



## CHEMISTRY

### BOOKS - MTG CHEMISTRY (ENGLISH)

#### THE S-BLOCK ELEMENTS

#### Mcqs

1. Alkali metals are not found in free state due to their highly reactive nature. This is due to

- A. their large size and low ionisation enthalpy
- B. their large size and high ionisation enthalpy
- C. their low ionisation enthalpy and high electron gain enthalpy
- D. their tendency to impart colour to the flame.

**Answer: A**



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2. The ionisation energy of alkali metals decreases from Li to Cs because

- A. the atomic size increases from Li to Cs
- B. The distance between nucleus and outermost orbital decreases from Li to Cs
- C. electropositive character decreases down the group
- D. melting point decreases from Li to Cs.

**Answer: A**



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3. First ionisation energy of alkali metals is very low but second ionisation energy is very high because

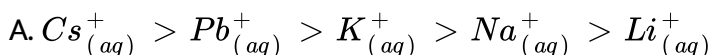
- A. alkali metals acquire noble gas configuration after losing one electron
- B. a large amount of energy is required to remove electron from a cation
- C. alkali metals can form only univalent ions
- D. first group elements can lose only one electron.

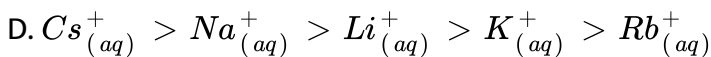
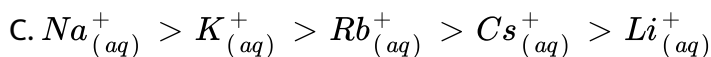
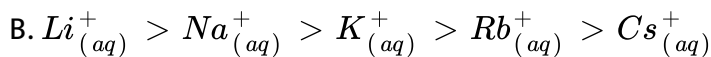
**Answer: A**

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4. The solubility of alkali metals salts in water is due to the fact that the cations get hydrated by water molecules. The degree of hydration depends upon the size of the cation. If the trend of relative ionic radii is  $Cs^+ > Rb^+ > K^+ > Na^+ > Li^+$ .

What is the relative degree of hydration?





**Answer: B**

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5. The mobilities of the alkali metal ions in aqueous solution are

$Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$  because

A. greater is the degree of hydration, lesser is the mobility in aqueous  
aqueous medium

B. larger the size of cation, greater is the mobility in aqueous medium

C. larger the size of cation, lesser is the mobility of ions in aqueous  
medium

D. lesser the degree of hydration, lesser is the mobility of ions in aqueous medium

**Answer: A**

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6. Arrange the following elements in the order of the increasing electropositive character.

Li, Na, K, Rb, Cs

A.  $Li > Na > K > Rb > Cs$

B.  $Li < Na < K < Rb < Cs$

C.  $Li > Na < K < Rb < Cs$

D.  $Na > Li > K < Rb < Cs$

**Answer: B**

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7. Which is the characteristic flame colouration of Li?

- A. Yellow
- B. Violet
- C. Blue
- D. Crimson red

**Answer: D**



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8. Which of the following is not true about alkali metals?

- A. Alkali metals do not occur free in nature.
- B. Alkali metals are good oxidising agents.
- C. Alkali metals salts impart colour to the flame
- D. Alkali metal salts are generally ionic.

**Answer: B**

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**9.** Which of the following alkali metals when burnt in air forms a mixture of oxide as well as nitride?

A. K

B. Na

C. Li

D. Cs

**Answer: C**

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**10.** A metal M reacts with nitrogen to give nitride which on reaction with water produces ammonia gas. Metal M can be

A. Na

B. K

C. Li

D. Rb

**Answer: C**

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**11.** Alkali metals cannot be extracted by reduction of their oxides and other compounds because

A. alkali metals are strong reducing agents

B. alkali metals have low ionisation enthalpy

C. alkali metals have high lattice enthalpy

D. alkali metals are strongly basic in nature.

**Answer: A**



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

- A. 0 to -1
- B. 0 to -2
- C. -1 to -2
- D. No change.

**Answer: A**

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13. In all oxides, peroxides and superoxides, the oxidation state of alkali metals is

- A. +1 and -1

B. +1 and +2

C. +1 only

D. +1, -1 and +2

**Answer: C**

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14. The normal oxide contains \_\_\_ ion, peroxide contains \_\_\_ ion and superoxide contains \_\_\_ ion.

A.  $O^{2-}$ ,  $O_2^{2-}$ ,  $O_2^-$

B.  $O^{2-}$ ,  $O_2^-$ ,  $O_2^{2-}$

C.  $O^-$ ,  $O^{2-}$ ,  $O^{3-}$

D.  $O^-$ ,  $O^{2-}$ ,  $O_2^{2-}$

**Answer: A**

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

A. Na

B.  $H_2O$

C.  $H_2$

D. NaOH

**Answer: C**



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16. What happens when  $H_2$  is passed over lithium at 1073K?

A. Covalent lithium hydride is formed

B. Coloured complex is formed

C. Ionic lithium hydride is formed

D. No reaction

**Answer: C**

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17. On reaction with dihydrogen the alkali metals

- A. form hydrides which are ionic solids with high melting points
- B. form hydrides which are molecular solids with low melting points
- C. form hydrides which are ionic solids with low melting points
- D. form hydrides which are non-stoichiometric.

**Answer: A**

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18. Lithium is the strongest reducing agent though it has highest ionisation energy in its group. Which of the following factors is responsible for making Li the strongest reducing agent?

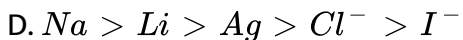
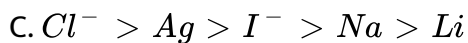
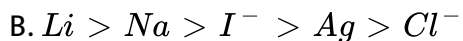
- A. Large heat of atomisation
- B. Smaller size
- C. Large sublimation energy
- D. Large amount of hydration enthalpy

Answer: D

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19.  $E^\circ$  for  
 $Cl_2/Cl^- = +1.36$ ,  $I_2/I^- = +0.53$ ,  $Ag^+/Ag = +0.79$ ,  $Na^+/Na =$   
. What is the order of decreasing reducing strength for these species?

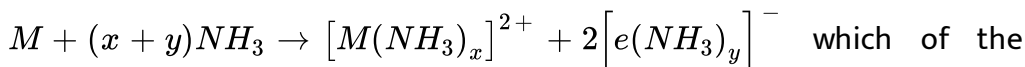
- A.  $Li > Cl^- > Ag > I^- > Na$



**Answer: B**

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20. The alkali metals dissolve in ammonia to give a deep blue solution which is conducting in nature.



following is not true about the solutions of alkali metals in liquid ammonia?

A. The blue colour is due to ammoniated electron

B. the solution is paramagnetic.

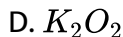
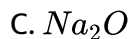
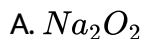
C. The blue colour changes to brown on standing

D. In concentrated solution blue colour changes to bronze and becomes diamagnetic

**Answer: C**

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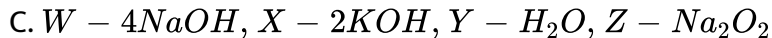
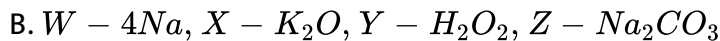
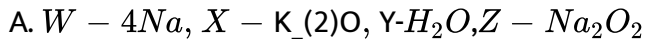
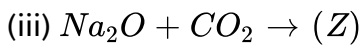
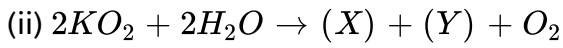
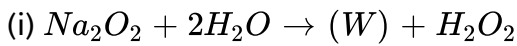
21. Superoxides of alkali metals act as oxidising agents while normal oxides are basic in nature. The oxide which is paramagnetic in nature due to presence of unpaired electron is



**Answer: B**

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22. Complete the following equations:



Answer: D



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23. Crystalline sodium chloride is a bad conductor of electricity while molten NaCl and its aqueous solution conduct electricity. This is because

A. crystalline sodium chloride contains molecules only



B. the ions present in it are not free to move in solid state

C. sodium chloride is a covalent crystal

D. solid substances do not conduct electricity.

**Answer: B**



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**24.** All alkali halides are soluble in water except LiF. The low solubility of LiF in water is due to its (i)\_\_\_\_\_ the low solubility of CsI is due to (ii)\_\_\_\_\_. LiF is soluble in (iii)\_\_\_\_\_ solvents.

A. (i) low lattice enthalpy, (ii) large hydration enthalpy, (iii) polar solvents

B. (i) high lattice enthalpy, (ii) smaller hydration enthalpy, (iii)-non-polar solvents

C. (i) high hydration enthalpy, (ii)-high lattice enthalpy, (iii)- non-polar solvents

D. (i)-smaller hydration enthalpy, (ii)-high lattice enthalpy, (iii)-polar solvents

**Answer: B**

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**25.** Which one of the following material conducts electricity?

- A. Crystalline potassium chloride
- B. Fused sulphates
- C. Molten sodium chloride
- D. Diamond

**Answer: C**

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26. Which of the following increasing order is not correct as per the property indicated against it?

A.  $CsCl < RbCl < KCl < NaCl < LiCl$  (lattice energy)

B.  $LiOH < NaOH < KOH$  (solubility in water)

C.  $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$  (size of hydrated ion)

D.  $NaI < NaBr < NaCl < NaF$  (Lattice energy)

Answer: C



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27. Which of the following statements are true about the alkali metals?

A. All alkali metals form oxo salts such as carbonates, sulphates and nitrates

B. the basic character of oxides increases down the group

- C. Carbonates and sulphates of lithium are stable and their stability decreases down the group
- D. Solubility of carbonates and sulphates increases down the group.

**Answer: C**

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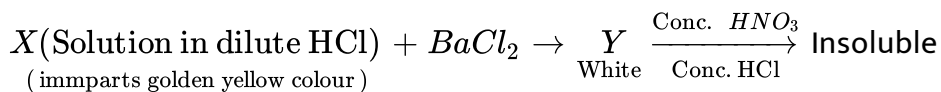
**28. Which of the following has lowest thermal stability ?**

- A.  $Li_2CO_3$
- B.  $Na_2CO_3$
- C.  $K_2CO_3$
- D.  $Rb_2CO_3$

**Answer: A**

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29. A solution of a compound X in dilute HCl on treatment with a solution of  $BaCl_2$  gives a white precipitate of compound Y which is insoluble in conc.  $HNO_3$  and conc.  $HCl$ . Compound X imparts golden yellow colour to the flame.



What are compounds X and Y?

- A. X is  $MgCl_2$  and Y is  $BaSO_4$
- B. X is  $CaCl_2$  and Y is  $BaSO_4$
- C. X is  $Na_2SO_4$  and Y is  $BaSO_4$
- D. X is  $MgSO_4$  and Y is  $BaSO_4$

**Answer: C**



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30. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	Role in biological systems
(B)	K	(ii)	Golden yellow flame
(C)	Na	(iii)	Photoelectric cell
(D)	Cs	(iv)	Carbonate decomposes on heating

A.  $A \rightarrow iv, B \rightarrow i, C \rightarrow iii, D \rightarrow ii$

B.  $A \rightarrow i, B \rightarrow iii, C \rightarrow ii, D \rightarrow iv$

C.  $A \rightarrow iii, B \rightarrow ii, C \rightarrow i, D \rightarrow iv$

D.  $A \rightarrow iv, B \rightarrow i, C \rightarrow ii, D \rightarrow iii$

**Answer: D**

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31. The properties of lithium are similar to those of Mg. This is because

- A. both have nearly the same size
- B. both have similar electronic configuration
- C. both have nearly same charge to size ratio
- D. Both are found together in nature

**Answer: B**

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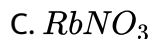
**32.** Lithium salts are mostly hydrated like  $LiCl \cdot 2H_2O$  due to

- A. maximum ionisation enthalpy
- B. maximum degree of hydration of  $Li^+$
- C. maximum hygroscopic nature
- D. maximum chemical reactivity.

**Answer: B**

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33. Which nitrate will decompose to give  $NO_2$  on heating?



Answer: D



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34. Which of the following does not show the anomalous behaviour of lithium?

A. Lithium reacts with nitrogen to form a nitride

B. Lithium carbonate decomposes on heating

C. Lithium nitrate gives  $NO_2$  on heating



D. lithium is the strongest reducing agent.

**Answer: D**

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**35.** Fill up the blanks with appropriate choice.

Lithium and magnesium react slowly with water.

their hydroxides are\_\_\_\_soluble in water.

