EXERCISE- I

1. The alkali metals which form normal oxide, peroxide as well as super oxides are :-
(1) Na, Li (2) K, Li
(3) Li, Cs (4) K, Rb

2. The correct order of degree of hydration of M^+ ions of alkali metals is
(1) $Li^+ < K^+ < Na^+ < Rb^+ < Cs^+$
(2) $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$
(3) $Cs^+ < Rb^+ < K^+ < Na^+ < Li^+$
(4) $Cs^+ < Rb^+ < Na^+ < K^+ < Li^+$

3. The hydroxide of II[nd] A metal, which has the lowest value of solubility product (K_{sp}) at normal temperature (25°C) is
(1) $Ca(OH)_2$ (2) $Mg(OH)_2$
(3) $Sr(OH)_2$ (4) $Be(OH)_2$

4. $Mg_2C_3 + H_2O \longrightarrow X$ (organic compound). Compound X is
(1) C_2H_2 (2) CH_4
(3) propyne (4) ethene

5. The alkaline earth metals, which do not impart any colour to Bunsen flame are
(1) Be and Mg (2) Mg and Ca
(3) Be and Ca (4) Be and Ba

6. $Y \xleftarrow{\Delta,205°C} CaSO_4 \cdot 2H_2O \xrightarrow{\Delta,120°C} X.$
X and Y are respectively
(1) plaster of paris, dead burnt plaster
(2) dead burnt plaster, plaster of paris
(3) CaO and plaster of paris
(4) plaster of paris, mixture of gases

7. The correct order of basic-strength of oxides of alkaline earth metals is
(1) BeO > MgO > CaO > SrO
(2) SrO > CaO > MgO > BeO
(3) BeO > CaO > MgO > SrO
(4) SrO > MgO > CaO > BeO

8. Weakest base among KOH, NaOH, $Ca(OH)_2$ and $Zn(OH)_2$ is
(1) $Ca(OH)_2$ (2) KOH
(3) NaOH (4) $Zn(OH)_2$

9. $BeCl_2 + LiAlH_4 \longrightarrow X + LiCl + AlCl_3$
(1) X is LiH (2) X is BeH_2
(3) X is $BeCl_2 \cdot 2H_2O$ (4) None

10. A metal which is soluble in both water and liquid NH_3 separately -
(1) Cr (2) Mn
(3) Ba (4) Al

11. $MgBr_2$ and MgI_2 are soluble in acetone because of
(1) Their ionic nature
(2) Their coordinate nature
(3) Their metallic nature
(4) Their covalent nature

12. Which of the following reaction produces hydrogen gas ?
(1) $Mg + H_2O$ (2) $BaO_2 + HCl$
(3) $H_2S_2O_8 + H_2O$ (4) $Na_2O_2 + 2HCl$

13. Hydrogen combines with other elements by
(1) Losing an electron
(2) Gaining an electron
(3) Sharing an electron
(4) Losing, gaining or sharing electron

14. The oxide that gives hydrogen peroxide on the treatment with a dilute acid is
(1) MnO_2 (2) PbO_2
(3) Na_2O_2 (4)TiO_2

15. In which of the following reaction hydrogen peroxide is a reducing agent
(1) $2FeCl_2 + 2HCl + H_2O_2 \longrightarrow 2FeCl_3 + 2H_2O$
(2) $Cl_2 + H_2O_2 \longrightarrow 2HCl + O_2$
(3) $2HI + H_2O_2 \longrightarrow 2H_2O + I_2$
(4) $H_2SO_3 + H_2O_2 \longrightarrow H_2SO_4 + H_2O$

16. When zeolite (Hydrated sodium aluminium silicate) is treated with hard water the sodium ions are exchanged with
(1) OH^- ions (2) SO_4^{2-} ions
(3) Ca^{2+} ions (4) H^+ ions

17. Temporary hardness may be removed from water by adding
(1) $CaCO_3$ (2) $Ca(OH)_2$
(3) $CaSO_4$ (4) HCl

18. Which of the following can effectively remove all types of hardness of water
(1) Soap (2) Washing soda
(3) Slaked lime (4) None of these

19. Temporary unstable hardness of water due to presence of :-
(1) $CaCl_2$, $MgSO_4$
(2) Ca^{+2}, Mg^{+2}
(3) K^+, $CaCO_3$
(4) $Ca(HCO_3)_2$, $Mg(HCO_3)_2$

