SELECT THE CORRECT ALTERNATIVE (ONLY ONE CORRECT ANSWER)

1. Alkaline earth metals (group 2 or IIA elements) differ from group 12 (or IIB) elements in the electronic configuration of their :

(A) Antipenultimate shell (B) Innermost shell

(C) Outermost shell (D) Penultimate shell

2. The first ionization enthalpy of magnesium is lower than the first ionization enthalpy of :

(A) Lithium (B) Sodium (C) Calcium (D) Beryllium

3. Chemical A is used for water softening to remove temporary hardness. A reacts with Na_2CO_3 to generate caustic soda. When CO_2 is bubbled through A, it turns cloudly. What is the chemical formula of A :

(A) $CaCO_3$ (B) CaO (C) $Ca(OH)_2$ (D) $Ca(HCO_3)_2$

4. The substance not likely to contain $CaCO_3$ is :

(A) Calcined gypsum (B) Sea shells (C) Dolomite (D) A marble statue

5. A metal M readily forms water soluble sulphate MSO_4, water insoluble hydroxide $M(OH)_2$ and oxide MO which becomes inert on heating. The hydroxide is soluble in NaOH. The M is :

(A) Be (B) Mg (C) Ca (D) Sr

6. A chloride dissolves appreciably in cold water. When placed on a Pt wire in Bunsen flame, no distinctive colour is noted. Which cation could be present?

(A) Be^{2+} (B) Ba^{2+} (C) Pb^{2+} (D) Ca^{2+}

7. The hydroxide which is best soluble in water is :

(A) $Ba(OH)_2$ (B) $Mg(OH)_2$ (C) $Sr(OH)_2$ (D) $Ca(OH)_2$

8. What is X in the following reaction?

$MgCl_2 + 2\ H_2O \longrightarrow X + 2\ HCl + H_2O$

(A) MgO (B) Mg (C) $Mg(OH)_2$ (D) Mg(OH) Cl

9. (Yellow ppt) T $\xleftarrow{K_2CrO_4}$ X $\xrightarrow{\text{dil. HCl}}$ Y (Yellow ppt) + Z$\uparrow$ (pungent smelling gas) If X gives green flame test. Then, X is :

(A) $MgSO_4$ (B) BaS_2O_3 (C) $CuSO_4$ (D) PbS_2O_3

10. The correct statement is/are :

(A) $BeCl_2$ is a covalent compound (B) $BeCl_2$ is an electron deficient molecule

(C) $BeCl_2$ can form dimer (D) The hybrid state of Be in $BeCl_2$ is sp^2

11. The reaction of an element A with water produces combustible gas B and an aqueous solution of C. When another substance D reacts with this solution C also produces the same gas B. D also produces the same gas even on reaction with dilute H_2SO_4 at room temperature. Element A imparts golden yellow colour to Bunsen flame. Then A, B, C and D may be identified as :

(A) Na, H_2 NaOH and Zn (B) K, H_2, KOH and Zn

(C) K, H_2, NaOH and Zn (D) Ca, H_2, $CaCOH_2$ and Zn

12. An alkaline earth metal (M) gives a salt with chlorine, which is insoluble in water at room temperature but soluble in boiling water. It also forms an insoluble sulphate whose mixture with a sulphide of a transition metal is called 'lithopone'a white pigment. Metal M is :

(A) Ca (B) Mg (C) Ba (D) Sr

13. In electrolysis of NaCl when Pt electrode is taken then H_2 is liberated at cathode while with Hg cathode it forms sodium amalgam:

(A) Hg is more inert than Pt

(B) More voltage is required to reduce H^+ at Hg than at Pt

(C) Na is dissolved in Hg while it does not dissolve in Pt

(D) Conc. of H^+ ions is larger when Pt electrode is taken

14. The correct sequence of increasing covalent character is represented by –

(A) $BeCl_2$ < NaCl < LiCl (B) NaCl < LiCl < $BeCl_2$

(C) $BeCl_2$ < LiCl < NaCl (D) LiCl < NaCl < $BeCl_2$

15. The paramagnetic species is :

(A) KO_2 (B) SiO_2 (C) TiO_2 (D) BaO_2

16. The pair of amphoteric hydroxides is :-

(A) $Al(OH)_3$, LiOH (B) $Be(OH)_2$, $Mg(OH)_2$

(C) $B(OH)_3$, $Be(OH)_2$ (D) $Be(OH)_2$, $Zn(OH)_2$

17. Maximum thermal stability is shown by

(A) $MgCO_3$ (B) $CaCO_3$ (C) $SrCO_3$ (D) $BaCO_3$

18. Stable oxide is obtained by heating the carbonate of the element

(A) Li (B) K (C) Na (D) Rb

19. The stable superoxide is formed by the element

(A) Li (B) Na (C) K (D) Ca

20. The metallic lustre exhibited by sodium is explained by

(A) diffusion of sodium ions

(B) oscillation of loose electrons

(C) excitation of free protons

(D) existence of body centred cubic lattice

21. A solution of sodium sulphate in water is electrolysed using inert electrodes. The products at the cathode and anode are respectively

(A) H_2 , O_2 (B) O_2 , H_2 (C) O_2 Na (D) O_2, SO_2

22. The hydration energy of Mg^{2+} is greater than that of

(A) Al^{3+} (B) Na^{+} (C) Be^{2+} (D) Mg^{3+}

23. Calcium is obtained by the

(A) electrolysis of molten calcium chloride

(B) electrolysis of a solution of $CaCl_2$ in water

(C) reduction of $CaCl_2$ with carbon

(D) roasting of limestone

24. The material used in photoelectric cells contains –

(A) Cs (B) Si (C) Sn (D) Ti

25. Four alkali metals A, B, C and D are having respectively standard reduction potentials as –3.05, –1.66, –0.40 and 0.80 V. Which one will be the most reducing agent ?