Carbonates of Li and Mg\_\_\_\_easily on heating. Both LiCl and  $MgCl_2$  are\_\_\_\_in ethanol and are\_\_\_\_.they crystallise from their aqueous solutions as\_\_\_\_\_.

- A. More, do not decompose, soluble, hygroscopic, hydrates
- B. less, decompose, soluble, deliquescent, hydrates
- C. freely, sublime, insoluble, deliquescent, anhydrous
- D. freely, decompose, soluble, hygroscopic, crystals

**Answer: B**



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36. In Solvay ammonia process, sodium bicarbonate is precipitated due to

- A. presence of  $NH_3$
- B. reaction with  $CO_2$
- C. reaction with brine solution
- D. reaction with NaOH.

Answer: C



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37.  $K_2CO_3$  cannot be prepared by solvay process because

- A.  $KHCO_3$  is less soluble than  $NaHCO_3$
- B.  $KHCO_3$  is more soluble to be precipitated by KCl and  $NH_4HCO_3$
- C.  $K_2CO_3$  is less soluble than  $Na_2CO_3$ .

D.

**Answer: B**

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**38.** What are the raw materials used in solvay's process?

A.  $NaCl$ ,  $NH_3$ ,  $CaCO_3$

B.  $NaOH$ ,  $CO_2$

C.  $NaCl$ ,  $CaCO_3$ ,  $C$ ,  $H_2SO_4$

D.  $NH_3$ ,  $H_2O$ ,  $H_2SO_4$

**Answer: A**

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**39.** When washing soda is heated

A. CO is released

B. CO+CO<sub>2</sub> is released

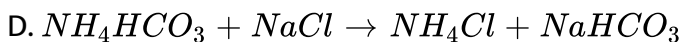
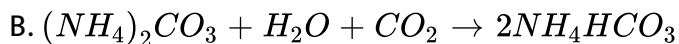
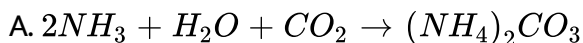
C. CO<sub>2</sub> is released

D. Water vapour is released.

**Answer: D**

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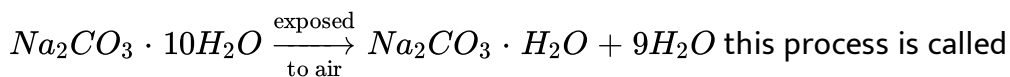
**40.** Which of the following reaction is not a part of solvay's process for preparation of sodium carbonate?



**Answer: C**

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41. When kept open in air, the crystals of washing soda lose 9 molecules off water to form a monohydrate.



- A. efflorescence
- B. deliquescence
- C. dehydration
- D. hydration

**Answer: A**

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42. A white solid X on heating gives a white solid Y and an acid gas Z. gas Z is also given out when X reacts with an acid. The compound Y is also formed if caustic soda is left open in the atmosphere. X, Y and Z are

A.  $X - NaHCO_3, Y - Na_2CO_3, Z - CO_2$

B.  $X - Na_2CO_3, Y - NaOH, Z - CO_2$

C.  $X - Na_2CO_3, Y - NaHCO_3, Z - CO_2$

D.  $X - NaOH, Y - NaHCO_3, Z - CO_2$

**Answer: A**

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**43.** Which of the following statements is correct?

A. Sodium carbonate decomposes on heating

B. sodium bicarbonate is more soluble in water than potassium bicarbonate.

C. sodium when heated with excess of  $O_2$ , gives peroxide

D. Lithium halides are highly ionic in nature.

**Answer: C**



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44. Which of the following statements is not correct regarding preparation of NaOH/

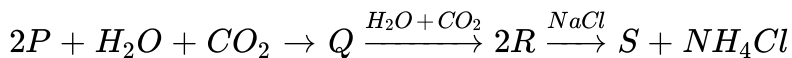
- A. NaOH is prepared by electrolysis of sodium chloride in castner-kellner cell.
- B. sodium metal discharged at cathode combines with mercury to form sodium amalgam,.
- C. Chlorine is evolved at anode.
- D. Amalgam is heated to separate Na and Hg.

**Answer: D**

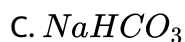
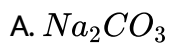


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45. In the given chemical reaction,



Identify S.

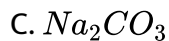
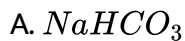


**Answer: C**

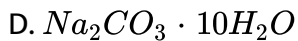


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46. Baking soda is







**Answer: A**

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**47.** Which of the following is not a use of baking soda?

- A. In medicines as antacid
- B. as a component of baking powder
- C. in removing permanent hardness of water.
- D. In fire extinguishers.

**Answer: C**

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48. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	$\text{Na}_2\text{CO}_3$	(i)	Caustic soda
(B)	$\text{NaOH}$	(ii)	Glauber's salt
(C)	$\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$	(iii)	Soda ash
(D)	$\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$	(iv)	Washing soda

A.  $A \rightarrow iv, B \rightarrow i, C \rightarrow ii, D \rightarrow iii$

B.  $A \rightarrow iv, B \rightarrow i, C \rightarrow iii, D \rightarrow ii$

C.  $A \rightarrow ii, B \rightarrow iii, C \rightarrow iv, D \rightarrow i$

D.  $A \rightarrow iii, B \rightarrow i, C \rightarrow iv, D \rightarrow ii$

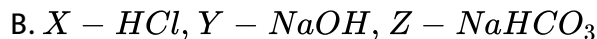
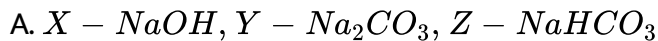
Answer: D



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49. A certain compound X imparts golden yellow flame. When zinc powder is heated with concentrated solution of X,  $\text{H}_2$  gas is evolved. X combines

with  $CO_2$  to give a salt Y. Y is a hydrated salt which on reaction with HCl or excess of  $CO_2$  gives another salt Z which is an important part of baking powder. identify X, Y and Z.

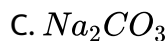


**Answer: A**



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**50.** A white solid X reacts with dil. HCl to give colourless gas which is used in fire extinguishers. The solid X is

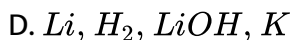
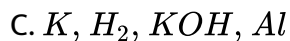
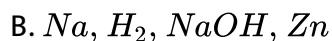
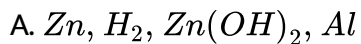




**Answer: D**

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51. A metal X reacts with water to produce a highly combustible gas Y, and a solution Z. another metal P reacts with Z to give the same gas Y. X,Y,Z and P respectively are



**Answer: B**

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52. What is the biological important of  $Na^+$  and  $K^+$  ions in cell fluids like blood plasma?

- A. They participate in transmission of nerve signals.
- B. They regulate the number of red and white blood corpuscles in the cell
- C. They can be present in any amount in the blood since they are absorbed by the cells.
- D. They regulate the viscosity and colour of the blood

**Answer: A**



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53.  $Ca^{2+}$  is isoelectronic with

- A.  $Na$
- B.  $Mg^{2+}$

C.  $Ba^{2+}$

D. Ar

**Answer: D**

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**54.** Which of the following is not true about s-block elements?

A. They have large atomic sizes

B. They have lower ionisation enthalpies

C. they have variable oxidation state

D. They form basic oxides

**Answer: C**

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55. The decreasing order of the second ionization potential of Mg, Ca and Ba is

A.  $Mg > Ca > Ba$

B.  $Ca > Ba > Mg$

C.  $Ba > Mg > Ca$

D.  $Mg > Ba > Ca$

**Answer: A**



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56. The first ionisation enthalpies of the alkline earth metals are higher than that of alkali metals but second ionisation ethalpies are smaller, why?

A. In alkli metals, second ionisation enthylpy involves removal of electron from noble gas electronic configuration while in alkaline

earth metals, second electron is removed from  $ns^1$  configuration

B. Alkaline earth metals have very high melting point as compared to alkali metals.

C. Electrons in s-orbital are more closely packed in alkaline earth metals than alkali metals.

D. due to smaller size alkaline earth metals do not form divalent ions very easily

**Answer: A**

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57. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Na	(i)	Crimson red
(B)	K	(ii)	Yellow
(C)	Sr	(iii)	Apple green
(D)	Ba	(iv)	Violet



A.  $A \rightarrow i, B \rightarrow ii, C \rightarrow iii, D \rightarrow iv$

B.  $A \rightarrow ii, B \rightarrow iv, C \rightarrow i, D \rightarrow iii$

C.  $A \rightarrow iv, B \rightarrow iii, C \rightarrow ii, D \rightarrow i$

D.  $A \rightarrow iv, B \rightarrow iii, C \rightarrow ii, D \rightarrow i$

**Answer: B**

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**58.** What is the formula of hydrated  $BeCl_2$ ?

A.  $BeCl_2 \cdot H_2O$

B.  $BeCl_2 \cdot 2H_2O$

C.  $BeCl_2 \cdot 3H_2O$

D.  $BeCl_2 \cdot 4H_2O$

**Answer: D**

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59. Which among the following is kinetically inert towards water?

A. Na

B. Be

C. Ca

D. K

**Answer: B**

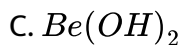


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60. An oxide of alkaline earth metals X reacts with C and  $Cl_2$  to give a compound Y. Y is found in polymeric chain structure and is electron deficient molecule. The compound Y is

A. BeO

B.  $BeCl_2$



**Answer: B**



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**61.** When alkaline earth metals dissolve in ammonia, they form coloured solution like alkali metals. Which of the following observations regarding the reaction are correct?

- (i) Dilute solutions are bright blue in colour due to solvated electrons.
- (ii) These solutions decompose to form amides and hydrogen.
- (iii) From this solution the ammoniates

$[M(NH_3)_6]^{2+}$  can be recovered by evaporation.

- A. Only (i) and (ii)
- B. Only (i), (ii) and (iii)
- C. Only (ii) and (iii)

D. Only (i)

**Answer: B**

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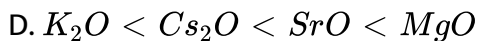
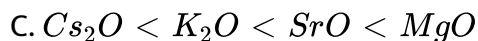
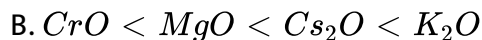
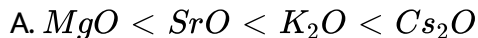
62. Which of the following statements is correct regarding alkaline earth metals?

- A. Alkaline earth metals are weaker reducing agents than alkali metals
- B. Alkaline earth metal salts are paramagnetic in nature
- C. Alkaline earth metal salts are more soluble than corresponding alkali metal salts.
- D. solubility of sulphates of alkaline earth metals increases from top to bottom in the group

**Answer: A**

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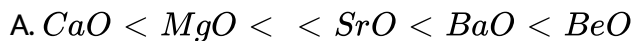
63. The increasing order of basic character of oxides  $MgO$ ,  $SrO$ ,  $K_2O$  and  $Cs_2O$  is



**Answer: A**

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64. Which of the following is arranged according to increasing basic strength?





**Answer: D**

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**65.** BeO is insoluble but BaO is soluble as

A. lattice energy of  $BeO$  is higher than BaO due to small size of  $Be^{2+}$  ion and its covalent nature

B. hydration energy of BeO is lower than BaO due to small size  $Be^{2+}$  ion

C. BeO is amphoteric in nature while BaO is basic

D. BeO forms hydrated salts while BaO forms anhydrous salts

**Answer: A**

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66. The pair of amphoteric oxides is

A.  $BeO$ ,  $ZnO$

B.  $Al_2O_3$ ,  $Li_2O$

C.  $BeO$ ,  $BO_3$

D.  $BeO$ ,  $MgO$

Answer: A



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67. One word answers are given for the following, Mark the example which is not correct.

A. Alkali metals with lowest melting point- Cs

B. Alkaline earth metal with higher hydration enthalpy-  $Ba^{2+}$

C. Alkaline earth metal which imparts brick red colour to the flame-

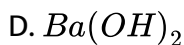
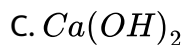
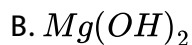
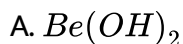


D. Oxide of alkaline earth metal which is amphoteric in nature -BeO

**Answer: B**

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68. Which of the following will have lowest value of  $K_{sp}$  at room temperature?



**Answer: A**

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69. Two metals X and Y belong to the cond group of periodic table. X forms insoluble oxide but soluble sulphate. Y forms a soluble oxide but insoluble sulphate. Hydroxide of metal X is soluble in NaOH while that of metal Y is insoluble in NaOH. What are metals X and Y?

