Alkali Metals

1. **Sodium reacts with water more vigorously than lithium because**

   1) It has higher atomic mass 2) It is more electropositive

   3) It is more electronegative 4) It is a metal

2. **On heating sodium carbonate …..... is evolved**

   1) 2) 3) $_2$ 4) No gas

3. **Sodium carbonate can be manufactured by Solvay's process but potassium carbonate cannot be prepared because**

   1) is more soluble 2) is less soluble

   3) is more soluble than 4) Is less soluble than

4. **Zinc reacts with excess of caustic soda to form**

   1) 2) 3) 4) $_2$.

5. **Alkali metals are characterised by**

   1) Good conductors of heat and electricity 2) High melting points

   3) Low oxidation potentials 4) High ionisation potentials

6. **A solution of sodium in liquid ammonia is strongly reducing due to the presence of**

   1) Sodium atoms 2) Sodium hydride

   3) Sodium amide 4) Solvated electrons

7. **Causticisation is used for the preparation of**

   1) Caustic soda 2) Slaked lime 3) Caustic potash 4) Baryta

8. **A substance X is a compound of an element of group 1A. The substance X gives a violet colour in flame test, X is**

   1) 2) 3) 4) None of these

9. Select the correct statement.

1) Lithium carbonate is soluble in water.

2) Potassium carbonate is soluble in water.

3) Barium carbonate is soluble in water.

4) Bicarbonate of lithium is insoluble in water.

