DPS No.1 **Topic : Basic Physical Chemistry**

(Atom, Atomic weight, Gram atomic weight, Number of gram atomic weight, Avogadro's hypothesis)
(Molecule, Molecular weight, Gram molecular weight, No. of mole, Avogadro's hypothesis)

1. An elementary particle is
a) Smallest particle of an element
b) Atom of an element
c) Smallest particle of an atom
d) A sub atomic particle

2. The atomic weights of elements are usually fractional because:
a) These are mixture of allotropes
b) These are mixture of isotopes
c) These are mixture of isobars
d) Elements contains impurities

3. Gram atomic mass is the absolute mass in grams of _____ atoms of any elements.
a) 6.02×10^{23} b) 1.67×10^{-24} g c) 1.624×10^{-24} g d) none of these.

4. The mass of an atom of carbon is:
a) 1 g b) 1.99×10^{-23} g c) $\frac{1}{12}$ g d) 1.99×10^{23} g

5. The number of atoms in 12 g of ${}_{6}{}^{12}C$ is
a) 6 b) 12 c) 6.02×10^{23} d) $12 \times 6.02 \times 10^{23}$

6. The number of C atoms in 18 g of glucose
a) 3.61×10^{23} b) 7.22×10^{23} c) 6.02×10^{23} d) 0.361×10^{23}

7. Calculate the mass of 2.5 gram atoms of oxygen
a) 32 g b) 80.0 g c) 40 g d) 120.0 g

8. The number of atoms in 1.4 g nitrogen gas is
a) 6.02×10^{22} b) 3.01×10^{22} c) 1.20×10^{23} d) 6.02×10^{23}

9. 4.6×10^{22} atoms of an element weigh 13.8 g. The atomic mass of the element is:
a) 290 b) 180 c) 34.4 d) 10.4

10. The number of atoms is 22 g of carbon dioxide is
a) $3 \times 6.02 \times 10^{23}$ b) $4.5 \times 6.02 \times 10^{23}$ c) $1.5 \times 6.02 \times 10^{23}$ d) $2.5 \times 6.02 \times 10^{23}$

11. 19.7 kg of gold was recovered from a smuggler. The atoms of gold were recovered (Au = 197)
a) 100 b) 6.02×10^{23} c) 6.02×10^{26} d) 6.02×10^{25}

12. What is the average weight in kg of a hydrogen atom?
a) 1.67×10^{-27} kg b) 1.008 kg c) 1.624×10^{-24} g d) 1.67×10^{-27} g

13. The number of atoms in 2.3 kg ${}_{11}{}^{23}Na$ is
a) 6.023×10^{23} Na atoms b) 6.02×10^{25} Na atoms c) 6.02×10^{24} Na atoms d) 6.02×10^{22} Na atoms

14. The number of atoms in 32.0 g Br_2 is
a) 6.02×10^{23} Br atoms b) 3.02×10^{23} Br atoms c) 2.408×10^{23} Br atoms d) 1.204×10^{25} Br atoms

15. The weight of a single atom of oxygen is:
a) 1.057×10^{23} g b) 3.556×10^{23} g c) 2.656×10^{-23} g d) 4.538×10^{-23} g

16. Naturally occurring carbon consists of two isotopes ^{12}C and ^{13}C. The percentage abundances of two isotopes in a sample of carbon whose atomic weight is 12.01112, are
a) 1.109% ^{13}C b) 98.891% ^{12}C c) a & b both d) 98.891% ^{13}C

17. ^{35}Cl and ^{37}Cl are the only naturally occurring chlorine isotopes. What percentage distribution accounts for the atomic weight, 35.453?
a) 24.23% ^{37}Cl b) 24.23% ^{35}Cl c) 25% ^{37}Cl d) 75% ^{37}Cl

18. A mole of any substance is related to
a) number of particles b) volume of gaseous substances
c) mass of a substance d) all of these