20. Out of the following metals which will give H_2 on reaction with NaOH :

I : Zn, II : Mg,
III : Al, IV : Be
(1) I, II, III, IV (2) I, III, IV
(3) II, IV (4) I, III

21. One of the following is an incorrect statement, point it out.

(1) Permanent hardness can be removed by boiling water
(2) Hardness of water effects soap consumption
(3) Temporary hardness is due to bicarbonates of Ca and Mg
(4) Permanent hardness is due to the soluble SO_4^{2-}, Cl^- of Ca and Mg

22. All alkali metal superoxides contain the $[O_2^-]$ ion. They are–

(1) paramagnetic
(2) colored compounds
(3) oxidizing agents
(4) all of these

23. As compared to potassium, sodium has

(1) Lower electronegativity
(2) Higher ionization potential
(3) Larger atomic radius
(4) Lower melting point

24. On passing excess of CO_2 in lime water, its milky appearance disappears because -

(1) Soluble $Ca(OH)_2$ is formed
(2) Soluble $Ca(HCO_3)_2$ is formed
(3) Reaction becomes reversible
(4) Calcium compound evaporated

25. Which of the following alkali metals has the biggest tendency of the half reaction $M_{(g)} \longrightarrow M^+_{(aq)} + e^-$

(1) Sodium (2) Lithium
(3) Potassium (4) Cesium

26. Which of the following releases 0.2 moles of hydrogen on hydrolysis ?

(1) 0.1 mole of LiH
(2) 0.2 mole of LiH
(3) 0.3 mole of LiH
(4) 0.4 mole of LiH

27. Which of the following statement is not correct ?

(1) LiOH is amphoteric in nature
(2) LiCl is soluble in pyridine
(3) Li_3N is stable while Na_3N doesn't exist even at room temperature
(4) BeO is amphoteric in nature

28. There is loss in weight when mixture of Li_2CO_3 and $Na_2CO_3.10H_2O$ is heated strongly. This loss is due to :

(1) Li_2CO_3
(2) $Na_2CO_3.10H_2O$
(3) both
(4) none

29. Which of the following statements is incorrect ?

(1) $NaHCO_3$ on heating gives Na_2CO_3
(2) Pure sodium metal dissolves in liquid ammonia to give blue solution
(3) NaOH reacts with glass to give sodium silicate
(4) Aluminium reacts with excess NaOH to give $Al(OH)_3$

30. Which alkali metal on flame test gives red violet colour ?

(1) Li (2) Cs
(3) Na (4) Rb

ANSWER KEY — Exercise-I

Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**4**	**3**	**4**	**3**	**1**	**1**	**2**	**4**	**2**	**3**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**4**	**1**	**4**	**3**	**2**	**3**	**2**	**2**	**4**	**2**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**1**	**4**	**2**	**2**	**2**	**2**	**1**	**3**	**4**	**4**

EXERCISE- II

1. The species that do not contain peroxide linkage are - **[JEE 1992]**
(1) PbO_2 (2) H_2O_2
(3) SrO_2 (4) BaO_2

2. The following compounds have been arranged in order of their increasing thermal stabilities. Identify the correct order. **[JEE 1996]**
K_2CO_3(I) $MgCO_3$(II) $CaCO_3$(III) $BeCO_3$(IV)
(1) I < II < III < IV (2) IV < II < III < I
(3) IV < II < I < III (4) II < IV < III < I

3. Property of all the alkaline earth metals that increase with their atomic number is - **[JEE 1997]**
(1) ionisation energy
(2) solubility of their hydroxides
(3) solubility of their sulphate
(4) electronegativity

4. The set representing the correct order of first ionization potential is - **[JEE 2001]**
(1) K > Na > Li (2) Be > Mg > Ca
(3) B > C > N (4) Ge > Si > C

5. 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

6. 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

7. 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

8. 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

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

10. 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

11. Berylium and aluminium exhibit many properties which are similar. But the two elements differ in - **[AIEEE-2004]**
(1) Exhibiting maximum covalency in compounds
(2) Forming polymeric hydrides
(3) Forming covalent halides
(4) Exhibiting amphoteric nature in their oxides.

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

13. The products obtained on heating $LiNO_3$ will be :- **[AIEEE-2011]**
(1) $LiNO_2 + O_2$ (2) $Li_2O + NO_2 + O_2$
(3) $Li_3N + O_2$ (4) $Li_2O + NO + O_2$

14. What is the best description of the change that occurs when Na_2O(s) is dissolved in water ? **[AIEEE-2011]**
(1) Oxidation number of sodium decreases
(2) Oxide ion accepts sharing in a pair of electrons
(3) Oxide ion donates a pair of electrons
(4) Oxidation number of oxygen increases

