**swer the following questions:**

i) Distinguish between normality factor and titration error.

ii) A chemistry lab-boy weighed 1.31 gm of $Na_2CO_3$ to prepare 250ml of it's decinormal solution.

a. Calculate the actual strength of the solution indicating normality factor.

b. Find the volume of water required to be evaporated to make it exactly normal solution.

c. Calculate the mass of oxalic acid crystal required to neutrilisation the solution completely.

2. $B \xrightarrow{\text{alc.KOH}} C \xrightarrow{HCl} D \xrightarrow{AgCN} E \xrightarrow{LiAlH_4} F$

B and D are isomers having mol. Formula $C_3H_7Cl$

3. i) Give correct chemical reaction for the preparation of chlorobenzene from. (a) benzene (b) benzene diazonium chloride

ii) Why is haloarene less reactive than haloalkane towards nucleophilic substitution reactions?

iii) How would you convert chlorobenzene to phenol.

4. i) Define the following term with example:

a) Sand meyer's reaction b) Wurtz reaction c) Iodoform reaction

ii. A primary haloalkane (X) when allowed to react with KCN yields a compound (Y), which on acidic hydrolysis gives propanoic acid? Identify (X) and (Y).

5. i) What is meant by transition metal? ii) Justify giving proper reason.

a) Transition metals mostly form coloured compounds. b) Zinc is regarded as non-typical transition metal.

c) Draw splitting of d-orbital in octahedral field showing eg set and $t_2g$ set.

6. The following data are given for the reaction $2P + Q \rightarrow R$

| Exp. No | [P] mol $L^{-1}$ | [Q] mol $L^{-1}$ | Initial rate mol $L^{-1}$ $S^{-1}$ |
|---|---|---|---|
| 1 | 0.1 | 0.1 | $7\times10^{-3}$ |
| 2 | 0.3 | 0.2 | $8.4\times10^{-2}$ |
| 3 | 0.3 | 0.4 | $3.36\times10^{-1}$ |
| 4 | 0.4 | 0.1 | $2.8\times10^{-2}$ |

**Calculate:**

i) The order with respect to P and Q ii) Rate constant

iii) Half life of reaction with respect to P iv) Rate of formation of product when [P] = 0.6 mol L–1 and Q = 0.3 mol $L^{-1}$

7. NaCl is a primary, NaOH and HCl are secondary standard substances.

a. Write the difference between primary and secondary standard substances.

b. Define primary standard substance with the example. Calculate molality of one liter of 93% $H_2SO_4$ solution (weight by volume). The density of the solution is 1.84 $gmL^{-1}$.

8. What is Grignard's reagent? How can you prepare butanol, propan-2-ol and 2-methylpropan-2-ol from Grignard's reagent

9. An alcohol (A) of molecular formula $C_3H_8O$ undergoes Victor Meyer's reaction to give blue colour at the end of reaction when added KOH solution:

a) Draw structural formula and IUPAX name of (A) b) Give the complete chemical reaction for the Victor-Meyer's test of (A).

c) Starting from $CH_3MgBr$, how would you prepare compound A?

d) What happens when (A) is oxidized? e) Convert (A) into propene.

10. A sweet smelling organic compounds (A) slowly oxidized by air in the presence of sunlight to give highly poisonous gas carbonyl chloride.

i) Why above compound (A) stored in dark and brown bottle?

ii) Give principle reaction involved in the preparation f compound (A) from ethanol.

iii) How would you convert compound (A) into (a) Chloretone (b) ethyne (c) Chloropicrin

iv) Why the compound (A) cannot give white ppt with $AgNO_3$ solution?

11. Copper is reddish brown coloured solid, also Tama in Nepal and used to prepare household utensils.

i. Starting from copper pyrite, how would you obtain pure copper? Explain the steps involved in the process with necessary diagram for it.

ii. What happens when:

a. A copper coin is dropped into concentrated nitric acid in a test tube. b. Copper is exposed to moist air.

