

Type IV

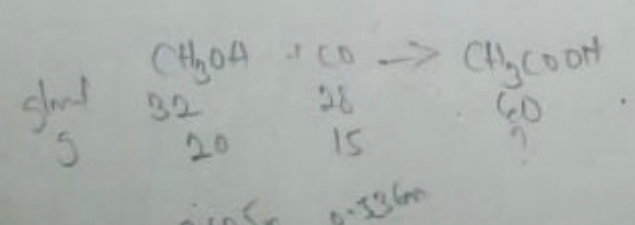
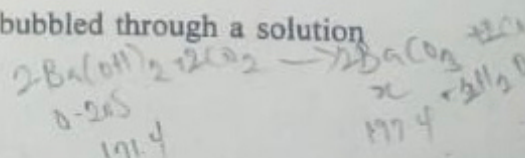
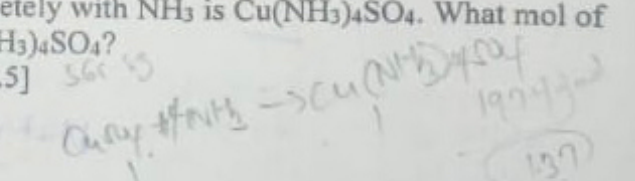
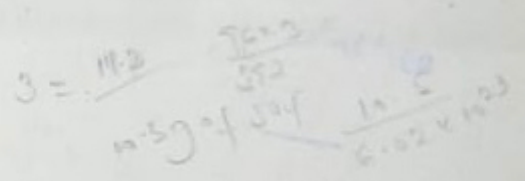
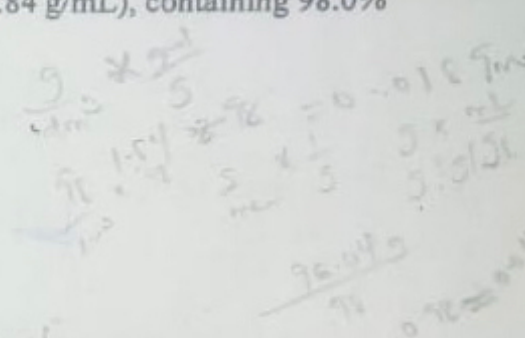
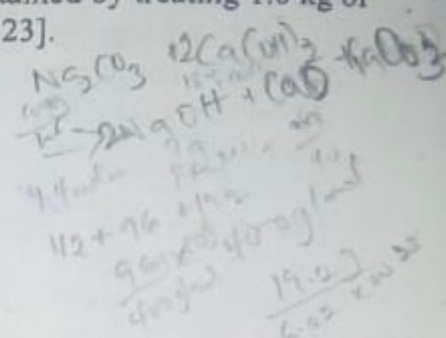
- Pb C. 0.130g  
Pb CHS 0.130
- To a 0.254-g sample of lead(II) ethanoate was added excess  $K_2CrO_4$  in which case 0.130 g of lead(II) chromate was precipitated. What is the percentage composition of lead in the organic salt? [O = 16; Cr = 52; Pb = 207].  
(A) 28.80% (C) 42.80%  
(B) 38.80% (D) 32.80%
  - When balanced in a basic medium, the ionic equation:  
 $CN^- + MnO_4^- \rightarrow CNO^- + MnO_2$ , exactly becomes  
(A)  $2MnO_4^- + 4H_2O + 6e^- \rightarrow 2MnO_2 + 8OH^-$   
(B)  $3CN^- + 2MnO_4^- + 4H_2O + 6OH^- \rightarrow 3CNO^- + 2MnO_2 + 8OH^- + 3H_2O$   
(C)  $3CN^- + 2MnO_4^- + H_2O \rightarrow 3CNO^- + 2MnO_2 + 2OH^-$   
(D)  $3CN^- + 6OH^- \rightarrow 3CNO^- + 3H_2O + 6e^-$
  - A  $25.0\text{ cm}^3$  portion of 0.30 M sodium ethanoate,  $Na_2C_2O_4$ , solution is warmed and titrated against an acidified solution of  $KMnO_4$ . If  $45.0\text{ cm}^3$  of  $KMnO_4$  solution is required for the titration, determine the concentration of the  $KMnO_4$  in  $g/dm^3$ .  
[O = 16, K = 39; Mn = 54.9]  
(A) 12.58 (C) 10.58  
(B) 13.59 (D) 15.79
  - What is the molar concentration of a solution prepared by adding 750.0 mL of 0.25 M NaOH to 250.0 mL of 0.10 M NaOH? Leave your answer to 2 significant figures.  
