10 The *s*-Block Elements

Trend Analysis with Important Topics & Sub-Topics

		2020		2019		2018		2017		2016	
Topic Name	**Sub-Topic**	**QNS.**	**LOD**	**QNS.**	**LOD**	**QNS.**	**LOD**	**QNS.**	**LOD**	**QNS.**	**LOD**
Preparation and properties of alkali metals and their compounds	biological importance of alkali metals	1	E								
Some important compounds of sodium	properties of sodium chloride	1	E								
Preparation and properties of alkaline earth metal and their compounds	properties of alkaline earth metals compounds			1	A	2	A				
	biololgical importance of alkaline earth metals			1	E					1	E
LOD - Level of Difficulty	**E - Easy**	**A - Average**				**D - Difficult**		**Qns - No. of Questions**			

Topic 1: Preparation and Properties of Alkali Metals and their Compounds

1. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals. ***[2020]***
   (a) Copper (b) Calcium
   (c) Potassium (d) Iron
2. Which of the alkali metal chloride (MCl) forms its dihydrate salt ($MCl \cdot 2H_2O$) easily? ***[NEET Odisha 2019]***
   (a) KCl (b) LiCl
   (c) CsCl (d) RbCl
3. The function of "Sodium pump" is a biological process operating in each and every cell of all animals. Which of the following biologically important ions is also a consituent of this pump : ***[2015]***
   (a) Mg^{2+} (b) K^+
   (c) Fe^{2+} (d) Ca^{2+}
4. Which one of the alkali metals, forms only, the normal oxide, M_2O on heating in air ? ***[2012]***
   (a) Rb (b) K
   (c) Li (d) Na 5. The ease of adsorption of the hydrated alkali metal ions on an ion-exchange resins follows the order : ***[2012]***
   (a) $Li^+ < K^+ < Na^+ < Rb^+$
   (b) $Rb^+ < K^+ < Na^+ < Li^+$
   (c) $K^+ < Na^+ < Rb^+ < Li^+$
   (d) $Na^+ < Li^+ < K^+ < Rb^+$
6. In the replacement reaction
   $\gtrless CI + MF \longrightarrow \gtrless CF + MI$
   The reaction will be most favourable if *M* happens to be : ***[2012 M]***
   (a) Na (b) K
   (c) Rb (d) Li
7. The sequence of ionic mobility in aqueous solution is : ***[2008]***
   (a) $K^+ > Na^+ > Rb^+ > Cs^+$
   (b) $Cs^+ > Rb^+ > K^+ > Na^+$

(c) $Rb^+ > K^+ > Cs^+ > Na^+$
(d) $Na^+ > K^+ > Rb^+ > Cs^+$

8. The alkali metals form salt-like hydrides by the direct synthesis at elevated temperature. The thermal stability of these hydrides de-creases? *[2008]*
(a) CsH < RbH < KH < NaH < LiH
(b) KH > NaH > LiH > CsH > RbH
(c) NaH > LiH > KH > RbH > CsH
(d) LiH > NaH > KH > RbH > CsH

9. The correct order of the mobility of the alkali metal ions in aqueous solutions is *[2006]*
(a) $Na^+ > K^+ > Rb^+ > Li^+$
(b) $K^+ > Rb^+ > Na^+ > Li^+$
(c) $Rb^+ > K^+ > Na^+ > Li^+$
(d) $Li^+ > Na^+ > K^+ > Rb^+$

10. In crystals of which one of the following ionic compounds would you expect maximum distance between centres of cations and anions? *[1998]*
(a) CsI (b) CsF

11. Which of the following metal ions plays an important role in muscle contraction ? *[1994]*
(a) K^+ (b) Na^+
(c) Mg^{2+} (d) Ca^{2+}

12. Which of the following statement is false ? *[1994]*
(a) Strontium decomposes water readily than beryllium
(b) Barium carbonate melts at a higher temperature than calcium carbonate
(c) Barium hydroxide is more soluble in water than magnesium hydroxide
(d) Beryllium hydroxide is more basic than barium hydroxide.