- A. X=Be,Y=Ba
- B. X=Mg,Y=Ca
- C. X=Ca,Y=Sr
- D. X=Ba,Y=Mg

**Answer: A**

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70. Calcium chloride is used as a dehydrating agent because

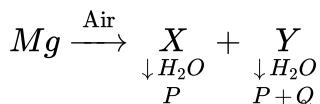
- A. it has a strong affinity for water

- B. it has water of crystalline attached to it
- C. it loses water when exposed to air
- D. it has a high melting point.

**Answer: A**

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71. What happens when magnesium is burnt in air and the products X and Y are treated with water?



- A.  $X - MgO, Y - Mg(OH)_2, P - Mg(OH)_2, Q - N_2$
- B.  $X - MgO, Y - Mg_3N_2, P - Mg(OH)_2, Q - NH_3$
- C.  $X - MgO, Y - Mg_3N_2, P - Mg(OH)_2, Q - N_2$
- D.  $X - MgO, Y - MgCO_3, P - Mg(OH)_2, Q - CO_2$

**Answer: B**



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72. When  $BeCl_2$  is hydrolysed, white fumes of gas are given out. The intensity of fumes intensifies when a rod dipped in moist ammonia is brought near the mouth of the test tube. The gas which comes out during hydrolysis is

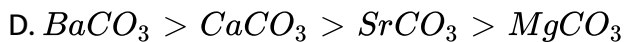
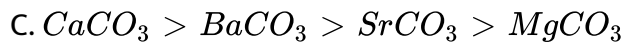
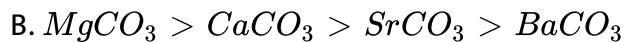
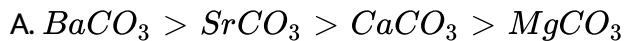


**Answer: B**



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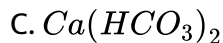
73. Which is the correct sequence of solubility of carbonates of alkaline earth metals?



**Answer: B**

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**74.** Which of the following bicarbonate does not exist in solid state?



**Answer: C**

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75. Which of the following compounds are not arranged in correct order as indicated?

A.  $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$  (increasing of hydrolysis)

B.  $SrCl_2 < CaCl_2 < MgCl_2 < BeCl_2$  (increasing lattice energy)

C.  $CaSO_4 < MgSO_4 < BeSO_4$  (increasing stability)

D.  $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2$  (increasing solubility)

Answer: C



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76. Sulphates of Be and Mg are readily soluble in water but sulphates of Ca, Sr and Ba are insoluble. This is due to the fact

A. the greater hydration enthalpies of  $Be^{2+}$  and  $Mg^{2+}$  overcome the lattice enthalpy

B. high lattice enthalpy of  $Be^{2+}$  and  $Mg^{2+}$  makes them soluble in water

C. solubility decreases from  $BeSO_4$  to  $BaSO_4$  due to increase in ionic size

D.  $BeSO_4$  and  $MgSO_4$  are ionic in nature while other sulphates are covalent

**Answer: A**

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77. The correct order of solubility of the sulphates of alkaline earth metals in water is

A.  $Be > Ca > Mg > Ba > Sr$

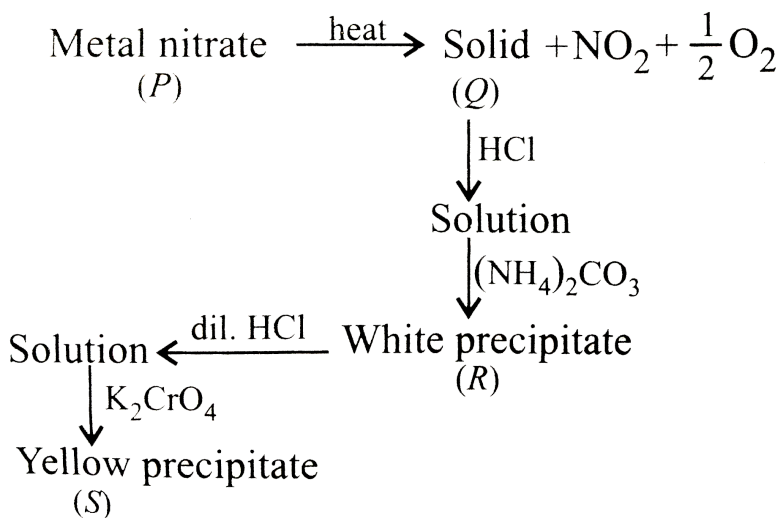
B.  $Mg > Be > Ba > Ca > Sr$

C.  $Be > Mg > Ca > Sr > Ba$

D.  $Mg > Ca > Ba > Be > Sr$

Answer: C

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78.

What are (P),(Q),(R) and (S)?

A.  $P - Be(\text{NO}_3)_2$ ,  $Q - BeO$ ,  $R - Be\text{CO}_3$ ,  $S - Be\text{CrO}_4$

B.  $P - \text{NaNO}_3$ ,  $Q - \text{Na}_2\text{O}$ ,  $R - \text{Na}_2\text{CO}_3$ ,  $S - \text{Na}_2\text{CrO}_4$

C.  $P - \text{Ba}(\text{NO}_3)_2$ ,  $Q - \text{BaO}$ ,  $R - \text{BaCO}_3$ ,  $S - \text{BaCrO}_4$

D.  $P - KNO_3$ ,  $Q - K_2O$ ,  $R - K_2CO_3$ ,  $S - K_2CrO_4$

Answer: C

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79. Beryllium shows diagonal relationship with aluminium. Which of the following similarly is incorrect?

A.  $Be_2C$  like  $Al_4C_3$  yields methane on hydrolysis

B. Be like Al is rendered passive by  $HNO_3$

C.  $Be(OH)_2$  like  $Al(OH)_3$  is basic

D. Be forms beryllates and Al forms aluminates.

Answer: C

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80. Which of the following does not show diagonal relationship between beryllium and aluminium?

- A. Both  $\text{BeO}$  and  $\text{Al}_2\text{O}_3$  are amphoteric in nature.
- B. Both beryllium and aluminium form polymeric covalent hydrides.
- C. Both beryllium and aluminium form nitrides with nitrogen which evolve  $\text{NH}_3$  with water.
- D. Both metal carbonates are highly stable.

Answer: D



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81. Which of the following is not the point of difference between Be and other alkline earth metals?

- A. It has a tendency to form covalent bonds.
- B. It dissolves in alkalies with evolution of hydrogen

C. Its oxides and hydroxides are amphoteric.

D. its carbide gives acetylene on hydrolysis.

**Answer: D**

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**82.** Which of the following is not a similarity of beryllium with aluminium?

A. It becomes passive when treated with conc.  $HNO_3$ .

B. It forms polymeric covalent hydrides

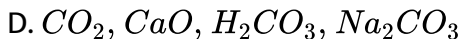
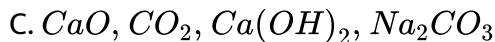
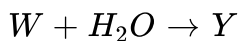
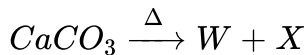
C. Carbonate of Be is extremely stable

D. salts of Be do not impart colour to the flame.

**Answer: C**

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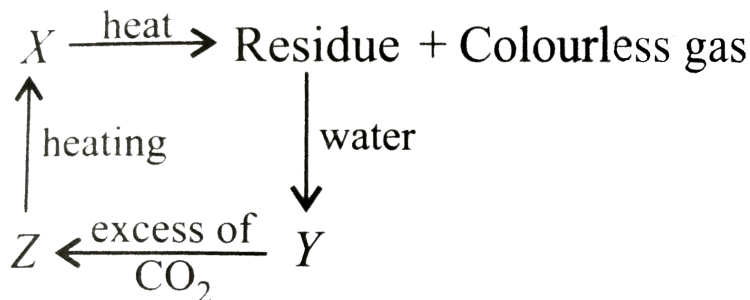
83. Identify W, X, Y and Z respectively in the given reactions.



**Answer: C**



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84. Identify X, Y and Z.

Identify X, Y and Z.

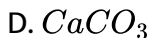
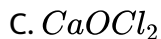
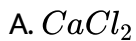
- A.  $X - \text{Ca}(\text{HCO}_3)_2$ ,  $Y - \text{CaCO}_3$ ,  $Z - \text{Ca}(\text{OH})_2$
- B.  $X - \text{CaCO}_3$ ,  $Y - \text{Ca}(\text{OH})_2$ ,  $Z - \text{Ca}(\text{HCO}_3)_2$
- C.  $X - \text{CaCO}_3$ ,  $Y - \text{CaO}$ ,  $Z - \text{Ca}(\text{OH})_2$
- D.  $X - \text{CaCO}_3$ ,  $Y - \text{CaO}$ ,  $Z - \text{Ca}(\text{HCO}_3)_2$

Answer: B



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85. Slaked lime reacts with chlorine to form



Answer: C

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86. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Quick lime	(i)	$\text{CaH}_2$
(B)	Slaked lime	(ii)	$\text{Ba(OH)}_2$
(C)	Baryta water	(iii)	$\text{Ca(OH)}_2$
(D)	Hydrolith	(iv)	$\text{CaO}$

A.  $A \rightarrow i, B \rightarrow ii, C \rightarrow iii, D \rightarrow iv$

B.  $A \rightarrow iii, B \rightarrow ii, C \rightarrow i, D \rightarrow iv$

C.  $A \rightarrow i, B \rightarrow iii, C \rightarrow iv, D \rightarrow ii$

D.  $A \rightarrow iv, B \rightarrow iii, C \rightarrow ii, D \rightarrow i$

**Answer: D**



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87. An element X burns in nitrogen to give a compound Y which on reaction with water gives a compound Z and a gas with a pungent smell. Z can be used during construction and white washing. When excess of  $CO_2$  is bubbled through Z, a compound P is formed which on heating decomposes to give a colourless, odourless gas. identify X, Y, Z and P.

A.  $X - Ca, Y - Ca_3N_2, Z - Ca(OH)_2, P - Ca(HCO_3)_2$

B.  $X - Mg, Y - MgO, Z - Mg(OH)_2, P - MgCO_3$

C.  $X - Ca, Y - Ca_3N_2, Z - Ca(OH)_2, P - CaCO_3$

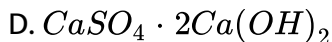
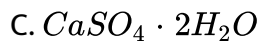
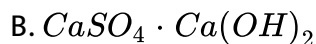
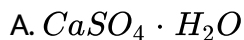
D.  $X - Ca, Y - CaO, Z - Ca(OH)_2, P - Ca(HCO_3)_2$

**Answer: A**



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88. when plaster of paris comes in contact with water it sets into a hard mass. The composition of the hard mass is

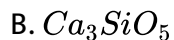
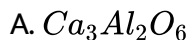


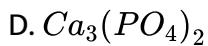
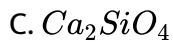
Answer: C



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89. Which of the following is not present in portland cement?





**Answer: D**

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**90.** The difference of number of water molecules in gypsum and plaster of

Pairs is

A.  $\frac{5}{2}$

B. 2

C.  $\frac{1}{2}$

D.  $1\frac{1}{2}$

**Answer: D**

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91. Gypsum is added to portland cement to

- A. fasten the process of setting
- B. slow down the process of setting
- C. improve the colour of the cement
- D. increase the melting point of cement.

Answer: B



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92. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Quick lime	(i)	Setting fractured bones
(B)	Plaster of Paris	(ii)	A constituent of chewing gum
(C)	Slaked lime	(iii)	Manufacture of bleaching powder
(D)	Limestone	(iv)	Manufacture of dyestuffs

A.  $A \rightarrow i, B \rightarrow iv, C \rightarrow ii, D \rightarrow iii$

B.  $A \rightarrow iv, B \rightarrow i, C \rightarrow iii, D \rightarrow ii$

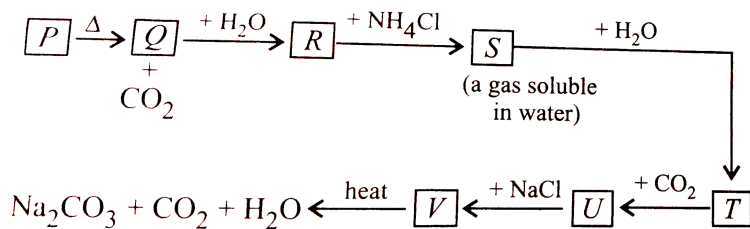
C.  $A \rightarrow ii, B \rightarrow iii, C \rightarrow i, D \rightarrow iv$

D.  $A \rightarrow iii, B \rightarrow ii, C \rightarrow iv, D \rightarrow i$

Answer: B

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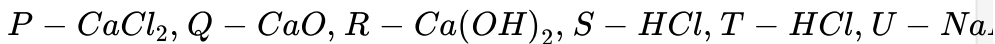
93. Study the road map for preparation of washing soda and fill the blanks



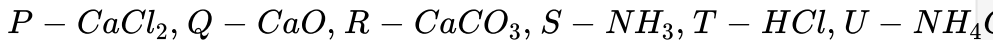
A.

