

FORM SIX HOLIDAY PACKAGE 2021

1. With the help of chemical equations, explain extraction of aluminium metal from its chief ore.
2. With the help of chemical equations, explain extraction of copper metal from its chief ore.
3. With the help of chemical equations, explain extraction of tin metal from its chief ore.
4. Briefly, summarize four general steps of extraction of metals.
5. (a) State Dobereiner's law of triads.
(b) State Mendeleev's periodic law.
(c) What was the basis for the Mendeleev's classification of elements?
6. (a) What is the basis of classification of elements in the modern periodic table?
(b) How does the modern periodic table differ from the Mendeleev's periodic table?
(c) Describe the advantages of the long form of the periodic table over the Mendeleev's periodic table?
7. (a) Why did Mendeleev leave the gaps in his periodic table?
(b) State the law of Octaves as given by Newland.
(c) What is periodicity?
(d) What is the most important cause of periodicity in the periodic table?
8. (a) What was the necessity for the classification of elements?
(b) Write a brief account for the Dobereiner's attempt for the classification of elements. Give an example.
(c) **X**, **Y** and **Z** are three members of a Dobereiner's triad. If the atomic mass of **X** is 7 and that of **Z** is 39, what is the atomic mass of **Y**?
9. (a) Write a brief account of the Newland's attempt for the periodic classification of elements.
(b) How far was the Newland's attempt successful for the classification of elements?
(c) Describe in brief (about 5-6 lines) Lothar Meyer's classification of elements.
10. (a) What is the periodic law as suggested by Mendeleev? Is this periodic law the same as was observed by Lothar Meyer?
(b) Give a brief account of Mendeleev's classification of elements.
(c) State the periodic law given by Mendeleev's periodic table was based. Why and how was this periodic law changed?

11.(a) In what respects the Mendeleev's classification is superior to the other classification given earlier?

(b) What are the anomalies in the Mendeleev's periodic classification? How have these been overcome in the present basis of the periodic table classification of elements?

(c) Which discovery led to a change in the Mendeleev's periodic law? What is the modern form of the periodic law?

12.(a) What are the general features of the long form of the periodic table?

(b) How is long form periodic table superior to the Mendeleev's periodic table?

13.(a) Explain with the help of chemical equations why oxides of group IA elements like Na and K and those of silver and mercury cannot be prepared through decomposing their nitrates?

(b) Explain with the help of chemical equations why oxides of group IA elements like Na and K and those of mercury and silver cannot be prepared through decomposing their carbonates?

(c) What are the uses of metal oxides? Give five uses.

(d) With the help of chemical equations, explain the chemical properties of metal oxides. Give four points.

14. Describe with examples, the two common methods used for the preparation of metal oxides.

15. Some oxides are both acidic and basic.

(a) Mention their collective name and give any four examples.

(b) Write equations to show the reactions between each of the four metal hydroxides and;

(i) nitric acid. (ii) excess of sodium hydroxide solution.

16. Mention the classes of metal oxides based on their reactions with acids or bases, and in each case, give two examples with complete balanced equations.

17. Write an equation to show the;

(a) burning of sodium in air. (b) decomposition of metal carbonate by heat.

(c) dissolving of sodium oxide in dilute acid.

18. Name two metal oxides which are soluble in water and other two which are insoluble in water.

19. Account for the colour of the following metal oxides when hot or cold.

(a) CuO (b) ZnO (c) PbO (d) MgO.

20. Write the equations to show how each of the oxides of aluminium, potassium, and copper reacts with;

(a) water (b) dilute nitric acid (c) dilute sulphuric acid (d) dilute hydrochloric acid.

21. Explain with balanced chemical equations, what happens when;

(a) a piece of sodium metal is dipped in water.

(b) sodium metal is heated in excess of air that is free of carbon dioxide gas.

(c) sodium peroxide is dissolved in water at a room temperature.

(d) sodium peroxide is dissolved in ice-cold water.

22. Complete and balance the following reactions;



23. (a) What will be observed when Na and Ca metals are put in a beaker containing water?

(b) How does calcium hydroxide react with the following:

(i) carbon dioxide gas (ii) Ammonium salt. (iii) Temporary hard water. (iv) Hydrochloric acid.

