CHEMISTRY

BOOKS - CENGAGE CHEMISTRY (ENGLISH)

S-BLOCK GROUP 1 - ALKALI METALS

Illustration

1. How many water molecules of crystallisation are present in

(a) trona, (b) borax and (c) carnallite ?

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2. On addition of conc HNO_3 to the aqueous solution of common

salt, sodium chloride crystallises out. Give reason.

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3. Why formation of Na^{2+} ion is not possible ?

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4. Both sodium and potassium are present in equal abundance in the earth's crust, but sodium is about 30 times as abundant as potassium in oceans. Give reasons.

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5. Give reasons for the following:

a. Alkli metals do not occur free in nature.

b. Alkali metal salts impart characteristic colour to the flame.

c. Caesium is used in photoelectric cell.

d. Alkali metals are good reducing agents in aqueous medium.

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6. Give reasons for the following:

a. Alkali metals are soft and volatile.

b. First ionisation enthalpies of alkali metals are low.

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7. Explain the following:

a. Despite the fact that $Li^{\oplus}$ has the smallest size among alkali metals, it moves through a solution less rapidly than the others.

b. LiF has the lowest solubility among group 1 metal haldes.

c. The softness of alkali metals increases with the increases in atomic number.

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8. a. Monoxides of all alkali metals are hydrolysed by water, but lithium monoxide is slowly hydrolysed. Why?

b. Predict the product of the product of the hydrolysis of KO_2.

c. Which of the following is paramagnetic: K_2O, K_2O_2, KO_2

d. Caesium oxide is expected to be strongly basic, weakly basic or acidic.

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9. Calculate the change in oxidation state of the oxygen, on reaction with the following alkali metals on heating: (a) Li, (b) Na and (c) Rb.

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10. a. Which alkali metal is used as a coolent in nuclear reactor ?

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11. Give reason for the following:

a. Why potassium is less reactive than rubidium ?

b. Irrespective of the alkali metal dissolved in liquid ammonia, dil solution is always blue coloured.

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12. Sodium fire in the laboratory should not be extinguished by using water. Why ?

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13. Choose the correct answers:

a. Which of the following alkali metal is the most electropositive ?

i. Na , ii. K , iii. Rb , iv. Cs

b. Which of the following alkali metals has the lowest m.pt. ?

i. Li , ii. K , iii. Na , iv. Rb

c. Which of the following is the stronger reducing agent ?

i. Li , ii. Na , iii. K , iv Rb

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14. LiH, LiF and Li_3N show exceptional thermal stabilites. Comment.

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15. Salt of $Li^{\oplus}$ with larger anions CO_3^{2-}, NO_3^{Θ} are relatively less stable than its salts with small anions. Comment.

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16. Among LiF and LiI, which has more covalent character and why ?

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17. Among LiF and LiI, which is more soluble in water and why ?

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18. Arrange the following in order of the increasing covalent character:

MCl, MBr, MF, MI (where M = alkali metals)

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19. a. when is an ion highly polarising ? Which alkali metal ion has the highest polarising power ?

b. What makes lithium to show properties uncommon to the rest of the alkali metals ?

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20. why a standard sollution of NaOH cannot be-prepared direct weighing cold NaOH ?

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21. Why potassium carbonate (K_2CO_3) cannot be prepared by Solvay-ammonia process ?

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22. What is the general name for element of group 18 ?

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23. Lithium on being heated in air mainly forms the monoxide and not peroxide

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24. Give the name of the alkali metal which is radioactive.

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25. $CaCI_2$ is added to NaCI in the electrolytic manufacture of sodium.

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26. What is the oxidation state of Cs in

Cs_2O_2

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27. Starting with sodium chloride how would you proceed to prepare (i) sodium metal (ii) sodium hydroxide (iii) sodium peroxide (iv) sodium carbonate ?

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28. What happens when:

White phosporus is heated with caustic soda.

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Solved Examples

1. How many moles of CO_2 will be formed when a mixture containing 10 moles each of Li_2CO_3 and Na_2CO_3 are heated ?

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2. alkali metal (A) on flame test gives a crimson red colour to the Bunsen flame. (A) on heating in air gives compound (B), and (B) further on hydrolysis gives (C) and gas (D). Gas (D) with Nessler's reagent gives a brown precipitate Identify (A), (B), (C) and (D).

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3. Zinc on reaction with NaOH gives a salt (A) along with a gas (B). (A) on reaction with H_2S gas gives a white precipitate (C). Identify (A), (B) and (C).

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4. Identify (A), (B), (C) and (D) and give their chemical formulate.

$(A) + NaOH \xrightarrow{\Delta} NaCI + NH_3 + H_2O$

$NH_3 + CO_2 + H_2O \rightarrow (B)$

$(B) + NaCI \rightarrow (C) + NH_4CI$

$(C) \xrightarrow{\Delta} Na_2CO_3 + H_2O + (D)$

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5. A certain compound (A) is used in the laboratory for analysis, its aqueous solution gives the following reactions:

a. On addition to copper sulphate, a brown precipitate is obtained which turns white on addition of excess of the $Na_2S_2O_3$ solution.

b. On addition to the $Ag^{\oplus}$ ion solution, a yellow curdy precipitate is obtained which is insoluble in ammonium hydroxide. Identify (A) and give equations for the reactions at steps (a) and (b).

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6. Identify (A), (B), (C) and (D) and give their formula:

$(A)_{(aq)} + Zn \rightarrow (B)_{(g)}$

$(A)_{(aq)} + (C) \xrightarrow{\Delta} PH_3$

$(A)_{(aq)} + NH_4CI \rightarrow (D)_{(g)}$

Compound (A) imparts golden yellow colour to the Bunsen flame.

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7. A ceratin compound (A) imperts a golden yellow flame and exhibits following reactions:

a. When a concentrated solution of (A) is boiled with Zn power, hydrogen gas is evolved.

b. When an aqueous solution of (A) is added to an aqueous solution of stannous chloride precipitate is obtained, which dissolves in excess of solution (A).

Identify (A) and give equations for reactions in (ii).

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8. An inorganic compound (A) loses its water of crystallisation on heating and its aqueous solution gives the following reactions:

a. It gives a white turbidity with dil HCI.

b. It decolourises a solution of iodine in KI.

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9. 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.

a. Identify the substance and explain the balanced equation.

b. Explain what would happen to the red litmus if the white solid were the other compound.

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10. When CI_2 gas bubbled through aqueous KOH, a firework explosive (A) is formed along with KCI and H_2O. Write down the balanced along

chemical reaction involved.

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11. A binary of potassium (A) on heating with sulphar, compound (B) is formed. (B) on reacting with $BaCI_2$ gives a white precipitate (C) which is insoluble in concentrated HCI. Indenfity (A), (B) and (C).

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Ex 4 1 Subjective

1. Write three general characteristics of the elements of s-block of the periodic table which distinguish them from the elements of the other blocks.

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2. The alkali metals follow the noble gases in their atomic structure. What properties of these metals can be predicted from this information?

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3. What is atomic number of sodium and Why is sodium metal kept under kerosene oil ?

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4. When is a cation highly polarising ? Which alkali metal cation has the highest plorising power ?

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5. Why superoxides of of alkali metals are paramagnetic ?

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6. Alkali metals are paramagnetic but their salts are dimagnetic. Explain.

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7. Give reasons for the following.

LiI has lower melting point than LiF.

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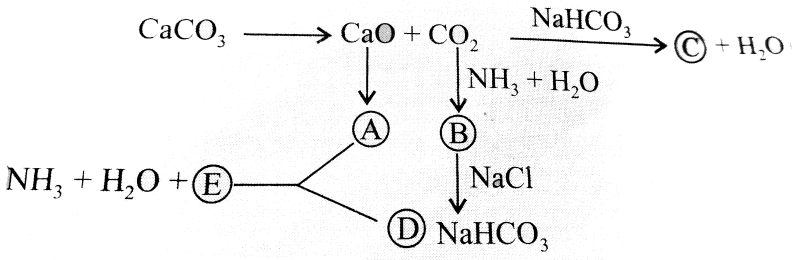
8. The Haber process can be represented as follows



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9. Why does the reaction.

$$\geq C - Cl + MF \longrightarrow \geq C - F + MCl$$

proceed better with KF than with NaF ?

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10. why lithium is kept wrapped in paraffin wax and not stored in kerosene oil ?

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11. When is a cation highly polarising? Which alkali metal cation has the highest polarising power?

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12. Why cesium can be used in photoelectric cell, while lithium cannot be ?

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13. Give reason for the decreasing order of the conductivity of the following.