$P - CaCO_3, Q - CaO, R - Ca(OH)_2, S - NH_3, T - NH_4OH, U -$

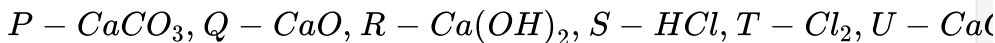
B.



C.



D.

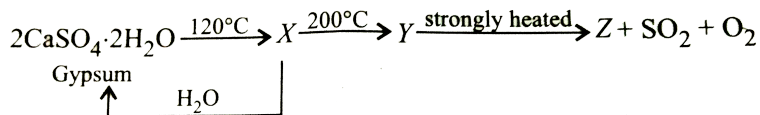


**Answer: A**



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94. Identify X, Y and Z



A. X-Plaster of paris  $\left( CaSO_4 \cdot \frac{1}{2} H_2O \right)$ , Y-Burnt plaster  $(CaSO_4)$ , Z-

Quick lime (CaO)

B. X-Calcium sulphate ( $CaSO_4$ ), Y-Plaster of Paris ( $CaSO_4 \cdot \frac{1}{2}H_2O$ )

Z-Quick lime (CaO)

C. X-Quick lime (CaO), Y-Plaster of Paris ( $CaSO_4 \cdot \frac{1}{2}H_2O$ ), Z-Lime

water ( $Ca(OH)_2$ )

D. X-Plaster of Paris ( $CaSO_4 \cdot \frac{1}{2}H_2O$ ), Y-Burnt plaster (CaO), Z-

slaked lime ( $Ca(OH)_2$ )

**Answer: A**



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**95.** The average composition of portland cement is

A.  $CaO$ : 40 – 50 %,  $SiO_2$ : 30 – 40 %,  $Al_2O_3$ ,  $Fe_2O_3$ : 10 – 20 %

B.

$CaO$ : 50 – 60 %,  $SiO_2$ : 20 – 25 %,  $Al_2O_3$ : 5 – 10 %,  $MgO$ : 2 – 3 %

C.  $SiO_2$ : 40 – 50 %,  $CaO$ : 30 – 40 %,  $Al_2O_3$ : 10 – 20 %

D.  $CaO$ : 50 % ,  $SiO_2$ : 50 %

**Answer: B**

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96. The metal ion which plays an important role in muscle contraction is

A.  $Be^{2+}$

B.  $Mg^{2+}$

C.  $Ca^{2+}$

D.  $Ba^{2+}$

**Answer: C**

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97. Which of the following metals is required as cofactor by all enzymes utilisation ATP in phosphate transfer?

A. K

B. Ca

C. Na

D. Mg

**Answer: D**



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98. Match the column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	$\text{Na}^+$	(i)	Chlorophyll
(B)	$\text{K}^+$	(ii)	Bones and teeth
(C)	$\text{Ca}^{2+}$	(iii)	Regulating flow of water across cell membrane
(D)	$\text{Mg}^{2+}$	(iv)	Activation of enzyme within cell fluids

A.  $A \rightarrow i, B \rightarrow iii, C \rightarrow ii, D \rightarrow iv$

B.  $A \rightarrow iv, B \rightarrow iii, C \rightarrow ii, D \rightarrow i$

C.  $A \rightarrow i, B \rightarrow ii, C \rightarrow iii, D \rightarrow iv$

D.  $A \rightarrow iii, B \rightarrow iv, C \rightarrow ii, D \rightarrow i$

Answer: D



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Higher Order Thinkin Skills

1. The low solubility of LiF and that of CsI in water are respectively due to which of the properties of the alkali metal ions?

- A. Higher hydration enthalpy of  $Li^+$ , higher lattice enthalpy of  $Cs^+$
- B. Smaller hydration enthalpy of  $Li^+$ , higher lattice enthalpy of  $Cs^+$
- C. Smaller lattice enthalpy of  $Li^+$ , higher hydration enthalpy of  $Cs^+$
- D. Higher lattice enthalpy of  $Li^+$ , smaller hydration enthalpy of  $Cs^+$ .

**Answer: D**



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2. The violet flame shown by potassium in bunsen flame is due to jumping of the electron from

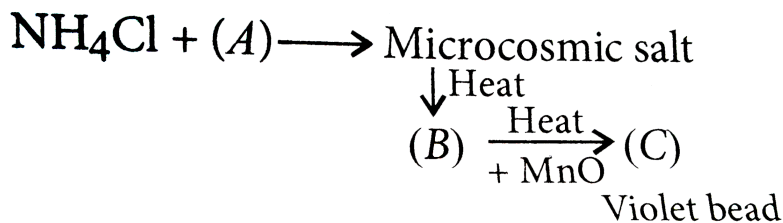
- A. 1s to 4p
- B. 1s to 5p
- C. 4p to 4s



D. 5p to 4s

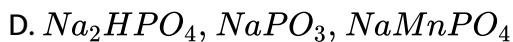
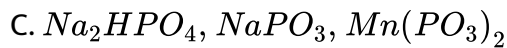
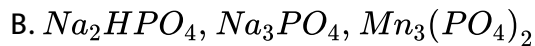
Answer: D

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3.

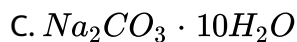
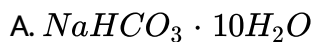
(A), (B) and (C) respectively are



Answer: D

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4. A compound of sodium does not give  $CO_2$  when heated but it gives  $CO_2$  when treated with dilute acids. A crystalline compound is found to have 37.1% Na and 14.52%  $H_2O$ . Hence, compound is

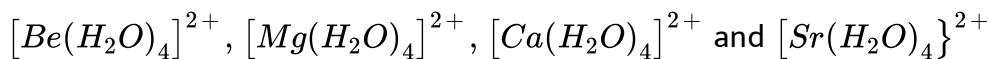


**Answer: D**

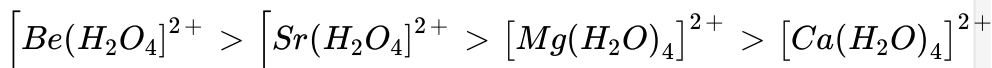


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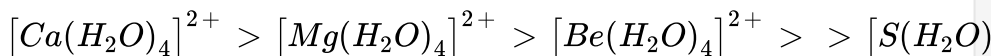
5. Nuclear attraction is often the deciding control factor for the association of neutral molecules to a given metal ion. Which one of the following represents the correct order of stability of the ions?



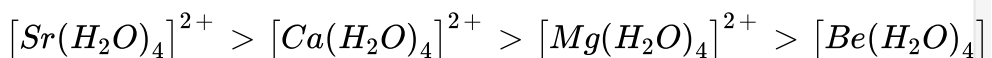
A.



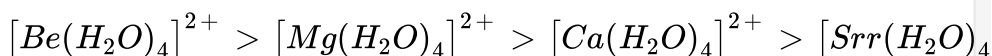
B.



C.



D.



**Answer: D**



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6. Be and Al exhibit diagonal relationship. Which of the following statements about them is/are not true?

(i) both react with HCl to liberate  $H_2$ .

(ii) They are made passive by  $HNO_3$ .

(iii) Their carbides give acetylene on treatment with water.

(iv) Their oxides are amphoteric.

A. (iii) and (iv)

B. (i) and (iii)

C. (i) only

D. (iii) only

**Answer: D**



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7. A metal  $M$  readily forms its sulphate  $MSO_4$  which is water soluble. It forms its oxide  $MO$  which becomes inert on heating. It forms its insoluble hydroxide  $M(OH)_2$  which is soluble in  $NaOH$  solution. Then  $M$  is

A.  $Be$

B.  $Ba$

C. Ca

D. Mg

**Answer: A**



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8. A metal salt solution forms a yellow precipitate with potassium chromate in acetic acid, a white precipitate with dilute sulphuric acid but does not give precipitate with sodium chloride or iodide. The white precipitate obtained when sodium carbonate is added to the metal salt solution will consist of

A. lead carbonate

B. basic lead carbonate

C. barium carbonate

D. strontium carbonate.

**Answer: C**



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9. The element A burns in nitrogen to give an ionic compound B. the compound B reacts with water to give C and D. A solution of C becomes milky on bubbling carbon dioxide. What is the nature of compound (D)?

- A. Acidic
- B. Basic
- C. Amphoteric
- D. Neutral

**Answer: B**



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10. The stability of  $K_2O$ ,  $K_2O_2$  and  $KO_2$  is in order  $K_2O < K_2O_2 < KO_2$ . This increasing stability as the size of metal ion increases is due to stabilisation of

- A. larger cation by smaller anions through lattice energy effects
- B. larger cation by larger anions through lattice energy effects
- C. smaller cations by smaller anions through melting point
- D. smaller cations by larger anions through melting point.

**Answer: B**

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## Exemplar Problems

1. The alkali metals have low melting point. Which of the following alkali metal is expected to melt if the room temperature rises to  $30^{\circ}C$  ?

- A. Na
- B. K
- C. Rb
- D. Cs

**Answer: D**



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2. Alkali metals react with water vigorously to form hydroxides and dihydrogen. Which of the following alkali metals reacts with water least vigorously ?

A. Li

B. Na

C. K

D. Cs

**Answer: A**



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3. The reducing power of a metal depends on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution.

- A. Sublimation enthalpy
- B. Ionisation enthalpy
- C. Hydration enthalpy
- D. Electron-gain enthalpy

**Answer: C**



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4. Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally?

- A.  $MgCO_3$
- B.  $CaCO_3$
- C.  $SrCO_3$

D.  $BaCO_3$

**Answer: D**



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5. Which of the carbonates given below is unstable in air and is kept in  $CO_2$  atmosphere to avoid decomposition?

A.  $BeCO_3$

B.  $MgCO_3$

C.  $CaCO_3$

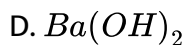
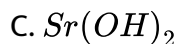
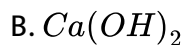
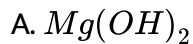
D.  $BaCO_3$

**Answer: A**



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6. Metals form basic hydroxides. Which of the following metal hydroxide is the least basic?

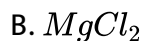


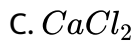
**Answer: A**



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7. Some of the Group 2 metal halides are covalent and soluble in organic solvents. Among the following metal halides, the one which is soluble in ethanol is

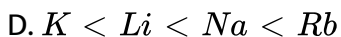
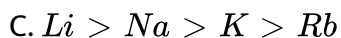
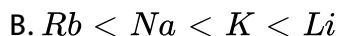
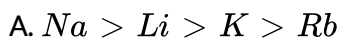




**Answer: A**

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8. The order of decreasing ionisation enthalpy in alkali metals is



**Answer: C**

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9. The solubility of metal halides depends on their nature, Lattice enthalpy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals, the lowest solubility of LiF in water is due to

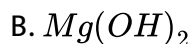
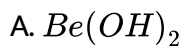
- A. ionic nature of lithium fluoride
- B. high lattice enthalpy
- C. high hydration enthalpy for lithium ion
- D. low ionisation enthalpy of lithium atom

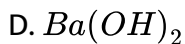
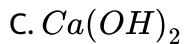
**Answer: B**



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10. Amphoteric hydroxides react with both alkalies and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide?





**Answer: A**



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11. In the synthesis of sodium carbonate, the recovery of ammonia is done by treating  $NH_4Cl$  with  $Ca(OH)_2$ . The by-product obtained in this process is



**Answer: A**



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12. When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to

- A. ammoniated electron
- B. sodium ion
- C. sodium amide
- D. ammoniated sodium ion

**Answer: A**



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13. By adding gypsum to cement

- A. setting time of cement becomes less
- B. setting time of cement increases
- C. colour of cement becomes light

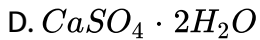
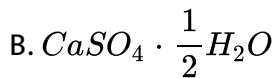
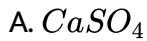
D. shining surface is obtained

**Answer: B**



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14. Dead burnt plaster is



**Answer: A**



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15. Suspension of slaked lime in water is known as



- A. lime water
- B. quick lime
- C. milk of lime
- D. aqueous solution of slaked lime

**Answer: C**

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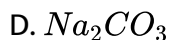
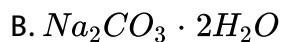
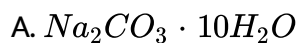
**16.** Which of the followingg elements does not form hydride by direct heating with dihydrogen?