24. When a solution of Barium hydroxide is mixed with a solution of sulphuric acid, a white precipitate forms and its electrical conductivity decreases markedly.

(i) Write balanced equation for the reaction that occurred. (ii) Account for the decrease in electrical conductivity.

25. Solid lithium hydroxide is used in space vehicles to remove exhaled carbon dioxide from the living environment. What mass of gaseous carbon dioxide can be absorbed by 1 kg of lithium hydroxide? (Atomic masses; Li=7, O=16, H=1, C=12)

26. (a) Give three examples of amphoteric hydroxides.

(b) Write equations to show how each of the hydroxides provided in (a) reacts with;

(i) dilute nitric acid. (ii) excess sodium hydroxide solution.

27. Using balanced chemical equations, explain the direct method of preparing metal hydroxides.

28. Explain the importance of storing hydroxides in containers which are tightly closed.

29. The hydroxides of metals can be classified in terms of their reactions with acids and bases. Name the classes of the hydroxides and in each case, give two examples and provide balanced chemical equations for their reactions.

30. Give two examples of water soluble and insoluble hydroxides. What is the name given to the water-soluble hydroxides?

31. With examples, explain any five (5) uses of metal hydroxides.

32. Describe how one can prepare sodium carbonate in the laboratory.

33. Write the equations to show the reaction between;

(a) potassium hydrogencarbonate and zinc chloride. (b) Sodium hydrogencarbonate and lead nitrate. (c) Sodium hydrogencarbonate and copper (II) sulphate.

34. Write equations to show the effect of heat on the following carbonates:

(a) potassium carbonate. (b) magnesium carbonate. (c) silver carbonate. (d) Ammonium carbonate.

35. What happens when dilute hydrochloric acid is added into powdered lead carbonate in a beaker? Use an equation to explain your answer.

36. Describe how you can distinguish between a hydrogen carbonate from a soluble carbonate.

37. Give five uses of metal carbonates.

38. With the help of chemical equations explain what will be observed when dilute hydrochloric acid is reacted;

(i) sodium carbonate. (ii) lead carbonate. (iii) CuCO_3

39. With the help of chemical equations explain how the following carbonates of Pb and Ca react with;

(i) dilute sulphuric acid. (ii) dilute nitric acid.

40. With the help of chemical equations, show how you can distinguish the solutions of sodium carbonate and its bicarbonate in the laboratory.

41. Baking powder contains sodium hydrogen carbonate mixed with an acid. When water is added, the baking powder releases carbon dioxide gas.

(a) How could you test the gas to show that it is carbon dioxide?

(b) Write a balanced chemical equation for the reaction of sodium hydrogen carbonate with sulphuric acid.

42. Dilute nitric acid is added to a green solid **P**. A blue solution **Q** is formed and a gas **R** that forms a white precipitate with lime water is formed. The blue solution is evaporated to dryness and then strongly heated in a crucible. A black solid **S**, brown fumes of gas **T** and a gas that re-lights a glowing splint are formed.

(a) Identify the;

(i) solids **P** and **S**. (ii) gases and **R**.

(b) Write an equation for the

(i) reaction between solid **P** and dilute nitric acid. (ii) formation of solid **S**.

43. Name the following compounds indicating the co-ordination number of the central metal atom in each case:

- (a) $\text{Li} [\text{AlH}_4]$ (b) $[\text{CrCl}(\text{H}_2\text{O})_5]\text{Cl}_2 \cdot \text{H}_2\text{O}$ (c) $[\text{Ag}(\text{NH}_3)_2]^{2+}$ (d) $[\text{Fe}(\text{OX})_3]^{3-}$ (e) $[\text{Ni}(\text{en})_3]^{2+}$
(f) $[\text{Be}(\text{H}_2\text{O})_4]^{2+}$ (g) $[\text{Be}(\text{OH})_4]^{2-}$ (h) $[\text{Cr}(\text{H}_2\text{O})_6] \text{Cl}_3$ (i) $[\text{Ag}(\text{CN})_2]^-$ (j) $[\text{Au}(\text{CN})_2]^-$

44. Write the formula of the following complexes:

- (a) Triamminetrichloroplatinum (IV) chloride. (b) Potassium tetraaquadisulphatochromate (III)
(c) Tetraamminecopper (II) sulphate monohydrate. (d) Potassium heptaoxodichromate (VI)
(e) Dichlorobis(ethylenediamine)chromium (III) nitrate. (f) Sodium hexafluoroaluminate.