$Cs^{\oplus}_{(aq)} > Rb^{\oplus}_{(aq)} > K^{\oplus}_{(aq)} > Na^{\oplus}_{(aq)} > Li^{\oplus}_{(aq)}$

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14. $NaHCO_3$ and $NaOH$ cannot exist together in solution. Why ?

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15. On exposure to air, sodium hydroxide becomes liquid and after sometime it changes to white power. Explain.

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16. Alkali metals are obtained by the electrolysis of the molten salts and not by the electrolysis of their aqueous solutions. Give reason.

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17. What happens when:

a. Potassium metal is dropped in water

b. Potassium is heated in free supply of air

c. Potassium superoxide is dissolved in water

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18. How is sodium carbonate manufactured by Solvay's process? Draw a schematic diagram and explain all the steps involved in the process. What is the action of heat on sodium carbonate ?

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19. a. Describe one method of manufacture of castic soda.

b. What happens when caustic soda reacts with

i. Ai metal , ii. CO_2 , iii. SiO_2

c. Describe four industrial uses of caustic soda.

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20. Answer the following:

Give the name of the hardest alakli metal.

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21. Explain the following:

a. Alkali metals are paramagnetic, but their salts are diamagnetic.

b. The inside surface of a glass bottle containing caustic sada becomes dull.

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22. Identify (A) and (B) in the following:

$KO_2 + S \xrightarrow{\Delta} (A)$

$(A) + BaCI_2 \rightarrow \underset{\text{White ppt.}}{B}$

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23. LiOH has been used by astronauts. Explain the use with the help of reaction.

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24. Give the composition and action of backing powder.

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Ex 4 1 True False

1. True or False

a. Li is the least electronegative alkali metal.

b. Potassium is the most abundant alkail metal in the earth's crust.

c. Lithium reacts with nitrogen to form nitride.

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Ex 4 1 Objective

1. Match the compounds given in (X) with uses in (Y),

(X) A. NaOH , (Y) 1. Glass

(X) B. $Na_2S_2O_3$, (Y) 2. Germicide

(X) C. NaCN , (Y) 3. Antichlor

(X) D. Na_2CO_3 , (Y) 4. Soap

Codes:

A. A 4, B 3, C 2, D 1

B. A 3, B 4, C 1, D 2

C. A 2, B 3, C 4, D 1

D. A 1, B 2, C 3, D 4

Answer: A

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

A. Blue-colured solution is obtained

B. Ammoniated $Na^{\oplus}$ ions are formed in solution

C. Liquid ammonia becomes good conductor of electricity

D. The liquid ammonia remains diamagnetic

Answer: D

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3. The aqueous solutions of lithlium salts are poor conductor of electricity rather than other alkali metals because of:

A. high ionisation energy

B. high electronegativity

C. lower ability of $Li^{\oplus}$ ions to polaries water molecules

D. higher degree of hydration of $Li^{\oplus}$ ions

Answer: D

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4. $NaOH + CO \xrightarrow[5-10atm]{200^{\circ}C} A$. The product A is:

A. $NaHCO_3$

B. Na_2CO_3

C. $HCOONa$

D. H_2CO_3

Answer: C

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5. Which of the property of alkali metals is not listed correctly ?

A. The least electronegative metal: Cs

B. A natural radioactive metal: Fr

C. The alkali metal the lowest density: K

D. The most abundant alkali metal in the earth's crush: Na

Answer: C

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6. Which of the following statement is true for all the alkali metals?

A. Their nitrates decompose on heating to give NO_2 and O_2.

B. Their carbonates decompose on heating to give CO_2 and normal oxide.

C. They react with halogens to give the halides of the type MX.

D. They react with oxygen to give mainly the oxide, M_2O.

Answer: A::C

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7. The electrolyte, used in Castner's proceed of sodium extraction is

A. anhydrous Na_2CO_3

B. aqueous NaOH

C. $NaCI + CaCI_2$

D. fused anhdrous NaOH

Answer: D

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8. Based on lattic energy and other considerations, which one of the following alkali metal chloride is expected to have the highest melting point ?

A. LiCl

B. NaCl

C. KCl

D. RbCl

Answer: B

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9. Which among the following is the least soluble in water

A. NaF

B. LiF

C. KF

D. RbF

Answer: B

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10. Which of the following metals is used for drying organic solvents ?

A. Magnesium

B. Sodium

C. Platinum

D. Nickel

Answer: B

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11. Which of the following does not illustrate the anomalous behaviour of lithium ?

A. Lithium reacts with nitrogen to form a nitride.

B. Lithium is the hardest alkali metal.

C. Lithium reacts with oxygen to form normal oxide only.

D. Lithium carbonate decomposes on heating.

Answer: B

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12. The correct of stability of hydrides of alkali metals is

A. $LiH > NaH > KH > RbH$

B. $NaH > KH > RbH > LiH$

C. $RbH > KH > NaH > LiH$

D. $LiH > RbH > KH > NaH$

Answer: A

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13. The sequence of ionic mobility in aqueous solution is

A. $K^{\oplus} > Rb^{\oplus} Na^{\oplus} > Li^{\oplus}$

B. $Rb^{\oplus} > K^{\oplus} > Na^{\oplus} > Li^{\oplus}$

C. $Li^{\oplus} > Na^{\oplus} > K^{\oplus} > Rb^{\oplus}$

D. $Na^{\oplus} > K^{\oplus} > Rb^{\oplus} > Li^{\oplus}$

Answer: B

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14. Pick out statement (s) which is/are not true about diagonal relationship of Li and Mg:

A. Polarising powers of $Li^{\oplus}$ and Mg^{2+} ions are almost the same.

B. Like Li, Mg decomposes water very fast.

C. LiCI and $MgCI_2$ are deliquesent.

D. Like Li, Mg readily reacts with liquid bromine at ordinary temperaure.

A. A and D

B. B and C

C. Only B

D. B and D

Answer: D

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15. Select correct statement:

A. Oxides (M_2O) and peroxides (M_2O_2) of alkali metals are diamagnetic and colourless.

B. Superoxides (MO_2) of alkali metals are paramagnetic.

C. Li and Na do not form superoxides.

D. All are correct.

Answer: D

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16. Which of the following salts does not form any precipitate with excess of NaOH ?

A. $ZnCI_2$

B. $FeCI_3$

C. $CrCI_3$

D. $CuSO_4$

Answer: A

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17. Which of the following is the best CO_2 absorber as well as source of O_2 in space capsule ?

A. KOH

B. K_2O_2

C. KO_2

D. $LiOH$

Answer: C

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Exercises Linked Comperension

1. The first element of group different form its congeners, i.e. other members of the group in many ways. These differences may be due to the following:

i. Small size of atom and ion.

ii. High electronegativity.

iii. Non-availability of low lying d-orbitals.

The first element of a group shows resemblance with the second element of the adjacent group on the right. This is known as

diagonal relationship.

Metal $(M) + N_2 \rightarrow$ Nitride $\xrightarrow[\text{Hydrolysis}]{H_2O} NH_3$

Metal (M) can be

A. Li

B. Na

C. K

D. Mg

Answer: A::D

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2. The first element of group different form its congeners, i.e. other members of the group in many ways. These differences may be

due to the following:

i. Small size of atom and ion.

ii. High electronegativity.

iii. Non-availability of low lying d-orbitals.

The first element of a group shows resemblance with the second element of the adjacent group on the right. This is known as

diagonal relationship.

Lithium exhibits many physical and chemical similarites with magnesium. The reason is:

A. Both have the same size.

B. Both are found in native state.

C. Both have the same ionisation enthalpies.

D. Both have the same electronic configuration.

Answer: A

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3. The first element of group different form its congeners, i.e. other members of the group in many ways. These differences may be due to the following:

i. Small size of atom and ion.

ii. High electronegativity.

iii. Non-availability of low lying d-orbitals.

The first element of a group shows resemblance with the second element of the adjacent group on the right. This is known as diagonal relationship.

In dry air, lithium and sodium react to give

A. Li_2O, Li_3N, Na_2O

B. Li_2, Na_2O

C. Li_2O, Li_3N, NH_3, Na_2O

D. Li_2O, Li_3N, Na_2O, Na_3N

Answer: A

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4. The first element of group different form its congeners, i.e. other members of the group in many ways. These differences may be due to the following:

i. Small size of atom and ion.

ii. High electronegativity.

iii. Non-availability of low lying d-orbitals.

The first element of a group shows resemblance with the second element of the adjacent group on the right. This is known as diagonal relationship.

On heating which of the following gives NO_2 ?

A. $NaNO_3$

B. $LiNO_3$

C. NH_4NO_3

D. NH_4NO_2

Answer: B

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5. Which of the following is a false statement ?