- A. *Be*
- B. Mg
- C. Sr
- D. Ba

**Answer: A**

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17. The formula of soda ash is



**Answer: D**

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18. A substance which gives a brick red flame and breaks down on heating to give oxygen and a brown gas is

A. magnesium nitrate

B. calcim nitrate

C. barium nitrate

D. strontium nitrate

**Answer: B**

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19. Which of the following statements is true about  $Ca(OH)_2$ ?

A. It is used in the preparation of bleaching powder.

B. It is a light blue solid.

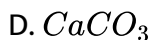
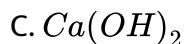
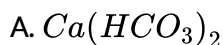
C. it does not possess disinfectant property

D. it is used in the manufacture of cement.

**Answer: A**

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20. A chemical A is used for the preparation of washing soda to recover ammonia. When  $CO_2$  is bubbled through an aqueous solution of A, the solution turns milky. It is used in white washing due to disinfectant nature what is the chemical formula of A?



**Answer: C**



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21. Dehydration of hydrates of halides of calcium, barium and strontium i.e.,  $CaCl_2 \cdot 6H_2O$ ,  $BaCl_2 \cdot 2H_2O$ ,  $SrCl_2 \cdot 2H_2O$ , can be achieved by heating. These become wet on keeping in air. Which of the following statements is correct about these halides?

- A. Act as dehydrating agent.
- B. Can adsorb moisture from air
- C. Tendency to form hydrate decreases from calcium to barium
- D. All of the above

**Answer: D**

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## Assertion Reason

1. Assertion: Elements of group 1 are called 'alkali metals'.

Reason: All the alkali metals react with water.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: B**

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2. Assertion: Lithium resembles magnesium diagonally placed in next group.

Reason: The size of  $Li^+$  and  $Mg^{2+}$  are different and their electropositive character is same.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: C**

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3. Assertion: Alkali metals are obtained by electrolysis of molten salt and not aqueous solution.

Reason: The discharge potential of  $H^+$  ions is lower than alkali metals cation hence hydrogen is discharged at cathode instead of metal.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**

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4. Assertion: Lithium salts are mostly hydrated.

Reason: The hydration enthalpies of alkali metal ions decrease with increase in ionic sizes.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: A**



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5. Assertion: The melting and boiling points of the alkali metals are low.

Reason: Alkali metals have weak metallic bonding.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: B**

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6. Assertion: Lithium fluoride is most covalent in nature.

Reason: Small anion can be easily distorted.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: D**



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7. Assertion: The carbonate of lithium decomposes easily on heating.

Reason: Lithium being very small in size polarises large carbonate ion leading to the formation of more stable  $Li_2O$  and  $CO_2$ .

- A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: A**

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**8. Assertion :** Super-oxides of alkali metals are para-magnetic.

**Reason :** Super-oxides contain the ion  $O_2^-$  which has one unpaired electron.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: A**

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9. Assertion: Be and Mg do not impart characteristic colour to the flame.

Reason: both Be and Mg have high ionization energy.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**

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10. Assertion: The fluorides of alkaline earth metals are relatively less soluble than chlorides.

Reason: Fluorides have high lattice energies.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**



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11. Assertion: Be is readily attacked by acids.

Reason: Be shows diagonal relationship to Na.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: D**



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**12.** Assertion: Alkaline earth metal oxides are quite stable to heat.

Reason: Enthalpies of formation of alkaline earth metal oxides are quite high.

- A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: A**

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**13.** Assertion:  $BeSO_4$  and  $MgSO_4$  are insoluble in water.

Reason:  $Be^{2+}$  and  $Mg^{2+}$  have low hydration enthalpies.

A. If both assertion and reason are true and reason is the correct explanation of assertion

B. If both assertion and reason are true but reason is not the correct explanation of assertion

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: D**

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14. Assertion:  $CaCO_3$  is prepared by passing carbon dioxide gas through slaked lime.

Reason: Passingg excess of  $CO_2$  through slaked lime leads to the formation off quick lime.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.



**Answer: C**

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**15.** Assertion: For biological functions in human body, barium is not required.

Reason: Barium is a divalent ion.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: B**

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1. Alkali metals are not found in free state due to their highly reactive nature. This is due to

- A. their large size and low ionisation enthalpy
- B. their large size and high ionisation enthalpy
- C. their low ionisation enthalpy and high electron gain enthalpy
- D. their tendency to impart colour to the flame.

**Answer: A**

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2. The ionisation energy of alkali metals decreases from Li to Cs because

- A. the atomic size increases from Li to Cs

- B. The distance between nucleus and outermost orbital decreases from Li to Cs
- C. electropositive character decreases down the group
- D. melting point decreases from Li to Cs.

**Answer: A**

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3. First ionisation energy of alkali metals is very low but second ionisation energy is very high because

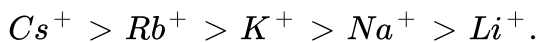
- A. alkali metals acquire noble gas configuration after losing one electron
- B. a large amount of energy is required to remove electron from a cation
- C. alkali metals can form only univalent ions

D. first group elements can lose only one electron.

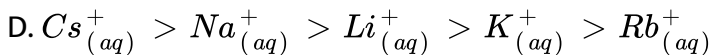
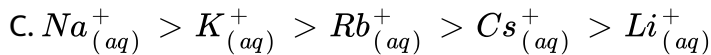
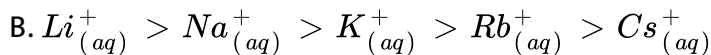
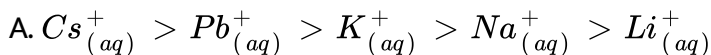
**Answer: A**

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4. The solubility of alkali metals salts in water is due to the fact that the cations get hydrated by water molecules. The degree of hydration depends upon the size of the cation. If the trend of relative ionic radii is



What is the relative degree of hydration?



**Answer: B**

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5. The mobilities of the alkali metal ions in aqueous solution are

$Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$  because

A. greater is the degree of hydration, lesser is the mobility in aqueous aqueous medium

B. larger the size of cation, greater is the mobility in aqueous medium

C. larger the size of cation, lesser is the mobility of ions in aqueous medium

D. lesser the degree of hydration, lesser is the mobility of ions in aqueous medium

**Answer: A**



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6. Arrange the following elements in the order of the increasing electropositive character.

Li, Na, K, Rb, Cs

A.  $Li > Na > K > Rb > Cs$

B.  $Li < Na < K < Rb < Cs$

C.  $Li > Na < K < Rb < Cs$

D.  $Na > Li > K < Rb < Cs$

**Answer: B**



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7. Which is the characteristic flame colouration of Li?

A. Yellow

B. Violet

C. Blue

D. Crimson red

**Answer: D**

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**8. Which of the following is not true about alkali metals?**

- A. Alkali metals do not occur free in nature.
- B. Alkali metals are good oxidising agents.
- C. Alkali metals salts impart colour to the flame
- D. Alkali metal salts are generally ionic.

**Answer: B**

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9. Which of the following alkali metals when burnt in air forms a mixture of oxide as well as nitride?

A. K

B. Na

C. Li

D. Cs

**Answer: C**



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10. A metal M reacts with nitrogen to give nitride which on reaction with water produces ammonia gas. Metal M can be

A. Na

B. K

C. Li



D. Rb

**Answer: C**



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**11.** Alkali metals cannot be extracted by reduction of their oxides and other compounds because

- A. alkali metals are strong reducing agents
- B. alkali metals have low ionisation enthalpy
- C. alkali metals have high lattice enthalpy
- D. alkali metals are strongly basic in nature.

**Answer: A**



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

- A. 0 to -1
- B. 0 to -2
- C. -1 to -2
- D. No change.

**Answer: A**



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13. In all oxides, peroxides and superoxides, the oxidation state of alkali metals is

- A. +1 and -1
- B. +1 and +2
- C. +1 only

D. +1, -1 and +2

Answer: C

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14. Match column I with column II and mark the appropriate choice.

Column I		Column II	
(A)	Li	(i)	$M_2O_2$
(B)	Na	(ii)	$MO_2$
(C)	Rb	(iii)	$M_2O$

A.  $A \rightarrow i, B \rightarrow ii, C \rightarrow iii$

B.  $A \rightarrow iii, B \rightarrow ii, C \rightarrow i$

C.  $A \rightarrow iii, B \rightarrow i, C \rightarrow ii$

D.  $A \rightarrow ii, B \rightarrow iii, C \rightarrow i$

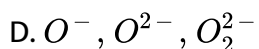
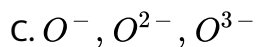
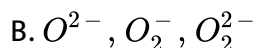
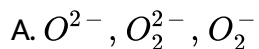
Answer: C





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15. The normal oxide contains \_\_\_\_\_ ion, peroxide contains \_\_\_\_\_ ion and superoxide contains \_\_\_\_\_ ion.



Answer: A



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

A. Na

B.  $H_2O$

C.  $H_2$

D. NaOH

**Answer: C**

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17. What happens when  $H_2$  is passed over lithium at 1073K?

A. Covalent lithium hydride is formed

B. Coloured complex is formed

C. Ionic lithium hydride is formed

D. No reaction

**Answer: C**

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18. On reaction with dihydrogen the alkali metals

- A. form hydrides which are ionic solids with high melting points
- B. form hydrides which are molecular solids with low melting points
- C. form hydrides which are ionic solids with low melting points
- D. form hydrides which are non-stoichiometric.

**Answer: A**



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19. Lithium is the strongest reducing agent though it has highest ionisation energy in its group. Which of the following factors is responsible for making Li the strongest reducing agent?

- A. Large heat of atomisation
- B. Smaller size
- C. Large sublimation energy

D. Large amount of hydration enthalpy

Answer: D

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20.  $E^\circ$  for  
 $Cl_2/Cl^- = +1.36$ ,  $I_2/I^- = +0.53$ ,  $Ag^+/Ag = +0.79$ ,  $Na^+/Na =$   
. What is the order of decreasing reducing strength for these species?

A.  $Li > Cl^- > Ag > I^- > Na$

B.  $Li > Na > I^- > Ag > Cl^-$

C.  $Cl^- > Ag > I^- > Na > Li$

D.  $Na > Li > Ag > Cl^- > I^-$

Answer: B

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21. The alkali metals dissolve in ammonia to give a deep blue solution which is conducting in nature.

$M + (x + y)NH_3 \rightarrow [M(NH_3)_x]^{2+} + 2[e(NH_3)_y]^-$  which of the following is not true about the solutions of alkali metals in liquid ammonia?

- A. The blue colour is due to ammoniated electron
- B. the solution is paramagnetic.
- C. The blue colour changes to brown on standing
- D. In concentrated solution blue colour changes to bronze and becomes diamagnetic

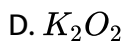
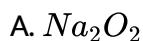
**Answer: C**

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**General Characteristic Of The Compounds Of The Alkali Metals**



1. Superoxides of alkali metals act as oxidising agents while normal oxides are basic in nature. The oxide which is paramagnetic in nature due to presence of unpaired electron is

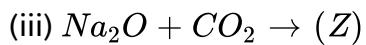
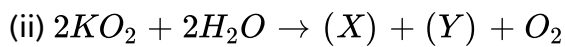
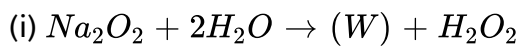


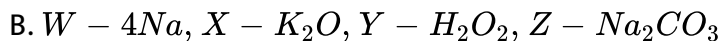
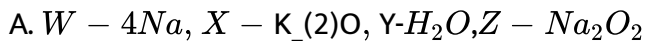
**Answer: B**



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2. Complete the following equations:





**Answer: D**

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3. Crystalline sodium chloride is a bad conductor of electricity while molten NaCl and its aqueous solution conduct electricity. This is because

A. crystalline sodium chloride contains molecules only

B. the ions present in it are not free to move in solid state

C. sodium chloride is a covalent crystal

D. solid substances do not conduct electricity.

**Answer: B**

4. All alkali halides are soluble in water except LiF. The low solubility of LiF in water is due to its (i)\_\_\_\_\_ the low solubility of CsI is due to (ii)\_\_\_\_\_. LiF is soluble in (iii)\_\_\_\_\_ solvents.