(A) A (B) B (C) C (D) D

26. Which of the following imparts violet colouration to the Bunsen burner non-luminous flame

(A) NaCl (B) $BaCl_2$ (C) $CaCl_2$ (D) KCl

27. Which one of the following is most basic ?

(A) Al_2O_3 (B) MgO (C) SiO_2 (D) P_2O_5

28. Molten sodium is used in nuclear reactors to

(A) absorb neutrons in order to control the chain reaction

(B) slow down the fast neutrons

(C) absorb the heat generated by nuclear fission

(D) extract radio-isotopes produced in the reactor

29. Bone ash contains

(A) CaO

(B) $CaSO_4$

(C) $Ca_3(PO_4)_2$

(D) $Ca(H_2PO_4)_2$

30. Which of the following does not illustrate the anomalous properties of Li ?

(A) The m.p. and b.p. of Li are comparatively high

(B) Li is much softer than the other I group metals

(C) Li forms a nitride Li_3N unlike group I metals

(D) The ion of Li and its compounds are more heavily hydrated than those of the rest of the group

31. Of the following the commonly used as a laboratory desicator is

(A) Na_2CO_3

(B) $CaCl_2$

(C) NaCl

(D) None of the above

32. The increasing order of solubility is

(A) $CaCO_3.KHCO_3$, $NaHCO_3$

(B) $NaHCO_3$, $KHCO_3$, $CaCO_3$

(C) $KHCO_3$, $NaHCO_3$, $CaCO_3$

(D) $CaCO_3$, $NaHCO_3$, $KHCO_3$

33. Which one of the following compounds gives methane on treatment with water ?

(A) Al_4C_3

(B) CaC_2

(C) VC

(D) SiC

34. Sodium loses its lustre on exposure to air due to formation of –

(A) Na_2O, NaOH and Na_2CO_3

(B) Na_2O and NaOH

(C) Na_2O and Na_2CO_3

(D) NaOH and Na_2CO_3

35. Which of the following hydride is covalent and polymeric :-

(A) CaH_2

(B) BeH_2

(C) NaH

(D) BaH_2

CHECK YOUR GRASP — ANSWER KEY — EXERCISE -1

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	D	D	C	A	A	A	A	A	B	A,B,C	A	C	D	B	A
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	D	D	A	C	B	A	B	A	A	A	D	B	C	C	B
Que.	31	32	33	34	35										
Ans.	B	D	A	A	B										

SELECT THE CORRECT ALTERNATIVES (ONE OR MORE THEN ONE CORRECT NSWERS)

1. Which of the following is incorrect?

(A) Mg burns in air releasing dazzling light rich in UV rays.

(B) $CaCl_2$ 6 H_2O when mixed with ice gives freezing mixture.

(C) Mg cannot form complexes

(D) Be can form complexes due to its very small size.

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

(A) Blue coloured solution is obtained.

(B) Na^+ ions are formed in the solution.

(C) Liquid NH_3 becomes good conductor of electricity.

(D) Liquid ammonia remains diamagnetic.

3. The minimum equivalent conductance in fused state is shown by –

(A) $MgCl_2$ (B) $BeCl_2$ (C) $CaCl_2$ (D) $SrCl_2$

4. The metal which cannot be produced on reduction of its oxide by aluminium is

(A) K (B) Mn (C) Cr (D) Fe

5. Magnesium on reaction with very dilute HNO_3 gives

(A) NO (B) N_2O (C) H_2 (D) NO_2

6. The alkali metal that reacts with nitrogen directly to form nitride is

(A) Li (B) Na (C) K (D) Rb

7. Which of the following statement is/are false for alkali metals ?

(A) Lithium is the strongest reducing agent

(B) Na is amphoteric in nautre

(C) Li^+ is exceptionally small

(D) All alkali metals give blue solution in liquid ammonia

8. Amongst LiCl, RbCl, $BeCl_2$ and $MgCl_2$, the compounds with the greatest and least ionic character respectively are :-

(A) LiCl, RbCl (B) RbCl, $BeCl_2$ (C) RbCl, $MgCl_2$ (D) $MgCl_2$, $BeCl_2$

9. K_2CS_3 can be called potassium

(A) sulphocyanide (B) thiocarbide (C) thiocarbonate (D) thiocyanate

10. Anhydrous $MgCl_2$ can be prepared by heating $MgCl_2.6H_2O$

(A) in a current of dry HCl gas (B) with carbon

(C) until it fuses (D) with lime

11. Oxygen ions structure in its peroxide, superoxide, ozonide :

(A) O_2^-, O_2^{2}, O_3^{-2} (B) O_2^{-2}, $O_2^{\cdot-}$, O_3^- (C) O_2^{-2}, O^{-2}, O_3^- (D) O_2^-, O_2^{-3}, O_3^{-2}

12. In presence of iron, alkali metal react with liquid ammonia and form

(A) Metal mixture + H_2 (B) Iron metal mixture + H_2

(C) Metal mixture (D) Metal amide + H_2

13. The ionic conductance of following cation in a given concentration are in the order

(A) $Li^+ < Na^+ < K^+ < Rb^+$ (B) $Li^+ > Na^+ > K^+ > Rb^+$

(C) $Li^+ < Na^+ > K^+ > Rb^+$ (D) $Li^+ = Na^+ < K^+ < Rb^+$

14. Which of the following does not give an oxide on heating –

(A) $MgCO_3$ (B) Li_2CO_3 (C) $ZnCO_3$ (D) K_2CO_3

15. On heating sodium metal in the current of dry ammonia leads to the formation of which gas–

(A) $NaNH_2$ (B) NaN_3 (C) NH_3 (D) H_2

16. On allowing ammonia solution of s-block metals to stand for a long time, blue colour becomes fade. The reason is:-

(A) Formation of NH_3 gas (B) Formation of metal amide

(C) Cluster formation of metal ions (D) Formation of metal nitrate

17. When Na and Li placed in dry air we get :-

(A) NaOH, Na_2O, Li_2O (B) Na_2CO_3, Na_2O_2, Li_2O

(C) Na_2O, Li_3N, NH_3 (D) Na_2O, Li_2O, Li_3N

18. The hydride ion H^- is stronger base than its hydroxide ion OH^-. Which of the following reaction will occur if sodium hydride is dissolved in water:-

(A) $H^-_{(aq)} + H_2O \rightarrow H_3O^+$ (B) $H^-_{(aq)} + H_2O \rightarrow OH^- + H_2$

(C) $H^- + H_2O \rightarrow H_2 + O_2$ (D) $H^- + H_2O \rightarrow$ No reaction

19. Which can not be used to generate H_2 :–

(A) Al + NaOH (B) Zn + NaOH (C) Mg + NaOH (D) LiH + H_2O

20. Only those elements of s-block can produce superoxides which have :-

(A) High ionisation energy (B) High electronegativity

(C) High charge density (D) Low ionisation potential

21. Alum is the name used for all double salts having the composition $M_2^{I}\,SO_4.M_2^{III}(SO_4)_3.24H_2O$. Where M^{III} stands for Al^{+3}, Cr^{+3}, Fe^{+3}, while M^{I} stands for:-