19. The number of grams in a mole of gypsum, $CaSO_4 \cdot 2H_2O$ is
a) 172.2 g b) 17.22 gm c) 1.722 gm d) .1722 gm

20. The number of mole of O_2 in 64 g O_2 is
a) 2 b) 3 c) 4 d) 5

21. How many g of S are required to produce 100 mole H_2SO_4
a) 3200 g b) 1600 g c) 32.65 g d) 16.00 g

22. How many atoms of Na are present in 0.5 mole of Na_2CO_3
a) N b) $\frac{3N}{2}$ c) $\frac{N}{2}$ d) 2N

23. One mole of CH_4 contains
a) 4.0 g atoms of hydrogen b) 3.0 g atoms of carbon
c) 6.02×10^{23} atoms of hydrogen d) 1.81×10^{23} molecules of CH_4

24. The total number of protons in 10 g of $CaCO_3$ is ($N_0 = 6.02 \times 10^{23}$)
a) 3.01×10^{24} b) 2.01×10^{24} c) 4.06×10^{24} d) 3.01×10^{23}

25. The weight of one molecule of a compound $C_{60}H_{122}$ is
a) 1.3×10^{-20} g b) 5.01×10^{-21} g c) 3.72×10^{-23} g d) 1.4×10^{-21} g

26. If Avogadro's number would have been 1×10^{23} mol^{-1}, then mass of one atom of oxygen would have been:
a) 16 a.m.u b) (16 × 6.02) a.m.u c) $\frac{16}{6.02}$ a.m.u d) 16×10^{-23} a.m.u

27. In a bank, there are as many coins as number of molecules in 1.6 μg of CH_4. The number of coins are there in bank is
a) 6.022×10^{16} molecules b) 3.011×10^{16} molecules c) 1.6×10^{-6} molecules d) 1.5×10^{16} molecules

28. The number of moles of sucrose ($C_{12}H_{22}O_{11}$) are there in a table spoon of sugar that contains 2.85 g
a) 8.33×10^{-3} mol b) 0.833 mol c) 83.3×10^{-3} mol d) 8.33 mol

29. One requires 0.01 mole of Na_2CO_3. Mass of $Na_2CO_3.10H_2O$ to be taken is
a) 1.06 g b) 2.86 g c) 1.80 g d) 3.02 g

30. Heamoglobin contain 0.33% of iron by weight the molecular weight of heamoglobin is approximately 67200. The number of iron atoms (at. wt . of Fe is 56) present in one molecule of heamoglobin are:
a) 1 b) 6 c) 4 d) 2

31. Which has maximum number of molecules?
a) 7 g N_2 b) 2g H_2 c) 16 g NO_2 d) 16 g O_2

32. The molecular weight of a substance, each molecule of which contains 9 carbon atoms, 13 hydrogen atoms and 2.33×10^{-23} g of other component is
a) 135.049 g b) 13.504 g c) 145 g d) 136 g

33. The no. of mole of water in 488 g $BaCl_2 . 2H_2O$is
a) 4 b) 2 c) 1 d) 6.02×10^{23}

34. The dot at the end of this sentence has a mass of about one microgram. Assuming the black stuff is carbon approximate atoms of carbon needed to make such a dot is
a) 5×10^{16} atoms b) 5×10^{24} atoms c) 6.023×10^{23} atoms d) $12 \times 6.023 \times 10^{23}$ atoms

35. The number of molecules in 51.0g of NH_3 is
a) 1.806×10^{24} b) 2.0×10^{24} c) 2.408×10^{23} d) 2.974×10^{23}

36. The number of mole of Zn $(FeS_2)_2$ can be made from 2g Zn, 3g Fe and 4g S is
a) 0.0268 mol b) 0.268 mol d) 2.68 mol d) 2.068 mol

37. How many gram atom and no. of atoms are there in 60 gm carbon.

38. In 4 g atoms of Ag, Calculate weight of one atom of Ag. at. wt. Ag = 108.

39. Mass of one atom of an element = A is 3.9854×10^{-23} g. How many atoms are contained in 1 g of the element A ?

40. Analysis of chlorophyll shows that it contains 2.68 percent magnesium. How many atoms of magnesium does 1.00 g of chlorophyll contain ?