A. (i) low lattice enthalpy, (ii) large hydration enthalpy, (iii) polar solvents

B. (i) high lattice enthalpy, (ii) smaller hydration enthalpy, (iii)-non-polar solvents

C. (i) high hydration enthalpy, (ii)-high lattice enthalpy, (iii)- non-polar solvents

D. (i)-smaller hydration enthalpy, (ii)-high lattice enthalpy, (iii)-polar solvents

**Answer: B**

5. Which one of the following material conducts electricity?

A. Crystalline potassium chloride

B. Fused sulphates

C. Molten sodium chloride

D. Diamond

**Answer: C**



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6. Which of the following increasing order is not correct as per the property indicated against it?

A.  $CsCl < RbCl < KCl < NaCl < LiCl$  (lattice energy)

B.  $LiOH < NaOH < KOH$  (solubility in water)

C.  $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$  (size of hydrated ion)

D.  $NaI < NaBr < NaCl < NaF$  (Lattice energy)

Answer: C

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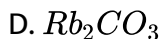
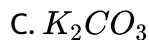
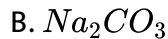
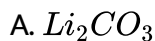
7. Which of the following statements are true about the alkali metals?

- A. All alkali metals form oxo salts such as carbonates, sulphates and nitrates
- B. the basic character of oxides increases down the group
- C. Carbonates and sulphates of lithium are stable and their stability decreases down the group
- D. Solubility of carbonates and sulphates increases down the group.

Answer: C

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8. Which of the following has lowest thermal stability ?

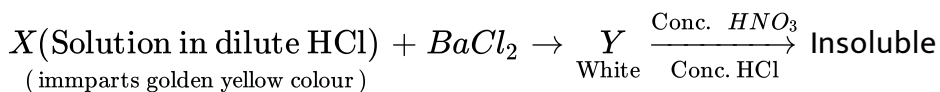


Answer: A



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9. A solution of a compound X in dilute HCl on treatment with a solution of  $BaCl_2$  gives a white precipitate of compound Y which is insoluble in conc.  $HNO_3$  and and conc.  $HCl$ . Compound X imparts golden yellow colour to the flame.



What are compounds X and Y?

A. X is  $MgCl_2$  and Y is  $BaSO_4$

B. X is  $CaCl_2$  and Y is  $BaSO_4$

C. X is  $Na_2SO_4$  and Y is  $BaSO_4$

D. X is  $MgSO_4$  and Y is  $BaSO_4$

**Answer: C**

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## Anomalous Properties Of Lithium

1. The properties of lithium are similar to those of Mg. This is because

- A. both have nearly the same size
- B. both have similar electronic configuration
- C. both have nearly same charge to size ratio
- D. Both are found together in nature

**Answer: B**

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2. Lithium salts are mostly hydrated like  $LiCl \cdot 2H_2O$  due to

- A. maximum ionisation enthalpy
- B. maximum degree of hydration of  $Li^+$
- C. maximum hygroscopic nature
- D. maximum chemical reactivity.

**Answer: B**

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3. Which nitrate will decompose to give  $NO_2$  on heating?

- A.  $NaNO_3$



B.  $KNO_3$

C.  $RbNO_3$

D.  $LiNO_3$

**Answer: D**

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4. Which of the following does not show the anomalous behaviour of lithium?

A. Lithium reacts with nitrogen to form a nitride

B. Lithium carbonate decomposes on heating

C. Lithium nitrate gives  $NO_2$  on heating

D. lithium is the strongest reducing agent.

**Answer: D**

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5. Fill up the blanks with appropriate choice.

Lithium and magnesium react slowly with water.

their hydroxides are\_\_\_\_soluble in water.

Carbonates of Li and Mg\_\_\_\_easily on heating. Both LiCl and  $MgCl_2$  are\_\_\_\_in ethanol and are\_\_\_\_.they crystallise from their aqueous solutions as\_\_\_\_\_.

- A. More, do not decompose, soluble, hygroscopic, hydrates
- B. less, decompose, soluble, deliquescent, hydrates
- C. freely, sublime, insoluble, deliquescent, anhydrous
- D. freely, decompose, soluble, hygroscopic, crystals

**Answer: B**



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1. In Solvay ammonia process, sodium bicarbonate is precipitated due to

- A. presence of  $NH_3$
- B. reaction with  $CO_2$
- C. reaction with brine solution
- D. reaction with NaOH.

**Answer: C**

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2.  $K_2CO_3$  cannot be prepared by solvay process because

- A.  $KHCO_3$  is less soluble than  $NaHCO_3$
- B.  $KHCO_3$  is more soluble to be precipitated by KCl and  $NH_4HCO_3$
- C.  $K_2CO_3$  is less soluble than  $Na_2CO_3$ .
- D.

**Answer: B**

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**3. What are the raw materials used in solvay's process?**

- A.  $NaCl, NH_3, CaCO_3$
- B.  $NaOH, CO_2$
- C.  $NaCl, CaCO_3, C, H_2SO_4$
- D.  $NH_3, H_2O, H_2SO_4$

**Answer: A**

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**4. When washing soda is heated**

- A. CO is released

B.  $\text{CO} + \text{CO}_2$  is released

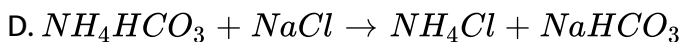
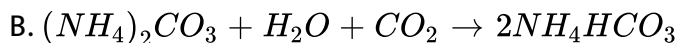
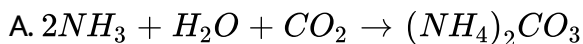
C.  $\text{CO}_2$  is released

D. Water vapour is released.

**Answer: D**

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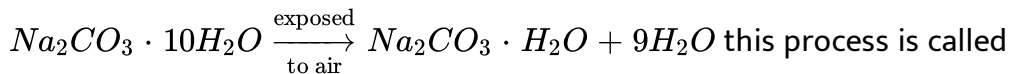
5. Which of the following reaction is not a part of solvay's process for preparation of sodium carbonate?



**Answer: C**

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6. When kept open in air, the crystals of washing soda lose 9 molecules of water to form a monohydrate.



- A. efflorescence
- B. deliquescence
- C. dehydration
- D. hydration

**Answer: A**

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7. A white solid X on heating gives a white solid Y and an acid gas Z. gas Z is also given out when X reacts with an acid. The compound Y is also formed if caustic soda is left open in the atmosphere. X, Y and Z are

A.  $X - NaHCO_3, Y - Na_2CO_3, Z - CO_2$

B.  $X - Na_2CO_3, Y - NaOH, Z - CO_2$

C.  $X - Na_2CO_3, Y - NaHCO_3, Z - CO_2$

D.  $X - NaOH, Y - NaHCO_3, Z - CO_2$

**Answer: A**

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**8.** Which of the following statements is correct?

A. Sodium carbonate decomposes on heating

B. sodium bicarbonate is more soluble in water than potassium bicarbonate.

C. sodium when heated with excess of  $O_2$ , gives peroxide

D. Lithium halides are highly ionic in nature.

**Answer: C**



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9. Which of the following statements is not correct regarding preparation of NaOH/

- A. NaOH is prepared by electrolysis of sodium chloride in castner-kellner cell.
- B. sodium metal discharged at cathode combines with mercury to form sodium amalgam,.
- C. Chlorine is evolved at anode.
- D. Amalgam is heated to separate Na and Hg.

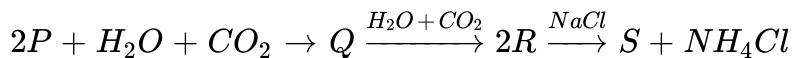
**Answer: D**



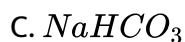
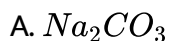
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10. In the given chemical reaction,



Identify S.

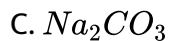
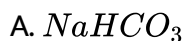


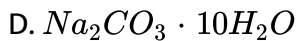
**Answer: C**



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11. Baking soda is





**Answer: A**

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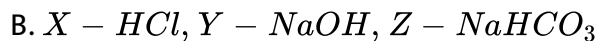
12. Which of the following is not a use of baking soda?

- A. In medicines as antacid
- B. as a component of baking powder
- C. in removing permanent hardness of water.
- D. In fire extinguishers.

**Answer: C**

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13. A certain compound X imparts golden yellow flame. When zinc powder is heated with concentrated solution of X,  $H_2$  gas is evolved. X combines with  $CO_2$  to give a salt Y. Y is a hydrated salt which on reaction with HCl or excess of  $CO_2$  gives another salt Z which is an important part of baking powder. Identify X, Y and Z.



**Answer: A**



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14. A white solid X reacts with dil. HCl to give colourless gas which is used in fire extinguishers. The solid X is

A.  $\text{NaCl}$

B.  $\text{CH}_3\text{COONa}$

C.  $\text{Na}_2\text{CO}_3$

D.  $\text{NaHCO}_3$

**Answer: D**



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15. A metal X reacts with water to produce a highly combustible gas Y, and a solution Z. another metal P reacts with Z to give the same gas Y. X,Y,Z and P respectively are

A.  $\text{Zn}, \text{H}_2, \text{Zn}(\text{OH})_2, \text{Al}$

B.  $\text{Na}, \text{H}_2, \text{NaOH}, \text{Zn}$

C.  $\text{K}, \text{H}_2, \text{KOH}, \text{Al}$

D.  $\text{Li}, \text{H}_2, \text{LiOH}, \text{K}$

**Answer: B**



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**16.** What is the biological important of  $Na^+$  and  $K^+$  ions in cell fluids like blood plasma?

- A. They participate in transmission of nerve signals.
- B. They regulate the number of red and white blood corpuscles in the cell
- C. They can be present in any amount in the blood since they are absorbed by the cells.
- D. They regulate the viscosity and colour of the blood

**Answer: A**



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1.  $Ca^{2+}$  is isoelectronic with

A.  $Na$

B.  $Mg^{2+}$

C.  $Ba^{2+}$

D. Ar

**Answer: D**



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2. Which of the following is not true about s-block elements?

A. They have large atomic sizes

B. They have lower ionisation enthalpies

C. they have variable oxidation state

D. They form basic oxides

**Answer: C**

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3. The decreasing order of the second ionization potential of Mg, Ca and Ba is

A.  $Mg > Ca > Ba$

B.  $Ca > Ba > Mg$

C.  $Ba > Mg > Ca$

D.  $Mg > Ba > Ca$

**Answer: A**

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4. The first ionisation enthalpies of the alkali earth metals are higher than that of alkali metals but second ionisation enthalpies are smaller, why?

A. In alkali metals, second ionisation enthalpy involves removal of electron from noble gas electronic configuration while in alkaline earth metals, second electron is removed from  $ns^1$  configuration

B. Alkaline earth metals have very high melting point as compared to alkali metals.

C. Electrons in s-orbital are more closely packed in alkaline earth metals than alkali metals.

D. due to smaller size alkaline earth metals do not form divalent ions very easily

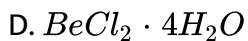
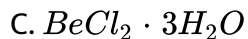
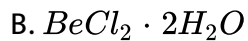
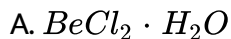
**Answer: A**



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5. What is the formula of hydrated  $BeCl_2$ ?



**Answer: D**



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6. Which among the following is kinetically inert towards water?

A. Na

B. Be

C. Ca

D. K

**Answer: B**



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7. An oxide of alkaline earth metals X reacts with C and  $Cl_2$  to give a compound Y. Y is found in polymeric chain structure and is electron deficient molecule. The compound Y is

A. BeO

B.  $BeCl_2$

C.  $Be(OH)_2$

D.  $BeCO_3$

**Answer: B**



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8. When alkaline earth metals dissolve in ammonia, they form coloured solutions like alkali metals. Which of the following observations regarding the reaction are correct?

- (i) Dilute solutions are bright blue in colour due to solvated electrons.
- (ii) These solutions decompose to form amides and hydrogen.
- (iii) From this solution the ammoniates

$[M(NH_3)_6]^{2+}$  can be recovered by evaporation.

- A. Only (i) and (ii)
- B. Only (i), (ii) and (iii)
- C. Only (ii) and (iii)
- D. Only (i)

**Answer: B**



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1. Which of the following statements is correct regarding alkaline earth metals?