13. Which of the following has largest size ? *[1993]*
(a) Na (b) Na^+
(c) Na^- (d) Can't be predicted

14. Compared with the alkaline earth metals, the alkali metals exhibit *[1990]*
(a) Smaller ionic radii
(b) Highest boiling points
(c) Greater hardness
(d) Lower ionization energies.

15. Which one of the following properties of alkali metals increases in magnitude as the atomic number rises ? *[1989]*
(a) Ionic radius
(b) Melting point
(c) Electronegativity
(d) First ionization energy.

Topic 2: Some Important Compounds of Sodium

16. HCl was passed through a solution of $CaCl_2$, $MgCl_2$ and NaCl. Which of the following compound(s) crystallise(s)? *[2020]*
(a) Only NaCl (b) Only $MgCl_2$ (c) NaCl, $MgCl_2$ and $CaCl_2$
(d) Both $MgCl_2$ and $CaCl_2$

17. Crude sodium chloride obtained by crystallisation of brine solution does not contain *[NEET Odisha 2019]*
(a) $CaSO_4$ (b) $MgSO_4$
(c) $MgCl_2$ (d) NaCl

18. In Castner-Kellner cell for production of sodium hydroxide: *[NEET Kar. 2013]*
(a) Brine is electrolyzed with Pt electrodes
(b) Brine is electrolyzed using graph-ite electrodes (c) Molten sodium chloride is electrolysed
(d) Sodium amalgam is formed at mer cury cathode

19. Which of the following statements is **incorrect**? *[2011M]*
(a) Pure sodium metal dissolves in liquid ammonia to give blue solution.
(b) NaOH reacts with glass to give sodium silicate
(c) Aluminium reacts with excess NaOH to give $Al(OH)_3$ *[2009]*
(d) BeO

20. Which of the following has amphoteric character? *[2001]*
(a) $Al(OH)_3$ (b) SiO_2
(c) BeO (d) B_2O_3

21. In which of the following processes, fused sodium hydroxide is electrolysed at a 330°C temperature for extraction of sodium? *[2000]*
(a) Castner's process (b) Down's process
(c) Cyanide process (d) Both 'b' and 'c'

22. Aqueous solution of sodium carbonate absorbs NO and NO_2 to give *[1996]*
(a) $CO_2 + NaNO_3$ (b) $CO_2 + NaNO_2$
(c) $NaNO_2 + CO$ (d) $NaNO_3 + CO$

23. Which of the following is known as fusion mixture? *[1994]*
(a) Mixture of $Na_2CO_3 + NaHCO_3$
(b) $Na_2CO_3.10H_2O$ (c) Mixture of $K_2CO_3 + Na_2CO_3$
(d) $NaHCO_3$

24. Washing soda has formula *[1990]*
(a) $Na_2CO_3.7H_2O$ (b) $Na_2CO_3.10H_2O$
(c) $Na_2CO_3.3H_2O$ (d) Na_2CO_3

Topic 3: Preparation and Properties of Alkaline Earth Metals and their Compounds

25. Which of the following is an amphoteric hydroxide ? *[2019]*
(a) $Sr(OH)_2$ (b) $Ca(OH)_2$
(c) $Mg(OH)_2$ (d) $Be(OH)_2$

26. Enzymes that utilize ATP in phosphate transfer require an alkaline earth metal (*M*) as the cofactor. *M* is: *[2019]*
(a) Be (b) Mg
(c) Ca (d) Sr

27. Which of the following oxides is most acidic in nature? *[2018]*
(a) MgO (b) BeO
(c) CaO (d) BaO

28. Among CaH_2, BeH_2, BaH_2, the order of ionic character is *[2018]*
(a) $BeH_2 < CaH_2 < BaH_2$
(b) $CaH_2 < BeH_2 < BaH_2$
(d) $BaH_2 < BeH_2 < CaH_2$
(d) $BeH_2 < BaH_2 < CaH_2$

29. Which of the following statements is false ? *[2016]*
(a) Mg^{2+} ions form a complex with ATP (b) Ca^{2+} ions are important in blood clotting
(c) Ca^{2+} ions are not important in maintaining the regular beating of the heart.
(d) Mg^{2+} ions are important in the green parts of plants.