A. Lithium has greateer hardnes as compound to other alkali metals.

B. $LiHCO_3$ and $Mg(HCO_3)_2$, do not exist in the solid state.

C. Lithium and magnesium form nitrides on reacting with nitrogen but other alkali metals do not.

D. Alkali metal flurides are highly soluble in water.

Answer: D

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6. Among NaO_2, Na_2O_2, Li_2O, CsO_2 upaired electron is present in

A. Na_2O_2 and Li_2O

B. Na_2O_2

C. Li_2O

D. CsO_2 and NaO_2

Answer: D

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7. On heating in excess of oxygen, lithium gives

A. Li_2O

B. LiO

C. Li_2O_2

D. LiO_3

Answer: A

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8. On exposure to air, alkali metals get tranished due to formation of oxides, hydroxides and carbonates on their surface. When heated in air or oxygen they burn vigourously forming different types of oxides depending upon the nature of the metal. The formation and stability of these metals can be explained on the basis of size of alkali metal ion and the anion. Peroxides are colourless, while superoxides are coloured. The normal oxides are basic while peroxides and superoxides act as oxidising agents.

Oxone is

A. Li_2O

B. Na_2O_2

C. KO_2

D. CsO_2

Answer: B

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On heating in excess of oxygen, potassium gives

A. K_2O

B. KO

C. K_2O_2

D. KO_2

Answer: C

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10. On exposure to air, alkali metals get tranished due to formation of oxides, hydroxides and carbonates on their surface. When heated in air or oxygen they burn vigourously forming different types of oxides depending upon the nature of the metal. The formation and stability of these metals can be explained on the basis of size of alkali metal ion and the anion. Peroxides are colourless, while superoxides are coloured. The normal oxides are basic while peroxides and superoxides act as oxidising agents.

Na_2O_2 has light yellow colour. This is due to

A. Presence of traces of NaO_2

B. Presence of unpaired electron in the molecule.

C. Presence of traces of Na_2O.

D. None of the above.

Answer: A

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11. Alkali metal salts ionic and soluble in water. The solubility of an ionic compound depends on (i) lattic ethalpy and (ii) hydration enthalpy. These two factor oppose each other. If hydration ethalpy is high, the ions will have greater tendency to be hydrated and therefore the solubility will be high. The smaller the cation, the greater is the

degree of hydration. The reducing behaviour of alkali metals in

solution is also dependent on the hydration enthalpy besides other factors.

The radius of which of the hydrated ion is the highest ?

A. $Li^{\oplus}_{(aq)}$

B. $Na^{\oplus}_{(aq)}$

C. $K^{\oplus}_{(aq)}$

D. $Rb^{\oplus}_{(aq)}$

Answer: A

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degree of hydration. The reducing behaviour of alkali metals in

solution is also dependent on the hydration enthalpy besides other factors.

The hydration energy is maximum for

A. $Li^{\oplus}$

B. $Na^{\oplus}$

C. $K^{\oplus}$

D. $Rb^{\oplus}$

Answer: A

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13. Alkali metal salts ionic and soluble in water. The solubility of an ionic compound depends on (i) lattic ethalpy and (ii) hydration enthalpy. These two factor oppose each other. If hydration ethalpy is high, the ions will have greater tendency to be hydrated and therefore the solubility will be high. The smaller the cation, the greater is the degree of hydration. The reducing behaviour of alkali metals in solution is also dependent on the hydration enthalpy besides other factors.

The ionic mobility of $Li^{\oplus}$ is less than of the $Na^{\oplus}$ ion in solution because

A. $Li^{\oplus}$ ion has a high charge density.

B. $Li^{\oplus}$ ion has the highest hydration tendency.

C. $Li^{\oplus}$ ion has the highest ionisation enthalpy.

D. $Li^{\oplus}$ ion has two electrons.

Answer: A::B

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Which of the following is the strongest reducing agent

A. Li

B. Na

C. K

D. Rb

Answer: A

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15. In the manufacture of sodium carbonate, following reactions are involved:

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

$$(B) + H_2O \rightarrow (C) \overset{+NH_4Cl \rightarrow (D)}{\xrightarrow{+H_2O}} \underset{\text{Solution}}{E}$$

$$(E) + CO_2 \rightarrow (F)$$

$$(F) + NaCl \rightarrow (G) \xrightarrow{\text{Heat}} Na_2CO_3 + CO_2 + H_2O$$

(D) is a gas which is soluble in H_2O

The name of the process is

A. Solvay

B. Salt cake

C. Lowing

D. Gossage

Answer: A

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16. In the manufacture of sodium carbonate, following reactions are involved:

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

$$(B) + H_2O \rightarrow (C) \overset{+NH_4Cl \rightarrow (D)}{\xrightarrow{+H_2O}} \underset{\text{Solution}}{E}$$

$$(E) + CO_2 \rightarrow (F)$$

$$(F) + NaCl \rightarrow (G) \xrightarrow{\text{Heat}} Na_2CO_3 + CO_2 + H_2O$$

(D) is a gas which is soluble in H_2O

(A) is

A. $Ca(HCO_3)_2$

B. $CaCO_3$

C. CaC_2

D. $NaHCO_3$

Answer: B

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17. In the manufacture of sodium carbonate, following reactions are involved:

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

$(B) + H_2O \rightarrow (C) \overset{+NH_4Cl \rightarrow (D)}{\xrightarrow{+H_2O}} \underset{\text{Solution}}{E}$

$(E) + CO_2 \rightarrow (F)$

$(F) + NaCl \rightarrow (G) \xrightarrow{\text{Heat}} Na_2CO_3 + CO_2 + H_2O$

(D) is a gas which is soluble in H_2O

(B) is

A. CaO

B. Ca_2O_2

C. CaO_2

D. Na_2O

Answer: A

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18. In the manufacture of sodium carbonate, following reactions are involved:

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

$$(B) + H_2O \rightarrow (C) \overset{+NH_4Cl \rightarrow (D)}{\xrightarrow{+H_2O}} \underset{\text{Solution}}{E}$$

$$(E) + CO_2 \rightarrow (F)$$

$$(F) + NaCl \rightarrow (G) \xrightarrow{\text{Heat}} Na_2CO_3 + CO_2 + H_2O$$

(D) is a gas which is soluble in H_2O

(C) is

A. Calcium hydroxide

B. Sodium hydroxide

C. Calcium oxide

D. None of these

Answer: A

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19. In the manufacture of sodium carbonate, following reactions are involved:

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

$$(B) + H_2O \rightarrow (C) \overset{+NH_4Cl \rightarrow (D)}{\xrightarrow{+H_2O}} \underset{\text{Solution}}{E}$$

$$(E) + CO_2 \rightarrow (F)$$

$$(F) + NaCl \rightarrow (G) \xrightarrow{\text{Heat}} Na_2CO_3 + CO_2 + H_2O$$

(D) is a gas which is soluble in H_2O

(E) and (F) are

A. NH_4OH and NH_4HCO_3

B. $NaOH$ and $NaHCO_3$

C. $Ca(OH)_2$ and $Ca(HCO_3)_2$

D. None of these

Answer: A

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20. In the manufacture of sodium carbonate, following reactions are involved:

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

$(B) + H_2O \rightarrow (C) \overset{+NH_4Cl \rightarrow (D)}{\xrightarrow{+H_2O}} \underset{\text{Solution}}{E}$

$(E) + CO_2 \rightarrow (F)$

$(F) + NaCl \rightarrow (G) \xrightarrow{\text{Heat}} Na_2CO_3 + CO_2 + H_2O$

(D) is a gas which is soluble in H_2O

(G) is $NaHCO_3$. The other compound formed with (G) is

A. NH_4Cl

B. NH_4OH

C. $CaCl_2$

D. None of these

Answer: A

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Exercises Multiple Correct

1. During electrolysis of aqueous solution of NaCI in Castner Kellner cell, the gas(es) produced are

A. CI_2

B. O_2

C. H_2

D. HCI

Answer: A::C

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2. Which of the following compounds decompose on heating ?

A. CsOH

B. KOH

C. $LiNO_3$

D. $NaHCO_3$

Answer: C::D

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3. Which of the following compounds is/are not soluble in water ?

