



CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

ALKALI METALS

PROBLEMS

1. Elements of group I are called alkali metals. Why?



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2. List the metals which are lighter than water. Write the increasing order of their density.



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3. Why sodium peroxide is used in submarines?



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4. Standard reduction potential is least for Li. Why?



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5. Why alkali metals exhibit +1 oxidation state only in their compounds?



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6. How the colour and magnetic property of solutions of alkali metals in liquid NH_3 changes with concentration ?



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7. Potassium super oxide is preferred to sodium peroxide to purify air. Why?



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8. 'X' is an oxide of potassium. If 'X' is coloured and paramagnetic, what are the hydrolysis products of X?



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9. What is the role of sodium carbonate in salt analysis



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10. Caustic soda is used to separate a mixture of ferric chloride and aluminium chloride. Explain.



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11. What is the action of alkali on an ammonium salt?



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12. NaCl is not hygroscopic but common table salt is hygroscopic. Why?



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13. Sodium and potassium are chemically similar, but their biological roles are different. Why?



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14. Elements of group I are called alkali metals. Why?



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30. Why alkali metals exhibit $+1$ oxidation state only in their compounds?



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31. Why sodium peroxide is used in submarines?



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32. Sodium in liquid ammonia is called mixed conductor. Comment.



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33. Ammonia acts as an acid to sodium. Substantiate.



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34. Why I_2 is less soluble in water but more soluble in KI solution?



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35. How is alkaline silver nitrate represented?



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36. What is the action of alkali on an ammonium salt?



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37. Caustic soda is used to separate a mixture of ferric chloride and aluminium chloride. Explain.



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38. How is phenolphthalein used to distinguish between sodium carbonate and sodium bicarbonate.



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39. What is the role of sodium carbonate in salt analysis



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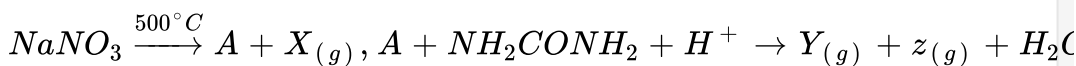
40. What are ultramines ?

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41. Zeolites are

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42.



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What are the gases X, Y and Z ?

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43. 'X' is an oxide of potassium. If 'X' is coloured and paramagnetic, what are the hydrolysis products of X?



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44. Potassium super oxide is preferred to sodium peroxide to purify air. Why?



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45. Potassium is used in photogalvanic cells. Why?



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46. Why Solvay's process is not used for the manufacture of potassium carbonate.



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47. Sodium and potassium are chemically similar, but their biological roles are different. Why?



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48. What is the difference in the crystal structures of $NaHCO_3$ and $KHCO_3$?



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49. Why $Al(OH)_3$ is insoluble in excess of NH_4OH but soluble in $NaOH$?



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50. Why alcoholic KOH is preferred than alcoholic NaOH in organic chemistry?



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SUBJECTIVE EXERCISE - 1 (LONG ANSWER QUESTIONS)

1. Enumerate the anomalous behaviour of Li



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2. How are following properties of alkali metals varying in the group (a) Ionisation enthalpy (b) atomic and ionic size (c) reaction with H_2 .



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3. In what respects does Li show diagonal relationship with Mg?



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SUBJECTIVE EXERCISE - 1 (SHORT ANSWER QUESTIONS)

1. How do alkalimetal occur in nature? Discuss



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2. Mention IA group elements. Write the electronic configuration of any four of the alkalimetals.



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3. Enumerate the anomalous behaviour of Li



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4. Write a note on the variation of atomic radius in alkalimetals



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5. What elements show diagonal relationship? Give an example



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6. How are following properties of alkali metals varyig in the group (a) Ionisation enthalpy (b) atomic and ionic size (c) reaction with H_2 .



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7. Write short not on the nature of alkalimeals reaction with O_2



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8. Give three uses of sodium metal.



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SUBJECTIVE EXERCISE - 1 (VERY SHORT ANSWER QUESTIONS)

1. How do the alkali metals occur in nature? Give the names and formulae of any two minerals of an alkali metal.



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2. Write the electronic configuration of K and Rb



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3. Why does the first element in a group show anomalous behaviour. Give a reason



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4. What elements show diagonal relationship? Give an example



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5. How are IE's changing in the 1st group elements and why?



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6. Sizes of alkali metals are the biggest in a given period. Why?



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7. An active metal (M) gives its only oxide MO_2 . Guess the metal.



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SUBJECTIVE EXERCISE - 2 (LONG ANSWER QUESTIONS)

1. Write an essay on the manufacture of NaOH by castner - kellner process.



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2. Describe Solvay process of preparing soda ash with suitable equations.



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SUBJECTIVE EXERCISE - 2 (SHORT ANSWER QUESTIONS)

1. How do you convert lime stone into caustic soda? Give equations.



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2. What is the role of mercury in the manufacture of caustic soda. Give necessary equations.



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3. Which is better oxidizing agent $NaNO_3$ or $NaNO_2$? Give the reaction to show that.



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4. Write about an electrolytic method to prepare Na_2CO_3 .



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5. What is the role of alkali metal ions in biology



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6. Write the equations for the reaction of Carbon and Silicon with NaOH

.



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7. To an aluminium sulphate solution an excess of sodium hydroxide solution is slowly added with shaking. Write the reactions.



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8. How is common salt purified ?



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SUBJECTIVE EXERCISE - 2 (VERY SHORT ANSWER QUESTIONS)

1. Why are the elements of group 1 called alkali metals ?



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2. Give equations for the formation of caustic soda from $NaCl$.



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3. Why is sodium hydroxide called caustic soda?



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4. An equimolecular mixture of Na_2CO_3 and $NaHCO_3$ is heated in rotary vacuum kiln. Explain what happens ?



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5. Write the difference between soda ash and washing soda.



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6. Write an equation for the reaction of Na_2CO_3 with S in a current of SO_2 gas



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7. Write the use of Na_2CO_3 in laundries ?



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8. How is sodium bicarbonate prepared in the laboratory ?



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9. What happens when sodium bicarbonate is strongly heated ?



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10. Aqueous solution of sodium carbonate is alkaline. Why?