(A) 0.25 M (C) 0.21 M  
(B) 0.20 M (D) 0.15 M
  - Quicklime (CaO) is produced by thermal decomposition of calcium carbonate ( $CaCO_3$ ). Calculate the volume of  $CO_2$  produced at STP from the decomposition of 60.8 g  $CaCO_3$ .  
[C = 12; O = 16; Ca = 40].  
(A) 26.3 L (C) 34.1 L  
(B) 13.6 L (D) 31.4 L
  - Four grams (4 g) of a mixture of  $CaCO_3$  and sand is treated with an excess of hydrochloric acid, and 0.880 g of  $CO_2$  is produced. What is the percent of  $CaCO_3$  in the original mixture?  
(A) 30.0% (C) 70.0%  
(B) 10.0% (D) 50.0%
  - Calculate the amount of quicklime (CaO) that can be prepared by heating 200 kg of limestone  
(A) 100 kg (C) 107 kg  
(B) 117 kg (D) 127 kg
  - Calculate the number of mol of ammonia,  $NH_3$ , required to produce 2.50 mol of  $Cu(NH_3)_4SO_4$  according to the equation:  $CuSO_4 + 4NH_3 \rightarrow Cu(NH_3)_4SO_4$ .  
(A) 20.0 mol  $NH_3$  (B) 15.0 mol  $NH_3$  (C) 12.5 mol  $NH_3$  (D) 10.0 mol  $NH_3$
  - If the entire gas liberated when concentrated  $H_2SO_4$  is added stoichiometrically to 5.85 g of pure crystals of NaCl is dissolved in 100 mL distilled water, which of the following statements gives a correct description of the resultant solution? [H = 1.0; O = 16.0; Na = 23.0; S = 32.0; Cl = 35.5]  
(A) 1.0 M HCl acid (C) 0.1 M HCl acid  
(B) 0.1 M  $H_2SO_4$  acid (D) 1.0 M  $H_2SO_4$  acid