A. NaCl

B. LiF

C. Li_2CO_3

D. Na_2CO_3

Answer: B::C

Watch Video Solution

4. Sulphides of which of the metals is/are soluble in water.

A. Na

B. K

C. Zn

D. Cu

Answer: A::B

Watch Video Solution

5. Camallites is an ore of

A. Sodium

B. Potassium

C. Magnesium

D. Aluminum

Answer: B::C

Watch Video Solution

6. Which of the following compound is/are efforescent ?

A. Washing soda

B. Caustic soda

C. Caustic potash

D. Epsom salt

Answer: A::D

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7. KO_2 find use in breathing equipment and safeguards the user to breathe in oxygen generated internally in the apparatus without

being exposed to toxic fumes ouside. The supply of oxygen is due to

A. Slow decomposition of KO_2

B. Reaction of KO_2 with CO_2 in the exhaled air

C. Reaction of KO_2 with moisture in the essential air

D. Fast decomposition of KO_2

Answer: B::C

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8. During electrolysis of aqueous solution of NaCI in Castner Kellner cell, the gas(es) produced are

A. $NaOH$

B. CI_2

C. O_2

D. H_2

Answer: B::C::D

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9. Which of the following reaction (s) correct ?

A. $CI_2 + \underset{\text{Hot and conc soin}}{NaOH} \rightarrow NaCI + NaCIO_3 + H_2O$

B. $P_4 + NaOH + H_2O \rightarrow NaH_2PO_2 + PH_3$

C. $S + NaOH \xrightarrow{\Delta} Na_2S_2O_3 + Na_2S + H_2O$

D. $C + NaOH \xrightarrow{\Delta} Na_2SiO_3 + H_2$

Answer: A::B::C

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10. When a mixture of Li_2CO_3 and $Na_2CO_3.10H_2O$ is heated strongly, there occurs a loss of mass due to

A. Decomposition of Li_2CO_3

B. Loss of water by $Na_2CO_3.10H_2O$

C. Decomposition of $Na_2CO_3.10H_2O$

D. None of the above.

Answer: A::B

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11. The pair of compounds which cannot exist together in aqueous solution is ,

(I)NaH_2PO_4 and $NaHCO_3$ (II)Na_2CO_3 and $NaHCO_3$ (III) $NaOH$ and NaH_2PO_4 (IV)$NaHCO_3$ and $NaOH$

A. NaH_2PO_4 and Na_2HPO_4

B. Na_2CO_3 and $NaHCO_3$

C. $NaOH$ and NaH_2PO_4

D. $NaHCO_3$ and $NaOH$

Answer: C::D

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12. Alkali metlas are characterised by

A. Good conductor of heat and electricity

B. High oxidation potentials

C. Low melting points

D. Solubility in liquid ammonia

Answer: A::B::C::D

Watch Video Solution

13. Select wrong statements about alkali metals:

A. All form $(MNH)_2$ amide.

B. All form superoxides (MO_2)

C. All form ionic hydrides (MH)

D. All form nitrides

Answer: B::D

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14. A highly pure dilute solution of sodium in liquid ammonia:

A. Shows blue colour

B. Exhibits electrical conductivity

C. Produces sodium amide

D. Produces hydrogen gas

Answer: A::B

Watch Video Solution

15. Li has the following abnormal behaviour in its group:

A. Lithium carbonate decomposes into its oxide on heating, unlike other elements.

B. LiCI is covalent in nature.

C. Li_3N is stable compound.

D. LiCI is poor conductor of electricity in molten state.

Answer: A::B::C

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16. Which among the following compounds is paramagnetic ?

A. KO_2

B. K_2O_2

C. K_2O

D. NO_2

Answer: A::D

Watch Video Solution

17. Nitrate of which of the following elements are converted to their oxides on heating ?

A. Li

B. Na

C. K

D. Mg

Answer: A::D

Watch Video Solution

18. The compounds(s) formed upon combustion of sodium metal excess air is/are

A. Na_2O_2

B. Na_2O

C. NaO_2

D. NaOH

Answer: A::B

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19. An alloy of Na and K is

A. Liquid at room temperature

B. Used in specially designed thermometers

C. Unstable

D. Solid at room temperature

Answer: A::B

Watch Video Solution

20. Which of the following is/are correct ?

A. Sodium thiosulphate is called hypo.

B. Sodium peroxide is callede oxone.

C. Potassium carbonate is calledparl ash.

D. Sodium nitrate is called Indian nitre.

Answer: A::B::C

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21. Sodium chloride is known as

A. Table salt

B. Common salt

C. Soda ash

D. Rock salt

Answer: A::B::D

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22. The compounds) used in Solvay process is/are

A. Na_2SO_4

B. $NaCI$

C. NH_3

D. $CaCO_3$

Answer: B::C::D

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23. What is atomic number of sodium and Why is sodium metal kept under kerosene oil ?

A. Kerosene

B. Benzene

C. Toluene

D. Alcohol

Answer: A::B::C

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24. Which of the following carbonates does not evolve CO_2 on heating?

A. Li_2CO_3

B. $MgCO_3$

C. Na_2CO_3

D. K_2CO_3

Answer: C::D

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25. select the correct statement:

A. Lithium carbonate is insoluble in water.

B. Potassium carbonate is soluble in water.

C. Barium carbonate is soluble in water.

D. Lithium bicarbonate is insoluble in water.

Answer: A::B

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26. Sodium metal cannot be stroed under

A. Kerosene

B. Toluene

C. Alcohol

D. Benzene

Answer: C::D

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27. Which of the following is/are found in the solid state ?

A. $LiHCO_3$

B. $KHCO_3$

C. $NaHCO_3$

D. $RbHCO_3$

Answer: B::C::D

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28. An element having electronic configuration $[Xe]6s^1$ will:

A. Form basic oxide

B. Can be used in photolectric cell

C. Has high ionisation enthalpy

D. Both 1 and 2

Answer: A::B

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29. Which of the following compound(s) will impart a golden yellow colour to the Bunsen flame ?

A. KCl

B. K_2CO_3

C. $NaCl$

D. Na_2CO_3

Answer: C::D

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30. Which of the following compounds is paramagnetic ?

A. KO_2

B. RbO_2

C. TiO_2

D. SiO_2

Answer: A::B

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31. Identify the correct statement:

A. Elemental sodium is easily oxidised.

B. Elemental sodium is solluble in ammonia.

C. Elemental sodium is a strong oxidising agent.

D. Elemental sodium can be prepared and isolated by electrolysing an aqueous solution of sodium chloride.

Answer: A::B

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32. Nitrogen dioxide cannot be obtained by heating

A. KNO_3

B. $NaNO_3$

C. $AgNO_3$

D. $Cu(NO_3)_2$

Answer: A::B

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33. The hydroxide of which metal ion(s) which is/are soluble in excess of NaOH solution

A. $A1^{3+}$

B. Zn^{2+}

C. Fe^{3+}

D. Cu^{2+}

Answer: A::B

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34. Pick out statement (s) which is/are not true about diagonal relationship of Li and Mg:

A. Polarising powers of $Li^{\oplus}$ and Mg^{2+} ions are almost the same.

B. Like Li, Mg decomposes water very fast.

C. LiCI and $MgCI_2$ are deliquesent.

D. Like Li, Mg readily reacts with liquid bromine at ordinary temperaure.

A. LiCI and $MgCI_2$ are deliquescent.

B. Like Li, Mg decomposes water very fast.

C. Polarising powers of $Li^{\oplus}$ and Mg^{2+} are almost the same.

D. Like Li, Mg redily reacts with liquid ammonia at ordinary temperature.

Answer: B::D

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Exercises Single Correct

1. Alklali metals do not exist in free state in nature because these are

A. Very reactive

B. Very volatile

C. Metallic in nature

D. Highly electtronegative elements.

Answer: A

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2. The formula of carnallite is

A. $LiAI(Si_2O_5)_2$

B. $KCI.\ MgCI_2.6H_2O$

C. $K_2O.\ AI_2O_3.6SiO_2$

D. $KCI.\ MgCI_2.4H_2O$

Answer: B

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3. Alkali metals can be extracted form their salts by

A. Reduction with carbon

B. Electrolysis of fused halides

C. Electrolysis of used halides

D. Reduction with aluminum

Answer: C

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4. Solvay's process is used for the manufacture of

A. Sodium metal

B. Washing soda

C. Potassium chlorate

D. Ammonia

Answer: D

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5. State true or False

In Down's process for the manufacture of sodium , $CaCl_2$, is added to increase its melting point.

A. Increase ionisation of NaCI

B. Increase the melting point of NaCI

C. Decrease the melting point of NaCI

D. Increses conductance of electrolyte

Answer: C

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6. Which one of the alkali metal forms only, the normal oxide, M_2O ?