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OBJECTIVE EXERCISE - 1 (GENERAL)

1. Which of the following ions, has polarizing power close to that of



Answer: D



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2. Alkali metals are

- A. Representative elements
- B. Metalloids
- C. Inner transition elements
- D. Noble metals

Answer: A



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3. The most abundant alkali metal in the earth's crust is

- A. Lithium
- B. Sodium
- C. Caesium
- D. Potassium

Answer: B



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4. The lightest metal among the following is

A. *Be*

B. *Li*

C. H

D. *Na*

Answer: B



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5. Among the following most reactive metal is

A. *Mg*

B. Na

C. Cs

D. Ca

Answer: C



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6. Alkali metals are soft and have low melting point and boiling point due to

A. Inter atomic bonds are weak

B. Inter atomic bonds are strong

C. Low ionisation potential

D. Smaller atomic size

Answer: A



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7. The pair of elements with the following atomic numbers are chemically similar

A. 13, 12

B. 13, 15

C. 3, 11

D. 2, 8

Answer: C



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8. Which of following reacts most violently with water

A. Na

B. K

C. Cs

D. Rb

Answer: C



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9. In certain respects, lithium differs from other alkali metals. The main reason for this is

A. Small size of lithium electro positivity of Li

B. Extremely high electro positivity of Li

C. Greater hardness of Li

D. Hydration of Li^+ ion

Answer: A



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10. (A): Alkali metals should not be stored in water and alcohol

(R) : Alkali metals are passive towards water and alcohol

- A. Both A and R are correct and R is the correct explanation of A.
- B. Both A and R are correct but R is not the correct explanation of A.
- C. A is True but R is False
- D. R is True but A is False.

Answer: C



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11. (A): Alkali metals are not soft and have low melting and boiling points

(R): This is because interatomic bonds are weak

- A. Both A and R are correct and R is the correct explanation of A.
- B. Both A and R are correct but R is not the correct explanation of A.
- C. A is True but R is False

D. R is True but A is False.

Answer: D



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12. Consider the following statements.

- (I) Cs⁺ ion is more highly hydrated than other alkali metal ions
- (II) Among the alkali metals, only lithium forms a stable nitride by direct combination with nitrogen.
- (III) Among alkali metals, Li, Na, K, Rb, the metal, Rb has the highest melting point
- (IV) Among alkali metals Li, Na, K, Rb only Li forms peroxide when heated with oxygen.

A. I

B. II

C. III

D. IV

Answer: B



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OBJECTIVE EXERCISE - 1 (OXIDES)

1. (A): The monoxides of alkali metals are colourless.

(R): They are paramagnetic in nature

A. Both A and R are correct and R is the correct explanation of A.

B. Both A and R are correct but R is not the correct explanation of A.

C. A is True but R is False

D. R is True but A is False.

Answer: C



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2. Peroxides of alkali metals are

- A. Paramagnetic
- B. Diamagnetic
- C. Acidic in nature
- D. Amphoteric in nature

Answer: B



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3. Which among the following is coloured and paramagnetic

- A. Li_2O
- B. Na_2O
- C. K_2O
- D. KO_2

Answer: D



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4. The metal that gives mainly a monoxide when heated in excess of O_2 is

A. Cs

B. Na

C. K

D. Li

Answer: D



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5. The oxidation statel of oxygen in superoxide is

A. -1

B. -2

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

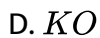
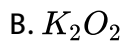
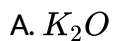
D. $+1$

Answer: C



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6. Potassium metal is heated strongly in O_2 . It produces



Answer: C



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7. (A): Alkali metal super oxides are paramagnetic

(R): Super oxide ion is isoelectronic with F_2 molecule

- A. Both A and R are correct and R is the correct explanation of A.
- B. Both A and R are correct but R is not the correct explanation of A.
- C. A is True but R is False
- D. R is True but A is False.

Answer: C



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8. The following compounds of all alkali metals are coloured

- A. Chlorides
- B. Carbonates
- C. Oxides
- D. Superoxides

Answer: D



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9. The species which contains unpaired electrons is

A. Oxide ion

B. Peroxide ion

C. Superoxide

D. Suborix ion

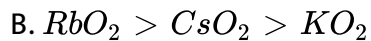
Answer: C



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





Answer: C



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OBJECTIVE EXERCISE - 1 (HYDROXIDES)

1. The most basic hydroxide is



Answer: D



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2. The most stable hydroxide is



Answer: D



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3. The most soluble hydroxide among the following is



D. $CsOH$

Answer: A



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4. Hydroxide of following ion is highly water soluble

A. Ni^{2+}

B. Al^{3+}

C. K^{+}

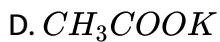
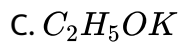
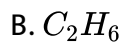
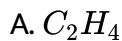
D. Ag^{+}

Answer: C



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5. The solution of KOH in ethyl alcohol contains

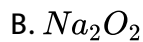
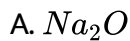


Answer: C



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6. Which of the following is paramagnetic

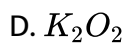
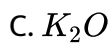
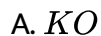


Answer: C



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7. The non existing compound is



Answer: A



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OBJECTIVE EXERCISE - 1 (HALIDES)

1. Alkali metal halides can be prepared by the reaction of aqueous hydrohalic acid with



- B. Alkalimetal hydroxide
- C. Alkali metal carbonate
- D. Any of the above

Answer: D



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2. Which halide exists as a hydrated salt

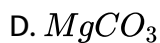
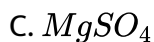
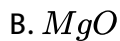
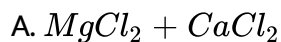
- A. $LiCl$
- B. $NaCl$
- C. KCl
- D. $RbCl$

Answer: A



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3. Common table salt is hygroscopic due to the presence of



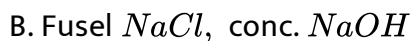
Answer: A



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OBJECTIVE EXERCISE - 1 (SODIUM HYDROXIDE)

1. The electrolyte used in the outer and the inner compartment in the Castner-Kellner cell are



C. $NaOH$, $NaCl$

D. Fused $NaOH$ and Brine

Answer: A



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2. $NaOH$ is least soluble in

A. H_2O

B. Ethanol

C. CCl_4

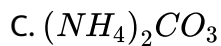
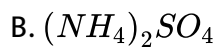
D. Dil. HCl

Answer: C



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3. NaOH liberates NH_3 with



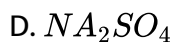
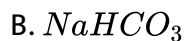
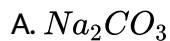
D. All the above