10. Alkali metals are powerful reducing agents because

1) These are metals

2) These are monovalent

3) Their ionic radii are large

4) Their ionization potentials are low

11. Electrolysis of fused will give

1) Na 2) $NaOH$ 3) $NaClO$ 4) $NaClO_3$

12. An element having electronic configuration $1s^2, 2s^2, sp^6, 3s^2, 3p^6, 4s^1$ will form

1) Acedic oxide 2) Basic oxide 3) Amphoteric oxide 4) Neutral oxide

13. The products of electrolysis of concentrated common salt solution are

1) $Na + Cl_2$ 2) $H_2 + O_2$ 3) $NaOH + H_2 + Cl_2$ 4) $NaOH + Cl_2 + O_2$

14. One of the natural minerals of sodium is tin cal. Its formula is

1) $Na_2CO_3.10H_2O$ 2) $NaNO_3$ 3) $Na_2B_4O_7.10H_2O$ 4) $NaCl$

15. Potassium when heated strongly in oxygen, it forms

1) K_2O 2) KO_2 3) K_2O_2 4) KO

16. The reaction of sodium is highly exothermic with water. The rate of reaction is lowered by

1) Lowering the temperature

2) Mixing with alcohol

3) Mixing with acetic acid

4) Making an amalgam

17. Chile saltpetre is

1) $NaNO_2$ 2) KNO_2 3) $NaNO_3$ 4) KNO_3

18. What are the raw materials used in Solvay process?

1) $NaCl, NH_3, CaCO_3$ 2) $NaOH, CO_2$

3) $NaCl, CO_2$ 4) $NaCl, CaCO_3, C, H_2SO_4$

19. Potassium nitrate is called

1) Mohr's salt 2) Indian saltpetre 3) Gypsum 4) Chile saltpetre

20. In the following reaction $NaOH + S \rightarrow A + Na_2S_5 + H_2O_2$ A **is**

1) Na_2SO_3 2) Na_2SO_4 3) $Na_2S_2O_3$ 4) Na_2S

21. $Na_2CO_3 + Fe_2O_3 \rightarrow A + CO_2$**, what is in the reaction?**

1) $NaFeO_2$ 2) Na_3FeO_3 3) Fe_3O_4 4) Na_2FeO_2

22. The name oxone is given to

1) Ozone 2) Sodium peroxide 3) Sodium oxide 4) Sodamide

23. A combustible gas is liberated when caustic soda solution is heated with

1) S 2) NH_4Cl 3) I_2 4) Zn

24. Caustic soda is

1) Efflorescent 2) Deliquescent 3) Hygroscopic 4) Oxidant

25. The compound called microcosmic salt is

1) $Na_2HPO_4.2H_2O$ 2) $Na(NH_4)HPO_4.4H_2O$ 3) $Na_2NH_4PO_4.2H_2O$ 4) $(NH_4)_2HPO_4.2H_2O$

26. Sodium carbonate solution is alkaline due to

1) Hydrolysis of Na^+ 2) Hydrolysis of CO_3^-

3) Hydrolysis of both Na^+ and CO_3^- ions 4) None of the above

27. If $NaOH$ **is added to an aqueous solution of** Zn^{2+} **ions, a white precipitate appears and on adding excess of** $NaOH$**, the precipitate dissolves. In the solution, zinc exists in the**

1) Anionic part 2) Cationic part

3) Both in anionic and cationic parts 4) Colloidal form

28. Which of the following has lowest thermal stability?

1) Li_2CO_3 2) Na_2CO_3 3) K_2CO_3 4) Rb_2CO_3

29. The pair of compounds which cannot exist together in solution is

1) $NaHCO_3$ and $NaOH$ 2) Na_2CO_3 and $NaHCO_3$

3) Na_2CO_3 and $NaOH$ 4) $NaHCO_3$ and $NaCl$

30. The most abundant alkali metal in nature is

1) Lithium 2) Sodium 3) Potassium 4) Caesium

31. Sodium burns in dry air to give

1) Na_2O 2) Na_2O_2 3) NaO_2 4) Na_3N

32. Sodium sulphate is soluble in water whereas barium sulphate is sparingly soluble because

1) The hydration energy of sodium sulphate is more than its lattice energy

2) The lattice energy of barium sulphate is less than its hydration energy

3) The lattice energy has no role to play is solubility

4) The hydration energy of sodium sulphate is less than its lattice energy

33. Which of the following increases in magnitude as the atomic number of alkali metals increases?

1) Electro negativity 2) First ionisation potential

3) Ionic radius 4) Melting point

34. Washing soda has the formula

1) Na_2CO_3 2) $Na_2CO_3.H_2O$ 3) $Na_2CO_3.7H_2O$ 4) $Na_2CO_3.10H_2O$

35. The metallic luster exhibited by sodium is explained by

1) Diffusion of sodium ions 2) Oscillation of mobile valence electrons

3) Existence of free protons 4) Existence of body centered cubic lattice

36. Crude common salt is hygroscopic because of impurities of

1) $CaSO_4$ and $MgSO_4$ 2) $CaCl_2$ and $MgCl_2$

3) $CaBr_2$ and $MgBr_2$ 4) $Ca(HCO_3)_2$ and $Mg(HCO_3)_2$

37. When sodium is added in scanty water, it catches fire. In this process which one of the following burns?

1) Na 2) H_2O 3) CO 4) H_2

38. Among $LiCl, RbCl, BeCl_2$ and $MgCl_2$ the compounds with greatest and least ionic character respectively are

1) $LiCl, RbCl$ 2) $RbCl, BeCl_2$ 3) $RbCl, MgCl_2$ 4) $MgCl_2BeCl_2$

39. Prefix 'alkali' for alkali metals denotes

1) Silvery luster 2) metallic nature 3) active metals 4) ashes of plants

40. $LiSO_4$ is not isomorphous with sodium sulphate

1) Due to small size of lithium

2) Due to high hydrogen number of lithium

3) Due to high ionisation energy of lithium

4) None of the above

41. Thermal stability of hydrides of first group elements follows the order

1) $LiH > NaH > KH > RbH$ 2) $LiH > KH > NaH > RbH$

3) $LiH > RbH > KH > NaH$ 4) $LiH > KH > RbH > NaH$

42. Chile saltpetre is the ore of

1) Iodine 2) Bromine 3) Sodium 4) Magnesium

43. In certain matters, lithium differs from other alkali metals, the main reason for this is

1) Small size of lithium atom and Li^+ 2) Extremely high electro positivity of Li

3) Greater hardness of Li 4) Hydration of Li^+ ion

44. Identify the correct statement. Elemental sodium

1) Can be prepared and isolated by electrolysing an aqueous solution of sodium chloride