A. Li

B. Na

C. K

D. Rb

Answer: A

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7. The main process for the manufacture of sodium carbonate is

A. Carbon process

B. Solvay process

C. Down's process

D. Nelson process

Answer: B

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8. Microcosmic salt is

A. $Na(NH_4)HPO_4.4H_2O$

B. $Na(NH_4).\ H_2O$

C. $Na(NH_3)HPO_4.4H_2O$

D. $K(NH_4)HPO_4.2H_2O$

Answer: A

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9. The similarity in the properties of alkali metals is due to

A. Their same atomicity

B. Similar outer shell configuration

C. Same energy of outer shell

D. Same energy ofouter shell

Answer: B

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10. CsOH is

A. Strongly basic

B. Weakly basic

C. Slightly acidic

D. Amphoteric

Answer: A

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11. $K^{\oplus}$ ion is isolectronic with

A. $Na^{\oplus}$

B. Ne

C. Ar

D. $Cs^{\oplus}$

Answer: C

Watch Video Solution

12. Which hydroxide decomposes on heating?

A. $LiOH$

B. $NaOH$

C. KOH

D. $CsOH$

Answer: A

Watch Video Solution

13. Among the alkali metals, the most abundant metal is

A. Na

B. K

C. Li

D. Cs

Answer: A

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14. The alkali metal having highest melting point is

A. Li

B. Na

C. Cs

D. Rb

Answer: A

Watch Video Solution

15. When heated in oxygen, lithium forms....., sodium forms....., while potassium forms.....

A. LiO

B. LiO_2

C. Li_2O

D. Li_2O_2

Answer: C

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16. The material used in solar cells contains

A. Lithium

B. Calcium

C. Ceasium

D. Francium

Answer: C

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17. The size of $Na^{\oplus}$ ion is same as that of

A. Ne atom

B. Na atom

C. K atom

D. None of these

Answer: D

Watch Video Solution

18. Which one of the following halide has the highest melting point ?

A. (a) KCl

B. (b) KBr

C. (c) KF

D. (d) KI

Answer: C

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19. Sodium thiosulphate, $Na_2S_2O_3 \cdot 5H_2O$ is used in photography to:

A. Reduce the AgBr grains to metallic Ag

B. Convert metallic Ag to Ag salt

C. Remove undecomposed AgBr as soluble silver thisolphate complex

D. Remove reduced silver

Answer: C

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20. Baking soda is

A. $Na_2CO_3.10H_2O$

B. $Na_2SO_4.10H_2O$

C. Na_2SO_4

D. $NaHCO_3$

Answer: D

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21. Sodium can be extracted on a commercial scale by the electrolysis of used sodium chloride. The process is called

A. Castner procedd

B. Down's process

C. Nelson process

D. Solvay process

Answer: B

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22. Potassium is --------, ---------- and --------- than sodium.

A. lighter, softer and more reactive

B. heavier, softer and less reactive

C. lighter, harder and more reactive

D. None of the above.

Answer: A

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23. Potassium can be prepared by

A. Heating K_2CO_3 with coke

B. Electrolysis of fused KOH

C. Heating KF with CaC_2

D. All the above

Answer: D

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24. NaOH is manufacture by the electrolysis of brine in a specially designed cell called

A. Castner -Kellner cell

B. Castner cell

C. Solvay cell

D. Leblanc cell

Answer: A

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25. Molecular formula of chile salt petre.

A. KNO_3

B. $NaNO_3$

C. $NaCI$

D. Na_2CO_3

Answer: A

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26. Which is an ore potassium?

A. Carnalite

B. Cryolite

C. Dolomite

D. Bauxite

Answer: A

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27. Chile salpeter is

A. KNO_3

B. $NaNO_3$

C. Na_2SO_4

D. $Na_2S_2O_3$

Answer: B

Watch Video Solution

28. Molecular formula of Glauber's salt is

A. $Na_2CO_3.10H_2O$

B. $Na_2SO_4.10H_2O$

C. $FeSO_4.7H_2O$

D. $CuSO_4.5H_2O$

Answer: B

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29. Which of the alkali metals have the highest density ?

A. Cs

B. Li

C. Na

D. Rb

Answer: A

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30. Causticizing process is used for the preparation of

A. (a) Caustic soda

B. (b) Caustic potash

C. (c) Slaked lime

D. (d) Sodium carbonate

Answer: A

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31. A sodium fire in the laboratory is extinguished by

A. Water

B. Petrol

C. Alcohol

D. CCI_4

Answer: D

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32. The densities of Li, Na and K followed the order

A. $Li > Na < K$

B. $Li < Na < K$

C. $Li < K < Na$

D. $Li > Na > K$

Answer: C

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33. The sequence of ionic mobility in aqueous solution is

A. $Li^{\oplus} > Na^{\oplus} > K^{\oplus} > rb^{\oplus}$

B. $Rb^{\oplus} > Na^{\oplus} \equiv K^{\oplus} > Li^{\oplus}$

C. $Li^{\oplus} < Na^{\oplus} < K^{\oplus} < Rb^{\oplus}$

D. $Na^{\oplus} \equiv K^{\oplus} > Rb^{\oplus} > Li^{\oplus}$

Answer: C

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34. Which of the following elements combines directly with nitrogen to form its nitride ?

A. (a) Li

B. (b) Na

C. (c) K

D. (d) Rb

Answer: A

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35. Which alkali metal ion has maximum polarising power and why ?

A. $Li^{\oplus}$

B. $K^{\oplus}$

C. $Na^{\oplus}$

D. $Cs^{\oplus}$

Answer: A

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36. Which of the following carbonates does not evolve CO_2 on heating?

A. Li_2CO_3

B. Na_2CO_3

C. K_2CO_3

D. Cs_2CO_3

Answer: A

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37. The metallic lustre of sodium is explanined by the presence of

A. $Na^{\oplus}$ ions

B. The oscillation of loosely bound electrons

C. Loosely held electectrons

D. bacc lattice

Answer: B

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38. Which of the following is not a characteristic of alkali metals ?

A. Low IE

B. Low EN

C. Ions are isoelectronic with noble gases

D. High EN

Answer: D

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39. A neutral white sodium salt (A) on heating liberates a gas (B), leaving a highly alkaline reside (C). Thegas (B) is colourless, odourless and turns lime water milky. (A) is

A. $NaNO_3$

B. $NaHCO_3$

C. Na_2CO_3

D. $NaCI$

Answer: B

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40. The pairs of compounds which cannot exist together in aqueous solution are

A. $NaHCO_3 + NaOH$

B. $NaHCO_3 + Na_2CO_3$

C. $Na_2CO_3 + NaOH$

D. $NaOH + NaCI$

Answer: A

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41. Which of the following is the strongest reducing agent in aqueous medium?

A. Li

B. Na

C. K

D. Rb

Answer: A

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42. The product of electrolysis of an aqueous solution of K_2SO_4 using inert electrodes, at anode and cathode respectively are

A. O_2 and H_2

B. O_2 and K

C. O_2 and SO_2

D. O_2 and SO_3

Answer: A

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43. Potassium gives a -------- colour to the Bunsen flame.

A. violet

B. blue

C. apple green

D. brick red

Answer: A

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44. Which of the following is strongly hydrated in aqueous solution ?

A. (a) $Li^{\oplus}$

B. (b) $Na^{\oplus}$

C. (c) $K^{\oplus}$

D. (d) $Cs^{\oplus}$

Answer: A

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45. When an aqueous of potassium ethanote is electrolysed ?

A. Ethane and CO_2 gases are liberated at anode and H_2 gas at cathode.

B. Ethane and CO_2 gases are liberated at cathode and H_2 gas at anode.

C. Ethane and CO_2 gases are liberated at anode and K metal is deposited at cathode.

D. Ethyne, H_2 and CO_2 are liberated at anode and K metal is deposited at cathode.

Answer: A

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46. Which of the following alkali metal does not form alum ?

A. Li

B. Na

C. K

D. Rb

Answer: A

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47. Sodium reacts with water more vigorously than lithium because

A. It has high atomic mass

B. It is more electronegative

C. It is more electropositive

D. It is a metal

Answer: C

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48. When Na_2CO_3 is added to an aqueous solution of $CuSO_4$

A. $CuCO_3$ is precipitated

B. Copper hydroxide is precipitated

C. Basic copper carbonate is percipitated

D. No reaction takes place

Answer: C

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49. K_2CS_3 is called potassium ----------.

A. thiocarbide

B. thiocarbonate

C. thiocyanate

D. sulphocyanide

Answer: B

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50. Pearl ash' is

A. K_2CO_3

B. $KMnO_4$

C. K_2O_3

D. KOH

Answer: A

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51. How many $Na^{\oplus}$ ions sorround each CI^{Θ} ion in $NaCI$ crystal lattice ?