Answer: D



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4. CO_2 can be easily absorbed by



Answer: C



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5. The role of using mercury as cathode and anode at the bottom of the tank in the Castner-Kellner cell is

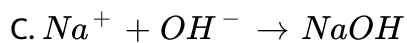
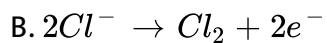
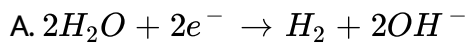
- A. mercury is non toxic
- B. mercury is a bad conductor
- C. mercury acts as intermediate electrode and discharges Na^+ easily
- D. mercury is a metal

Answer: C



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6. In Castner Kellner cell, reaction at mercury cathode is

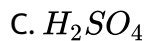


Answer: A



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7. $NaOH$ exhibits disproportionation reaction with



Answer: D



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8. When a crystal of NaOH is exposed to air a liquid layer is developed on its surface because

- A. Crystal melts
- B. It loses water to the surroundings
- C. It absorbs moisture and CO_2 from the surroundings
- D. It undergoes sublimation

Answer: C



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9. Caustic soda is

- A. Efflorescent
- B. Hygroscopic
- C. Deliquescent

D. Oxidant

Answer: C



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10. In the Castner -Kellner process, the gases that are liberated at outer and middle compartment are respectively

A. H_2 and Cl_2

B. Cl_2 and H_2

C. Cl_2 and O_2

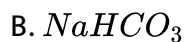
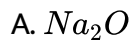
D. O_2 and Cl_2

Answer: B



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1. When CO_2 is passed into aqueous solution of Na_2CO_3 the following is formed



Answer: B



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2. Aqueous solution of Na_2CO_3 is

A. Acidic

B. Basic

C. Neutral

D. Highly acidic

Answer: B



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3. Alkali metals used in photoelectric cells

A. Li

B. Li, Na

C. Li, Na, K

D. K, Cs

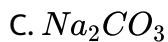
Answer: D



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4. Solvay process is used in the manufacture of

A. K_2CO_3



Answer: C



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5. In Solvay's process $NaHCO_3$ separates out due to

A. high lattice energy

B. high solubility

C. common ion effect

D. less solubility of Na_2CO_3

Answer: C



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6. Aqueous solution of $NaHCO_3$ is alkaline

- A. because of cationic hydrolysis
- B. because of anionic hydrolysis
- C. because it is acidic salt
- D. because it is basic salt

Answer: B



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7. (A): Aq. Na_2CO_3 solution is more basic than that of aq. $NaHCO_3$.

(R): The extent of hydrolysis of Na_2CO_3 is less than that of $NaHCO_3$

- A. Both A and R are correct and R is the correct explanation of A.
- B. Both A and R are correct but R is not the correct explanation of A.
- C. A is True but R is False
- D. R is True but A is False.

Answer: C



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8. Baking soda is

- A. sodium bisulphate
- B. sodium carbonate
- C. sodium bicarbonate
- D. potassium carbonate

Answer: C



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9. Which of the following set of raw materials are used in the manufacture of Na_2CO_3 by Solvay process?

A. $\text{Ca}(\text{OH})_2, \text{NH}_3, \text{CO}_2$

B. $\text{CaCl}_2, \text{NH}_3, \text{CO}_2$

C. $\text{NaOH}, \text{NH}_3, \text{CO}_2$

D. $\text{NaCl}, \text{NH}_3, \text{CO}_2$

Answer: D



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10. Which of the following does not participate in the Solvay's process for the manufacture of Na_2CO_3 ?

A. NH_3

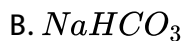
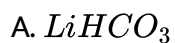
B. NaCl solution

C. CO_2

D. H_2SO_4

Answer: D

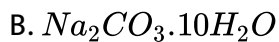
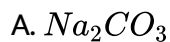
11. Which bicarbonate does not exist in solid state



D. All

Answer: A

12. Composition of soda ash is



D. $NaHCO_3$

Answer: A



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13. The principle involved in Ammonia-solvay process is

A. Low solubility of Na_2CO_3

B. High solubility of $NaHCO_3$

C. Low solubility of $NaHCO_3$

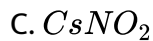
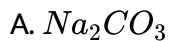
D. High hydration energy and lattice energy of $NaHCO_3$

Answer: C



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14. Which of the following is not an oxo salt of alkali metals?

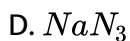
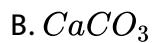
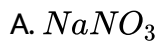


Answer: D



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15. Which of the following is used as nitrogeneous fertilizer in agriculture ?



Answer: A



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16. Which halide is found in sea water

A. $NaCl$

B. $LiCl$

C. $RbCl$

D. $CsCl$

Answer: A



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17. Chile salt petre is

A. $NaCl$

B. Na_2SO_4

C. $NaNO_3$

D. KCl

Answer: C



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OBJECTIVE EXERCISE - 1 (BIOLOGICAL IMPORTANCE)

1. Which ions are responsible for the electrical potential across the cells membrane ?

A. Na^+ & Zn^{2+}

B. K^+ & Ba^{2+}

C. Na^+ & K^+

D. Na^+ & Ca^{2+}

Answer: C



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2. K^{+} ions are essential for

- A. Metabolism of glucose inside the cell
- B. The synthesis of proteins
- C. Activation of certain enzymes
- D. All

Answer: D



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3. The ion that is pumped out from the cells is

- A. Na^{+}
- B. K^{+}
- C. both
- D. none

Answer: A



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OBJECTIVE EXERCISE - 2 (GENERAL)

1. Among KO_2 , AlO_2^- , BaO_2 and NO_2^+ , unpaired electron is present in

A. Na^+ and BaO_2

B. KO_2 and AlO_2^-

C. KO_2 only

D. BaO_2 only

Answer: C



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2. Metals having ns^1 as the valence electronic configuration

- A. act as strong oxidising agents
- B. are highly electronegative
- C. are highly electropositive
- D. have a first ionization potential of more than

Answer: C



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3. What are the products formed when Li_2CO_3 undergoes decomposition?