12. Prove that $V_1S_1 = V_2S_2$. What volume of $\frac{N}{2}$ and $\frac{N}{10}$ HCl must be mixed to give 2 liters of $\frac{N}{5}$ HCl? 1.97 gram of a mixture of $CaCO_3$ and $mgCO_3$ was dissolved in 400 mL of 0.15N HCl solution. After the reaction was complete the resulting solution was diluted to 300 mL and 15 mL of this solution required 18 ml of 0.05N NaOH solution for complete neutralization. Calculate the percentage composition of the mixture.

13 i) Define half-life period of first order reaction. ii) Why is half-life period of first order reaction independent of the initial concentration?

iii) Mention the major application of half-life period in biological Scientific research.

iv) A first order reaction is 60% complete in 30 minute.

a) Find out the rate constant and half life period. b) Calculate the time required to convert 99% of the reactant into products

v) Mention an example to show effect of surface area of reactant on rate of reaction.

14.i) Define acidity of a base. 200 mL of 0.2M HCl is neutralized with 0.1M NaOH. Then during their half neutralization, what is the molarity of HCl

ii) Calculate the rate of $NH_3$ and $H_2O$ from the following reaction if the rate of formation of NO is $3.6\times10^{-3}$ mol $L^{-1}S^{-1}$

$4NH_3(g) + 5O_2(g) \rightarrow 4NO(g) + 6H_2O(g)$

15. What is normality factor? 1 g of mixture containing Mg and Zn required 72 mL of 1N HCl solution for complete neutralization percentage composition of mixture. (Atomic wt. of Zn= 65.4)

16. The following data are given below in a reaction A+B → Product.

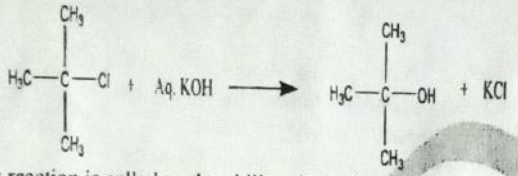
| Experiments | [A] mol $L^{-1}$ | [B] mol $L^{-1}$ | Initial rate mol $L^{-1}$ $S^{-1}$ |
|---|---|---|---|
| 1 | 0.1 | 0.1 | $4\times10^{-4}$ |
| 2 | 0.2 | 0.2 | $1.6\times10^{-3}$ |
| 3 | 0.5 | 0.1 | $1\times10^{-2}$ |
| 4 | 0.5 | 0.5 | $1\times10^{-2}$ |

i) What is the order with respect to A and B for the reaction? ii) Calculate the rate constant.
iii) Find the rate law.
iv) Find the reaction rate when concentration of A and B are 0.2 $molL^{-1}$ and 0.35 $molL^{-1}$ respectively.

17. An organic compounds (A) when heated with Ag power gives $C_2H_2$ and form carbonyl chloride when it exposes to air.
i) Identify the compound (A) ii) Write reaction for the laboratory methods of preparation of (A)
iii) What happens when the compound (A) is treated with conc. nitric acid. iv) Covert (A) into methanoic acid

18. Write down the Monohydric isomers of $C_3H_8O$ with their IUPAC names. Which one of them gives positive iodoform test? Write the reactions involved. Convert one isomer to another and vice verse.

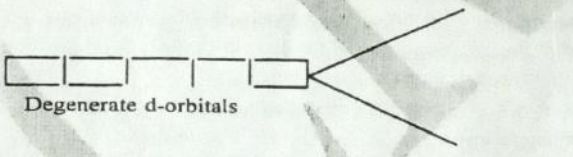
19. We have chemical reaction:




a) This reaction is called nucleophilic substitution reaction, why?
b) Is this reaction following $SN^1$ or $SN^2$ mechanism?
c) Give mechanism or reaction to justify answer of question number 'b'?
d) What is difference in product if above reaction is carried out in presence of alcoholic KOH? Also state the type of reaction.