30. Solubility of the alkaline earth's metal sulphates in water decreases in the sequence :- *[2015]*
(a) Ca > Sr > Ba > Mg (b) Sr > Ca > Mg > Ba
(c) Ba > Mg > Sr > Ca (d) Mg > Ca > Sr > Ba

31. Which of the following compounds has the *[2011]*
(a) $CaCl_2$ (b) $CaBr_2$
(c) CaI_2 (d) CaF_2

32. Which of the following alkaline earth metal sulphates has hydration enthalpy higher than the lattice enthalpy? *[2010]*
(a) $_4$ (b) $BeSO_4$
(c) $BaSO_4$ (d) $SrSO_4$

33. Property of the alkaline earth metals that increases with their atomic number *[2010]*
(a) Solubility of their hydroxides in water
(b) Solubility of their sulphates in water
(c) Ionization energy (d) Electronegativity 34. The correct order of increasing thermal sta bility of K_2CO_3, $MgCO_3$, $CaCO_3$ and $BeCO_3$ is *[2007]*
(a) $BeCO_3 < MgCO_3 < CaCO_3 < K_2CO_3$
(b) $MgCO_3 < BeCO_3 < CaCO_3 < K_2CO_3$
(c) $K_2CO_3 < MgCO_3 < CaCO_3 < BeCO_3$
(d) $BeCO_3 < MgCO_3 < K_2CO_3 < CaCO_3$

35. In which of the following the hydration energy is higher than the lattice energy? *[2007]*
(a) $MgSO_4$ (b) $RaSO_4$
(c) $SrSO_4$ (d) $BaSO_4$

36. Calcium is obtained by the *[1997]*
(a) electrolysis of solution of calcium chloride in water
(b) electrolysis of molten anhydrous calcium chloride or fused calcium chloride
(c) roasting of limestone (d) reduction of calcium chloride with carbon

37. For two ionic solids CaO and KI, identify the wrong statement amongst the following : *[1997]*
(a) The lattice energy of CaO is much large than that of KI (b) KI is more soluble in water (c) KI has higher melting point
(d) CaO has higher melting point

38. Which one is the correct statement with reference to solubility of $MgSO_4$ in water? *[1996]*
(a) SO_4^{2-} ion mainly contributes towards hydration energy (b) Sizes of Mg^{2+} and SO_4^{2-} are similar (c) Hydration energy of $MgSO_4$ is higher in comparison to its lattice energy
(d) Ionic potential (charge/radius ratio) of Mg^{2+} is very low

39. Sodium is made by the electrolysis of a molten mixture of about 40% NaCl and 60% $CaCl_2$ because ***[1995]***
(a) Ca^{2+} can reduce NaCl to Na (b) Ca^{2+} can displace Na from NaCl (c) $CaCl_2$ helps in conduction of electricity (d) this mixture has a lower melting point than NaCl

40. All the following substances react with water. The pair that gives the same gaseous product is ***[1994]***
(a) K and KO_2 (b) Na and Na_2O_2
(c) Ca and CaH_2 (d) Ba and BaO_2

41. Which one of the following has minimum value of cation/anion ratio. ***[1993]***
(a) NaCl (b) KCl
(c) $MgCl_2$ (d) CaF_2

42. Electronic configuration of calcium atom can be written as ***[1992]***
(a) [Ne], $4p^2$ (b) [Ar], $4s^2$
(c) [Ne], $4s^2$ (d) [Kr], $4p^2$