- A. $Li_2O_2 + CO$
- B. $Li_2O + CO$
- C. $Li_2O + CO_2$
- D. $LiO_2 + CO$

Answer: C



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4. Alkali metals when exposed to air tarnish quickly due to the

- A. Formation of their hydroxides
- B. Formation of their carbonates
- C. Formation of their oxides
- D. All the above

Answer: D



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5. The alkali metal that can react differently in many reactions is

- A. Na

B. Rb

C. K

D. Li

Answer: D



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6. Among alkali metal salts, the lithium salts are the poorest conductors of electricity in aqueous solution because of

A. Easy diffusion of Li^+ ions

B. Lower ability of Li^+ ions to polarize water molecules

C. Lowest charge to radius ratio

D. Higher degree of hydration of Li^+ ions

Answer: D



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7. Alkali metals impart colour to bunsen flame due to

- A. low ionization energies
- B. low melting points
- C. their softness
- D. the presence of one electron in the outer most shell

Answer: A



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8. The one which cannot be stored in water is

- A. Li
- B. Na
- C. K
- D. All

Answer: D



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9. Which of the following alloy is needed to make $PbEt_4$?

A. $Mg - Pb$

B. $Na - Pb$

C. $Mg - Al$

D. $Pb - Cs$

Answer: B



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10. Which of the following has highest conductivity in aqueous solution ?

A. Li^+ ion

B. Cs^+ ion

C. Na^+ ion

D. K^+ ion

Answer: B



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11. In solvay process when ammoniacal brine is saturated with CO_2 gas the product formed is

A. NH_4HCO_3

B. $(NH_4)_2CO_3$

C. $NaHCO_3$

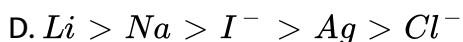
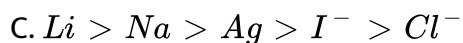
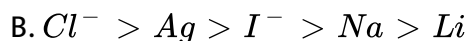
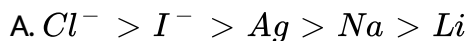
D. Na_2CO_3

Answer: C



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12. E^0 values for $Cl_2, Cl^-, I_2^-, Ag^+, Ag, Na^+, Na, Li^+, Li$ are respectively $+1.36, +0.53, +0.79, -2.71$ and $-3.04V$. Correct decreasing order of reducing strength of I^-, Ag, Na and Li is



Answer: D



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13. The number of hydroxide ions produced by one molecule of Na_2CO_3 on hydrolysis

A. 4

B. 2

C. 3

D. 0

Answer: B



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14. The cathode in middle compartment of Castner-Kellner process is

A. Graphite

B. Mercury

C. Iron

D. Steel

Answer: C



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15. (A): Lithium reacts with water more vigorously than sodium

(R): Lithium possesses small size and very high hydration energy

The correct answer is

A. (A) is correct but (R) is not correct

B. (A) is not correct but (R) is correct

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

D. Both (A) and (R) are correct but (R) is not the correct explanation of (A)

Answer: B



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OBJECTIVE EXERCISE - 2 (SODIUM SALTS)

1. Which of the following hydrogen compounds is most ionic ?

A. LiH

B. CsH

C. HF

D. HI

Answer: B



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2. Sodium metal itself is used as

A. oxidising agent

B. dehydrating agents

C. reducing agent

D. bleaching agent

Answer: C



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3. Sodium carbonate is soluble in water because

- A. High lattice enthalpy
- B. Low lattice enthalpy
- C. Low molecular weight
- D. High molecular weight

Answer: B



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4. Which of the following statements is not true for lithium ?

- A. It is the hardest alkali metal
- B. It reacts with nitrogen forming Li_3N
- C. Li is the strongest reducing agent

D. Most of the compounds of Li are ionic

Answer: D



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5. Which of the following is not the correct use of caustic soda ?

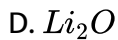
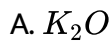
- A. For mercerizing cotton
- B. In the manufacture of artificial silk
- C. In refrigeration
- D. To prepare soda lime

Answer: C



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6. Orange red coloured monoxide is

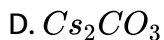
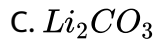
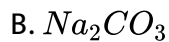
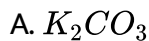


Answer: D



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7. The least soluble alkali metal carbonate is

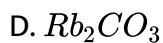
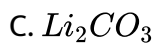
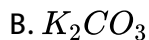
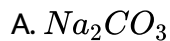


Answer: C



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8. Which one of the following decomposes easily on heating ?



Answer: C



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9. Except LiNO_3 , Nitrates of IA group on heating give



D. NO_2

Answer: A



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10. Correct statement of the following is

- A. solubility of NaCl increass with increase in temperature
- B. Solubility of NaCl decreases with incrfease in emperature
- C. Solubility of NaCl does not change appreciably with increase in temperature
- D. NaCl is insoluble in water

Answer: C



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11. The addition of Na_2CO_3 , to the aqueous solution of an oxide produces CO_2 . This reaction indicates that

- A. Oxide is basic
- B. Oxide is neutral
- C. Oxide is that of a metal
- D. Oxide is that of a non-metal

Answer: D



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12. In between the metals A and B, both form oxide but B also forms nitride, when both are heated in air. A and B are respectively

- A. Cs , K
- B. Mg , Ca
- C. Li , Na

D. K , Li

Answer: D



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13. Which of the following is formed when lithium is heated in air ?

A. Only Li_2O

B. Only Li_3N

C. Both Li_2O and LiN_3

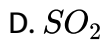
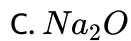
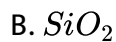
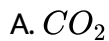
D. Both Li_2O and Li_3N

Answer: D



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14. Which one of these is basic ?

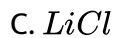
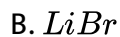


Answer: C



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15. Which of the following substances of lithium is most stable ?

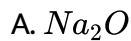


Answer: A



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16. Which of the following is paramagnetic ?

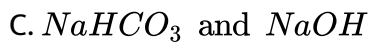
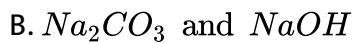
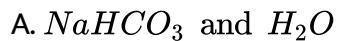


Answer: C



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17. The pair of compound which cannot exist together in solution is



D. NaHCO_3 and Na_2CO_3

Answer: C



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PRACTICE EXERCISE

1. The correct increasing order of densities of alkali metals is :

A. $\text{Li} < \text{K} < \text{Na} < \text{Rb}$

B. $\text{Li} < \text{Na} < \text{K} < \text{Rb}$

C. $\text{Li} < \text{Na} < \text{K} < \text{Rb}$

D. $\text{Li} < \text{Na} < \text{K} < \text{Rb}$

Answer: A



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2. Which among the following is softest metal and due to

A. $Li < Na > K = Rb$

B. Li - due to small size

C. Na - due to low ionisation potential

D. Cs - due to weak inter atomic force of attraction

Answer: C



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3. Lithium is strongest reducing agent due to

A. its high ionisation enthalpy

B. its high electron gain enthalpy

C. high hydration enthalpy of Li^+

D. its high lattice enthalpy

Answer: C



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4. Which of the following alkali metal ions has lowest ionic mobility in aqueous solution?