20. Give two chemical reactions for the preparation of chlorobenzene. Why does it give ortho and para products during electrophilic substitution reaction? What happens when Chlorobenzene is treated with $NH_3$?

21. One of the common features of transition elements is the formation of coloured compound.
a) Give name of five d-orbitals. b) $Cu^+$ ion is transition metal but can't possess colour, why?
c) Complete given diagram.




In octahedral complex

i) "Transition metal compound possess colour" explain on the basis of diagram from question 'c'.

22. A. i. Write down the two method of preparation of phenol.
ii. What is Esterification? Define with reaction.

B. A monohydric alcohol reacts with $PBr_3$ to give 'B'. The compound B, if heated with alc. KOH gives 'C'. C on ozonolysis produces ethanal and methanal as major products. The compound "A" responses iodoform test. Identity A, B and C with reactions involved. What happens when "B" is heated with sodium in presence of dry ether?

23. An alcohol (P) having molecular formula $C_4H_{10}O$ undergoes victor-Meyers test to give blue colour at the end of reaction when added KOH solution.
i) Draw structure formula and write IUPAC name of P. ii) Write down complete chemical reaction for the victor meyer test of P
iii) How would you prepare (P), starting form $CH_3MgBr$? iv) What product would you obtain when P is oxidized?
v) Convert propan-1ol into propan-2-ol

24. A. Distinguish between order and molecularity. Derive integrated rate law equation for first order.
B. 0.8 g of a divalent metal was dissolved in 100 cc of 1.28 N HCl solution and the solution is diluted to 200 cc. Then, 50 cc of this diluted solution requires 54.6 cc of 0.22 N NaOH for neutralization. Find the atomic wt. of metal.

25. i) Define pseudo first order reaction with example.
ii) Why is half-life period of zero order reaction dependent of the initial concentration?
iii) Calculate the half life period of a first order reaction when the rate constant is 5 $year^{-1}$.
iv) A first order reaction is 99% complete in 32 minute.
a) Find out the rate constant and half life period.
b) Calculate the time required to convert 99.1% of the reactant into products.
v) Draw the energy profile diagram which gives the relationship between rate of reaction and Catalyst.

26. Copper is reddish brown coloured solid, also 'Tama' in Nepal and used to prepare household utensils.
What happens when:
a. A copper coin is dropped into concentrated $H_2SO_4$ in a test tube. b. Copper is exposed to moist air.

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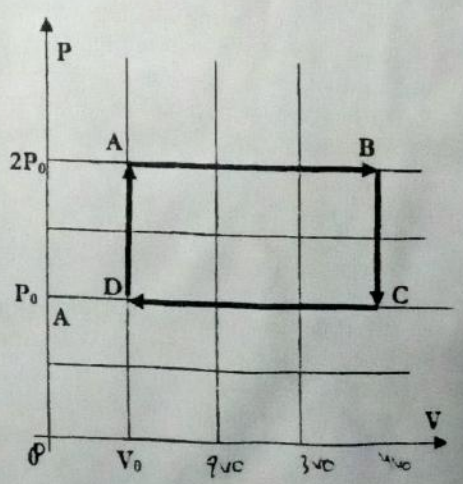
Happy Dashain / Tihar / Chhath 2080

*The following questions should be on your respective teachers' note copy. These questions are necessary but not sufficient. For further practice, please take the reference of your text book. We may ask you these questions for your internal evaluation at any time.*