(A) Li^+, Cu^+, Ag^+ (B) Li^+, NH_4^+, Na^+ (C) Na^+, K^+, Rb^+ (D) Ca^{+2}, Mg^{+2}, Sr^{+2}

22. Identify the correct statement -

(A) Gypsum contains a lower percentage of Ca than plaster of paris

(B) Gypsum is obtained by heating plaster of paris

(C) Plaster of paris can be obtained by hydration of gypsum

(D) Plaster of paris is obtained by partial oxidation of gypsum

23. In the reaction $M + O_2 \longrightarrow MO_2$ (super oxide) the metal is

(A) Li (B) Na

(C) K (D) Ba

24. Na^+ and Ag^+ differ in

(A) Na_2CO_3 is thermally stable while Ag_2CO_3 decomposes into Ag, CO_2 and O_2

(B) Ag^+ forms complexes, Na^+ does not

(C) NaCl is water soluble, AgCl is insoluble

(D) NaBr-yellow and AgBr pale yellow

25. The stability order of oxide, peroxide and superoxide of alkali metal is

(A) Normal oxide > super oxide > per oxide

(B) Normal oxide > per oxide > super oxide

(C) super oxide > per oxide > normal oxide

(D) per oxide > normal oxide > super oxide

26. Match list I with list II and choose the correct answer from the codes given below

List I	List II
(A) $NaNO_3$	(a) Baking soda
(B) $Na(NH_4)HPO_4$	(b) Chile salt peter
(C) $NaHCO_3$	(c) Microcosmic salt
(D) $Na_2CO_3.10H_2O$	(d) Washing soda

Codes is :

	A	B	C	D
(A)	a	b	c	d
(B)	b	c	a	d
(C)	c	a	b	d
(D)	d	a	b	c

27. Which of the following statement is not correct

(A) LiOH is amphoteric in nature

(B) LiCl is soluble in pyridine

(C) Li_3N is stable while Na_3N doesn't exist even at room temperature

(D) BeO is amphoteric in nature

28. Which of the following statement is correct for s–block elements :-

(A) Be has smallest atomic size in II A group

(B) Li is most metallic

(C) Mg impart red colour to the flame

(D) Cs is most reducing in water

29. Which of the following are ionic carbides?

(A) CaC_2 (B) Al_4C_3 (C) SiC (D) Be_2C

30. Which of the following groups of elements have chemical properties that are most similar :

(A) Na, K, Ca (B) Mg, Sr, Ba

(C) Be, Al, Ca (D) Be, Ra, Cs

31. Which of the following statements are false?

(A) $BeCl_2$ is a linear molecule in the vapour state but it is polymeric in the solid state

(B) Calcium hydride is called hydrolith

(C) Carbides of both Be and Ca react with water to form acetylene

(D) Oxides of both Be and Ca are amphoteric.

32. The incorrect statement(s) is/are :

(A) Mg cannot form complexes

(B) Be can form complexes due to a very small atomic size

(C) The first ionisation potential of Be is higher than that of Mg.

(D) Mg forms an alkaline hydroxide while Be forms amphoteric oxides.

33. Na_2SO_4 is water soluble but $BaSO_4$ is insoluble because :

(A) The hydration energy of Na_2SO_4 is higher than that of its lattice energy

(B) The hydration energy of Na_2SO_4 is less than that of its lattice energy

(C) The hydration energy of $BaSO_4$ is less than that of its lattice energy

(D) The hydration energy of $BaSO_4$ is higher than that of its lattice energy

34. $BeCl_2 + LiAlH_4 \longrightarrow X + LiCl + AlCl_3$

(A) X is lithium hydride (B) X is BeH_2

(C) X is $BeCl_2 \quad 2H_2O$ (D) X is LiH

35. $X \xrightarrow{CaCl_2} CaCl_2 + Y \uparrow$; the effective ingredient of X is :

(A) OCl^- (B) Cl^- (C) OCl^+ (D) OCl_2^-

36. Which of the following substance(s) is/are used in laboratory for drying purposes?

(A) Anhydrous P_2O_5 (B) Graphite

(C) Anhydrous $CaCl_2$ (D) Na_3PO_4

37. If X and Y are the second ionisation potentials of alkali and alkaline earth metals of same period, then :

(A) X > Y (B) X < Y (C) X = Y (D) X << Y

38. $X \xrightarrow{N_2,\Delta} Y \xrightarrow{H_2O} Z$ (colourless gas) $\xrightarrow[CuSO_4]{} T$ (blue colour) :

Then, substances Y and T are –

(A) Y = Mg_3N_2 and T = $CuSO_4 \quad 5H_2O$ (B) Y = Mg_3N_2 and T = $CuSO_4 \quad 4NH_3$

(C) Y = $Mg(NO_3)_2$ and T = CuO (D) Y = MgO and T = $CuSO_4 \quad 4NH_3$

39. When K_2O is added to water, the solution becomes basic in nature because it contains a significant concentration of :

(A) K^+ (B) O^{2-} (C) OH^- (D) O_2^{2-}

40. (White ppt) D $\xrightarrow{Na_2CO_3}$ A $\xrightarrow[\text{(in acetic acid}]{K_2CrO_4}$ B (Yellow ppt)

dil. H_2SO_4 ↓

C(White ppt)

If A is the metallic salt, then the white ppt. of D must be of

(A) Magnesium oxide (B) Red lead

(C) Barium carbonate (D) Calcium carbonate

41. Which of the following compounds are paramagnetic in nature?

(A) KO_2 (B) K_2O_2 (C) Na_2O_2 (D) RbO_2

42. NaOH(Solid) + CO $\xrightarrow{200°C}$ X; product X is :

(A) $NaHCO_3$ (B) $NaHCO_2$ (C) HCOONa (D) H_2CO_3

43. EDTA is used in the estimation of :

(A) Mg^{2+} ions (B) Ca^{2+} ions

(C) Both Ca^{2+} and Mg^{2+} ions (D) Mg^{2+} ions but not Ca^{2+} ions

44. Na + Al_2O_3 $\xrightarrow{\text{high temperature}}$ X $\xrightarrow[\text{water}]{CO_2 \text{ in}}$ Y; compouind Y is :