A. Rb^+

B. Cs^+ ion

C. Li^+

D. Li^+

Answer: C



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5. In organic reactions, sodium in liquid ammonia is used as

- A. Reducing agent
- B. Hydrolysing agent
- C. Oxidising agent
- D. Precipitating agent

Answer: A



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6. Nitrogen dioxide cannot be obtained by heating

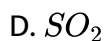
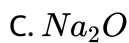
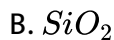
- A. KNO_3
- B. $Pb(NO_3)_2$
- C. $Cu(NO_3)_2$
- D. $AgNO_3$

Answer: A



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7. Which one of these is basic ?

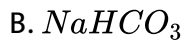
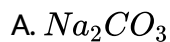


Answer: C



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8. Which of the following is used in cakes or pastries to making them light and fluffy ?



D. $NaOH$

Answer: B



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9. Which of the following compounds is odd from the remaining

A. $NaNO_3$

B. KNO_3

C. $LiNO_3$

D. $RbNO_3$

Answer: C



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10. Atomic radius of Li is 1.23\AA and ionic radius of Li^+ is 0.76\AA . The percentage of volume occupied by 2s electron is

- A. 50 %
- B. 60 %
- C. 76 %
- D. 94 %

Answer: C



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11. Enthalpy of formation values for fluorides of alkali metals become

- A. Less negative
- B. More negative
- C. Less positive
- D. More positive

Answer: A



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12. Which of the following does not illustrate the anomalous property of Li ?

- A. The m.p. and b.p. of Li are comparatively high
- B. Li forms a nitride Li_3N unlike group I metal
- C. Li is much softer than the other I group metals
- D. Li^+ ion is more heavily hydrated than those of the rest of the group

Answer: C



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13. Thermally most stable hydride among the following is

A. CsH

B. RbH

C. NaH

D. LiH

Answer: D



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14. From Lithium to Caesium stabilities of peroxides and superoxides of alkali metals ----- and the most stable superoxide is ---- due to ---

A. Increases, LiO_2 , high hydration energy

B. decreases, NaO_2 , high ionisation energy

C. Increases, CsO_2 , low ionisation energy

D. Increases, CsO_2 , high lattice energy

Answer: D

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15. The mole ratio of products H_2 , $NaOH$, Cl_2 formed in a Nelson cell method is

A. 1 : 2 : 1

B. 2 : 2 : 1

C. 1 : 1 : 2

D. 1 : 1 : 1

Answer: A

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16. The raw materials used in ammonia-soda process are

A. Brine, NH_3 , CO_2

B. NH_3 , CO_2 , H_2O

C. CO_3 , NH_4Cl , Na_2CO_3

D. $NaHCO_3$, CO_2 and NH_3

Answer: A



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17. $Na_2CO_3 \cdot 10H_2O$ when exposed to air loses water of crystallisation and gives finally

A. $NaCO_3 \cdot 4H_2O$

B. $Na_2CO_3 \cdot H_2O$

C. $Na_2CO_3 \cdot 7H_2O$

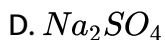
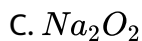
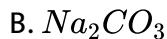
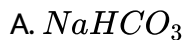
D. $Na_2CO_3 \cdot 9H_2O$

Answer: B



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18. The following is used in the softening of water

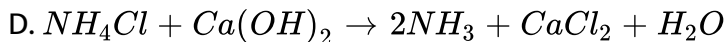
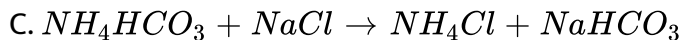
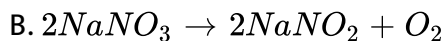
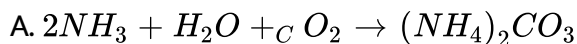


Answer: B



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19. Reaction that is not related to the preparation of sodium carbonate by Solvay process is

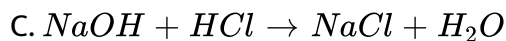
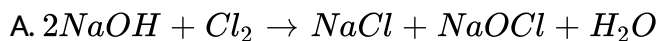


Answer: B



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20. Purpose of 'U' shaped perforated vessel in Nelson cell is mainly to prevent the reaction



D.

Answer: A



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21. About NaOH some statements are given below

i) It is used for mercerising cotton

ii) It can be stored in moist air

iii) It can be used for the purification of Bauxite

A. I and ii are correct

B. all are correct

C. ii and iii are correct

D. I and iii are correct

Answer: D



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22. Which of the following is more soluble in water

A. $LiCl$

B. $LiBr$

C. LiF

D. LiI

Answer: C



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23. In cell fluid, the most abundant cation is :

A. Na^{+} ion

B. K^{+} ion

C. Mg^{+2} ion

D. Ca^{+2} ion

Answer: B



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24. Among the following which is/are correct regarding abnormal properties of lithium in IA group.

A) $LiHCO_3$ is not obtained in solid state while other hydrogen

carbonates are solids

- B) Reddish brown NO_2 is not obtained in the thermal decomposition of $LiNO_3$
- C) Lithium unlike other alkalimetals forms no ethynide on reaction with ethyne
- D) Lithium is much harder than other alkali metals

A. Only A and B

B. Only A and C

C. only B and D

D. Only A, C and D

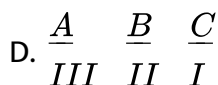
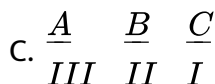
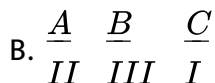
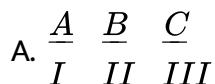
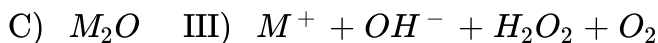
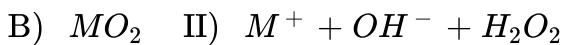
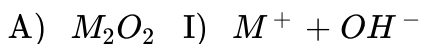
Answer: D