1. Identify the wrong statement a) for isothermal process, $\Delta T = 0$ b) for isochoric process, $\Delta V = 0$ c) for isobaric process, $\Delta P = 0$ **d)** for cyclic process, $\Delta W = 0$
2. An ideal gas ratio of heat capacities = 5/3 at 72°C is expanded adiabatically to eight times to its original volume. Approximate rise in temperature of the gas is **a)** 86 K b) 186 K c) 259 K d) 273 K
3. Which of the following is correct expression of the first law of thermodynamics? a) $q = \Delta H - W$ **b)** $\Delta H = q + W$ c) $\Delta U = q + W$ d) $\Delta U = \Delta H + P\Delta K$
4. The first law of thermodynamics is also known as, a) law of mass action b) law of conservation of mass **c)** law of conservation of energy d) law of conservation of mass and energy
5. What are the conditions for an adiabatic pressure? a) transfer of heat but no change in temp. b) no transfer of heat and no change in temp. **c)** no transfer of heat but change in temp d) none of the above
6. What is the process during the working stroke of heat engine? a) isothermal **b)** Adiabatic c) Isobaric d) Isochoric
7. When a gas undergoes adiabatic expansion, its internal energy: a) Increases **b)** Decreases c) Remains same d) None
8. In an adiabatic process on a gas with $\gamma = 1.4$, the pressure is increased by 0.5%. The volume of the gas decreases by **a)** 0.36% b) 0.7% c) 0.5% d) 1%
9. If a gas is allowed to expand adiabatically against external pressure. a) Its temperature remains constant b) pressure remains constant c) there is increase in internal energy **d)** There is decrease in internal energy
10. The maximum efficiency of an engine operating between 30°C and 300°C is, a) 4.71% **b)** 47% c) 90% d) 9 %
11. A Carnot cycle includes **a)** Two isothermal and Two adiabatic processes. b) Two isothermal and Two isobaric processes. c) Two isothermal processes. d) Two adiabatic processes.
12. The refrigerator and heat pump is work on which principle. a) First law of thermodynamics b) Second law of thermodynamics c) Third law of thermodynamics **d)** Zeroth law of thermodynamics
13. The law of Kelvin Planck statement about the a) Conservation of energy b) Conservation of heat c) Conservation of work **d)** Conversion of heat into work
14. According to Kelvin Planck statement of 2nd law of thermodynamics. **a)** It is impossible to construct an engine working on a cyclic process whose main purpose is to covert heat energy into the work. b) It is possible to construct an engine working on a cyclic process whose sole purpose is to convert heat into work.c) Both of the above d) None of the above
15. A Carnot engine takes 2000 J of heat from a reservoir at 500 K, does some work and discards some heat to the reservoir at 273 K. The work done by the engine is a) 980 J **b)** 908 J c)2000 J d) 1000 J
16. The efficiency of a Carnot engine is $\frac{1}{5}$. On reducing the temperature of sink by 45°C, efficiency becomes $\frac{1}{3}$. The initial temperature of the sink was **a)** 270 Kb) 310 K c) 337 K d) 540 K
17. The efficiency of a carnot engine is 20%. On reducing te temperature of sink by 45°C, efficiency becomes 33.3%. The initial temperature of the sink was **a)** 270 K b) 310 K c) 337 K d) 540 K
18. In a Carnot's engine, the temperature of the het sink is 27°C and that of the source is 327°C. The efficiency of the engine is a) 50% b) 70% **c)** 91% d) 95%
19. Efficiency of Carnot engine working between 27°C and 127°C is a) 50% b) 100% c) 25% d) 75%
20. A Carnot engine takes in 3000 kcal of heat from a reservoir at 627°C and gives it to a sink at 27°C. The work done by the engine is a) $4.2\times10^6$ J **b)** $8.4\times10^6$ J c) $16.8\times10^6$ J d) 0
21. What happens to the energy added to an ideal gas when it is heated at? i) constant volume ii) constant pressure
22. A certain quantity of ideal gas is compressed to half of its initial volume. The process may be adiabatic or isothermal. For which process greater amount of mechanical work is required?
23. What are the limitations of first law of thermodynamics?
24. The initial energy of a compressed gas is less than that of a rarefied gas at the same temperature. Why?
25. Why does the temperature of a gas drop during an adiabatic expansion?
26. Why does a gas have two specific heat capacities? Is $C_p$ always greater than $C_v$?
27. Explain the significance of the first law of thermodynamics. Hence write its expression in terms of the change in entropy of the system.
28. Why specific heat capacity of gas at constant pressure is greater than its specific heat capacity at constant volume?
29. When a gas expands adiabatically, it does work on its surroundings. But, if there is no heat input to the gas where does the energy come from?
30. Can heat be considered as a form of potential energy?
31. When we blow on the block of our hand with our mouth wide open, we feel warm. But if we partially close out mouth to form an 'O' and then blow on our hand, our breath feels cool. Why?
32. Air escaping from a tiny hole of a tube is felt cool, why? Air escaping from an air hose at a gas station always feels cold. Why?
33. Explain why temperature of gas drops in adiabatic expansion.
34. Milk is poured into a cup of tea and is mixed with spoon. Is this an example of reversible process? Explain.
35. Why is the molar heat capacity of a gas at constant pressure always greater than at constant volume?