(A) $NaAlO_2$ (B) $NaHCO_3$ (C) Na_2CO_3 (D) Na_2O_2

45. The compound(s) which have –O–O– bond(s) is/are :

(A) BaO_2 (B) Na_2O_2 (C) CrO_5 (D) Fe_2O_3

46. KO_2 finds use in oxygen cylinders used for space and submarines. The fact(s) related to such use of KO_2 is/are :

(A) it produces O_2 (B) It produces O_3

(C) It absorbs CO_2 (D) It absorbs both CO and CO_2

47. $CsBr_3$ contains :

(A) Cs–Br covalent bonds (B) Cs^{3+} and Br^- ions

(C) Cs^+ and Br_3^- ions (D) Cs^{3+} and Br_3^{3-} ions

48. Fire extinguishers contain :

(A) conc. H_2SO_4 solution (B) H_2SO_4 and $NaHCO_3$ solutions

(C) $NaHCO_3$ solution (D) $CaCO_3$ solution

BRAIN TEASERS — ANSWER KEY — EXERCISE -2

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	C	D	B	A	C	A	B	B	C	A	B	D	A	D	D
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	B	D	B	C	D	C	A	C	D	B	B	A	A	A,B,D	B,C
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	C,D,	A	A,C,	B	A	A,C	A	B	B	C	A,D	C	C	C	A,B,C
Que.	46	47	48												
Ans.	A,C	C	B												

EXERCISE–03 MISCELLANEOUS TYPE QUESTIONS

TRUE / FALSE

1. Magnesium is an essential constituent of chlorophyll, the green colouring matter of plants.
2. Setting of cement is an endothermic process.
3. Calcium bicarbonate is known in solid state.
4. BeH_2 is an ionic hydride.
5. $BeCO_3$ is thermally stable compounds.
6. In the electrolysis of fused calcium hydride, hydrogen is liberated at cathode.
7. $MgCl_2.6H_2O$ on heating forms $MgCl_2$.
8. Sodium when heated in excess of oxygen gives sodium oxide.
9. In group IA of alkali metals, the ionisation potential decreases down the group. Therefore, lithium is a poorer reducing agent in gaseous medium.
10. The softness of group IA metals increases down the group with increasing atomic number.

FILL IN THE BLANKS

1. Anhydrous magnesium chloride is obtained by heating the hydrated salt with.....
2. $Ca(OH)_2$ is..... basic than $Mg(OH)_2$.
3. CaH_2 is comercially known as.....
4. Magnesium burn is air forming ..... and .....
5. Ba react with cold water ..... Mg reacts with..... while Be has..... with boiling water.
6. A standard solution of sodium hydroxide cannot be prepared by direct weighing because.....
7. Potassium bicarbonate cannot be prepared by solvay process because.....
8. Solution of alkali metals in liquid ammonia conducts electricity due to.....

MATCH THE COLUMN

1.

Column-I		Column-II	
(A)	Hydrolith	(p)	Contain Ca
(B)	Nitrolium	(q)	Used as a fertilizer
(C)	Dolomite	(r)	Used to prepare H_2
(D)	Pearl's ash	(s)	Contain potassium

2.

Column-I		Column-II	
(A)	Solvay process	(p)	NaCl
(B)	Evolve $CO_2\uparrow$ on heating	(q)	Na_2O_2
(C)	aq. soln. is neutral towards litmus	(r)	$NaHCO_3$
(D)	Oxone	(s)	Na_2CO_3

3.

Column-I		Column-II	
(A)	Metal sulphate $\xrightarrow{\Delta}$ metal oxide + SO_2 + O_2	(p)	Ba
(B)	Metal cation + K_2CrO_4 $\longrightarrow$ yellow ppt	(q)	Sr
(C)	Metal + NH_3 $\xrightarrow{\text{(liquid)}}$ blue solution	(r)	Na
(D)	MCl_2 + conc. H_2SO_4 $\longrightarrow$ white ppt.	(s)	Mg

ASSERTION & REASON QUESTIONS

These questions contains, Statement I (assertion) and Statement II (reason).

(A) Statement-I is true, Statement-II is true ; Statement-II is correct explanation for Statement-I.

(B) Statement-I is true, Statement-II is true ; Statement-II is not a correct explanation for statement-I

(C) Statement-I is true, Statement-II is false

(D) Statement-I is false, Statement-II is true

1. **Statement-I** : Li_2SO_4 do not form double salt like alum.
Because
Statement-II : Atomic size of Li is too small.

2. **Statement-I** : NaCl when exposed in air it becomes wet.
Because
Statement-II : NaCl contains hygroscopic impurities like $CaCl_2$, $MgCl_2$ etc.

3. **Statement-I** : Lithium is the weakest reducing agent among alkali metals.
Because
Statement-II : In alkali metals I.P. decreases down the group.

4. **Statement-I** : $BaCO_3$ is more soluble in HNO_3 than in plain water.
Because
Statement-II : Carbonate is a weak base and reacts with the H^+ from the strong acid causing the barium salt to dissociate.

5. **Statement-I** : $BeCl_2$ fumes in moist air.
Because
Statement-II : $BeCl_2$ reacts with moisture of form HCl gas.

COMPREHENSION BASED QUESTIONS

Comprehension # 1

$A \xrightarrow{\Delta} B\text{ (oxide)} + CO_2$

$B + H_2O \longrightarrow C$

$C + CO_2 \longrightarrow A\text{ (milky)}$

$C + NH_4Cl \xrightarrow{\Delta} D\text{ (gas)}$

$D + H_2O + CO_2 \longrightarrow E$

$E + NaCl \longrightarrow F$

$F \xrightarrow{\Delta} Na_2CO_3 + CO_2 + H_2O$

1. A is :

(A) $Ca(HCO_3)_2$ (B) $CaCO_3$

(C) CaO (D) Na_2CO_3

2. B and C are :

(A) CaO, $Ca(OH)_2$ (B) $Ca(OH)_2$, $CaCO_3$

(C) $CaCO_3$, $Ca(OH)_2$ (D) $Ca(OH)_2$, CaO

3. D, E and F are :

(A) NH_3, NH_4Cl, NH_4HCO_3

(B) NH_3, NH_4HCO_3, $NaHCO_3$

(C) NH_4HCO_3, Na_2CO_3, $NaHCO_3$

(D) None

Comprehension # 2

Following given passage the five observation regarding alkali metals are mentioned.

(i) On exposure to air, sodium hydroxide becomes liquid and after some time it changes to white powder.

(ii) In water LiF is least soluble fluorides among fluorides of alkali metal, but its solublity increases as HF is added in aqueous solution.