5.85g " 100 x 10<sup>-3</sup> dm<sup>3</sup>  
55.5g H<sub>2</sub>O

Type IV

10. Caustic soda, NaOH, can be prepared commercially by the reaction of  $\text{Na}_2\text{CO}_3$  with slaked lime,  $\text{Ca}(\text{OH})_2$ . What is the mass (in g) of NaOH that can be obtained by treating 1.0 kg of  $\text{Na}_2\text{CO}_3$  with  $\text{Ca}(\text{OH})_2$ ? [H = 1; C = 12; O = 16; Na = 23].
- (A) 755 g NaOH (B) 106 g NaOH (C) 850 g NaOH (D) 800 g NaOH
11. How many atoms of sulphur are there in 80 g of  $\text{Fe}_2(\text{SO}_4)_3$ ? [O = 16; S = 32; Fe = 56;  $N_A = 6.02 \times 10^{23}$  particles/mole]
- (A)  $3.20 \times 10^{23}$  sulphur atoms (B)  $3.61 \times 10^{23}$  sulphur atoms (C)  $2.62 \times 10^{23}$  sulphur atoms (D)  $1.20 \times 10^{23}$  sulphur atoms
12. Calculate the volume of concentrated sulphuric acid (density 1.84 g/mL), containing 98.0%  $\text{H}_2\text{SO}_4$  by weight, that would contain 40.0 g pure  $\text{H}_2\text{SO}_4$ .
- (A) 55.5 mL (B) 33.3 mL (C) 44.4 mL (D) 22.2 mL
13. What is the net ionic equation for the balanced equation:  
 $16\text{HCl} + 2\text{KMnO}_4 \rightarrow 2\text{MnCl}_2 + 8\text{H}_2\text{O} + 5\text{Cl}_2 + 2\text{KCl}$
- (A)  $8\text{H}^+ + \text{MnO}_4^- \rightarrow 2\text{Mn}^{2+} + 8\text{H}_2\text{O}$   
 (B)  $8\text{Cl}^- + 8\text{H}^+ + \text{MnO}_4^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O} + 4\text{Cl}_2$   
 (C)  $10\text{Cl}^- + 16\text{H}^+ + 2\text{MnO}_4^- \rightarrow 2\text{Mn}^{2+} + 8\text{H}_2\text{O} + 5\text{Cl}_2$   
 (D)  $8\text{H}^+ + \text{MnO}_4^- \rightarrow \text{Mn}^{2+} + 4\text{H}_2\text{O}$
14. How many grams of zinc iodide is 0.654 mol zinc iodide? [Zn = 65.41; I = 126.90]
- (A) 208.76 g (B) 22.98 g (C) 208.67 g (D) 20.88 g
15. Calculate the actual number of  $\text{SO}_4^{2-}$  ions in 14.3 g  $\text{Cr}_2(\text{SO}_4)_3$ . [O = 16; S = 32; Cr = 52;  $N_A = 6.02 \times 10^{23}$ ].
- (A)  $6.59 \times 10^{22}$   $\text{SO}_4^{2-}$  ions (B)  $6.59 \times 10^{23}$   $\text{SO}_4^{2-}$  ions (C)  $4.39 \times 10^{22}$   $\text{SO}_4^{2-}$  ions (D)  $4.39 \times 10^{23}$   $\text{SO}_4^{2-}$  ions
16. The only product when  $\text{CuSO}_4$  reacts completely with  $\text{NH}_3$  is  $\text{Cu}(\text{NH}_3)_4\text{SO}_4$ . What mol of  $\text{NH}_3$  is required to produce 568.8 g of  $\text{Cu}(\text{NH}_3)_4\text{SO}_4$ ? [H = 1; N = 14; O = 16; S = 32; Cu = 63.5]
- (A) 4 mol  $\text{NH}_3$  (B) 10 mol  $\text{NH}_3$  (C) 8 mol  $\text{NH}_3$  (D) 6 mol  $\text{NH}_3$
17. Calculate the mass of  $\text{BaCO}_3$  produced when excess  $\text{CO}_2$  is bubbled through a solution containing 0.205 mol of  $\text{Ba}(\text{OH})_2$ . [ $\text{BaCO}_3 = 197.4$ ]
- (A) 40.5 g (B) 45.5 g (C) 25.5g (D) 35.5 g
18. In an experiment, 20.0 g of methanol and 15.0 g of carbon monoxide were placed in a reaction to produce acetic acid only. Determine the percentage yield of the acetic acid produced if the actual yield of the acetic acid is 30.1 g. [CO = 28;  $\text{CH}_3\text{OH} = 32$ ;  $\text{CH}_3\text{COOH} = 60$ ]
- (A) 89.1% (B) 81.9% (C) 93.7% (D) 94.6%



Type IV

19. An organic acid contains C, H and O only in one molecule of it. When subjected to combustion analysis, one mole of it was discovered to contain 68.8% C and 5.0% H. What is its empirical formula? [H = 1; C = 12; O = 16].