36. What happens to the internal energy of a gas during (1) isothermal expansion (ii) adiabatic expansion?
37. Why does a refrigerator consume more power in summer than in winter to cool the same quantity of food by same degree?
38. Entropy is defined is defined in the second law of thermodynamics. Can the first law be expressed in terms of entropy? How?
39. Explain the significant difference between the first and the second laws of thermodynamics.
40. Spark plug is not necessary in a diesel engine, why?
41. Write down the statements of second law of thermodynamics.
42. Why do diesel engines need no spark plugs?
43. Petrol engine is less efficient than diesel engine. Explain why?
44. Describe the working principle of diesel engine with the help of PV diagram.
45. State and explain second law of thermodynamics. Define the efficiency of a heat engine and explain qualitatively why the efficiency of such an engine is always less than 100%?
46. Describe the working principle of petrol engine with the help of its PV diagram.
47. Describe the workings of a diesel engine with a P-V diagram What are its merits and demerits?
48. Describe the workings of refrigerator.
49. What is entropy? Write the mathematical expression of entropy.
50. A Carnot engine working between 300 K and 600 K has a work output of 800 J per cycle. What is the amount of heat energy supplied to the engine from source per cycle? **Ans: 1600 J / cycle**
51. A Carnot engine takes $10^3$ calories of heat from a reservoir at 227°C and rejects heat to a reservoir at 27°C. How much work is done by it **Ans: 1680 J**
52. A diesel engine performs 2500J of mechanical work and discards 4000 J of heat each cycle. (i). How much heat must be supplied to the engine each cycle? (ii) What is the thermal efficiency of the engine? **Ans: 6500 J, 38.46%**
53. The efficiency of a Carnot cycle is 15%. If on reducing the temperature of sink by 65°C, the efficiency becomes double, find the temperature of source and sink. **Ans: 433.33 K, 368.33 K**
54. A Carnot engine has 50% efficiency with a sink at 9°C. By how many degrees should temperature of source be increased in order to raise the efficiency to 70%? **Ans: 376 K**
55. An ideal heat engine operates between two reservoirs at two temperatures in order to achieve 30% efficiency when the temperature of the sink to 50°C, what should be the temperature of the source? **Ans: 461.43 K**
56. The source reservoir of a Carnot engine is at a temperature of 400 K and takes 400 K and takes 400 J of heat and rejects 20 J of heat to the sink reservoir in each cycle. What is the efficiency of engine and the temperature of the sink? **Ans: 20 K**
57. A Carnot's engine has 25% efficiency with a sink at 9°c. By how many degrees should the temperature of the source be increased in order to raise the efficiency to 70%? **Ans: 564 K**