15. 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) $CaCO_3$

16. Very pure hydrogen (99.9%) can be made by which of the following processes ? **[AIEEE 2012]**
(1) Reaction of salt like hydrides with water
(2) Reaction of methane with steam
(3) Mixing natural hydrocarbons of high molecular weight
(4) Electrolysis of water

17. Based on lattice energy and other considerations, which one of the following alkali metal chloride is expected to have the highest melting point ? **[JEE MAIN-2012, Online]**
(1) RbCl (2) LiCl
(3) KCl (4) NaCl

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

19. 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 :- **[JEE MAIN-2012, Online]**
(1) NH_3 (2) MgO
(3) Mg_3N_2 (4) $Mg(NO_3)_2$

20. The correct statement for the molecule, CsI_3, is : **[JEE(Main)-2014]**
(1) it contains Cs^{3+} and I^- ions
(2) it contains Cs^+, I^- and lattice I_2 molecule
(3) it is a covalent molecule
(4) it contains Cs^+ and I_3^- ions

21. Which of the following statements about Na_2O_2 is **not** correct ? **[JEE MAIN-2014, Online]**
(1) Na_2O_2 oxidises Cr^{3+} to CrO_4^{2-} in acid medium
(2) It is diamagnetic in nature
(3) It is the super oxide of sodium
(4) It is a derivative of H_2O_2

22. Amongst LiCl, RbCl, $BeCl_2$ and $MgCl_2$ the compounds with the greatest and the least ionic character, respectively are :**[JEE MAIN-2014, Online]**
(1) RbCl and $MgCl_2$ (2) LiCl and RbCl
(3) $MgCl_2$ and $BeCl_2$ (4) RbCl and $BeCl_2$

23. From the following statements regarding H_2O_2, choose the incorrect statement : **[JEE(Main) 2015]**
(1) It has to be stored in plastic or wax lined glass bottles in dark
(2) It has to be kept away from dust
(3) It can act only as an oxidizing agent
(4) It decomposes on exposure to light

24. The correct order of thermal stability of hydroxides is : **[JEE(Main)Online-2015]**
(1) $Ba(OH)_2 < Sr(OH)_2 < Ca(OH)_2 < Mg(OH)_2$
(2) $Mg(OH)_2 < Sr(OH)_2 < Ca(OH)_2 < Ba(OH)_2$
(3) $Mg(OH)_2 < Ca(OH)_2 < Sr(OH)_2 < Ba(OH)_2$
(4) $Ba(OH)_2 < Ca(OH)_2 < Sr(OH)_2 < Mg(OH)_2$

25. Which of the alkaline earth metal halides given below is essentially covalent in nature :- **[JEE(Main)Online-2015]**
(1) $SrCl_2$ (2) $CaCl_2$
(3) $BeCl_2$ (4) $MgCl_2$

26. Which one of the following alkaline earth metal sulphates has its hydration enthalpy greater than its lattice enthalpy ? **[JEE(Main)-2015]**
(1) $BaSO_4$ (2) $SrSO_4$
(3) $CaSO_4$ (4) $BeSO_4$

27. The commercial name for calcium oxide is : **[JEE(Main)-2016]**
(1) Quick lime (2) Milk of lime
(3) Limestone (4) Slaked lime

28. The correct order of the solubility of alkaline-earth metal sulphates in water is : **[JEE(Main)-2016]**
(1) Mg < Sr < Ca < Ba
(2) Mg < Ca < Sr < Ba
(3) Mg > Ca > Sr > Ba
(4) Mg > Sr > Ca > Ba

29. The main oxides formed on combustion of Li, Na and K in excess of air are respectively : **[JEE(Main)-2016]**
(1) Li_2O, Na_2O_2 and KO_2
(2) Li_2O, Na_2O and KO_2
(3) LiO_2, Na_2O_2 and K_2O
(4) Li_2O_2, Na_2O_2 and KO_2

30. In KO_2, the nature of oxygen species and the oxidation state of oxygen atom are, respectively **[JEE(Main)ONLINE-2018]**
(1) Superoxide and –1/2
(2) Oxide and –-2
(3) Peroxide and –1/2
(4) Superoxide and –1

PREVIOUS YEARS QUESTIONS				ANSWER KEY						Exercise-II
Que.	1	2	3	4	5	6	7	8	9	10
Ans.	**1**	**2**	**2**	**2**	**4**	**1**	**3**	**4**	**4**	**2**
Que.	11	12	13	14	15	16	17	18	19	20
Ans.	**1**	**1**	**4**	**3**	**4**	**4**	**4**	**3**	**3**	**4**
Que.	21	22	23	24	25	26	27	28	29	30
Ans.	**3**	**4**	**3**	**3**	**3**	**4**	**1**	**3**	**1**	**1**