- A. Alkaline earth metals are weaker reducing agents than alkali metals
- B. Alkaline earth metal salts are paramagnetic in nature
- C. Alkaline earth metal salts are more soluble than corresponding alkali metal salts.
- D. solubility of sulphates of alkaline earth metals increases from top to bottom in the group

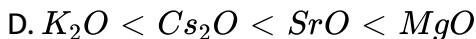
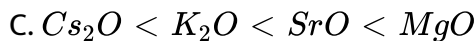
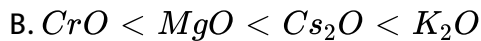
**Answer: A**



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2. The increasing order of basic character of oxides  $MgO$ ,  $SrO$ ,  $K_2O$  and  $Cs_2O$  is

- A.  $MgO < SrO < K_2O < Cs_2O$

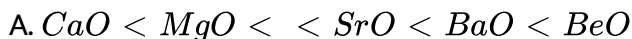


**Answer: A**



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3. Which of the following is arranged according to increasing basic strength?



**Answer: D**



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4. BeO is insoluble but BaO is soluble as

A. lattice energy of  $BeO$  is higher than BaO due to small size of  $Be^{2+}$  ion and its covalent nature

B. hydration energy of BeO is lower than BaO due to small size  $Be^{2+}$  ion

C. BeO is amphoteric in nature while BaO is basic

D. BeO forms hydrated salts while BaO forms anhydrous salts

Answer: A

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5. The pair of amphoteric oxides is

A.  $BeO$ ,  $ZnO$

B.  $Al_2O_3$ ,  $Li_2O$

C.  $BeO$ ,  $BO_3$

D.  $BeO$ ,  $MgO$

**Answer: A**

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6. One word answers are given for the following, Mark the example which is not correct.

A. Alkali metals with lowest melting point- Cs

B. Alkaline earth metal with higher hydration enthalpy-  $Ba^{2+}$

C. Alkaline earth metal which imparts brick red colour to the flame-

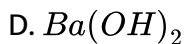
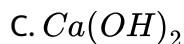
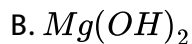
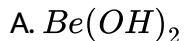
$Ca^{2+}$

D. Oxide of alkaline earth metal which is amphoteric in nature -BeO

**Answer: B**

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7. Which of the following will have lowest value of  $K_{sp}$  at room temperature?



**Answer: A**



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8. Two metals X and Y belong to the cond group of periodic table. X forms insoluble oxide but soluble sulphate. Y forms a soluble oxide but insoluble sulphate. Hydroxide of metal X is soluble in NaOH while that of metal Y is insoluble in NaOH. What are metals X and Y?



A. X=Be,Y=Ba

B. X=Mg,Y=Ca

C. X=Ca,Y=Sr

D. X=Ba,Y=Mg

**Answer: A**

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9. Calcium chloride is used as a dehydrating agent because

A. it has a strong affinity for water

B. it has water of crystalline attached to it

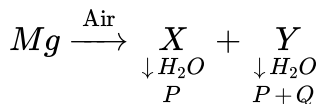
C. it loses water when exposed to air

D. it has a high melting point.

**Answer: A**

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10. What happens when magnesium is burnt in air and the products X and Y are treated with water?



- A.  $X - MgO, Y - Mg(OH)_2, P - Mg(OH)_2, Q - N_2$
- B.  $X - MgO, Y - Mg_3N_2, P - Mg(OH)_2, Q - NH_3$
- C.  $X - MgO, Y - Mg_3N_2, P - Mg(OH)_2, Q - N_2$
- D.  $X - MgO, Y - MgCO_3, P - Mg(OH)_2, Q - CO_2$

**Answer: B**

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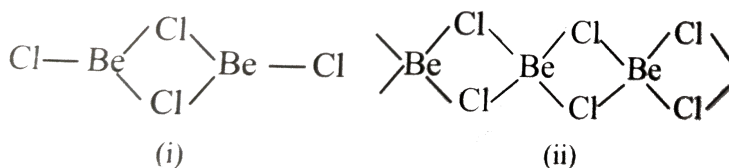
11. When  $BeCl_2$  is hydrolysed, white fumes of gas are given out. The intensity of fumes intensifies when a rod dipped in moist ammonia is brought near the mouth of the test tube. The gas which comes out during hydrolysis is



Answer: B

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12. The following two figures represent



A. (i)  $BeCl_2$  is a dimer in vapour phase, (ii)  $BeCl_2$  is chain structure in solid state

B. (i)  $BeCl_2$  is solid state, (ii)  $BeCl_2$  is in vapour phase

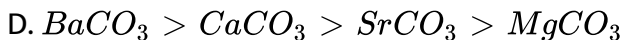
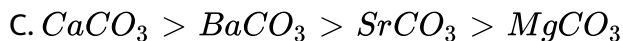
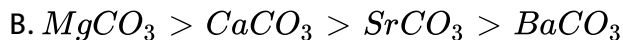
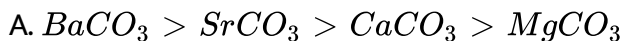
C. (i)  $BeCl_2$  is monomer in solid state, (ii)  $BeCl_2$  is linear polymer in vapour phase

D. (i)  $BeCl_2$  is linear monomer, (ii)  $BeCl_2$  is three dimensional dimer

**Answer: A**

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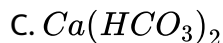
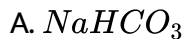
13. Which is the correct sequence of solubility of carbonates of alkaline earth metals?



**Answer: B**

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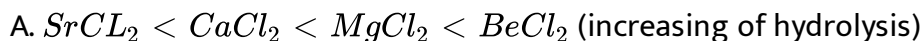
14. Which of the following bicarbonate does not exist in solid state?



Answer: C

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15. Which of the following compounds are not arranged in correct order as indicated?



D.  $Be(OH)_2 < Mg(OH)_2 < Ca(OH)_2$  (increasing solubility)

Answer: C

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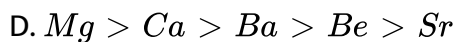
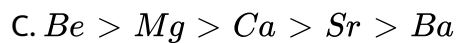
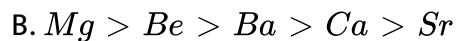
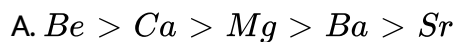
16. Sulphates of Be and Mg are readily soluble in water but sulphates of Ca, Sr and Ba are insoluble. This is due to the fact

- A. the greater hydration enthalpies of  $Be^{2+}$  and  $Mg^{2+}$  overcome the lattice enthalpy
- B. high lattice enthalpy of  $Be^{2+}$  and  $Mg^{2+}$  makes them soluble in water
- C. solubility decreases from  $BeSO_4$  to  $BaSO_4$  due to increase in ionic size
- D.  $BeSO_4$  and  $MgSO_4$  are ionic in nature while other sulphates are covalent

**Answer: A**

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17. The correct order of solubility of the sulphates of alkaline earth metals in water is



**Answer: C**

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**Anomalous Behaviour Of Beryllium**

1. Beryllium shows diagonal relationship with aluminium. Which of the following similarly is incorrect?

- A.  $Be_2C$  like  $Al_4C_3$  yields methane on hydrolysis
- B. Be like Al is rendered passive by  $HNO_3$
- C.  $Be(OH)_2$  like  $Al(OH)_3$  is basic
- D. Be forms beryllates and Al forms aluminates.

**Answer: C**



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2. Which of the following does not show diagonal relationship between beryllium and aluminium?

- A. Both  $BeO$  and  $Al_2O_3$  are amphoteric in nature.
- B. Both beryllium and aluminium form polymeric covalent hydrides.



- C. Both beryllium and aluminium form nitrides with nitrogen which evolve  $NH_3$  with water.
- D. Both metal carbonates are highly stable.

**Answer: D**

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3. Which of the following is not the point of difference between Be and other alkline earth metals?

- A. It has a tendency to form covalent bonds.
- B. It dissolves in alkalies with evolution of hydrogen
- C. Its oxides and hydroxides are amphoteric.
- D. its carbide gives acetylene on hydrolysis.

**Answer: D**

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4. Which of the following is not a similarity of beryllium with aluminium?

A. It becomes passive when treated with conc.  $HNO_3$ .

B. It forms polymeric covalent hydrides

C. Carbonate of Be is extremely stable

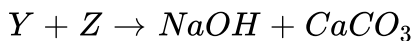
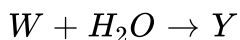
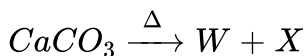
D. Salts of Be do not impart colour to the flame.

**Answer: C**

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## Some Important Compounds Of Calcium

1. Identify W, X, Y and Z respectively in the given reactions.



A.  $CaO$ ,  $CO_2$ ,  $CaCO_3$ ,  $Na_2CO_3$

B.  $CO_2$ ,  $Ca(OH)_2$ ,  $Ca(HCO)_3$ ,  $NaHCO_3$

C.  $CaO$ ,  $CO_2$ ,  $Ca(OH)_2$ ,  $Na_2CO_3$

D.  $CO_2$ ,  $CaO$ ,  $H_2CO_3$ ,  $Na_2CO_3$

**Answer: C**

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2. Slaked lime reacts with chlorine to form

A.  $CaCl_2$

B.  $CaO$

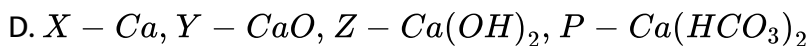
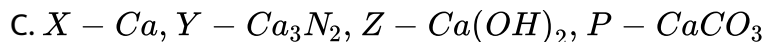
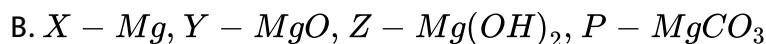
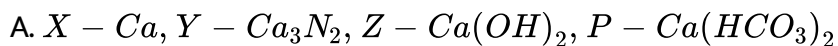
C.  $CaOCl_2$

D.  $CaCO_3$

**Answer: C**

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3. An element X burns in nitrogen to give a compound Y which on reaction with water gives a compound Z and a gas with a pungent smell. Z can be used during construction and white washing. When excess of  $CO_2$  is bubbled through Z, a compound P is formed which on heating decomposes to give a colourless, odourless gas. Identify X, Y, Z and P.

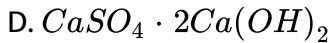
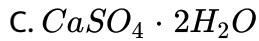
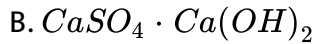
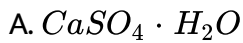


**Answer: A**



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4. When plaster of Paris comes in contact with water it sets into a hard mass. The composition of the hard mass is

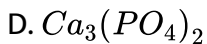
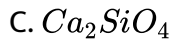
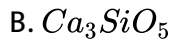
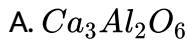


**Answer: C**



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5. Which of the following is not present in portland cement?



**Answer: D**



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6. The difference of number of water molecules in gypsum and plaster of

Pairs is

A.  $\frac{5}{2}$

B. 2

C.  $\frac{1}{2}$

D.  $1\frac{1}{2}$

**Answer: D**



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7. Gypsum is added to portland cement to

A. fasten the process of setting

B. slow down the process of setting

C. improve the colour of the cement

D. increase the melting point of cement.

**Answer: B**



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8. The average composition of portland cement is

A.  $CaO$ : 40 – 50 % ,  $SiO_2$ : 30 – 40 % ,  $Al_2O_3$ ,  $Fe_2O_3$ : 10 – 20 %

B.

$CaO$ : 50 – 60 % ,  $SiO_2$ : 20 – 25 % ,  $Al_2O_3$ : 5 – 10 % ,  $MgO$ : 2 – 3 %

C.  $SiO_2$ : 40 – 50 % ,  $CaO$ : 30 – 40 % ,  $Al_2O_3$ : 10 – 20 %

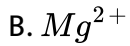
D.  $CaO$ : 50 % ,  $SiO_2$ : 50 %

**Answer: B**



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1. The metal ion which plays an important role in muscle contraction is



**Answer: C**



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2. Which of the following metals is required as cofactor by all enzymes utilisation ATP in phosphate transfer?

A. K

B. Ca

C. Na



D. Mg

**Answer: D**

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### Higher Order Thinking Skills

1. The low solubility of LiF and that of CsI in water are respectively due to which of the properties of the alkali metal ions?

- A. Higher hydration enthalpy of  $Li^+$ , higher lattice enthalpy of  $Cs^+$
- B. Smaller hydration enthalpy of  $Li^+$ , higher lattice enthalpy of  $Cs^+$
- C. Smaller lattice enthalpy of  $Li^+$ , higher hydration enthalpy of  $Cs^+$
- D. Higher lattice enthalpy of  $Li^+$ , smaller hydration enthalpy of  $Cs^+$ .