58. A diesel engine performs 2200 J of mechanical work and discards 4300 J of heat each cycle. (i) How much heat must be supplied to the engine in each cycle? (ii) What is the thermal efficiency of the engine? **Ans: 6500 J, 33.85%**
59. What will be the thermal efficiency of an engine if it takes 8 kJ heat from the source and rejects 6 kJ the sink in one cycle. **Ans:25%**
60. A Carnot engine works between the source and the sink with efficiency 40%. How much temperature of the sink be lowered keeping the source temperate constant so that its efficiency increases by 10%? **Ans: 30 K**
61. A Carnot engine works between the source and the sink with 25% efficiency. How much temperature of the sink be raised keeping the sink at the same constant temperature at 27°C so that the efficiency is increased by 15°C? **Ans: 100 K**
62. The efficiency of Carnot cycle is 15%. If on reducing temperature of the sink by 65°C, the efficiency becomes 30%, find the initial and final temperatures between which the cycle is working. **Ans: 433.33 k, 368.33 k**
63. A petrol engine consumes 25kg of petrol per hour. The calorific value of petrol is $11.4\times10^6$ cal/kg. The power of the engine is 99.75kw. Calculate the efficiency of the engine. **Ans: 30%**
64. A Carnot Engine works between 800° and 400°C. If it is possible either to increase the source temperature by 50°C or to decrease the sink temperature by 50°C, which of these actions will be causing more increase in the efficiency? Justify your answer. **Ans: To decrease the sink by 50°C because efficiency is more, η on increasing temperature of source is 40% while decreasing is 42%.**
65. A Carnot engine absorbs heat from a reservoir at the temperature 127°c. If the engine absorbs 1000 calories of heat form the high temperature reservoir, find the work done and the efficiency. **Ans: 1333.5 J**
66. A petrol engine consumes 10 kg of petrol in one hour. The calorific value of petrol is $11.4\times10^3$ cal.gm. The power of the engine is 20 kwatts. Calculate the efficiency of the engine. **Ans: 15%**
67. A Carnot engine whose low temperature reservoir is at 27°C has an efficiency of 25%. In order to increase the efficiency to 50%, how much the temperature of the high temperature reservoir be increased, if the temperature of ther low temperature reservoir remains constant. **Ans: 200 K**
68. A petrol engine consumes 5 kg of petrol per hour. If the power of engine is 20 KW and the calorific value of petrol is $11\times10^3$ K cal per kg. Calculate the efficiency of the engine. **Ans: 31.15%**
69. The given P-V diagram represents the thermodynamic cycle of an engine, operating with an ideal monatomic gas. Calculate the amount of heat extracted from the source in a single cycle. **Ans : 6.5 $P_0V_0$**