43. Which of the following atoms will have the smallest size ? ***[1989]***
(a) Mg (b) Na
(c) Be (d) Li

Topic 4: Some Important Compounds of Calcium

44. On heating which of the following releases CO_2 most easily ? ***[2015 RS]***
(a) K_2CO_3 (b) Na_2CO_3
(c) $MgCO_3$ (d) $CaCO_3$

45. Which one of the following is present as an active ingredient in bleaching powder for bleaching action ? ***[2011]***
(a) $CaOCl_2$ (b) $Ca(OCl)_2$
(c) CaO_2Cl (d) $CaCl_2$

46. Match List – I with List –II for the compositions of substances and select the correct answer using the code given below the lists : ***[2011M]***

List - I Substances	**List - II Composition**
(1) Plaster of paris	(i) $CaSO_4.2H_2O$
(2) Epsomite	(ii) $CaSO_4.\frac{1}{2}H_2O$
(3) Kieserite	(iii) $MaSO_4.7H_2O$
(4) Gypsum	(iv) $MgSO_4.H_2O$
	(v) $CaSO_4$

Code :

	(1)	(2)	(3)	(4)
(a)	(iii)	(iv)	(i)	(ii)
(b)	(ii)	(iii)	(iv)	(i)
(c)	(i)	(ii)	(iii)	(v)
(d)	(iv)	(iii)	(ii)	(i)

47. The compound *A* on heating gives a colourless gas and a residue that is dissolved in water to obtain *B*. Excess of CO_2 is bubbled through aqueous solution of *B*, *C* is formed which is recovered in the solid form. Solid *C* on gentle heating gives back *A*. The compound is ***[2010]***
(a) $CaSO_4.2H_2O$ (b) $CaCO_3$
(c) Na_2CO_3 (d) K_2CO_3

48. A solid compound '*X*' on heating gives CO_2 gas and a residue. The residue mixed with water forms '*Y*'. On passing an excess of CO_2 through '*Y*' in water, a clear solution '*Z*', is obtained. On boiling '*Z*', a compound '*X*' is reformed. The compound '*X*' is ***[2004]***
(a) $Ca(HCO_3)_2$ (b) $CaCO_3$
(c) Na_2CO_3 (d) K_2CO_3

49. Identify the correct statement ***[1995]***
(a) gypsum is obtained by heating plaster of Paris
(b) plaster of Paris can be obtained by hydration of gypsum
(c) plaster of paris is obtained by partial oxidation of gypsum
(d) gypsum contains a lower percentage of calcium than plaster of Paris

ANSWER KEY

1	(c)	**6**	(c)	**11**	(d)	**16**	(a)	**21**	(a)	**26**	(b)	**31**	(c)	**36**	(b)	**41**	(c)	**46**	(b)
2	(b)	**7**	(b)	**12**	(d)	**17**	(b)	**22**	(b)	**27**	(b)	**32**	(b)	**37**	(c)	**42**	(b)	**47**	(b)
3	(b)	**8**	(d)	**13**	(c)	**18**	(d)	**23**	(c)	**28**	(a)	**33**	(a)	**38**	(c)	**43**	(c)	**48**	(b)
4	(c)	**9**	(c)	**14**	(d)	**19**	(c)	**24**	(b)	**29**	(c)	**34**	(a)	**39**	(d)	**44**	(c)	**49**	(d)
5	(b)	**10**	(c)	**15**	(a)	**20**	(a)	**25**	(d)	**30**	(d)	**35**	(a)	**40**	(c)	**45**	(b)		

Hints & Solutions

1. (c) Potassium (K) activates many enzymes to participate in oxidation of glucose to produce ATP and helps in the transmission of nerve signal along with Na.

2. (b) Only LiCl forms a dihydrate, other metal chlorides do not form hydrates.

3. (b) In sodium pump, high concentration of potassium ions and a low concentration of sodium ions are maintained within a cell by a plasma membrane protein.