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25. Match the following oxides of alkalimetals and their hydrolisis products

Oxides Hydrolysis products



Answer: B



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26. The melting and boiling points of halides of alkali metals follow the trend

A) Fluorides

B) Chlorides

C) Bromides

D) Iodides

A. $A > B > C > D$

B. $D > C > B > A$

C. $A > C > B > D$

D. $D > B > C > A$

Answer: A



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27. A typical 70 kg man contains about 90g of 'A', 170 g of 'B', 5 g of 'C' and 0.06 g of 'D'. Then A,B,C and D are respectively

A. $K, Cu, Fe < Na$

B. Cu, Fe, Na, K

C. Na, K, Fe, Cu

D. Fe, Na, Cu, K

Answer: C



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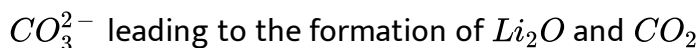
28. Correct statement of the following

A. The carbonates of alkalimetals decomposed on heating to liberate



B. The thermal stability of carbonates of IA group decreases down the group

C. Li_2CO_3 is not so stable to heat because Li^+ polarises a large



D. $LiHCO_3$ is solid and other hydrogen carbonates of IA group do not exist as solids

Answer: C



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29. The oxidation state of potassium in potassium superoxide is

A. $-1/2$

B. -1

C. $+1$

D. $+1/2$

Answer: C



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30. Wrong statement regarding solutions of alkali metals in liquid ammonia is

A. Blue colour is due to the ammoniated electrons

B. Paramagnetic due to the solvated electrons

C. These conducting in nature

D. These liberate oxygen slowly on standing

Answer: D



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31. Which of the following is the correct order of density ?

A. $Li > Na$

B. $K > Rb$

C. $Rb > Cs$

D. $Na > K$

Answer: D



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32. The numbers of s,p,d and f-electrons in caesium atom are respectively

A. 11, 24, 20, 14

B. 11, 24, 20, 0

C. 9, 20, 10, 14

D. 9, 18, 14, 14, 14

Answer: B



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33. Total number of electrons present in a super oxide anion is

A. 18

B. 17

C. 16

D. 15

Answer: B



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34. Solution "X" contains Na_2CO_3 and $NaHCO_3$, 20ml of X when titrated using methyl orange indicator consumed 60 ml of 0.1M HCl solution. In another experiment, 20 ml of X solution when titrated using phenolphthalein consumed 20 ml of 0.1M HCl solution. The concentrations (in mol lit^{-1}) of Na_2CO_3 and $NaHCO_3$ in X are respectively)

A. 0.01, 0.02

B. 0.1, 0.1

C. 0.01, 0.01

D. 0.1, 0.01

Answer: A



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35. KO_2 exhibits paramagnetic behaviour. This is due to the paramagnetic nature of



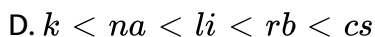
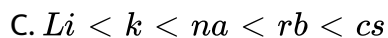
Answer: D



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LECTURE SHEET(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The correct increasing order of densities of alkali metals is :

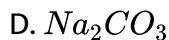
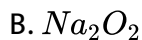


Answer: C



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2. On keeping Na-metal in air for a long time, we get :



Answer: D



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

A. Li

B. Na

C. K

D. Rb

Answer: B



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4. The ionic mobility of alkali metal ions in aqueous solution is maximum for

A. K^+

B. Rb^+

C. Li^+

D. Na^+

Answer: D



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5. What is the best description of the change that occurs when $Na_2O(s)$ is dissolved in water?

- A. Oxidation number of oxygen increase
- B. Oxidation number of sodium decreases
- C. Oxide accepts sharing in a pair of electrons
- D. Oxide ion donates a pair of electrons

Answer: D



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6. The reaction of Br_2 with Na_2CO_3 in aqueous solution gives sodium bromide and sodium bromate with evolution of CO_2 gas. The number of sodium bromide molecules involved in the balanced chemical equation is

A. 3

B. 4

C. 5

D. 2

Answer: A



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7. A white solid layer deposits on the surface of the aqueous solution of NaOH because of

A. formation of Na_2CO_3

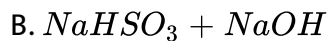
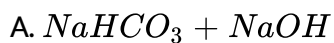
B. solification of NaOH

C. solidification of H_2O

D. combination of NaOH and H_2O

Answer: D

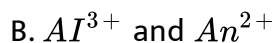
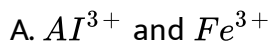
8. Which pair of compounds cannot exist together in aqueous solution ?



D. All of these

Answer: A

9. Which of the following mixtures can be separated into its constituents by using concentrated sodium hydroxide ?



C. Zn^{2+} and Pb^{2+}

D. Sn^{2+} and Pb^{2+}

Answer: A



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10. Which of the following decomposes on heating ?

A. LiOH

B. NaOH

C. KOH

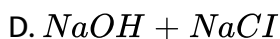
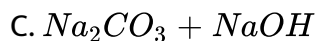
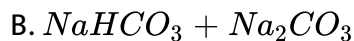
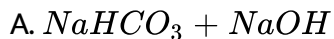
D. CsOH

Answer: A



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11. A pair of substance which cannot exist together in solution is



Answer: A



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12. The solubility of alkali metal hydroxides follows the order

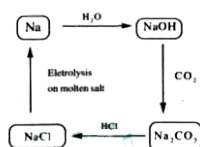
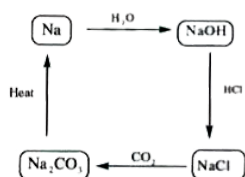
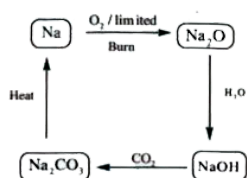
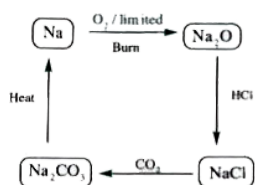


Answer: A



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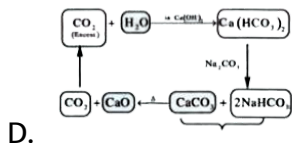
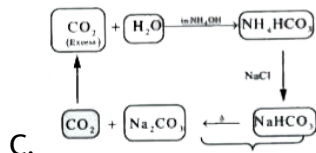
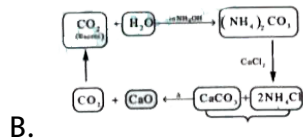
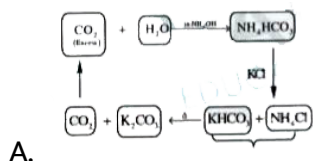
13. Which systematics diagram represents the correct chemical relations between sodium and its compound



Answer: D

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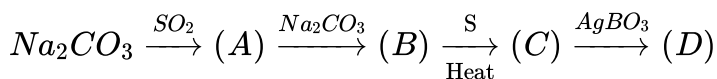
14. Which systematic diagram represents the correct sequence of Solvay process



Answer: C

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15. In the following sequence of reactions, identify the compounds (A), (B), (C) and (D)



- A. Na_2SO_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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16. 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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17. Explain how the radii of the alkali metals vary in the group? Are they obeying the periodic law.