## IGNMENT SET-C1 (BS/PJ/SG) –

*The following questions should be on your respective teachers' note copy. These questions are necessary but not sufficient. For further practice, please take the reference of your text book. We may ask you these questions for your internal evaluation at any time.*

1. Why is titration between ammonium hydroxide and carbonic acid uncommon?
2. What volume of water should be added to 50 mL of semi normal NaOH solution to make it exactly deci-normal.
3. Distinguish between titrant and titrand.
4. Oxalic acid is taken as primary standard substance, why?
5. Distinguish between decinormal and decimolar solution.
6. Distinguish between titration error and normality factor.
7. Differentiate between end point and equivalence point of a reaction.
8. Differentiate between normality and molarity.
9. Distinguish between primary standard solution and secondary standard solution.
10. Define the terms: i) Primary standard solution ii) Acidimetry
11. Define the terms: i) Normality ii) Secondary standard solution
12. How is end point differed from equivalence point?
13. What is the importance of calculating normality factor of solutions during titration?
14. Define the terms: i) Normality factor ii) Secondary standard solution
15. Why is crystal oxalic acid regarded as a good substance for the preparation of primary standard solution?
16. How would you convert 500 cc of 2 M $H_2SO_4$ into: i) Gram/liter ii) Normality
17. Distinguish between end point and equivalence poimt of reaction.
18. Which one has higher concentration and why? a. 80 g/litre NaOH solution and 3 M NaOH solution. b. 5.3 g/litre $Na_2CO_3$ and $\frac{N}{10}$ $Na_2CO_3$ solution.
19. A sample of $Na_2CO_3$ weighting 0.53 g is added to 101 $m^2$ of 0.1N $H_2SO_4$ solution. Will the resulting solution be acidic, basic or netural?
20. Define the term: i) Semi normal solution ii) Alkalimerty
21. Define secondary standard solution with a suitable example.
22. Write an example of redox titration. Why is it called so?
23. What is the normality of 20 cc of 2 M phosphoric acid ($H_3PO_4$)?
24. What is normality? How is it related with molarity?
25. What do you mean by equivalent weight of an element?
26. What are the requisites for a substance to be a primary standard?
27. Define decinormal solution.
28. Define the acidity of base 0.4 gm of a divalent metal was dissolved in 50 cc of 0.64 N Hcl and the solution was diluted to 100 cc. Then 25 cc of this solution required 27.3 cc of 0.11 N NaOH for neutralization. Find atomic mass of the metal.
29. Define molality of solution. Calculate molality of one liter of 93% $H_2SO_4$ solution (weight by volume). The density of the solution is 1.84 g $mL^{-1}$.
30. "All standard solution are not primary standard solution." Comment the statement. How many ml of a 0.1 MHCl are required to react completely 1gm mixture of Na2CO3 and NaHCO3 containing equimol???? Amount of the two.
31. Define normality factor. 0.18 g????? divalent metal was completely dissolved in 250 cc or ????? solution containing 4.9 g $H_2SO_4$ per liter 50 cc of ??? residual acid solution required 20 cc of N/10 alkali ????? complete neutralizion. Calculate the atomic weight of metal.
32. Are all standard solutions, primary standard solutions or not? Give reason. 1 g of a Divalent metal was dissolved in 25 mL of 2N $H_2SO_4$ (f = 1.01). The Excess acid required 15.1 mL of 1N NaOH (f = 0.8) for complete neutralization. Find the atomic weight of the metal.
33. It is better to express concentration in molality rather than molarity, why? x g of a metal (equivalent weight = 12) was completely dissolved in 100 cc of $\frac{N}{2}$ HCL solution. The volume was then made upto 500cc. It is found that 25cc of the diluted acid solution required 17.5 cc of $\frac{N}{10}$ NaOH for complete neutralization. Find the value of X.
34. Define deci- normal solution. 12 g of commercial zinc is made to react with excess dil. $H_2SO_4$. The total volume of $H_2$ gas was found to be 4.2 liters at 570 mmHg pressure and 279 K temperturte. Determine the percentage purity of the zinc.
35. Define end point. 12 g of commercial zinc is made to react with excess dilute $H_2SO_4$. The total volume of $H_2$ gas liberated was found to be 4.2 liters at 570 mmHg pressure and 279 K. Determine the percentage purity of the zinc. (Atomic mass of Zn = 65)
36. What is meant by normality factor? How many mL of conc. $HNO_3$ of specific gravity 1.41 containing 69% by mass are required to prepare 500mL of 0.5 N $HNO_3$?
37. Define the terms: i) Titration error ii) Unknown solution

What volume of 10 M HCl and 3 M HCl should be mixed to obtain one liter of 6 M HCl solution?

