : 13 : 14 ☒ (C) 14 : 13 : 13 (D) 14 : 13 : 14



$$Z = 13$$

$$A = 27$$

$$p = 13$$

$$e = 13$$

$$n = 14$$

$$n : e : p = 14 : 13 : 13$$

4. A and B are two elements which have same atomic weight and are having atomic number 27 and 30 respectively. If the atomic weight of A is 57 then number of neutron in B is

☒ (A) 27

(B) 33

(C) 30

(D) 40

$$\begin{array}{c} A \\ 27 \\ 57 \end{array}$$

$$\begin{array}{c} B \\ 30 \\ 57 \end{array}$$

$$\rightarrow \text{neutron} = 57 - 30 = 27$$

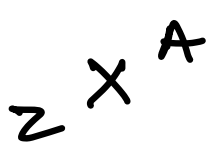
5. The atomic mass 25 had 13 neutron's in its nucleus. What its ion can be

(A) Mn^{+2}

(B) Cr^{+3}

(C) Al^{+3}

☒ (D) Mg^{+2}



$$A = 25$$

$$n = 13$$

$$Z = 12, \text{Mg}^{+2}$$

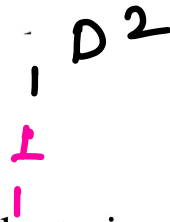
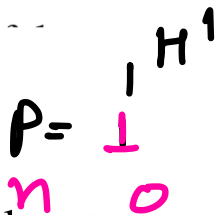
6. The sum of number of neutrons and protons in all of the isotopes of hydrogen is

(A) 3

(B) 4

(C) 5

☒ (D) 6



$$\text{Ans} = 6$$

7. Choose the false statement about deuterium

(A) It is an isotope of hydrogen

(B) It contains $[(1 e^-) + (1 P^+) + (1 n)]$

☒ (C) It contains only $[(1 P^+) + (1 n)]$

(D) D_2O is called the heavy water

It also contains 1 electron.

8. Complete the following table :

	Symbol	No. of protons in nucleus	No. of neutrons in nucleus	No. of electrons	Netcharge
1	Y_{39}^{89}	39	50	39	0
2	$_{20}\text{Ca}^{40}$	20	20	18	+2
3	$_{23}\text{V}^{51}$	23	28	20	+3
4	$_{15}\text{P}^{31}$	15	16	18	-3

9. No. of atoms in 4.25 g of NH_3 is approx

(A) 1×10^{23}

(B) 1.5×10^{23}

(C) 2×10^{23}

☒ (D) 6×10^{23}

$$\text{moles of } \text{NH}_3 = \frac{4.25}{17} = 0.25$$

$$\begin{aligned} \text{No. of atoms} &= \text{moles of } \text{NH}_3 \times N_A \times \text{atomicity} \\ &= 0.25 \times 6.02 \times 10^{23} \times 4 = 6 \times 10^{23} \end{aligned}$$

10. The volume occupied by 4.4 g of CO_2 at 273 K and ($P = 1 \text{ atm}$) is

(A) 22.4 L

☒ (B) 2.24 L

(C) 0.224 L

(D) 0.1 L

$$PV = nRT$$

$$\text{moles} = \frac{4.4}{44} = 0.1$$

$$V = \frac{0.1 \times 0.0821 \times 273}{1} = 2.24 \text{ L}$$

11. The number of neutrons present in 9 mg of O^{18} is $18 - 8 = 10$
- (A) 10 (B) $5N_A$ (C) $0.005 N_A$ (D) $0.0005 N_A$

$$\text{moles of } O^{18} = \frac{9 \times 10^{-3} \text{ g}}{18} = 5 \times 10^{-4} \text{ mol}$$

$$\text{No of neutron} = 5 \times 10^{-4} \times N_A \times 10 = 0.005 N_A$$

12. Rearrange the following (I to IV) in the order of increasing masses.

(I) 0.5 mole of O_3

(II) 0.5 gm molecule of Nitrogen

(III) 3.011×10^{23} molecule of O_2

(IV) 11.35 L of CO_2 at STP

(A) $IV < III < II < I$

(B) $II < III < IV < I$

(C) $III < II < I < IV$

(D) $I < II < III < IV$

$$(I) \text{ mass} = \text{mole} \times \text{molar mass} = 0.5 \times 48 = 24 \text{ g}$$

$$(III) = \text{mass} = \left(\frac{3.011 \times 10^{23}}{6.02 \times 10^{23}} \right) \times 32 = 16 \text{ g}$$

(II) 0.5g molecules means = moles of N_2
mass = $0.5 \times 28 = 14g$

(IV) mole of $CO_2 = \frac{11.35}{22.7} = 0.5$
mass = $0.5 \times 44 = 22g.$

$$I > \underline{IV} > \underline{III} > \underline{II}$$

13. Total number of protons, neutrons and electrons present in 14 mg of ${}^{14}_6\text{C}$ is (Take $N_A = 6 \times 10^{23}$)

- ✓ (A) 1.2×10^{22} (B) 1.2×10^{25} (C) 7.2×10^{21} (D) 1.08×10^{22}

$${}^{14}_6\text{C} \rightarrow p=6, e=6, n=8 \quad \text{total} = 20$$

$$\text{moles of } {}^{14}_6\text{C} = \frac{14 \times 10^{-3}}{14} = 10^{-3}$$

$$\begin{aligned} \text{No of } p, n, \text{ and } e^- &= (10^{-3}) \times N_A \times 20 = 10^{-3} \times 6 \times 10^{23} \times 20 \\ &= 1.2 \times 10^{22} \end{aligned}$$