- (A)  $C_6H_6O_2$  (C)  $C_7H_6O_2$   
 (B)  $CH_2O$  (D)  $C_3H_5O_2$

$CH_2O + O_2 \rightarrow CO_2 + H_2O$

20. What is the molecular mass of an organic compound having a molar mass of 60.00 amu if it consists of 39.9% C, 6.72% H given that the third element in the acid is oxygen?

[H = 1; C = 12; O = 16].

- (A)  $C_2H_4O_2$  (C)  $C_3H_6O_2$   
 (B)  $C_8H_6O_4$  (D)  $C_6H_{10}O_4$

21. Which of the following is the reason for the occurrence of systematic errors in an instrument?

- (A) Delivery fault (C) Regular or too frequent use  
 (B) Manufacturing fault (D) No use for a long time

22. In 5 experiments with the same objective, the values obtained are very close to each other. These values are said to be

- (A) Invalid (C) Accurate  
 (B) Average (D) Precise

23. The respective numbers of significant figures in 42306, 0.0007 and  $6.5 \times 10^{-3}$  are

- (A) 5, 1, 2 (C) 5, 5, 2  
 (B) 4, 4, 2 (D) 5, 1, 5

24. The values obtained when the following are evaluated:  $3.24 \text{ m} \times 7.0 \text{ m}$  and  $710 \text{ m} \div 3.0 \text{ s}$ , are

- (A)  $23 \text{ m}^2$  and  $236.6666667 \text{ m/s}$  (C)  $23 \text{ m}^2$  and  $2.4 \times 10^2 \text{ m/s}$   
 (B)  $22.68 \text{ m}^2$  and  $240 \text{ m/s}$  (D)  $22.68 \text{ m}^2$  and  $236.6666667 \text{ m/s}$

25. At s.t.p., a given substance with the mass  $10.48 \text{ g}$  occupies  $2.4 \text{ cm}^3$ . Then its density keeping significant fig in view is

- (A)  $4.763 \text{ g/cm}^3$  (C)  $4.4376 \text{ g/cm}^3$   
 (B)  $4.4 \text{ g/cm}^3$  (D)  $4.76 \text{ g/cm}^3$

26. Which of the following options represent the correct counting of significant figure of a given data?

- (A)  $300.0 \times 10^3$  has 4 significant digits (C)  $5.8 \times 10^8$  has 10 significant digits  
 (B)  $3.88 \times 10^3$  has 4 significant digits (D)  $3.8 \times 10^3$  has 3 significant digits

27. The density of a solid material is  $(16.2 \pm 0.1) \text{ g/cm}^3$  and its volume is  $(10.1 \pm 0.1) \text{ cm}^3$ . Then the correct value of the mass of the solid is

- (A)  $(164 \pm 2.6) \text{ g}$  (C)  $(163.62 \pm 2.6) \text{ g}$   
 (B)  $(164 \pm 3) \text{ g}$  (D)  $(163.62 \pm 3) \text{ g}$

Type IV

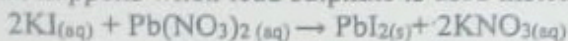
28. The accepted value in an experiment is 15.63. A student carried out a replicate analysis of the experiment and obtained 12.84, 13.02, and 12.96. Which of the options below correctly describes this standard experimental data?

- (A) Precise but not accurate (C) Neither accurate nor precise  
(B) Accurate but not precise (D) Both accurate and precise

29. A weighing machine that often over measures the weight of individuals is said to exhibit

- (A) Standard error (C) Random error  
(B) Probable error (D) Systematic error

30. What happens when lead sulphate is used instead of lead nitrate in the equation below?



- (A) No precipitate of lead iodide will be formed  
(B) Lead sulphate dissolves to release  $\text{Pb}^{2+}$  ions  
(C) Precipitate of lead iodide will be formed  
(D) Lead sulphate releases the sulphate ions.