38. Define titration error. 0.012 g of a divalent metal is completely dissolved in 40 cc of $\frac{N}{10}$ HCl. The excess of acid required 15 cc of $\frac{N}{5}$ NaOH for neutralization. Find the atomic weight of the metal.
39. Define the terms: i) titration error ii) Standrad solution
calculate the volume of 1M NaOH required to neutralize 200 cc of 2M HCl. What mass of sodium chloride are produced from the neutralization reaction?
40. What is meant by acidity of base? 500 cc of 2 N. Na2CO3 are mixed with 400 cc of 3 N $H_2SO_4$ and volume was diluted to one liter. Will the resulting solution acidic, basic or natural? Also calculate the molarity of the dilute solution.
41. Define redox titration. 10 g of NaOH was added to 200 cc of $\frac{N}{2}$ (f = 1.5) $H_2SO_4$. The volume was diluted to two liters. Predict whether the dilute solution is acidic, basic or natural and also calculate the resulting molarity of the dilute solution.
42. What is meant by acidimetry? A solution of conc. HCl contain 38% HCl by mass: i) What is the molarity of this solution if the density of the solution is 1.19 g/cc? ii) What volume of the conc. HCl is required to neutralize one liter of 0.1 M NaOH solution?
43. What is meant by normality factor? What volume of 95% sulphuric acid (denisity = 1.85g/cc) and what mass of water must be taken to prepare 100 cc of 15% solution of sulphuric acid (density = 1.1g/cc)?
44. What are primary and secondary standard solution? Calculate the resulting normality of a solution prepared by mixing 20 mL o f0.8 M NaOH with 25 mL of 0.4 M $H_2SO_4$ solution.
45. During litration the concentration of $KMnO_4$ solution can be determined by using standard oxalic acid solution. i) What is meant by standard solution? ii) Calculate the equivalent weight of $KMnO_4$ in acidic medium. (Molar mass of $KMnO_4$ = 158) iii) Why isd above titration called redox titration? Iv) Name the indictor used in this titration.
46. 1 gram of a divalent metal was dissolved in 25 mL of 1 M $H_2SO_4$. The unreacted acid future required 15 c.c. of NaOH (f = 0.8) for complete neutralization. i) Calculate the gram equivalent of unreacted acid. ii) Find the atomic weight of metal.
47. Define acidity of a base giving an example. 0.8 g of a divalent metal was dissolved in 100 cc of 1.28 N HCl and the solution was diluted to 200 cc. 50 cc of this dilute solution required 54.6 cc of 0.22 N NaOH for neutralization: Calculate the atomic mass of the metal.
48. Why volume of 5% NaOH are required to neutralize 2 liter of decinormal $H_2SO_4$?
49. Define the terms: i) Primary standard solution ii) Normality Solution iii) Acidic of a base iv) Alkalimetry.
What is meant by redox? Write an example of it. 4 g of NaOH was added to 20 cc of 2 N $H_2SO_4$ solution and the volume was diluted to one liter. Predict whether the dilute solution as acidic, basic or netural and also calculate the resulting normality of the dilute solution in term of g/liter.
50. Define normality and molarity of a solution. Find their relationship for a given solution. 1 g of NaOH is added to 2 liter of x M $H_2SO_4$ solution, so that the pH of the resulting solution is 7. Find the value of x.
51. Define molar solution, end point and indictor. Calculate the molarity of 5% $H_2SO_4$ Solution.
52. 7.5 g of a dibasic acid dissolved in water and the solution made up to 250 cc. 25 cc of this acid requires 16.3 cc (1 N) NaOH for co,plete neutralization. Calculate the molecular weight of the acid.
53. Normality and motarity are the terminologies of volumetric analysis used to express the concentration of solution.
    i) Distinguish between molarity and normality.
    ii) Deduce the normality equation $S_1V_1 = S_2V_2$.
    iii) Why is this equation not always used to calculate molarity?
    iv) Your chemistry teacher added 4 g of sodium hydroxide in a bottle containing 20 cc of 2N $H_2SO_4$ and he diluted sit up to 1 litre by adding water. Then, he gave you a blue and a red litmus paper.
        a) Which litmus paper would you used to test the solution and why?
        b) Calculate the normality of the dilute solution.
54. Normality and Molarity are the ways of expressing concentration of solution
    i) Establish the relationship between normality with molarity.
    ii) Calculate the resulting normality of a solution prepared by mixing 20 mL of 0.8 M NaOH with 25 mL 0.4 M $H_2SO_4$ solution.

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