45. (a) Briefly, explain the following and give one example in each.

- (i) Thermosetting polymers (ii) Thermoplastic polymers (iii) Natural polymers

(b) Write the monomers used in the synthesis of following polymers:

- (i) PVC (ii) Teflon (iii) Bakelite

(c) (i) Why cationic polymerization is more favoured than anionic polymerization when vinyl monomers contain an electron donating group?

(ii) Why styrene undergoes anionic polymerization easily? Briefly explain.

46. (a) With reasons, write down the use of each of the following polymers:

- (i) Buty-rubber (ii) Polyacrylonitriles (iii) Polyhaloalkanes.

(b) A compound 'X' ($\text{C}_2\text{H}_4\text{O}$) on oxidation gives 'Y' ($\text{C}_2\text{H}_4\text{O}_2$) undergoes iodoform reaction. On treatment with HCN, 'X' forms a product 'Z' which on hydrolysis gives 2-hydroxy propanoic acid.

(i) Write down structures of 'X' and 'Y'. (ii) Name the product when 'X' reacts with dilute NaOH. (iii) Write down the equations for the reactions involved.

47. When hydrogen gas is bubbled through a solution of acetyl chloride in xylene in the presence of deactivated palladium as a catalyst an aldehyde 'X' is formed.

(a) Identify the aldehyde 'X' with the help of chemical equation (s).

(b) Explain why the product of the reaction changes when the catalyst is not deactivated.

48. (a) Draw the structural formula of alkenes that yield the following products on ozonolysis:

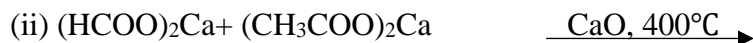
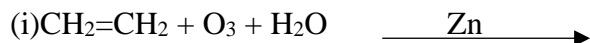
- (i) Methanal and pentan-2-one (ii) Ethanal and propanone.

(b) Account for the observation that the decarboxylation reaction involving formic acid and any other carboxylic acid yields a mixture of an aldehyde and a ketone.

49.(a)Write the equations (including reagents and conditions) for the following conversions;

(i)Ethanol \longrightarrow Ethanal. (ii) 1,1-dichloropropane \longrightarrow propanal.

(b)Complete the following chemical reactions:



(c)In the following conversions, give necessary reagents, conditions, and chemical equations:

(i)Suitable Grignard reagent+ Propanonitrile \longrightarrow Butanone.

(ii)Suitable acid chloride+ Benzene \longrightarrow Phenylethanone.

50.(a)What is a nucleophilic addition reaction?

(b)Describe the mechanism of nucleophilic addition reaction to a carbonyl compound.

(c)Explain why ethanal is more reactive than acetone towards nucleophilic addition.

51.By referring to the physical state, odour, melting and boiling points, solubility in water and intermolecular attractions, write brief notes on the physical properties of carbonyl compounds.

52.Account for each of the following:

(a)Although propanal and acetone have the same molar mass, the boiling point of acetone is higher than that of propanal.

(b)There is no intermolecular hydrogen bonding between the molecules of carbonyl compounds.

(c)Although both aldehydes and ketones contain carbonyl group, ketone is less susceptible to nucleophilic attack.

(d)2-pentanal and 2-methyl-2-propanone do not exist.

(e)Methanoic acid is a stronger acid than ethanoic acid.

(f)Chloroethanoic acid is stronger than ethanoic acid.

(g)Esterification of benzoic acid is easier than that of 2,6-dimethylbenzoic acid.

(h)4-hydroxybenzoic acid is less acidic than benzoic acid but 2-hydroxybenzoic acid is 15 times more acidic than benzoic acid.

53. Complete the following reaction equations in symbolic form:

(a)Propanoic acid+ Sulphur dichloride oxide \longrightarrow

(b)Butanoyl chloride + butan-1-ol. \longrightarrow

(c)Propanamide+sodium nitrite+hydrochloric acid. \longrightarrow

(d)2-methylpropanoic acid+diazomethane \longrightarrow