A. 4

B. 6

C. 8

D. 12

Answer: B

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52. Magnesium uranyl test is used for

A. Sodium

B. Potassium

C. Rubidium

D. Caesium

Answer: A

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53. Lithium water used for the treatment of gout is

A. $LiHCO_3$

B. Li_2CO_3

C. Li_2SO_4

D. LiOH

Answer: A

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54. Loewig method is used for the preparation of

A. KOH

B. $NaOH$

C. Na_2CO_3

D. $NaHCO_3$

Answer: B

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55. A solution of sodium metal in liquid ammonia is strongly reducing due to the presence of

A. Sodium atom

B. Sodium hydride

C. Sodium amide

D. Solvated electrons

Answer: D

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56. KO_2 is used in oxygen cylinders in space and submarines because it

A. Asorbs CO_2 and increases O_2 content

B. Elminates moisture

C. Absorbs CO_2

D. Produces ozone

Answer: A

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57. The stability of the following alkali metal chlorides follows the order:

A. $KCI > CsCI > NaCI > LiCI$

B. $LiCI > KCI > NaCI > CsCI$

C. $CsCI > KCI > NaCI > LiCI$

D. $NaCI > KCI > LiCI > CsCI$

Answer: A

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58. The peramagnetic species is

A. KO_2

B. SiO_2

C. TiO_2

D. BaO_2

Answer: A

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59. On dissolving moderate amount of sodium metal in liquid ammonia at low temperature, which of the following does not occur ?

A. Blue-coloured solution is obtqained.

B. $Na^{\oplus}$ ions are formed in the solution.

C. Liquid ammonia becomes a good conductor of electricity.

D. Liquid ammonia remains diamagnetic.

Answer: C

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60. The correct order of stability of hydrides of alkali metals is

A. $NaH > LiH > KH > RbH > CsH$

B. $LiH > NaH > KH > RbH > CsH$

C. $CsH > RbH > KH > NaH > LiH$

D. $KH > NaH > LiH > csH > RbH$

Answer: B

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61. A fire extinguisher contains H_2SO_4 and

A. $NaHCO_3$ and Na_2CO_3

B. $NaHCO_3$ solution

C. Na_2CO_3

D. $CaCO_3$

Answer: A

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62. Which of the following compound is used in gun powder ?

A. $LiNO_3$

B. $NaNO_3$

C. $Pb(NO_3)_2$

D. KNO_3

Answer: D

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63. Which of the following compounds is/are not soluble in water?

A. Li_2CO_3

B. LiF

C. Li_3PO_4

D. All of these

Answer: D

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64. When a standard solution of NaOH is left in air for a few hours:

A. A precipitate will form

B. Strength will decrese

C. Strength will increse

D. The concentration of $Na^{\oplus}$ ions will remain constant

Answer: B

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65. In the following sequence of recation, identify the compounds (A), (B), (C) and (D):

$$\underset{\text{Solution}}{N} a_2CO_3 \xrightarrow{SO_2} (A) \xrightarrow{Na_2CO_3} (B) \xrightarrow[\text{Heat}]{S} (C) \xrightarrow{AgNO_3} (D)$$

A. $NaSO_3. NaHSO_3. Na_2s. Ag_2S$

B. $NaHSO_3, Na_2SO_3, Na_2S_2O_3, Ag_2S$

C. $NaHSO_3, Na_2SO_4, Na_2S, Ag_2O$

D. $Na_2SO_3, Na_2SO_4, Na_2S_2O_3, Ag$

Answer: B

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66.

$$ZnCI_2 + NaHCO_3 \xrightarrow{\text{Heat}} (A) \xrightarrow{\text{Heat}} (B) + (C) + H_2O(B) + NaOH \rightarrow (D)$$

Identify the compound (D) present in the solution.

A. $ZnCO_3$

B. $Zn(OH)_2$

C. ZnO

D. Na_2znO_2

Answer: D

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67. The carbonate that will not decompose on heating is

A. Na_2CO_3

B. $CaCO_3$

C. $SrCO_3$

D. $BaCO_3$

Answer: A

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68. Which one of the following electrolysis is used in Down's process of extracting sodium mealt ?

A. $NaCI + KCI + KF$

B. $NaCI$

C. $NaOH + KCI + KF$

D. $NaCI + NaOH$

Answer: A

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69. What is the reaction occuring at the anode in Down's process for the extraction of sodium ?

A. $2CI^{\Theta} \rightarrow CI_2 + 2e^{\Theta}$

B. $4\overset{\Theta}{O}H \rightarrow 2H_2O + O_2 + 4e^{\Theta}$

C. $Na^{\oplus} + e^{\Theta} \rightarrow Na$

D. $NaOH \rightarrow Na^{\oplus} + \overset{\Theta}{O}H$

Answer: A

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70. shine at freshly cut sodium is because of

A. Oscillations of free electrons

B. Weak metallic bonding

C. Absorption of light in crystal lattice

D. Pressence of free valency at the surface

Answer: A

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71. The solubility of alkali metal hydroxides follows the order:

A. $LiOH < NaOH < KOH < RbOH < CsOH$

B. $LiOH > NaOH > KOH > RbOH > CsOH$

C. $LiOH > CsOH > RbOH > NaOH > KOH$

D. None of the above.

Answer: A

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72. The magnetic moment of KO_2 at room temperature is --------- BM.

A. 1.41

B. 1.73

C. 2.23

D. 2.64

Answer: B

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73. sodium peroxide which is a yellow solid, when exposed to air becomes white due to the formation of:

A. H_2O_2

B. Na_2O

C. Na_2O and O_3

D. $NaOH$ and Na_2CO_3

Answer: D

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74. among the alkali metals caesium is the most reactive because

A. It has incomplete shell which is nearest to the nucleus

B. It has a single electron it the valence shell

C. It is the heaviest alklali metal

D. The outermost electron is more loosely bound than the outermost electron of the other alkali metals

Answer: D

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75. Sodium hydride (NaH) when dissolved in water, produces

A. Acidic solution

B. Basic solution

C. Neutral solution

D. Cannot be predicted

Answer: B

Watch Video Solution

76. The correct order of stability for the following superoxides is

A. $KO_2 > RbO_2 > CsO_2$

B. $RbO_2 > CsO_2 > KO_2$

C. $CsO_2 > RbO_2 > KO_2$

D. $KO_2 > CsO_2 > RbO_2$

Answer: C

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77. for which one of the following minerals, the composition gives is incorrect ?

A. Soda ash-(Na_2CO_3)

B. Carnallite-$(KCl.\ MgCl_2.6H_2O)$

C. Borax-$(Na_2B_4O_7.7H_2O)$

D. glauber's salt-$(Na_2SO_4.10H_2O)$

Answer: C

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78. In the case of alkali metals, the covalent character decreases in the order

A. $MF > MCI > MBr > MI$

B. $MF > MCI > MI > MBr$

C. $MI > MBr > MCI > MF$

D. $MCI > MI > MBr > MF$

Answer: C

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79. Which of the following oxides is not expected to reast with sodium hydroxide ?

A. CaO

B. SiO_2

C. BeO

D. B_2O_3

Answer: A

Watch Video Solution

80. The reaction that takes place when Cl_2 gas is passed through conc NaOH solution is

A. Oxidation

B. Reduction

C. Displacement

D. Disproportionation

Answer: D

Watch Video Solution

81. When sodium is dropped in smal amount of water it catches fire. Whih one of the following burns in the process?

A. Na

B. H_2O

C. CO

D. H_2

Answer: D

Watch Video Solution

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

A. $LiCI, RbCI$

B. $RbCI, BeCI_2$

C. $RbCI, MgCI_2$

D. $MgCI_2, BeCI_2$

Answer: B

Watch Video Solution

83. which of the following compounds on reaction with NaOH and H_2O_2 gives yellow colour ?