14. Complete the following table : ($N_A = 6 \times 10^{23}$)

	Mass of sample	Moles of sample	Molecules in sample	Total atoms in sample
1	3.9g C_6H_6	$3.9/78 = 0.05$	$0.05 N_A$	$(0.05 N_A) \times 12 = 0.6 N_A$
2	3.6 gram	0.2 mole H_2O	$0.2 N_A$	$(0.2 N_A) \times 3 = 0.6 N_A$
3	1.76 gram	$\frac{2.4 \times 10^{22}}{6 \times 10^{23}} = 4 \times 10^{-2}$	2.4×10^{22} molecules CO_2	$(2.4 \times 10^{22}) \times 3 = 7.2 \times 10^{22}$
4	$3.6 \times 10^{-2} = 0.036$	$\frac{6 \times 10^{21}}{6 \times 10^{23}} = 10^{-2}$	$\frac{3.6 \times 10^{22}}{6} = 6 \times 10^{21}$	3.6×10^{22} Total atoms in CH_3OH sample

6

$$12 + 3 + 16 + 1$$

$$15 + 17 = 32$$

15. Number of electrons in 36mg of ${}^{18}_8\text{O}^{-2}$ ions are (Take $N_A = 6 \times 10^{23}$)

(A) 1.2×10^{21}

(B) 9.6×10^{21}

☒ (C) 1.2×10^{22}

(D) 1.9×10^{22}

$e^- = 8 + 2 = 10$

$$\text{Moles of } \text{O}^{2-} = \frac{36 \times 10^{-3}}{18} = 2 \times 10^{-3}$$

$$\begin{aligned} \text{No of electrons} &= (2 \times 10^{-3}) \times 6 \times 10^{23} \times 10 \\ &= 12 \times 10^{21} = 1.2 \times 10^{22} \end{aligned}$$

16. Molar mass of electron is nearly ($N_A = 6 \times 10^{23}$)

(A) $9.1 \times 10^{-31} \text{ kg mol}^{-1}$

(B) $9.1 \times 10^{-31} \text{ gm mol}^{-1}$

☒ (C) $54.6 \times 10^{-8} \text{ gm mol}^{-1}$

☒ (D) $54.6 \times 10^{-8} \text{ kg mol}^{-1}$

mass of $e^- = 9.1 \times 10^{-31} \text{ kg}$ (to remember)

$$\text{Molar mass} = 9.1 \times 10^{-31} \times 6 \times 10^{23} = 54.6 \times 10^{-8} \text{ kg/mol}$$

17. Which of the following contain highest number of molecules

(A) 2.8 g of CO

☒ (B) 3.2 g of CH₄

(C) 1.7 g of NH₃

(D) 3.2 g of SO₂

$$\text{No of molecules} = \text{mole} \times N_A$$

$$(A) \text{ mole} = \frac{2.8}{28} = 0.1$$

$$(B) \text{ mole} = \frac{3.2}{16} = 0.2$$

$$(C) \text{ mole} = \frac{1.7}{17} = 0.1$$

$$(D) \text{ mole} = \frac{3.2}{64} = 0.05$$

18. 5.6 L of oxygen at 273 K and 1 atm is equivalent to

(A) 1 mole

(B) 1/2 mole

☒ (C) 1/4 mole

(D) 1/8 mole

$$PV = nRT$$

$$n = \frac{1 \times 5.6}{0.0821 \times 273} = \frac{5.6}{22.4} = \frac{1}{4}$$

19. Which has maximum number of molecules of O_2

(A) 32 gm of O_2

(B) 1 mole of O_2

(C) 1 gram molecule of O_2

✓ (D) All have same

(A) moles of $O_2 = \frac{32}{32} = 1 \text{ mole}$

(B) = 1 mole O_2

(C) 1 gm molecule O_2 or 1 mole O_2

means all have same no of molecule

20. 1 gm - atom of nitrogen does not represents

✓ (A) 6.02×10^{23} N_2 molecules

✓ (B) 22.4 lit. of N_2 at N.T.P.

(C) 11.2 lit. of N_2 at N.T.P.

✓ (D) 28 g of nitrogen

1 gram atom = 1 mole nitrogen atom

(A) 6.022×10^{23} molecule

$$\text{mole of molecule} = \frac{6.02 \times 10^{23}}{6.02 \times 10^{23}} = 1$$

$$\text{mole of N atom} = 1 \times 2 = 2$$

(B) moles of $N_2 = \frac{22.4}{2} = 1$, moles of N atom $= 1 \times 2 = 2$

(C) moles of $N_2 = \frac{11.2}{22.4} = 0.5$, Moles of N atom $= 0.5 \times 2 = 1$

(D) moles of $N_2 = \frac{28}{28} = 1$ mole of N_2

$$\text{mole of N} = 1 \times 2 = 2$$

21. Column-I

Column-II

- (PQ) (A) 6.023×10^{23} molecules of CO_2
P (B) 6.023×10^{23} molecules of water
S (C) 96 g of O_2 gas
R (D) 88 g of CO_2 gas

- (P) 1 mol
(Q) 22.4 L
(R) 2 mol
(S) 3 mol

$$(A) \frac{6.022 \times 10^{23}}{6.022 \times 10^{23}} = 1 \text{ mole of } \text{CO}_2(g), \text{ or } 22.4 \text{ L}$$

$$(B) \frac{6.022 \times 10^{23}}{6.022 \times 10^{23}} = 1 \text{ mole of } \text{H}_2\text{O}(l)$$

$$(C) \frac{96 \text{ g}}{32} = 3 \text{ mole of } \text{O}_2$$

$$(D) \frac{88}{44} = 2 \text{ moles of } \text{CO}_2$$