2) Is a strong oxidising agent

3) Is insoluble in ammonia

4) Is easily oxidised

45. Which reacts directly with nitrogen to form nitride?

1) Na 2) Li 3) K 4) Rb

46. Which of the following compounds on reaction with $NaOH$ and H_2O_2 gives yellow colour?

1) $Zn(OH)_2$ 2) $Cr(OH)_3$ 3) $Al(OH)_3$ 4) None

47. The stability of the following alkali metal chlorides follows the order

1) $LiCl > KCl > NaCl > CsCl$ 2) $CsCl > KCl > NaCl > LiCl$

3) $NaCl > KCl > LiCl > CsCl$ 4) $KCl > CsCl > NaCl > LiCl$

48. In view of their low ionization energies the alkali metals are

1) Weak oxidizing agents 2) Strong reducing agents

3) Weak reducing agents 4) Weak reducing agents

49. When sodium is treated with sufficient oxygen/air, the product obtained is

1) Na_2O 2) Na_2O_2 3) NaO_2 4) NaO

50. Which of the following has the least ionization potential?

1) Li 2) He 3) N 4) N

51. KO_2 (Potassium superoxide) is used in oxygen cylinders in space and submarines because it

1) Decomposes to give oxygen 2) Eliminates moisture

3) Absorbs CO_2 4) Produces ozone

52. Sodium carbonate on heating gives

1) CO_2 2) Water vapour

3) Carbon dioxide + water vapour 4) None of the above

53. On dissolving moderate amount of sodium metal in liquid NH_3 at low temperature which one of the following does not occur?

1) Blue coloured solution is obtained

2) Na^+ ions are formed in the solution

3) Liquid NH_3 becomes good conductor of electricity

4) Liquid NH_3 remains diamagnetic

54. An alloy of Na and K is

1) Liquid at room temperature

2) Used in specially designed thermometers

3) Unstable

4) Solid at room temperature

55. (A) Lithium resembles magnesium diagonally placed in IIA group.

(R) The sizes of lithium and magnesium atoms and their ions (Li^+ and Mg^{2+}) are nearly the same.

1) If both (A) and (R) are correct and (R) is the correct explanation of (1).

2) If both (A) and (R) are correct and (R) is not the correct explanation of (1).

3) If (A) is correct and (R) is wrong.

4) If (A) is wrong and (R) is correct.

e) If both (A) and (R) are wrong.

56. (A) Lithium chloride is predominantly covalent compound.

(R) Electro negativity difference between Li and Cl is small.

57. (A) Alkali metals do not occur in native state.

(R) Alkali metals are highly reactive metals.

58. (A) Cannot be prepared by Solvay's process.

(R) Does not decompose on heating.

59. (A) Among the alkali metals, cesium salts exhibit the maximum electrical conductance in aqueous solutions.

(R) Bigger the radius of the hydrated cation, higher is the electrical conductance of the aqueous solution.

60. (A) Li_2CO_3 **and** Na_2CO_3 **are thermally stable.**

(R) Both the carbonates salts of large cations and large anions.

61. (A) Ether can extract $LiCl$ **from a mixture of** $LiCl$ **,** $NaCl$ **and** KCl **.**

(R) $LiCl$ **has covalent nature but** $NaCl$ **and** KCl **are ionic compounds.**

62. Zinc on reaction with $NaOH$ **gives a salt (1) along with a gas (X) and (1) on reaction with a gas (Y) gives white precipitate (W). Which of the following is correct?**

1) (1) is Na_4ZnO_3, (Y) is H_2S
2) (X) is H_2, (W) is $Zn(OH)_2$
3) (1) is Na_2ZnO_2, (X) is O_2
4) (W) is ZnS , (X) is H_2

63. For $Na + NH_3 \rightarrow (A) \xrightarrow{N_2O} (B) \xrightarrow{Heat} gas(X)$ **, Which of the following is correct?**

1) (1) on reaction with water gives and
2) (2) contains anion of linear geometry
3) (X) is coloured
4) All are correct