A. $Zn(OH)_2$

B. $Cr(OH)_3$

C. $AI(OH)_3$

D. None of these.

Answer: B

Watch Video Solution

84. stable oxide is obtained by heating the carbonate of the elements

A. Li

B. Na

C. K

D. Rb

Answer: A

Watch Video Solution

85. Ease with which hydrides are formed form Li to Cs:

A. Decreases

B. Increases

C. Remains the same

D. None of these

Answer: A

Watch Video Solution

86. For the preparation of sodium thiosulphate by "Spring's reaction', the reactants used are

A. $Na_2S + Na_2SO_3 + CI_2$

B. $Na_2S + SO_2$

C. $Na_2S + Na_2SO_3 + I_2$

D. $Na_2SO_3 + S$

Answer: C

Watch Video Solution

87. Li_2SO_4 is not isomorphous with sodium sulphate:

A. Due to small size of lithium

B. Due to high coordination number of lithium

C. Due to high ionisation energy of lithium

D. None of the above.

Answer: A

Watch Video Solution

88. Prefix 'alkali' for alkali metals denotes:

A. Silvery lutre

B. Metallic nature

C. Active metlas

D. Ashes of plants

Answer: D

Watch Video Solution

89. The chloride that can be extracted with ether is

A. NaCI

B. KCI

C. LiCI

D. RbCl

Answer: C

Watch Video Solution

90. Which of the following has the lowest melting point ?

A. NaCl

B. NaF

C. NaBr

D. NaI

Answer: D

Watch Video Solution

91. On exposure to air, alkali metals get tarnished due to formation of oxides, hydroxides and carbonates on their surface. When heated in air or oxygen they burn vigorously forming different types of oxides depending upon the nature of the metal. The formation and stability of these metals can be explained on the basis of size of alkali metal ion and the anion. Peroxides are colourless, while superoxides are coloured. The normal oxides are basic while peroxides and superoxides act as oxidising agents.

Oxone is

A. CaO

B. N_2O

C. Na_2O_2

D. $NaBO_3$

Answer: C

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92. In view of their low ionisation energies, the alkali metals are

A. Weak oxidising agents

B. Strong reducing agents

C. Strong oxidising agents

D. Weak reducing agents

Answer: B

Watch Video Solution

93. which of the following has the lowest melting point ?

A. Li

B. Na

C. K

D. Cs

Answer: D

Watch Video Solution

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

A. NaO

B. Na_2O

C. Na_2O_2

D. NaO_2

Answer: C

Watch Video Solution

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

A. $Na + CI_2$

B. $H_2 + O_2$

C. $NaOH + H_2 + CI_2$

D. $NaOH + CI_2 + O_2$

Answer: C

Watch Video Solution

96. Elements in the first column of the periodic table are called alkali metals. These metals have:

A. A single valency electron

B. One electron less than an inert gas configuration

C. High melting points

D. High ionisation potentals

Answer: A

Watch Video Solution

97. One of the natural minerals of sodium is tincal. Its formula is

A. $Na_2CO_3.10H_2O$

B. $NaNO_3$

C. $Na_2B_4O_7.10H_2O$

D. $NaCl$

Answer: C

Watch Video Solution

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

A. $NaFeO_2$

B. Na_3FeO_3

C. Fe_3O_4

D. Na_2FeO_2

Answer: A

Watch Video Solution

99. When dry ammonia gas is passed over heated sodium (out of contact of air) the product formed is

A. Sodium hydride

B. Sodium nitride

C. Sodamide

D. Sodium cynamide

Answer: C

Watch Video Solution

100. The principal products obtained on heating iodine with cold and concentrated caustic soda solution:

A. $NaIO + NaI$

B. $NaIO + NaIO_3$

C. $NaIO_3 + NaI$

D. $NaIO_4 + NaI$

Answer: A

Watch Video Solution

Exercises Assertion Reasoning

1. K_2CO_3 cannot be prepared by solvay's process because

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

2. Assertion (A): Sodium cannot be obtained by chemical reduction of its ore.

Reason (R): Sodium is one of the strongest reducing agents.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

3. Assertion (A): Sodium metal is softer than potassium metal.

Reason (R): Metallic bond in potassium is weaker than in sodium.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: D

Watch Video Solution

4. Assertion (A): Potassium is a stronger reducing agent than sodium.

Reason (R): IE of potassium is less than that of sodium.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

5. Assertion (A): NaOH is a stronger base than KOH.

Reason (R): KOH is more soluble in water than NaOH.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: D

Watch Video Solution

6. Assertion (A): Sodium reacts with oxygen to form Na_2O_2 whereas potassium reacts with oxygen to form KO_2.

Reason (R): Potassium is more reactive than sodium.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: B

Watch Video Solution

7. Assertion (A): Aqueous solution of Na_2CO_3 is alkaline in nature.

Reason (R): when dissolved in water, Na_2CO_3 undergoes anionic hydrolysis.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

8. 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 (A) and (R) are correct and (R) is the correct explanation of (A).

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

9. Assertion (A): Alkali metals do not occur in native state.

Reason (R): Alkali metlas are highly reactive elements.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

10. Assertion (A) : $LiCl$ is predominantly a covalent compound.

Reason (R) : EN difference between Li and Cl is too small.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: C

Watch Video Solution

11. Assertion (A): Caesium metal when dissolved in liquid amtmonia forms a blue-coloured solution.

Reason(R): The blue solution is a good conductor of electricity.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: B

Watch Video Solution

12. Assertion (A): Alkali metals dissolve in liquid ammoia to give blue solution.

Reason (R): Alkali metals in liquid ammonia give solvated species of the type $\left[e^{-}(NH_3)_y\right]^{\Theta}$.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

13. Assertion (A): $Li^{\oplus}$ (aq) has large ionic redius than $Na^{\oplus}$ (aq).

Reason (R): $Li^{\oplus}$ (aq) is relatively more hydrated as compared to $Na^{\oplus}$ aq.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

14. Assertion (A): In rainy season, common salt becomes damp after sometime on keeping.

Reason (R): Common salt (NaCI) is hygroscopic in nature.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: C

Watch Video Solution

15. Assertion (A): Na_2CO_3 and Li_2CO_3 are thermally stable.

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

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, and (R) is incorrect.

Answer: D

Watch Video Solution

16. Assertion (A): Lithium reacts with oxygen to form Li_2O, but potassium reacts with oxygen to form KO_2.

Reason (R): Potassium is more reactive than lithium.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: B

Watch Video Solution

17. Assertion (A): Among the alkali metals caesium salts exhibit the maximum conductance in aqueous solution.

Reaction (R): The radii of the hydrated caesium is the highest among alkali metals.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: C

Watch Video Solution

18. Assertion (A): $CuCI$ is more covalent than $NaCI$.

Reason (R): $Na^{\oplus}$ ion more polarising than $Cu^{\oplus}$ ion.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: C

Watch Video Solution

19. A: Sodium ions are discharged when aqueous solution of NaCl is electrolysed using mercury electrode.

R: The nature of electrode can affect the order of discharge of ions.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

20. Assertion (A): Alkali metlas impart colour to the flame.

Reason (R): The ionisation energies are low.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

21. Assertion (A): Alkali metals are strong reducing agents.

Reason (R): They have only one electron to be lost form their valence shells.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

22. Assertion: Potassium is not obtained by the the electrolysis of fused KCl

Reason: potassium vapourises at the melting point of KCl.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

23. Assertion (A): Alkali metals can form ionic hydrides which contain hydride ion, H.

Reason (R): The alkali metals have low EN. Their hydrides conduct electricity, when fused and liberate hydrogen at the anode.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

Watch Video Solution

24. Assertion (A): Ether can exteract LiCI form a mixture of LiCI, NaCI and KCI.

Reason (R): LiCI is covalent whereas NaCI and KCI are ionic in nature.

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

B. If both (A) and (R) are correct, but (R) is not the correct explanation of (A).

C. If (A) is correct, but (R) is incorrect.

D. If (A) is incorrect, but (R) is correct.

Answer: A

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Exercises Integer

1. What is the relative abundance of sodium by weight in the earth's crust?

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2. Trona is a natural hydrated mixed compound of sodium found in nature. In one molecule, how many sodium bicarbonate molecules are present ?

Watch Video Solution

3. Washing soda on standing in air effloresced. How many water molecules are lost ?

Watch Video Solution

4. Copper sulphate reacts with NaCN to form a cyanide complex. Write the balanced equation and find the number of NaCN molecules involved in the equation for one mole of $CuSO_4$.

Watch Video Solution

5. Calculate heat of solution of NaCI form the following data:

Hydration energy of $Na^{\oplus} = -389kJmol^{-1}$

Hydration energy of $CI^{\Theta} = -382kJmol^{-1}$

Lattic energy of $NaCI = -776kJmol^{-1}$

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6. Potassium iodide reacts with acidified $K_2Cr_2O_7$. How many moles of KI are required for one mole of $K_2Cr_2O_7$?