4. (c) All the alkali metals when heated with oxygen form different types of oxides for example lithium forms lithium oxide (Li_2O), sodium forms sodium peroxide (Na_2O_2), while K, Rb and Cs form their respective superoxides.

NOTES

Li^+ being smallest, combines with small anion O^{2-} to form stable Li_2O.
The Na^+ being relatively larger than Li^+ and weaker positive field than Li^+, combines with O_2^{2-} (peroxide ion) to form Na_2, O_2. K^+, Rb^+ and Cs^+ being relative larger than Na^+ and with weaker positive field than Na^+ combines with O_2^- (superoxide ion) to for KO_2, RbO_2 and CsO_2 respectively.

5. (b) All alkali metal salts are ionic (except Lithium) and soluble in water due to the fact that cations get hydrated by water molecules. The degree of hydration depends upon the size of the cation. Smaller the size of a cation, greater is its hydration energy.
Relative ionic radii :
$Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$
Relative ionic radii in water or relative degree of hydration:
$Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$

6. (c) Tertiary halide can show ionic reaction with MF so, MF should be most ionic for reaction to proceed forward. Hence 'M' should be 'Rb'.

7. (b) Smaller the ion more is its ionic mobility in aqueous solution. Ionic radii of the given alkali metals is in the order $Na^+ < K^+ < Rb^+ < Cs^+$ and thus expected ionic mobility will be in the same order $Cs^+ < Rb^+ < K^+ < Na^+$. However due to high degree of solvation (or hydration) and because of lower size or high charge density, the hydrated ion size follows the same order $Cs^+ < Rb^+ < K^+ < Na^+$ and thus conductivity order is $Cs^+ > Rb^+ > K^+ > Na^+$.

8. (d) The stability of alkali metal hydrides decreases from Li to Cs. It is due to the fact that *M*–H bonds becomes weaker with increase in size of alkali metals as we move down the group from Li to Cs. Thus the order of stability of hydrides is
LiH > NaH > KH > RbH > CsH

9. (c) Hydrated Ionic radii of alkali metals in water follows the order $Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$
Thus in aqueous solution due to larger ionic radius Li^+ has lowest mobility and hence the correct order of ionic mobility is
$Li^+ < Na^+ < K^+ < Rb^+$

10. (c) As Cs^+ ion has larger size than Li^+ and I^- has larger size than F^-, therefore maximum distance between centres of cations and anions is in CsI.

11. (d) Ca^{2+} ions is an essential element for the contraction of muscles.

12. (d) $Be(OH)_2$ is amphoteric, but the hydroxides of other alkaline earth metals are basic. The basic strength increases gradually.

13. (c) A cation is always much smaller than the corresponding atom, whereas an anion is always larger than the corresponding atom, hence the size decreases in the order
$Na^- > Na > Na^+$

14. (d) Because of larger size and smaller nuclear charge, alkali metals have low ionization potential relative to alkaline earth metals.

15. (a) Within a group, ionic radius increases with increase in atomic number. The melting point decrease down the group due to weakening of metallic bond. The electronegativity and the 1st ionization energy also decreases down the group.

16. (a) When HCl is passed through the solution Cl^- ion concentration increases. Hence ionic product becomes more than solubility product. Only NaCl is crystallised due to less solubility than $MgCl_2$ and $CaCl_2$.

17. (b) Crude sodium chloride which is obtained by crystallisation of brine solution contains Na_2SO_4, $CaSO_4$, $CaCl_2$ and $MgCl_2$ are present as impurities in crude.

18. (d) In castner kellner cell, sodium amalgam is formed at mercury cathode.

NOTES

Sodium is discharged from brine at a mercury cathode in preference to hydrogen because of the high hydrogen overpotential at mercury surface. This is the reason of using mercury cathode instead of graphite or platinum in castner-kellner cell.