(iii) LiH more stable than NaH when heated separately

(iv) When excess of $Na_2S_2O_3$ solution is added to the $FeCl_3$ solution an intense violet colouration is produced, but violet colour disappeared shortly

(v) Between Na^+ and Ag^+, Ag^+ is stronger Lewis acid.

1. The explanation of observation (v) is :

(A) Because Na^+ has inert gas configuration which has greater polarisation power

(B) Because Ag^+ has inert gas configuration which has greater polarisation power

(C) Because Ag^+ has pseudo inert gas configuration which has lesser polarisation power

(D) Because Ag^+ has pseudo inert gas configuration which has greater polarisation power

2. The explanation for the observation (iv) is :

(A) Initialy with $FeCl_3$, $Na_2S_2O_3$ produce an intense violet colour substance $Fe_2(S_2O)_3$. But $Fe_2(S_2O_3)_3$ changes to Fe^{2+} & $S_4O_6^{2-}$ on standing

(B) Initially with $FeCl_3$, is reduced to $FeCl_2$ by $Na_2S_2O_3$. $FeCl_2$ so produced undergo unstable complex formation $Fe(S_2O_3)_3^{4-}$ which is violet in colour.

(C) Initially with $FeCl_3$, $Na_2S_2O_3$ produce colloidal Fe which is violet in colour. After sometime, the colloidal suspension changes to the ppt of Fe.

(D) There is no reaction

3. As per observation (iii) LiH is more stable than NaH, because :

(A) Due to small size of Li^+, the lattice energy of LiH is greater

(B) Due to greater size of H^-, the lattice energy of LiH is greater

(C) LiH is more covalent than NaH

(D) Due to greater size of Na^+, the lattice energy of NaH is greater.

4. As per observation (ii) the solubility of LiF increases in the presence of HF, because :

(A) The HF further ionises to H^+ & F^- (B) In the presence of HF, there will be a comon ion effect

(C) In the presence HF, F^- is converted to HF_2^- (D) All of the above

5. The reaction for observation (i) can be explained as –

(A) $NaOH\ (S) \xrightarrow{H_2O} NaOH(aq)\ p; \xrightarrow{H_2O} N$

(B) $NaOH\ (S) \xrightarrow{H_2O} NaOH(aq) \xrightarrow{-H_2O} Na_2O\ (S)$

(C) $NaOH\ (S) \xrightarrow{H_2O} NaOH(aq) \xrightarrow{O_2/air} Na_2O\ (S)$

(D) $NaOH\ (S) \xrightarrow{H_2O} NaOH(aq) \xrightarrow{CO_2} Na_2CO\ (S)$

Comprehension # 3

$$Na \xrightarrow{H_2O} a \xrightarrow{CO_2} B \xrightarrow{SO_2} C \xrightarrow[\Delta]{Na_2S/I_2} D \xrightarrow{Ag^+/salt} E\ (complex)$$

1. The compound B and C are :

(A) Na_2CO_3, Na_2SO_4

(B) $NaHCO_3$, Na_2SO_4

(C) Na_2CO_3, Na_2SO_3

(D) None of these

2. The compound D is :

(A) Na_2SO_4

(B) $Na_2S_4O_6$

(C) $Na_2S_2O_5$

(D) $Na_2S_2O_3$

3. Oxidation number of each 'S' atom in compound D :

(A) + 2, + 2 (B) + 4, 0

(C) + 6, – 2 (D) + 5, – 1

Comprehension # 4

Alkali metals readily react with oxyacids forming corresponding salts like M_2CO_3, $MHCO_3$, MNO_3, M_2SO_4 etc. with evolution of hydrogen. They also dissolve in liquid NH_3 but without the evolution of hydrogen. The colour of its dilute solution is blue but when it is heated and concentrated then its colour becomes bronze.

1. Among the nitrate of alkali metals which one can be decomposed to its oxide?

(A) $NaNO_3$ (B) KNO_3

(C) $LiNO_3$ (D) All of these

2. Among the carbonates of alkali metals which one has highest stability?

(A) Cs_2CO_3 (B) Rb_2CO_3

(C) K_2CO_3 (D) Na_2CO_3

3. Which of the following statement about the sulphate of alkali metal is correct?

(A) Except Li_2SO_4 all sulphate of other alkali metals are soluble in water

(B) All sulphates of alkali metals except lithium sulphate forms alum.

(C) The sulphates of alkali metals cannot be hydrolysed.

(D) All of these

4. Which of the following statement about solution of alkali metals in liquid ammonia is correct?

(A) The solution have strong oxidizing properties.

(B) Both the dilute solution as well as concentrated solution are paramagnetic in nature

(C) Charge transfer is the responsible for the colour of the solution

(D) None of these

5. Which metal bicarbonates does not exist in solid state?

(i) $LiHCO_3$ (ii) $Ca(HCO_3)_2$ (iii) $Zn(HCO_3)_2$ (iv) $NaHCO_3$ (v) $AgHCO_3$

(A) (ii), (iii), (v) (B) (i), (ii), (iii) (C) (i), (ii), (v) (D) (ii), (iii), (iv)

MISCELLANEOUS TYPE QUESTION **ANSWER KEY** EXERCISE -3

- ***True / False***

1. T **2.** F **3.** F **4.** F **5.** F **6.** F **7.** F **8.** F **9.** T **10.** T

- ***Fill in the Blanks***

1. Dry HCl **2.** More **3.** Hydrolyth **4.** Mgo, Mg_3N_2 **5.** Vigrowly, slowly, no action

6. Absorb moisture & CO_2 from atmosphere **7.** Ammonated e^-

- ***Match the Column***

1. (A) → p,r ; (B) → p,q ; (C) → p ; (D) → s **2.** (A) → r,s ; (B) → r,s ; (C) → p ; (D) → q

3. (A) → p,q,s ; (B) → p,q; (C) → p,q,r,s ; (D) → p,q

- ***Assertion - Reason Questions***

1. A **2.** A **3.** D **4.** C **5.** A

- ***Comprehension Based Questions***

Comprehension #1 : 1. (B) **2.** (A) **3.** (B)

Comprehension #2 : 1. (D) **2.** (A) **3.** (A) **4.** (C) **5.** (D)

Comprehension #3 : 1. (C) **2.** (D) **3.** (C)

Comprehension #4 : 1. (C) **2.** (A) **3.** (D) **4.** (D) **5.** (A)

EXERCISE–04 [A] CONCEPTUAL SUBJECTIVE EXERCISE

1. Explain the following :

   (i) The reaction between marble and dilute H_2SO_4 is not used to prepare carbon dioxide.