Watch Video Solution

7. On heating 8 moles each of Li_2CO_3 and K_2CO_3, how many moles of CO_2 evolved ?

Watch Video Solution

8. How many alkali metals are known ?

Watch Video Solution

9. How many water of crystallization are there in washing soda ?

A. 10

B. 5

C. 8

D. 1

Answer: A

Watch Video Solution

10. How many moles of ammonia are produced, on hydrolysis of five moles of Li_3N ?

Watch Video Solution

Exercises Fill In The Blanks

1. Lithium resembles _____ more than sodium.

Watch Video Solution

2. Sodium is _____ electropositive than potassium.

Watch Video Solution

3. The most abundant ore of sodium is _____ .

Watch Video Solution

4. As the size of the cation _____ the basicity of the hydroxide increases.

Watch Video Solution

5. Lithopone is used as _____ .

Watch Video Solution

6. Molecular formula of chile salt petre.

Watch Video Solution

7. Sodium metal is extracted by the electrolysis of

Watch Video Solution

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

Watch Video Solution

9. In Solvay's process _____ is obtained as by-product.

Watch Video Solution

10. sodium peroxide which is a yellow solid, when exposed to air becomes white due to the formation of:

Watch Video Solution

11. Pearl ash' is

Watch Video Solution

12. Crude common salt is hygroscopic because of impurities of _____ and _____ .

Watch Video Solution

13. Potassium when heated strongly in air gives _____ .

Watch Video Solution

14. The reaction of sodium is highly exothermic with water. The rate of reaction is lowered by making an _____ .

Watch Video Solution

15. Sodium carbonate solution is alkaline due to hydrolysis of _____ .

Watch Video Solution

16. When chlorine is passed through concentrated solution of KOH, the compound formed is _____ .

Watch Video Solution

17. Washing soda is $Na_2CO_3.xH_2O$. The value of x is _____

Watch Video Solution

18. Tin dissolves in excess of sodium hydroxide solution to form _____ .

Watch Video Solution

19. On heating sodium hydrogen carbonate, the products formed are

Watch Video Solution

Exercises True False

1. Alkali metals are generally extracted by electrolysis of their ores.

Watch Video Solution

2. The chemistry of lithium is very similar to that of magnesium even though they are placed in different groups. Its reason is

Watch Video Solution

3. The electropositive character of alkali metals decreases with an increase in atomic number. True or False

Watch Video Solution

4. Give reasons for the following:

Alkali metals are good reducing agents.

Watch Video Solution

5. Explain why can alkali and alkaline earth metals not be obtained by chemical reduction methods ?

Watch Video Solution

6. Sylvine is an ore of potassium.

Watch Video Solution

7. Sodium is _____ electropositive than potassium.

Watch Video Solution

8. Caesium is the lightest alkali metal.

Watch Video Solution

9. Lithium compounds impart .....colour to the flame.

Watch Video Solution

10. Lithium is the hardest alkali metal.

Watch Video Solution

11. Potassium carbonate can be obtained by Solvay's process.

Watch Video Solution

12. In Castner-Kellner cell for production of sodium hydroxide :

Watch Video Solution

13. $LiAlH_4$ is used as a reducing agent.

Watch Video Solution

14. Li reacts directly with nitrogen to f0rm lithium nitride.

Watch Video Solution

15. In the electrolysis of NaCI solution, for the manufacture of NaOH, the ion discharged at cathode is $H^{\oplus}$.

Watch Video Solution

16. Colour of iodine solution is discharged by shaking it with aqueous solution of sodium thiosulphate.

Watch Video Solution

17. Li is used in photoelectric cells.

Watch Video Solution

Archives Multiple Correct

1. The material used in solar cells contains

A. Cs

B. Si

C. Sn

D. Ti

Answer: B

Watch Video Solution

2. A highly pure dilute solution of sodium in liquid ammonia:

A. Shows blue colour

B. Exhibits electrical conductivity

C. Produces sodium amide

D. Produces hydrogen gas

Answer: A::B

Watch Video Solution

3. Sodium nitrate decomposes above-$800^{\circ} C$ to give

A. N_2

B. O_2

C. NO_2

D. Na_2O

Answer: A::B::D

Watch Video Solution

4. The compounds(s) formed upon combustion of sodium metal in excess air is/are

A. Na_2O_2

B. Na_2O

C. NaO_2

D. $NaOH$

Answer: A::B

Watch Video Solution

5. The pair(s) of reagents that yield paramagnetic species is/are

A. Na and excess of NH_3

B. K and excess of O_2

C. Cu and dilute HNO_3

D. O_2 and 2-ethylanthraquinol

Answer: A::B::C

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Archives Single Correct

1. A solution of sodium metal in liquid ammonia is strongly reducing due to the presence of

A. Sodium atom

B. Sodium hydride

C. Sodium amide

D. Solvated electrons

Answer: D

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2. The molecular formula of Glauber's salt is

A. $MgSO_4.7H_2O$

B. $CuSO_4.5H_2O$

C. $FeSO_4.7H_2O$

D. $Na_2SO_4.10H_2O$

Answer: D

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3. Nitrogen dioxide cannot be obtained by heating

A. KNO_3

B. $Pb(NO_3)_2$

C. $Cu(NO_3)_2$

D. $AgNO_3$

Answer: A

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4. 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_3

Answer: A

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5. The metallic lustre of sodium is explanined by the presence of

A. Diffusion of sodium ions

B. Oscillation of loose electron

C. Excitation of free protons

D. Existence of body-centred cubic lattic

Answer: B

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6. Sodium thiosulphate is prepared by

A. Reducing Na_2SO_4 solution with H_2S

B. Boiling Na_2SO_4 solution with S in alkaline medium

C. Neutralising H_2SO_4 solution with $NaOH$

D. Boiling Na_2SO_3 solution with S in acidie medium

Answer: D

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7. Which of the following is correct ?

Aqueous solution of $Na_2S_2O_3$ on reaction with Cl_2 gives ?

(a) $Na_2S_4O_6$

(b) $NaHSO_4$

(c) $NaCl$

(d) $NaOH$

A. $Na_2S_4O_6$

B. $NaHSO_4$

C. $NaCI$

D. $NaOH$

Answer: B

Watch Video Solution

Archives Assertion Reasoning

1. Assertion (A): Alkali metals form ionic hydrides which contain hydride ion.

Reason (R): The alkali metals have low EN. Their hydrides conduct electricity, when fused and liberate hydrogen at the anode.

A. Statement I is true, Statement II is true, Statement II is the correct explanation for statement I.

B. Statement I is true, Statement II is true, Statement II is not the correct explanation for Statement I.

C. Statement I is true, Statement II is false.

D. Statement I is false, Statement II is true.

Answer: A

Watch Video Solution

2. Assertion (A) : $LiCl$ is predominantly a covalent compound.

Reason (R) : EN difference between Li and Cl is too small.

A. Statement I is true, Statement II is true, Statement II is the correct explanation for statement I.

B. Statement I is true, Statement II is true, Statement II is not the correct explanation for Statement I.

C. Statement I is true, Statement II is false.

D. Statement I is false, Statement II is true.

Answer: C

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3. Statement I: Alkali metals dissolve in liquid ammonia to give blue solutions.

Statement II: Alkali metals in liquid ammonia give solvated species of the type $\left[M(NH_3)_x\right]^{\oplus}$ (M = alkali metals).

A. Statement I is true, Statement II is true, Statement II is the correct explanation for statement I.

B. Statement I is true, Statement II is true, Statement II is not the correct explanation for Statement I.

C. Statement I is true, Statement II is false.

D. Statement I is false, Statement II is true.

Answer: B

Watch Video Solution

Archives Fill In The Blanks

1. The increase in the solubility of iodine in an aqueous solution of potassium iodide is due to the formation of _____ .

Watch Video Solution

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

Watch Video Solution

Archives True False

1. Sodium when burnt in excess of oxygen gives sodium oxide. True or False

Watch Video Solution

Archives Subjective

1. Why can Solvay process not be used for the manufacture of potassium carbonate?

Watch Video Solution

2. Give balanced equations for the following:

'Carbon dioxide is passed through a concentrated aqueous solution of sodium chloride saturated with ammonia'.

Watch Video Solution

3. Write the balanced chemical equations for the following reactions.

a. An aqueous solution solution of sodium nitrite is heated with zinc dust and caustic soda solution.

b. Sodium iodate is added to a solution of sodium bisulphite.

Watch Video Solution

4. Complete and balance the following chemical reactions:

anhydrous potassium nitrate is heated with excess of metallic potassium.

$KNO_3(s) + K(s) \rightarrow$

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5. Element (A) burns in nitrogen to give an ionic compound, (B) reacts with water to give (C) and (D). A solution of (C) becomes milky on bubbling carbon dioxide. Idendity (A),(B),(C) and (D)

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6. 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.

a. Identify the substance and explain the balanced equation.

b. Explain what would happen to the red litmus if the white solid were the other compound.

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7. Write the balanced chemical equation for developing photographic films.

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8. Identify the following:

$$Na_2CO_3 \xrightarrow{So_2} A \xrightarrow{Na_2CO_3} B \xrightarrow[\Delta]{\text{Element s}} C \xrightarrow{I_2} D$$

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

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