**Answer: D**

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2. The violet flame shown by potassium in bunsen flame is due to jumping of the electron from

A. 1s to 4p

B. 1s to 5p

C. 4p to 4s

D. 5p to 4s

**Answer: D**

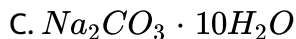


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3. A compound of sodium does not give  $CO_2$  when heated but it gives  $CO_2$  when treated with dilute acids. A crystalline compound is found to have 37.1% Na and 14.52%  $H_2O$ . Hence, compound is

A.  $NaHCO_3 \cdot 10H_2O$

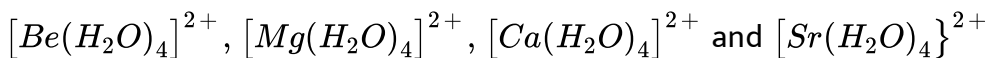
B.  $NaHCO_3 \cdot 5H_2O$



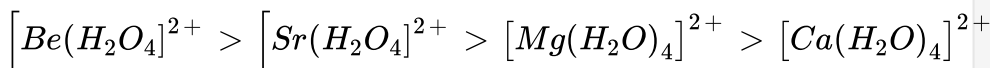
**Answer: D**

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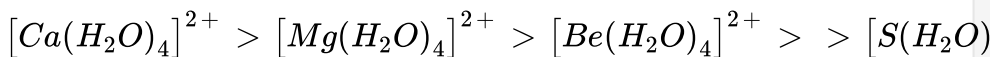
4. Nuclear attraction is often the deciding control factor for the association of neutral molecules to a given metal ion. Which one of the following represents the correct order of stability of the ions?



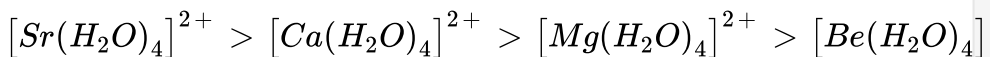
A.



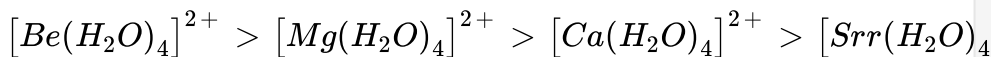
B.



C.



D.



**Answer: D**



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5. Be and Al exhibit diagonal relationship. Which of the following statements about them is/are not true?

- (i) both react with HCl to liberate  $H_2$ .
- (ii) They are made passive by  $HNO_3$ .
- (iii) Their carbides give acetylene on treatment with water.
- (iv) Their oxides are amphoteric.

A. (iii) and (iv)

B. (i) and (iii)

C. (i) only

D. (iii) only

**Answer: D**

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6. A metal  $M$  readily forms its sulphate  $MSO_4$  which is water soluble. It forms its oxide  $MO$  which becomes inert on heating. It forms its insoluble hydroxide  $M(OH)_2$  which is soluble in  $NaOH$  solution. Then  $M$  is

A.  $Be$

B.  $Ba$

C.  $Ca$

D.  $Mg$

**Answer: A**

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7. A metal salt solution forms a yellow precipitate with potassium chromate in acetic acid, a white precipitate with dilute sulphuric acid but does not give precipitate with sodium chloride or iodide. The white precipitate obtained when sodium carbonate is added to the metal salt solution will consist of

- A. lead carbonate
- B. basic lead carbonate
- C. barium carbonate
- D. strontium carbonate.

**Answer: C**



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8. The element A burns in nitrogen to give an ionic compound B. the compound B reacts with water to give C and D. A solution of C becomes milky on bubbling carbon dioxide. What is the nature of compound (D)?

A. Acidic

B. Basic

C. Amphoteric

D. Neutral

**Answer: B**

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9. The stability of  $K_2O$ ,  $K_2O_2$  and  $KO_2$  is in order  $K_2O < K_2O_2 < KO_2$ . This increasing stability as the size of metal ion increases is due to stabilisation of

A. larger cation by smaller anions through lattice energy effects

B. larger cation by larger anions through lattice energy effects

C. smaller cations by smaller anions through melting point

D. smaller cations by larger anions through melting point.

**Answer: B**

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## Ncert Exemplar

1. The alkali metals have low melting point. Which of the following alkali metal is expected to melt if the room temperature rises to  $30^{\circ}C$  ?

A. Na

B. K

C. Rb

D. Cs

**Answer: D**

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2. Alkali metals react with water vigorously to form hydroxides and dihydrogen. Which of the following alkali metals reacts with water least vigorously ?

A. Li

B. Na

C. K

D. Cs

**Answer: A**



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3. The reducing power of a metal depends on various factors. Suggest the factor which makes Li, the strongest reducing agent in aqueous solution.

A. Sublimation enthalpy

B. Ionisation enthalpy

C. Hydration enthalpy

D. Electron-gain enthalpy

**Answer: C**

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4. Metal carbonates decompose on heating to give metal oxide and carbon dioxide. Which of the metal carbonates is most stable thermally?

A.  $MgCO_3$

B.  $CaCO_3$

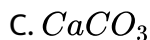
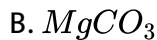
C.  $SrCO_3$

D.  $BaCO_3$

**Answer: D**

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5. Which of the carbonates given below is unstable in air and is kept in  $CO_2$  atmosphere to avoid decomposition?

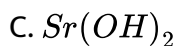
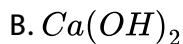
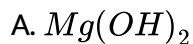


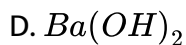
**Answer: A**



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6. Metals form basic hydroxides. Which of the following metal hydroxide is the least basic?



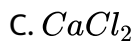
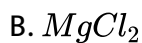


**Answer: A**



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7. Some of the Group 2 metal halides are covalent and soluble in organic solvents. Among the following metal halides, the one which is soluble in ethanol is

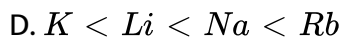
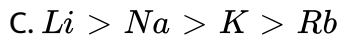
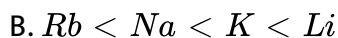
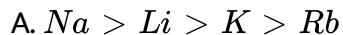


**Answer: A**



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8. The order of decreasing ionisation enthalpy in alkali metals is



**Answer: C**



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9. The solubility of metal halides depends on their nature, Lattice enthalpy and hydration enthalpy of the individual ions. Amongst fluorides of alkali metals, the lowest solubility of LiF in water is due to

A. ionic nature of lithium fluoride

B. high lattice enthalpy

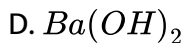
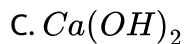
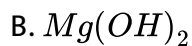
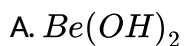
C. high hydration enthalpy for lithium ion

D. low ionisation enthalpy of lithium atom

**Answer: B**

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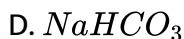
10. Amphoteric hydroxides react with both alkalies and acids. Which of the following Group 2 metal hydroxides is soluble in sodium hydroxide?



**Answer: A**

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11. In the synthesis of sodium carbonate, the recovery of ammonia is done by treating  $NH_4Cl$  with  $Ca(OH)_2$ . The by-product obtained in this process is



**Answer: A**



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12. When sodium is dissolved in liquid ammonia, a solution of deep blue colour is obtained. The colour of the solution is due to

A. ammoniated electron

B. sodium ion

C. sodium amide

D. ammoniated sodium ion

**Answer: A**

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**13.** By adding gypsum to cement

A. setting time of cement becomes less

B. setting time of cement increases

C. colour of cement becomes light

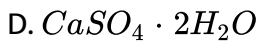
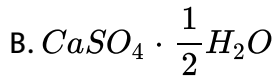
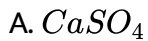
D. shining surface is obtained

**Answer: B**

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14. Dead burnt plaster is



**Answer: A**



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15. Suspension of slaked lime in water is known as

A. lime water

B. quick lime

C. milk of lime

D. aqueous solution of slaked lime

**Answer: C**

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16. Which of the followingg elements does not form hydride by direct heating with dihydrogen?

A. *Be*

B. Mg

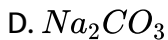
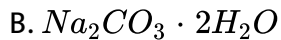
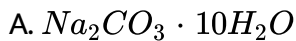
C. Sr

D. Ba

**Answer: A**

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17. The formula of soda ash is



**Answer: D**

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**18.** A substance which gives a brick red flame and breaks down on heating to give oxygen and a brown gas is

A. magnesium nitrate

B. calcium nitrate

C. barium nitrate

D. strontium nitrate

**Answer: B**

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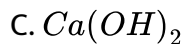
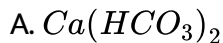
19. Which of the following statements is true about  $Ca(OH)_2$ ?

- A. It is used in the preparation of bleaching powder.
- B. It is a light blue solid.
- C. it does not possess disinfectant property
- D. it is used in the manufacture of cement.

**Answer: A**

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20. A chemical A is used for the preparation of washing soda to recover ammonia. When  $CO_2$  is bubbled through an aqueous solution of A, the solution turns milky. It is used in white washing due to disinfectant nature what is the chemical formula of A?



**Answer: C**

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21. Dehydration of hydrates of halides of calcium, barium and strontium i.e.,  $CaCl_2 \cdot 6H_2O$ ,  $BaCl_2 \cdot 2H_2O$ ,  $SrCl_2 \cdot 2H_2O$ , can be achieved by heating. These become wet on keeping in air. Which of the following statements is correct about these halides?

A. Act as dehydrating agent.

B. Can adsorb moisture from air

C. Tendency to form hydrate decreases from calcium to barium

D. All of the above

**Answer: D**



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## Assertion And Reason

1. Assertion: Elements of group 1 are called 'alkali metals'.

Reason: All the alkali metals react with water.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: B**



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2. Assertion: Lithium resembles magnesium diagonally placed in next group.

Reason: The size of  $Li^+$  and  $Mg^{2+}$  are different and their electropositive character is same.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: C**



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3. Assertion: Alkali metals are obtained by electrolysis of molten salt and not aqueous solution.

Reason: The discharge potential of  $H^+$  ions is lower than alkali metals cation hence hydrogen is discharged at cathode instead of metal.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**



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4. Assertion: Lithium salts are mostly hydrated.

Reason: The hydration enthalpies of alkali metal ions decrease with increase in ionic sizes.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**



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5. Assertion: The melting and boiling points of the alkali metals are low.

Reason: Alkali metals have weak metallic bonding.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: B**



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**6. Assertion:** Lithium fluoride is most covalent in nature.

**Reason:** Small anion can be easily distorted.

- A. If both assertion and reason are true and reason is the correct explanation of assertion

- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: D**

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7. Assertion: The carbonate of lithium decomposes easily on heating.

Reason: Lithium being very small in size polarises large carbonate ion leading to the formation of more stable  $Li_2O$  and  $CO_2$ .

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: A**

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**8.** Assertion : Super-oxides of alkali metals are para-magnetic.

Reason : Super-oxides contain the ion  $O_2^-$  which has one unpaired electron.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**



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9. Assertion: Be and Mg do not impart characteristic colour to the flame.

Reason: both Be and Mg have high ionization energy.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**



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10. Assertion: The fluorides of alkaline earth metals are relatively less soluble than chlorides.

Reason: Fluorides have high lattice energies.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: A**



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**11. Assertion:** Be is readily attacked by acids.

**Reason:** Be shows diagonal relationship to Na.

- A. If both assertion and reason are true and reason is the correct explanation of assertion

- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: D**

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**12.** Assertion: Alkaline earth metal oxides are quite stable to heat.

Reason: Enthalpies of formation of alkaline earth metal oxides are quite high.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.

D. If both assertion and reason are false.

**Answer: A**

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**13.** Assertion:  $BeSO_4$  and  $MgSO_4$  are insoluble in water.

Reason:  $Be^{2+}$  and  $Mg^{2+}$  have low hydration enthalpies.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: D**

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14. Assertion:  $CaCO_3$  is prepared by passing carbon dioxide gas through slaked lime.

Reason: Passingg excess of  $CO_2$  through slaked lime leads to the formation off quick lime.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: C**



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15. Assertion: For biological functions in human body, barium is not required.

Reason: Barium is a divalent ion.

- A. If both assertion and reason are true and reason is the correct explanation of assertion
- B. If both assertion and reason are true but reason is not the correct explanation of assertion
- C. If assertion is true but reason is false.
- D. If both assertion and reason are false.

**Answer: B**



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