19. (c) $2Al(s) + 2NaOH(aq) + 2H_2O(l) \longrightarrow 2NaAlO_2 + 3H_2$
sod. meta aluminate

20. (a) NaOH is a strong alkali. It combines with acidic and amphoteric oxides to form salts. Since CaO is a basic oxide hence does not react with NaOH.

21. (a) In Castner process, for production of (Na) sodium metal, sodium hydroxide (NaOH) is electrolysed at 330ºC.

22. (b) $Na_2CO_3 + NO + NO_2 \rightarrow 2\,NaNO_2 + CO_2$

23. (c) Mixture of K_2CO_3 and Na_2CO_3 is called as fusion mixture.

24. (b) Washing soda is $Na_2CO_3.10H_2O$.

25. (d) Amphoteric hydroxide means it can react with both acid and base.

$$Be(OH)_2 + 2HCl \longrightarrow BeCl_2 + 2H_2O$$

$$Be(OH)_2 + 2NaOH \longrightarrow Na_2\left[Be(OH)_4\right]$$

26. (b) Enzyme that utilise ATP in phosphate transfer require an alkaline earth metal (M) Mg as the cofactor.

27. (b) In metals, moving down the group, metallic character increases, so basic nature increases hence most acidic will be BeO.

$$\xrightarrow[\text{increasing basic character}]{BeO < MgO < CaO < BaO}$$

28. (a) $BeH_2 < CaH_2 < BaH_2$
Smaller the size of cation, more will be its polarising power. Hence, BeH_2 will be least ionic.

29. (c) Calcium regulates muscle contraction, including beating of heart muscle, so that it can contract and pump out blood to all our body.

30. (d) Solubility of alkaline earth metal sulphates decreases down the group due to decrease in hydration energy.

$$\xrightarrow[\text{Hydration energy}]{MgSO_4 > CaSO_4 > SrSO_4 > BaSO_4} \quad \text{Solubility}$$

31. (c) Melting point of metal halides decreases as the size of the halogen increases. The correct order is
$CaF_2 > CaCl_2 > CaBr_2 > CaI_2$

32. (b) Be^{2+} is very small, hence its hydration enthalpy is greater than its lattice enthalpy. Also, hydration energy decreases down the group.

33. (a) The magnitude of hydration energy for the hydroxides of alkaline earth metals remains almost same whereas lattice energy decreases appreciably down the group. Hence, solubility increases down the group.

34. (a) As the cation size increases down the group, the metal carbonates become more ionic in nature. Hence, the thermal stability increases as: $BeCO_3 < MgCO_3 < CaCO_3$.
The ionic character of group 1 carbonates is more than that of group 2, thus they possess more thermal stability. Hence, the correct order of thermal stability : $BeCO_3 < MgCO_3 < CuCO_3 < K_2CO_3$.

35. (a) The solubility and the hydration energy of sulphates of alkaline earth metals decreases as we move down the group from Be to Ba due to the reason that ionic size increases down the group. The lattice energy remains constant because sulphate ion is so large, so that small change in cationic sizes do not make any difference. Thus the order will be:
$BeSO_4 > MgSO_4 > CaSO_4 > SrSO_4 > BaSO_4$

36. (b) Calcium is obtained by electrolysis of a fused mass consisting six parts calcium chloride and one part calcium fluoride at about 700°C in an electrolytic cell.

37. (c) CaO has higher lattice energy because of higher charge on Ca^{2+} and O^{2-}, which results in higher attraction. KI is more soluble in water because of low lattice energy and higher hydration energy. Clearly (c) is wrong because CaO has higher melting point as compared to KI.

38. (c) $MgSO_4$ is the only alkaline earth metal sulphate which is soluble in water and for solubility hydration energy should be greater than lattice energy.

39. (d) Sodium is obtained by electrolytic reduction of its chloride. Melting point of chloride of sodium is high (803°C) so in order to lower its melting point(600°C), calcium chloride is added to it.

