RACE # 2

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

(A) 89, 231, 89 (B) 89, 89, 242 (C) 89, 142, 89 (D) 89, 71, 89

$_{Z}X^{A}$ $Z = 89$ $A = 231$

$p = 89$

$e = 89$

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

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 $_{13}Al^{27}$. 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

$_{13}A^{27}$

$Z = 13$

$A = 27$

$p = 13$

$e = 13$

$n = 14$

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

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

A	B
27	30
57	57

→ 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}

$_{Z}X^{A}$ $A = 25$ $n = 13$ $Z = 12$. 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

$_{1}H^{1}$ $_{1}D^{2}$ $_{1}T^{3}$

$P = 1 + 1 + 1$ Ans = 6

$n = 0 + 1 + 2$

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	$_{20}Ca^{40}$	20	20	18	+2
3	$_{23}V^{51}$	23	28	20	+3
4	$_{15}P^{31}$	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} ✓

$$\text{moles of } NH_3 = \frac{4.25}{17} = 0.25$$

$$\text{No of atoms} = \text{moles of } NH_3 \times N_A \times \text{atomicity}$$

$$= 0.25 \times 6.02 \times 10^{23} \times 4 = 6 \times 10^{23}$$

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

(A) 22.4 L ~~(B)~~ 2.24 L ✓ (C) 0.224 L (D) 0.1 L

$$PV = nRT \qquad \text{moles} = \frac{4.4}{44} = 0.1$$

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

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) $0.0005\ N_A$

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

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

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

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

(II) 0.5 g molecules means = moles of N_2

mass = $0.5 \times 28 = 14$ g

(IV) moles of $CO_2 = \frac{11.35}{22.7} = 0.5$

mass = $0.5 \times 44 = 22$ g.

I > IV > III > II

13. Total number of protons, neutrons and electrons present in 14 mg of ${}_6C^{14}$ 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}

$6C^{14} \rightarrow p = 6,\ e = 6,\ n = 8$ totals = 20

Moles of $C^{14} = \frac{14 \times 10^{-3}}{14} = 10^{-3}$

No of p, n, and $e^- = (10^{-3}) \times N_A \times 20 = 10^{-3} \times 6 \times 10^{23} \times 20$

$= 1.2 \times 10^{22}$

14. Complete the following table : ($N_A = 6 \times 10^{22}$)

	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 CO2	$(2.4 \times 10^{22}) \times 3 = 7.2 \times 10^{22}$
4	$32 \times 10^{-2} = 0.32$g	$\frac{6 \times 10^{21}}{6 \times 10^{23}} = 10^{-2}$	$\frac{3.6 \times 10^{22}}{6} = 6 \times 10^{21}$	3.6×10^{22} Total atoms in CH3OH sample

$12+3+16+1$

$15+17=32$

15. Number of electrons in 36mg of $^{18}_{8}O^{-2}$ ions are (Take $N_A = 6 \times 10^{23}$)

$\bar{e} = 8 + 2 = 10$

(A) 1.2×10^{21} (B) 9.6×10^{21} (C) 1.2×10^{22} (D) 1.9×10^{22}

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

No of electrons $= (2 \times 10^{-3}) \times 6 \times 10^{23} \times 10$

$= 12 \times 10^{21} = 1.2 \times 10^{22}$

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

(A) 9.1×10^{-31} kg mol^{-1} (B) 9.1×10^{-31} gm mol^{-1}

(C) 54.6×10^{-8} gm mol^{-1} (D) 54.6×10^{-8} kg mol^{-1}

mass of 1 e^- $= 9.1 \times 10^{-31}$ kg (to remember)

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

17. Which of the following contain highest number of molecules

(A) 2.8 g of CO ✓(B) 3.2 g of CH_4 (C) 1.7 g of NH_3 (D) 3.2 g of SO_2

No of molecules = mole × NA.

(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 $O_2 = \frac{32}{32} = 1$ 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

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

moles of N atom $= 1 \times 2 = 2$

(B) moles of $N_2 = \frac{22.4}{22.4} = 1$, 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 $N_2 = \frac{28\,g}{28} = 1$ mole of N_2

mole of $N = 1 \times 2 = 2$

21.

Column-I	**Column-II**
(A) 6.023×10^{23} molecules of CO_2	(P) 1 mol
(B) 6.023×10^{23} molecules of water	(Q) 22.4 L
(C) 96 g of O_2 gas	(R) 2 mol
(D) 88 g of CO_2 gas	(S) 3 mol

(PQ)
P
S
R

(A) $\frac{6.022 \times 10^{23}}{6.022 \times 10^{23}}$ = 1 mole of $CO_2(g)$, or 22.4 L

(B) $\frac{6.022 \times 10^{23}}{6.022 \times 10^{23}}$ = 1 mole of $H_2O(l)$

(C) $\frac{96\,g}{32}$ = 3 mole of O_2

(D) $\frac{88}{44}$ = 2 moles of CO_2