64. CO_2 **gas along with solid (Y) is obtained when sodium salt (X) is heated. (X) is again obtained when** CO_2 **gas is passed into aqueous solution of (Y), (X) and (Y) are**

1) Na_2CO_3, Na_2O
2) $Na_2CO_3, NaOH$
3) $NaHCO_3, Na_2OH$
4) $Na_2CO_3, NaHCO_3$

65. $A + Na_2CO_3 \rightarrow B + C$ (Milky cloud, C)

The chemical formulae of A, B and C are

	A	B	C
1)	$Ca(OH)_2$	$NaOH$	$CaCO_3$
2)	$NaOH$	$Ca(OH)_2$	$CaCO_3$
3)	$NaOH$	CaO	$CaCO_3$
4)	CaO	$Ca(OH)_2$	$NaOH$

66. In $LiAlH_4$, metal Al is present is

1) Cationic part 2) Anionic part

3) In both cationic and anionic parts 4) Neither in cationic nor in anionic part

67. When sodium reacts with excess of oxygen, oxidation number of oxygen changes from

1) 0 to -1 2) 0 to -2 3) -1 to -2 4) +1 to -1

68. Which disproportionate on heating with $NaOH$?

1) P_4 2) S 3) Cl_2 4) All of these

69. On heating a mixture containing 1 mole each of Li_2CO_3 and K_2CO_3.... is/ are formed

1) 2 moles of CO_2 2) 1 mole of CO_2 3) 1.5 moles of CO_2 4) No carbon dioxide

70. There is loss in mass when mixture of Li_2CO_3 and $Na_2CO_3.10H_2O$ Is heated strongly the loss is due to

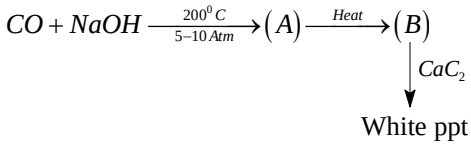
1) Li_2CO_3 only 2) $Na_2CO_3.10H_2O$ only

3) Both Li_2CO_3 and $Na_2CO_3.10H_2O$ 4) None of the above

71. A colourless solid (X) on heating evolved CO_2 when treated with dilute acid (X) is

1) Na_2CO_3 2) $CaCO_3$ 3) $NaHCO_3$ 4) $Ca(HCO_3)_2$

72.



(1) and (2) are

1) $NaHCO_3, Na_2CO_3$

2) $HCOONa, \underset{\displaystyle COONa}{\overset{\displaystyle COONa}{|}}$

3) $HCOONa, NaOH$

4) $NaHCO_3, NaOH$

73. Select the correct statement

1) Solubility of alkali hydroxides is in order $CsOH > RbOH > KOH > NaOH > LiOH$.

2) Solubility of alkali carbonates is in order $Li_2CO_3 > Na_2CO_3 > K_2CO_3 > Rb_2CO_3 > CsCO_3$.

3) Both are correct.

4) None is correct.

74. Match the following.

List-I	**List-2**
Common name	**Formula**
A) Caustic soda	**1)** $NaHCO_3$
B) Washing soda	**2)** $Na_2CO_3.10H_2O$
C) Baking soda	**3)** $NaCl$
D) Rock salt	**4)** Na_2CO_3
	5) $NaOH$

The correct match is

	A	B	C	D
1)	2	3	4	5
2)	1	2	4	3

3) 5 2 1 3

4) 4 3 1 2

75. Match the following.

List-I	**List-2**
A) Peroxide	**1)** KO_2
B) Deliquescent	**2)** Na_2CO_3
C) Superoxide	**3)** $Na_2SO_4.10H_2O$
D) Soda	**4)** Na_2O_2
	5) $LiCl$

The correct match is

	A	B	C	D
1)	2	3	4	5
2)	1	2	4	3
3)	3	2	1	2
4)	4	5	1	2

76.