   (ii) Lime water becomes turbid on passing CO_2 though it, but becomes clear when more CO_2 is passed.

   (iii) Alkaline earth metals have higher melting points than alkali metals.

   (iv) Beryllium does not exhibit a covalency beyond 4.

2. PbO_2 is soluble in NaOH and also in HCl. What does it reflect about the nature of PbO_2 ?

3. What happens when :

   (i) Hot and concentrated caustic soda solution reacts with iodine.

   (ii) White phosphorus is heated with caustic soda.

   (iii) Excess of caustic soda reacts with zinc sulphate solution.

   (iv) Excess of NaOH is added to $AlCl_3$ solution.

4. Write balanced equation for reaction between

   (i) Na_2O_2 and water (ii) KO_2 and water (iii) Na_2O_2 and CO_2

5. Element A bruns in nitrogen to give an ionic compound B. Compound B reacts with water to give C and D. A solution of C becomes milky on bubbling carbon dioxide . Identify A, B, C and D.

6. In water LiF is least soluble fluoride among fluorides of alkali metals, but its solubility increases as HF is added in aqueous solution, why?

7. What happens when $CuSO_4$(aq.) is treated with excess of $Na_2S_2O_3$ solution?

8. Arrange the following in order of increasing .....

(i) Thermal stability	$BeSO_4$, $MgSO_4$, $CaSO_4$
(ii) Polarising power	Be^{2+}, Mg^{2+}, Ca^{2+}
(iii) Solubility in H_2O	$Be(OH)_2$, $Mg(OH)_2$, $Ca(OH)_2$
(iv) Covalent nature	$BeCl_2$, $MgCl_2$, $CaCl_2$
(v) Hydrolysis nature	$BeCl_2$ $MgCl_2$, $CaCl_2$
(vi) Lattice energy	CaF_2, MgF_2, BaF_2
(vii) Hydration energy	Be^{2+}, Mg^{2+}, Ba^{2+}
(viii) Solubility in water	MgF_2, BaF_2, BeF_2
(ix) Basic nature	Be, Mg, Ca, Sr

9. Hydrogen reacts with a metal (A) to give an ionic hydride (B). The metal (A) gives brick red colour with bunsen flame. The hydride formed is commonly known by its trade name. The compound (B) on treating with water gives back H_2 and (C). Identify (A), (B) and (C).

1. (i) Insoluble $CaSO_4$ is formed which deposists on the surface of marble and prevents further action of dilute H_2SO_4, so the evolution of CO_2 ceases after sometime.

(ii) Insoluble $CaCO_3$ is first precipitated which dissolves in excess of CO_2 due to the form of $Ca(HCO_3)_2$.

$Ca(OH)_2 + CO_2 \longrightarrow \underset{\text{(Insoluble)}}{CaCO_3} + H_2O;$

$CaCO_3 + H_2O + CO_2 \longrightarrow \underset{\text{(Soluble)}}{Ca(HCO_3)_2}$

(iii) Metallic bonding is much stronger in alkaline earth metals as two electrons are present in valence shell.

(iv) The outermost energy shell in beryllium is the second. It cannot accommodate more than 8 electrons and hence a covalency limit 4 cannot be exceeded.

2. PbO_2 are amphoteric nature

$PbO_2 + 4HCl \longrightarrow PbCl_4 + 2H_2O$

$PbO_2 + 2NaOH \longrightarrow Na_2PbO_3 + H_2O$

3. (i) $3I_2 + 6NaOH \rightarrow 5NaI + NaIO_3 + 3H_2O$ (ii) $P_4 + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_2$

(iii) $ZnSO_4 + 2NaOH \longrightarrow \underset{\text{ppt}}{Zn(OH)_2} + Na_2SO_4$

$Zn(OH)_2 + 2NaOH \longrightarrow Na_2[Zn(OH)_4$

(iv) $AlCl_3 + 3NaOH \longrightarrow \underset{\text{ppt}}{Al(OH)_3} + 3NaCl$

$Al(OH)_3 + NaOH \longrightarrow Na[Al(OH)_4]$ or $NaAlO_2$

4. (i) $Na_2O_2 + 2H_2O \longrightarrow 2NaOH + H_2O_2$

(ii) $KO_2 + H_2O \longrightarrow KOH + H_2O_2 + O_2$

(iii) $2Na_2O_2 + 2CO_2 \longrightarrow 2Na_2CO_3 + O_2$

5. A = Ca, B = Ca_3N_2 C = $Ca(OH)_2$ D = NH_3

6. In presence of HF, F^- is converted into bifluoride ion HF_2^-, allowing further dissolution of solid LiF.

7. $CuSO_4 + Na_2S_2O_3 \longrightarrow CuS_2O_3 + Na_2SO_4$

$2CuS_2O_3 + Na_2S_2O_3 \longrightarrow CuS_2O_3 + Na_2S_4O_6$

Cupric thiosulphate

$3Cu_2S_2O_3 + 2Na_2S_2O_3 \longrightarrow Na_4[Cu_6(S_2O_3)_5]$

Sodium cuprothiosulphate.

8. (i) $BeSO_4 < MgSO_4 < CaSO_4$ (ii) $Ca^{2+} < Mg^{2+} < Be^{2+}$

(iii) $Be(OH)_2 < Mg(OH) < Ca(OH)_2$ (iv) $CaCl_2 < MgCl_2 < BeCl_2$

(v) $CaCl_2 < MgCl_2 < BeCl_2$ (vi) $BaF_2 < CaF_2 < MgF_2$

(vii) $Ba^{2+} < Mg^{2+} < Be^{2+}$ (viii) $BaF_2 < MgF_2 < BeF_2$

(ix) Be < Mg < Ca < Sr

9. (i) Ca gives brick red colour to flame (ii) $Ca + H_2 \longrightarrow \underset{\text{(A)}}{CaH_2}$ (hydrolith, trade name) (B)

(iii) $\underset{\text{(B)}}{CaH_2} + 2H_2O \longrightarrow \underset{\text{(C)}}{Ca(OH)_2} + 2H_2$

1. When a gas (A) is passed through dry KOH at low temperature, a deep red coloured compound (B) and a gas (C) are obtained. The gas (A) on reaction with but-2-ene followed by treatment with Zn/H_2O yields acetaldehyde. Identify (A), (B) and (C)

2. A compound (X) imports a golden yellow flame and shows the following reactions:
(i) Zinc powder when boiled with a concentrated aqueous solution of (X) dissolves and hydrogen is evolved.
(ii) When an aqueous solution of (X) is added to an aqueous solution of stannous chloride, a white precipitate is obtained first which dissolves in excess of solution of (X). Identify (X) and write equations at step (i) and (ii).