41. Mass of one atom of the element X is 1.66×10^{-24} g. Number of atoms in 1 g of the element is ?

42. The number of atoms present in 10.8 g of silver is [atomic weight of silver = 108] ?

43. Naturally occurring argon consists of three isotopes, the atoms of which occur in the following abundances : 0.34% ^{36}Ar 0.07% ^{38}Ar, and 99.59% ^{40}Ar. Calculate the atomic weight of argon from these data.

44. Naturally occurring boron consists of 80% ^{11}B (nuclidic mass = 11.01) and 20% another isotope. To account for the atomic weight, 10.81, what must be the nuclidic mass of the other isotope?

45. In a chemical atomic weight determination, the tin content of 3.7692 g of $SnCl_4$ was found to be 1.7170g. If the atomic weight of chlorine is taken as 35.453, what is the value for the atomic weight of tin determined from this experiment ?

46. A 1.5276 g sample of $CdCl_2$ was converted to metallic cadmium and cadmium-free products by an electrolytic process. The weight of the metallic cadmium was 0.9367 g. If the atomic weight of chlorine is taken as 35.453, what must be the atomic weight of Cd from this experiment ?

47. How many moles of atoms are contained in (a) 10.02 g calcium, (b) 92.91 g phosphorus ?

48. How many moles of molecular phosphorus are contained in 92.91 g phosphorus if the formula of the molecule is P_4 & How many atoms are contained in 92.91 g phosphorus?

49. How many moles are represented by (a) 9.54 g SO_2, (b) 85.16 g NH_3 (c) 25.02 g $TiS_{1.85}$

50. (a) How many moles of Ba and of Cl are contained in 107.0 g of $Ba(ClO_3)_2 \cdot H_2O$?
(b) How many molecules of water of hydration are in this same amount?

51. How many grams of each of the constituent elements are contained in one mole of (a) Fe_2O_3, (b) Ca_3P_2?

52. How many moles of Fe and of S are contained in (a) 1 kg of FeS_2? (b) How many kilograms of S are contained in exactly 1 kg of FeS_2?

53. A certain public water supply contained 0.10 ppb (part per billion) of chloroform, $CHCl_3$. How many molecules of $CHCl_3$ would be contained in a 0.05 mL drop of this water?

ANSWERS :

1B	2B	3A	4B	5C	6A	7C	8A	9B	
10C	11D	12A	13B	14C	15C	16C	17A		
18D	19A	20A	21A	22A	23A	24A	25D	26A	27A
28A	29B	30C	31D	32A	33A	34A	35A	36A	

37. 5, 30.1×10^{23} **38.** 17.93×10^{-23} g **39.** 2.5092×10^{22} atoms

40. 6.72×10^{20} atoms **41.** 6.00×10^{23} **42.** $6.02\ 0 \times 10^{22}$

43. 39.948 **44.** 10.00 **45.** 118.64

46. 112.41 g/mol

47. (a) 0.250 mol Ca atoms (b) 3.000 mol P atoms

48. 0.7500 mol P_4 molecule & 1.807×10^{24} atoms P

49. (a) 0.1489 mol SO_2 (b) 5.000 mol NH_3 (c) 0.2334 mol $TiS_{1.85}$

50. (a) 0.332 mol Ba, 0.664 mol Cl; (b) 2.00×10^{23} molecules H_2O

51. (a) 111.69 g Fe, 48.00 g O (b) 120.24 g Ca, 61.95 g P

52. (a) 8.33 mol Fe, 16.7 mol S; (b) 0.535 kg S

53. 2.5×10^{11}