31. Give the number of electrons, protons and neutrons in the following specie  $^{40}_{20}\text{Ca}^{2+}$ .

- (A)  $e^- = 18$ ,  $p = 20$  and  $n = 20$  (B)  $e^- = 17$ ,  $p = 17$  and  $n = 20$  (C)  $e^- = 17$ ,  $p = 20$  and  $n = 20$   
(D)  $e^- = 18$ ,  $p = 16$  and  $n = 16$

32. Who was the Scientist that carried out the alpha particle scattering experiment and what was the main thrust of his experiment?

- (A) Dalton, the atoms of a particular element are all exactly alike  
(B) Ernest Rutherford, an atom has a small positively charged centre nucleus where nearly all the mass is concentrated.  
(C) Chardwick, Cathode rays can impact mechanical motion on a tiny paddle wheel  
(D) Ernest Rutherford, atoms are electrical in nature and may possibly consist of sub-atomic particles.

33. One of the deductions of JJ Thompson experiment was that Cathode rays cause fluorescent screen to glow with a green light when high voltage current was turned on. State what the inner wall of the fluorescent screen is made up of.

- (A) Zinc Sulphide (B) Cobalt Chloride (C) Aluminium Sulphate (D) Zinc Chloride

34. Which of the followings best describe alpha particles, cathode and canal rays respectively?

- (A)  $^4_2\text{He}$ ,  $^0_{-1}e$  and  $^1_1\text{P}$  (B)  $^1_1\text{P}$ ,  $^4_2\text{He}$ , and  $^0_{-1}e$  (C)  $^4_2\text{He}$ ,  $^1_1\text{P}$  and  $^0_{-1}e$  (D)  $^0_{-1}e$ ,  $^1_1\text{P}$ , and  $^4_2\text{He}$

35. Arrange the following permissible orbits/energy levels K, L, M, N, O of electrons in a given atom in a decreasing order.

- (A)  $O < N < M < L < K$  (B)  $K < L < N < O$  (C)  $K > L > M > N > O$  (D)  $O > N > M > L > K$

36. Which of the following Scientists suggested a wave-particle dual nature for an electron?

- (A) J. J. Thompson (B) de-Broglie (C) Heisenberg (D) Erwin Schrodinger

Type IV

37. Which of the followings correctly represent the mass, charge and symbol of proton respectively?

- (A)  ${}^1_1P$ , +1 and  $1.673 \times 10^{-27}$  (B)  ${}^1_0n$ , neutral,  $1.675 \times 10^{-27}$  (C)  $1.673 \times 10^{-27}$ , +1 and  ${}^1_1P$   
(D)  $9.109 \times 10^{-31}$ , +1,  ${}^1_1P$

38. What orbital is occupied by electron describe by the quantum numbers  $n = 4$ ,  $\ell = 0$  indicating the values of  $m$  and  $s$  that each electron could have?

- (A)  $4p$ ,  $1$ ,  $\pm \frac{1}{2}$ ,  $\pm \frac{1}{2}$  (B)  $4s$ ,  $0$ ,  $\pm \frac{1}{2}$  (C)  $3s$ ,  $0$ ,  $\pm \frac{1}{2}$  (D)  $2s$ ,  $0$ ,  $\pm \frac{1}{2}$

39. Given that the JJ Thompson value of charge to mass ratio was  $1.76 \times 10^{11} \text{Ckg}^{-1}$  and the charge on the electron reported by Robert Millikan was  $1.602 \times 10^{-19}$  Calculate the mass of an electron.

- (A)  $9.11 \times 10^{-31} \text{kg}$  (B)  $1.91 \times 10^{-31} \text{kg}$  (C)  $9.11 \times 10^{-32} \text{kg}$  (D)  $4.51 \times 10^{-31} \text{kg}$

40. Which of the followings best describe the shape, degeneracy and maximum number of electrons in p-orbitals?

- (A) 3, Dumb bell and 6 respectively (B) Spherical, non and 2 respectively  
(C) Dumb bell, 3 and 6 respectively (D) Double dumb bell, 6 and 3 respectively