A. Lithium fluoride is most soluble fluoride (in water)

B. Lithium iodide has maximum covalent character out of all halides

C. Lithium carbonate is least thermally stable carbonate

D. Lithium oxide is most basic oxide

Answer: B::C



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18. NaH produce H_2 gas when

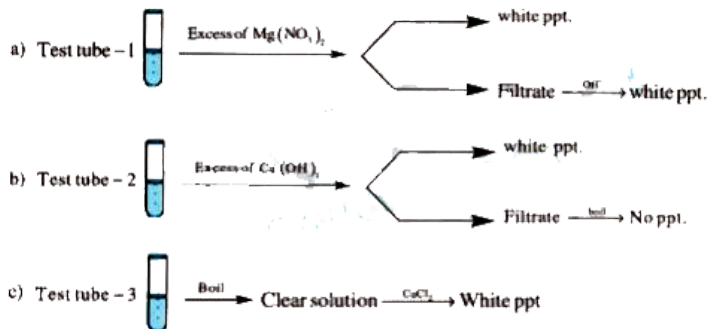
- A. It reacts with water
- B. It reacts with heavy water
- C. It is electrolysed in fused state
- D. It is heated for decomposition

Answer: A::C



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19. Consider following three observation in test tubes which may contain clear solution of CO_3^{2-} or HCO_3^{2-} or both



Select

statement(s) which is/ are true

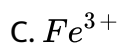
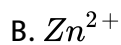
- A. Test tube-1 contains HCO_3^- ions
- B. Test tube-2 contains CO_3^{2-}
- C. Test tube-3 contains HCO_3^-
- D. Test tube-1 contains HCO_3^- and CO_3^{2-} both

Answer: A:D



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



Answer: A::B::C



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21. (C) is

A. Calcium hydroxide

B. Sodium hydroxid

C. Calcium oxide

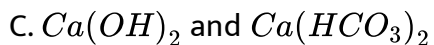
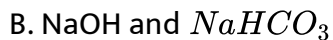
D. None of thes

Answer: A



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22. (E) and (F) are



D. None of these

Answer: A



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



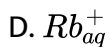
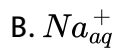
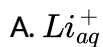
D. Both (a) and (b)

Answer: A



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24. The radius of which of the hydrated ion is the highest



Answer: A



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25. The ionic mobility of Li^+ is less than that of the Na^+ ion in solution because

- A. Li^+ ion has a high melting point
- B. Li^+ ion has the highest hydration tendency
- C. Li^+ ion has the highest ionisation enthalpy
- D. Li^+ ion has two electrons

Answer: B



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26. Washing soda on standing in air effloresces. How many water molecules are lost



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27. Calculate heat of solution of NaCl from the following data

Hydration energy of $Na^+ = -389 \text{ kJ mol}^{-1}$

Hydration energy of $Cl^- = -382 \text{ kJ mol}^{-1}$

Lattice energy of $NaCl = +776 \text{ kJ mol}^{-1}$



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



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29. The number of water molecules are associated with washing soda is X, then $X - 1 =$



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



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PRACTICE SHEET (LEVEL-1)(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The alkali metals are low melting. Which of the following alkali metals is expected to melt if the room temperature rises to 30°C ?

A. Na

B. K

C. Rb

D. Cs

Answer: D



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

A. Li

B. Na

C. K

D. Cs

Answer: A



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

A. Sublimation enthalpy

B. Ionisation enthalpy

C. Hydration enthalpy

D. Electron-gain enthalpy

Answer: C



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4. The order of decreasing ionization enthalpy in alkali metals is

A. $Na > Li > K > Rb$

B. $Rb > Na > K > Li$

C. $Li > Na > K > Rb$

D. $K > Li > Na > Rb$

Answer: C



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

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

Answer: B



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

- A. CaCl_2

B. NaCl

C. NaOH

D. NaHCO_3

Answer: A



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

A. 'ammoniated electron

B. sodium ion

C. sodium amide

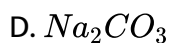
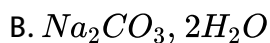
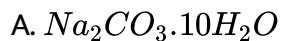
D. ammoniated sodium ion

Answer: A



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8. The formula of soda ash is



Answer: D



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9. The correct order of equivalent conductance at infinite dilution of LiCl, NaCl, KCl is



D. $LICI > KC1 > NaC$

Answer: B



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10. Aqueous solution of Na_2CO_3 is

A. Acidic

B. asic

C. Neutral

D. Highly acidic

Answer: B



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11. The super oxide among the following

A. BaO_2

B. PbO_2

C. KO_2

D. SnO_2

Answer: C



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12. Sulphates of which of the following does not form alum

A. Cs

B. K

C. Li

D. Na

Answer: C



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13. Alkali metals are good

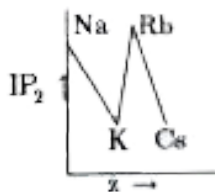
- A. Oxidising agents
- B. Reducing agent
- C. Bleaching agents
- D. dehydrating agent

Answer: B

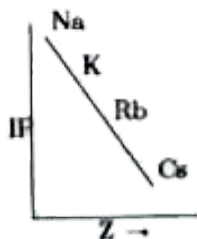


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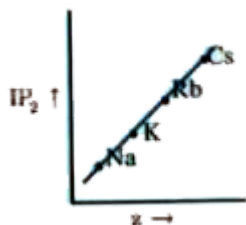
14. The correct graphical representation of IP_2 , values of Na, K, Rb, Cs



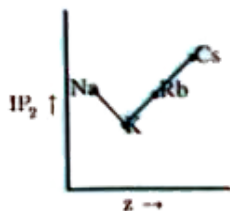
A.