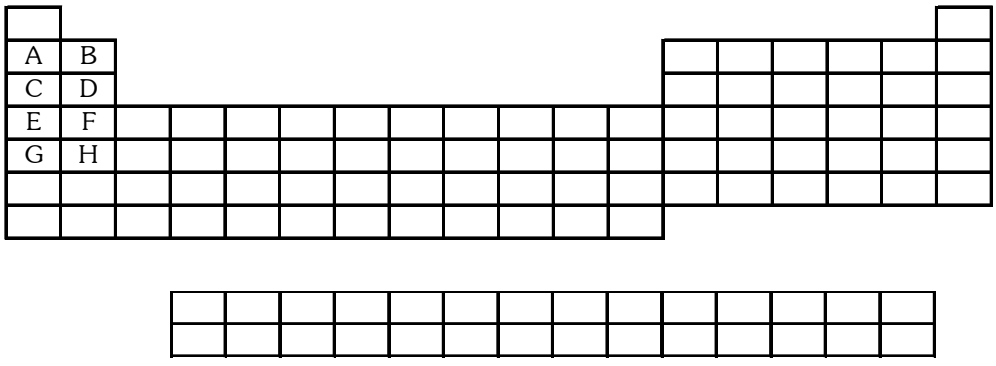
3. A white solid is either Na_2O or Na_2O_2. A piece of red litmus paper turns white when it is dipped into a freshly made aqueous solution of the white solid.
(i) Identify the substance and explain with balanced equation
(ii) Explain what would happen to the red litmus if the white solid were the other compound

4. (A) is binary compound of a univalent metal. 1.422 g of (A) reacts completely with 0.321 g of sulphur in an evacuated and sealed tube to give 1.743 g of a white crystalline solid (B) that formed a hydrated double salt (C) with $Al_2(SO_4)$. Identify (A),(B) and (C).

5. Element (M) is a shiny and highly reactive metal (melting point 63°C) and element (X) is a highly reactive non-metal (melting point – 7.2°C). They react to form a compound with the empirical formula MX, a colourless, brittle solid that melts at 734°C. When dissolved in water or when in the molten state, the substance conduct electricity. When chlorine gas is bubbled through an aqueous solution containing (MX), a reddish-brown liquid appears and and Cl^- are formed. From these observations, identify M and X.

6. Name an element which is invariable bivalent and whose oxide is soluble in excess of NaOH and its dipositive ion has a noble gas core.

7. Out of the elements marked A, B, C, D, E, F, G and H:
(a) Which form superoxide?
(b) Which form thermally stable carbonate?
(c) Which forms strongest base?
(d) Which show diagonal relationship?
(e) Which forms amphoteric oxide?



1. The gas (A) on treatment with but-2-ene followed by treatment with Zn/H_2O yields acetaldehyde and thus (A) is ozone

(i) $O_3 + CH_3 - CH=CH-CH_3 \longrightarrow CH_3 - \underset{\underset{O}{|}}{CH}-O-\underset{\underset{O}{|}}{CH}-CH_3$

Mono ozonide

$$2CH_3CHO \xleftarrow[Zn]{H_2O}$$

Acetaldehyde

(ii) $\underset{(A)}{5O_3} + 2KOH \longrightarrow \underset{\text{Potassium ozonide}\\ \text{Deep red (B)}}{2KO_3} + H_2O(g) + \underset{(C)}{5O_2}$

2. (i) $Zn + 2NaOH \longrightarrow \underset{(X)}{Na_2ZnO_2} + H_2$

(ii) (X) is also justified by step 2 reactions:

$2NaOH + SnCl_2 \longrightarrow Sn(OH)_2 + 2NaCl$

(X) White ppt.

$Sn(OH)_2 + 2NaOH \longrightarrow Na_2SnO_2 + 2H_2O$

(Excess) Soluble

(X)

3. (i) $Na_2O_2 + 2H_2O \longrightarrow 2NaOH + H_2O + [O]$

$[O] + Litmus \longrightarrow White\ (bleaching)$

Red

(ii) The other compound Na_2O will give NaOH on dissolution in water. The red litmus will turn to blue.

4. $2KO_2 + S \longrightarrow \underset{(A)}{K_2SO_4} \xrightarrow[aq.]{Al_2(SO_4)_3} \underset{(B)}{K_2SO_4}\ \underset{(C)}{Al_2(SO_4)_3}\ 24H_2O$

5. The given facts suggest M to be potassium (K) and (X) to be bromine (Br_2).

$2K + Br_2 \longrightarrow 2KBr$

(Ionic solid with m. pt. 734°C)

6. Be

7. (a) E and G (b) C, E and G (c) G (d) A and D (e) B

1. A metal M readily forms its sulphate MSO_4 which is water soluble. It forms oxide MO which becomes inert on heating. It forms insoluble hydroxide which is soluble in NaOH. The metal M is:- **[AIEEE-2002]**
(1) Mg (2) Ba (3) Ca (4) Be

2. KO_2 is used in space and submarines because it **[AIEEE-2002]**
(1) Absorbs CO_2 and increase O_2 concentration
(2) Absorbs moisture
(3) Absorbs CO_2
(4) Produces ozone

3. In curing cement plasters, water is sprinkled from time to time. This helps in :- **[AIEEE-2003]**
(1) Hydrating sand and gravel mixed with cement
(2) Converting sand into silicate
(3) Developing interlocking needle like crystals of hydrated silicates
(4) Keeping it cool

4. The solubilities of carbonates decreases down the magnesium group due to decrease in- **[AIEEE-2003]**
(1) Inter-ionic attraction
(2) Entropy of solution formation
(3) Lattice energy of solids
(4) Hydration energy of cations

5. The substance not likely to contain $CaCO_3$ is :- **[AIEEE-2003]**
(1) Sea shells (2) Dolomite
(3) A marble statue (4) Calcined gypsum

6. One mole of magnesium nitride on reaction with excess of water gives :- **[AIEEE-2004]**
(1) Two mole of HNO_3 (2) Two mole of NH_3
(3) 1 mole of NH_3 (4) 1 mole of HNO_3

7. The ionic mobility of alkali metal ioins in aqueous solution is maximum for :- **[AIEEE-2006]**
(1) Rb^+ (2) Li^+ (3) Na^+ (4) K^+