40. (c) Ca and CaH_2 both react with water to form H_2 gas,

$$Ca + 2H_2O \longrightarrow Ca(OH)_2 + H_2$$

$$CaH_2 + 2H_2O \longrightarrow Ca(OH)_2 + 2H_2$$

whereas

K gives H_2 while KO_2 gives O_2 and H_2O_2

$$2K + 2H_2O \longrightarrow 2KOH + H_2$$

$$2KO_2 + 2H_2O \longrightarrow 2KOH + O_2 + H_2O_2$$

$$2KO_2 + 2H_2O \longrightarrow 2KOH + O_2 + H_2O_2$$

Similarly, Na gives H_2 while Na_2O_2 gives H_2O_2

$$2Na + 2H_2O \longrightarrow 2NaOH + H_2$$

$$Na_2O_2 + 2H_2O \longrightarrow 2NaOH + H_2O_2$$

Also, Ba gives H_2 while BaO_2 gives H_2O_2

$$Ba + 2H_2O \longrightarrow Ba(OH)_2 + H_2$$

$$BaO_2 + 2H_2O \longrightarrow Ba(OH)_2 + H_2O_2$$

41. (c) Atomic size of $K^+ > Ca^{2+} > Mg^{2+}$ and that of $Cl^- > F^-$. Therefore, Mg^{2+}/Cl^- ratio has the minimum value.

42. (b) $_{20}Ca = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 = [Ar]\,4s^2$

43. (c) Within a period, the atomic size decreases from left to right.Further atomic size increases down the group. Hence the correct order is

i.e. Na > Mg > Li > Be.

44. (c) Carbonates becomes more thermally stable down the group, therefore $MgCO_3$ will leave CO_2 easily.

45. (b) Active ingredient in bleaching powder for bleaching action is $Ca(OCl)_2$.

NOTES

Bleaching powder is a mixture of calcium hypochlorite $Ca(OCl)_2$, dibasic calcium hypochlorite $Ca(OCl)_2 . 2\,Ca(OH)_2$ and dibasic calcium chloride $CaCl_2 . 2Ca(OH)_2$.

46. (b) (A) Plaster of paris $= CaSO_4 . \frac{1}{2}H_2O$

(B) Epsomite $= MgSO_4 . 7H_2O$

(C) Kieserite $= MgSO_4 . H_2O$

(D) Gypsum $= CaSO_4 . 2H_2O$

NOTES

Plaster of paris can be more accurately written as $(CaSO_4)_2 . H_2O$

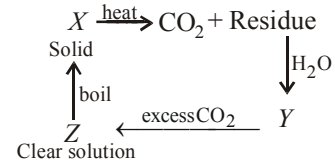
47. (b) $\underset{(A)}{CaCO_3(s)} \xrightarrow{\Delta} \underset{\text{colourless}}{CO_2(g)\uparrow} + \underset{\text{residue}}{CaO(s)}$

$$CaO(s) + H_2O \longrightarrow \underset{(B)}{Ca(OH)_2}$$

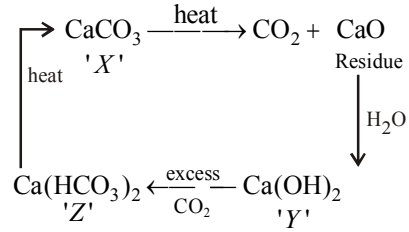
$$Ca(OH)_2 + 2CO_2 + H_2O \longrightarrow \underset{(C)}{Ca(HCO_3)_2}$$

$$\underset{(C)}{Ca(HCO_3)_{2(s)}} \xrightarrow{\Delta} \underset{(A)}{CaCO_{3(s)}} + CO_{2(g)} + H_2O$$

48. (b)



The given properties coincide with $CaCO_3$



49. (d) Gypsum is $CaSO_4 . 2H_2O$ and plaster of Paris is $(CaSO_4)_2 . H_2O$. Therefore, gypsum contains a lower percentage of calcium than plaster of Paris.