List-I	**List-2**
A) $K_2CO_3 + Na_2CO_3$	**1) Dehydrating agent**
B) Quick lime	**2) Water glass**
C) $Na_2B_4O_7 10H_2O$	**3) Borax**
D) Na_2SiO_3	**4) Glauber's salt**
	5) Fusion mixture

The correct match is

	A	**B**	**C**	**D**
1)	4	3	2	1
2)	5	1	3	2

3) 3 2 1 4

4) 4 2 5 3

77. **List-I** **List-2**

A) Soda lime **1)** $Na_2CO_310H_2O$

B) Electron **2)** $NaOH + CaO$

C) Black ash **3)** $Mg + Zn$ **alloy**

D) Washing soda **4)** $Na_2CO_3 + CaS$

5) $Mg + Al$ **alloy**

The correct match is

	A	B	C	D
1)	2	3	4	1
2)	3	4	5	2
3)	1	2	3	4
4)	3	4	2	1

KEY

1) 2	2) 3	3) 3	4) 3	5) 2	6) 4	7) 1	8) 3	9) 2	10) 4
11) 1	12) 2	13) 3	14) 3	15) 2	16) 4	17) 3	18) 1	19) 2	20) 3
21) 1	22) 2	23) 4	24) 2	25) 2	26) 2	27) 1	28) 1	29) 4	30) 2
31) 2	32) 1	33) 3	34) 4	35) 2	36) 2	37) 4	38) 2	39) 4	40) 1
41) 1	42) 3	43) 1	44) 4	45) 2	46) 2	47) 4	48) 2	49) 2	50) 1
51) 1	52) 4	53) 4	54) 4	55) 1	56) 3	57) 1	58) 2	59) 3	60) 4
61) 1	62) 4	63) 2	64) 3	65) 1	66) 2	67) 1	68) 4	69) 2	70) 3
71) 3	72) 2	73) 1	74) 3	75) 4	76) 2	77) 1			

HINTS

2) $Na_2CO_3 10H_2O \rightarrow Na_2CO_3 + 10H_2O$

4) $Zn + 2NaOH \rightarrow Na_2 2NO_2 + H_2O \uparrow$

14) $Tincol \rightarrow Na_2B_4O_7 10H_2O$

25) $Na(NH_4)HPO_4.4H_2O \rightarrow NaOH + H_2CO_3$

26) $Na_2CO_3 + 2H_2O \rightarrow NaOH + H_2CO_3$

28) Thermal stability of IA group carbonates $Li_2CO_3 < Na_2CO_3 < K_2CO_3 < RbCO_3$

38) Ionic character increases ….. the group

41) Thermal stability of hydrides $LiH > NaH > KH > RbH$

53) Due to presence of solvated electrons

55) Diagonal relationship is due to

i) Same E.N

ii) Same Polarising Power

iii) Same atomic radius

62)

$$Zn + 2NaOH \rightarrow Na_2 2NO_2 + H_2 \uparrow$$
$$\downarrow H_2S$$
$$ZnS + 2NaOH$$

63) $Na + NH_3 \rightarrow \underset{A}{NaNH_2} \xrightarrow{N_2O} \underset{B}{NaN_3} \rightarrow Na + \underset{X}{N_2}$

64) $\underset{X}{2NaHCO_3} \xrightarrow{\Delta} \underset{Y}{Na_2CO_3} + H_2O + CO_2$

$\underset{X}{Na_2CO_3} + H_2O + H_2O \rightarrow 2NaHCO_3$

65)

$$Ca(OH)_2 + Na_2CO_3 \rightarrow \underset{B}{2NaOH} + \underset{C}{CaCO_3}$$

$\downarrow$

$CaCO_3$

67) $2Na + O_2^0 \rightarrow Na_2O_2^{-1}$

69) $Li_2CO_3 \xrightarrow{\Delta} \underset{1\,mole}{Li_2O} + CO_2$

72)

$$CO + NaOH \rightarrow HCOONa$$

$\downarrow \Delta$

$$\begin{matrix} COONa \\ | \\ COONa \end{matrix} + CaC_2 \rightarrow \begin{matrix} COO \\ | \\ COO \end{matrix} > Ca + NaCl$$