8. Which of the following on thermal-decomposition yields a basic as well as an acidic oxide ? **[AIEEE-2012]**
(1) NH_4NO_3 (2) $NaNO_3$ (3) $KClO_3$ (4) $CaCO_3$

9. Fire extinguishers contain H_2SO_4 and which one of the following :- **[AIEEE-2012 (Online)]**
(1) $CaCO_3$ (2) $NaHCO_3$ and Na_2CO_3
(3) Na_2CO_3 (4) $NaHCO_3$

10. Which one of the following will react most vigorously with water ? **[AIEEE-2012 (Online)]**
(1) Li (2) K (3) Rb (4) Na

11. A metal M on heating in nitrogen gas gives Y. Y on treatment with H_2O gives a colourless gas which when passed through $CuSO_4$ solution gives a blue colour, Y is :- **[AIEEE-2012 (Online)]**
(1) NH_3 (2) MgO (3) Mg_3N_2 (4) $Mg(NO_3)_2$

PREVIOUS YEAR QUESTIONS				s-BLOCK						EXERCISE-05(A)						
Q.	1	2	3	4	5	6	7	8	9	10	11						
A.	4	1	3	4	4	2	1	4	3	3	3						

EXERCISE–05 (B) PREVIOUS YEARS QUESTIONS

1. Which process is used in the extractive metallurgy of Mg :

(A) Fused salt electrolysis (B) Self reduction

(C) Aquaous solution electrolysis (D) Thermite reduction

2. A sodium salt on treatment with $MgCl_2$ gives white precipitate only on heating. The anion of sodium salt is :

(A) HCO_3^- (B) CO_3^{2-} (C) NO_3^- (D) SO_4^{2-}

3. The following compounds have been arranged in order of their increasing thermal stabilities. Identify the correct order: **(IIT 96)**

(I) K_2CO_3 (II) $MgCO_3$ (III) $CaCO_3$ (IV) $BeCO_3$

(A) I < II < III < IV (B) IV < II < III < I

(C) IV < II < I < III (D) II < IV < III < I

4. Property of the alkaline earth metals that increases with their atomic number is – **(IIT 97)**

(A) Ionisation energy

(B) Solubility of their hydroxides

(C) Solubility of their sulphates

(D) Electronegativity

5. The characteristics of solid sodium chloride are **(REE 96)**

(1) Brittle (2) Ionic (3) Covalent (4) Non-conductor

(A) 1 & 2 (B) 3 & 4 (C) 1, 2, & 4 (D) 1, 3, & 4

6. Which of the following are not amphoteric – **(REE 97)**

(1) $Be(OH)_2$ (2) $Sr(OH)_2$ (3) $Ca(OH)_2$ (4) $Al(OH)_3$

(A) 1 & 3 (B) 2 & 3 (C) 1 & 4 (D) 2 & 4

7. Highly dilute solution of sodium in liquid ammonia :

(i) Shows blue colour (ii) Exhibits electrical conducitive

(iii) Produces sodium amide (iv) Produces hydrogen gas

(A) (i), (ii), (iii) (B) (i), (ii) (C) (iii), (iv) (D) Only (ii)

8. Which of the following hydrides is not ionic

(A) CaH_2 (B) BaH_2 (C) SrH_2 (D) BeH_2

9. The compound(s) formed upon combustion of sodium metal in excess air is (are) **[JEE 2009]**

(A) Na_2O_2 (B) Na_2O (C) NaO_2 (D) NaOH

ASSERTION & REASON QUESTIONS

(A) Statement–I is true, statement–II is true ; statement–II is a correct explanation for statement–I

(B) Statement–I is true, statement–II is true ; statement–II is NOT a correct explanation for statement–I

(C) Statement–I is true, statement–II is false

(D) Statement–I is false, statement–II is true

1. **Statement–I :** Alkali metals dissolve inz liquid ammonia to give blue solutions. **(IIT 2007)**

Because :

Statement–II : Alkali metals in liquid ammonia give solvated species of the type $[M(NH_3)n]^+$ (M = alkali metals)

SUBJECTIVE QUESTIONS

1. Identify the following:

$$Na_2CO_3 \xrightarrow{SO_2} A \xrightarrow{Na_2CO_3} B \xrightarrow{\text{Elemental S}} C \xrightarrow{I_2} D$$

Also mention the oxidation state of S in all the compounds.

2. Beryllium chloride shows acidic nature in water or why $BeCl_2$ is easily hydrolysed?

3. The crystalline salts of alkaline earth metals contain more water of crystallisation than the corresponding alkali metal salts, why?

4. Arrange the following sulphates of alkaline earth metals in order of their decreasing thermal stability. $BeSO_4$, $MgSO_4$, $CaSO_4$, $SrSO_4$.

5. Why the solubility of calcium acetate decreases while that of lead nitrate increases with increase in temperature.

6. Why magnesium is not precipitated from a solution of its salt by NH_4OH In the presence of NH_4Cl.

PREVIOUS YEARS QUESTIONS — ANSWER KEY — EXERCISE -05(B)

- **1**. (A) **2**. (A) **3**. (B) **4**. B **5**. C **6**. B **7**. B **8**. D
  9. A, B

- ***Assertion - Reason Questions***

  1. B

- ***Subjective Questions***

  1. A = $NaHSO_3$, Oxidation state of S = + 4

  B = Na_2SO_3, Oxidation state of S = + 4

  C = $Na_2S_2O_3$, Oxidation state of S = + 6 & – 2

  D = $Na_2S_4O_6$, Oxidation state of S = + 5 & 0

  2. $BeCl_2$ is a salt of weak base $Be(OH)_2$ and strong acid HCl and thus undergoes hydrolysis to result in an acidic solution in water.

$$BeCl_2 + 4H_2O \xrightarrow{\text{Hydration}} [Be(H_2O)_4]^{2+} + 2Cl^-$$

  3. Alkaline earth metals have smaller size and more nuclear charge.

  4. $SrSO_4 > CaSO_4 > MgSO_4 > BeSO_4$

  5. $(CH_3COO)_2$ Ca shows exothermic dissolution whereas $Pb(NO_3)_2$ show endothermic dissolution.

  6. The dissociation of NH_4OH (a weak electrolyte) is suppressed in presence of NH_4Cl due to common ion effect. Thus, $[OH^-]$ in solution becomes low. The ionic product of concentrations of Mg^{2+} and OH^- ions does not exceed the solubility product of $Mg(OH)_2$ and thus $Mg(OH)_2$ is not precipitated.