B.



C.



D.

Answer: B



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15. $\text{NaCZ (Aq)} + \text{Ag NO}_3 \text{ (Aq)} \rightarrow \text{AgC} + \text{NaNO}_3 \text{ (Aq)}$. The change takes place in the reaction

- A. Loss of e^-
- B. gain of e^-
- C. both loss and gain of e^-
- D. rearrangement of ions

Answer: D



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PRACTICE SHEET LEVEL-II(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. When sodium (Na) metal is dissolved in liquid ammonia (NH_3), it imparts a blue colour to the solution. This blue colouration is due to

- A. Solvated electrons, $e^- (\text{NH}_3)_y$
- B. Solvated atomic solution, $\text{Na}(\text{NH}_3)_x$
- C. $\text{Na}^+ + \text{Na}^-$
- D. $\text{NaNH}_2 + \text{H}_2$

Answer: A



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2. Following statements regarding the periodic trends of chemical reactivity of alkali metals and halogens are given. Which of these statements give the correct picture?

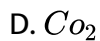
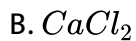
- A. In both, the alkali metals and the halogens, the chemical reactivity decreases with increase in atomic number down the group
- B. Chemical reactivity increases with increase in atomic number in both alkali metals and halogens
- C. In alkali metals the reactivity increases but in the halogens, it decreases with increase in atomic number down the group
- D. The reactivity decreases in the alkali metals but increases in the halogens with increase in atomic number down the group

Answer: C



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3. The by product of Solvay process is :



Answer: B



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4. Oxidation number of oxygen in KO_2 is



B. -2

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

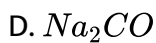
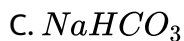
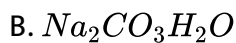
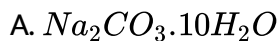
D. $+\frac{1}{2}$

Answer: C



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5. The outcome material from Solvay process is



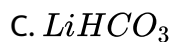
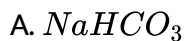
Answer: C



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6. A white, water soluble polymeric solid 'A' on heating releases CO_2 gas.

The residue is and reacts with acids to produce CO_2 . What is 'A'



Answer: A



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7. In Castner - Kellner process, the cathode in the outer chamber is

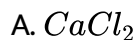


Answer: A



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8. Which of the following is /are recirculated in solvay process



D. Both (b) and (c)

Answer: D



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9. Which one is the highest melting halide ?



B. KBr

C. KF

D. KI

Answer: C



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10. A sodium fire in the laboratory is extinguished by

A. Water

B. Petrol

C. Alcohol

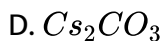
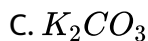
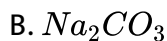
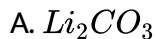
D. CCl_4

Answer: D



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11. Which of the following alkali metal carbonates decomposes easily by heat

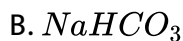
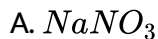


Answer: A



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



C. Na_2CO_3

D. NaC

Answer: B



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

A. A precipitate will form

B. Strength will decrease

C. Strength will increase

D. The concentration of Na^+ ions will remain constant

Answer: B



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14. As we move down the group covalent character decreases, solubility increases and thermal stability increases for which of the following?

- A. Fluorides of alkali metal
- B. carbonates of alkali metal
- C. Sulphates of alkali earth metal
- D. None of these

Answer: B



View Text Solution

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

- A. NaCl
- B. NaF
- C. NaBr
- D. NaI

Answer: D



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PRACTICE SHEET MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS

1. Which among the following is coloured and paramagnetic

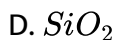
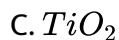
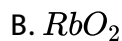


Answer: B



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2. Which of the following compounds(s) is/are paramagnetic

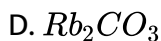
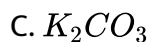
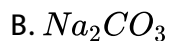
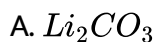


Answer: A::B::C



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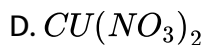
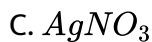
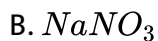
3. Which of the following alkali metal carbonates is/are water soluble and produce alkaline solution ?



Answer: B::C::D

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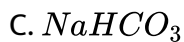
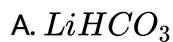
4. Nitrogen dioxide cannot be obtained by heating



Answer: A::B::C

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



D. NH_4HCO

Answer: B::C::D



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PRACTICE SHEET PASSAGE-I

1. 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 when it is heated and concentrated, then its colour becomes bronze

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

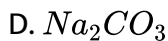
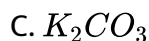
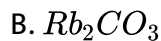
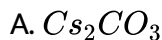
Answer: C



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2. 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 when it is heated and concentrated, then its colour becomes bronze

Among the carbonates of alkali metals which one has highest stability



Answer: A



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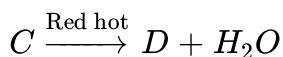
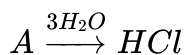
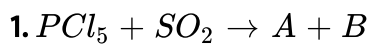
3. Which of the following statement about solution of alkali metals in liquid ammonia is correct

- A. The solution have strong oxidizing properties
- B. Both the dilute solution as well as concentrated solution are paramagnetic in nature
- C. Both the dilute solution as well as concentrated solution are paramagnetic in nature
- D. Charge transfer is the responsible for the colour of the solution

Answer: D



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Compound 'A' is

A. 0

B. 1

C. -2

D. -1

Answer: A



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2. Find the co-ordination number of Lithium chloride in its crystalline state

A. least basic among their alkali metal analogues

- B. most basic among their alkali metal analogues
- C. of intermediate basic strength among their alkali metal analogue
- D. All the above

Answer: A



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PRACTICE SHEET INTEGER TYPE QUESTIONS]

1. Find the co-ordination number of Lithium chloride in its crystalline state



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2. Out of given chemicals, number of chemicals which is/are related to Solvay process :

NH_3 , KCl , CO_2 , SO_2 , $Ca(OH)_2$, $NaCl$, H_2SO_4 , $NaNO_3$



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3. Total number of alkali metals (non-radioactive) which produce superoxide when burn with excess of O_2 is



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4. Write atomic number difference bewteen 1st alkali metal and alkali earth metal of 3rd period of periodic table



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5. Out of given hydroxides find number of hydroxide(s) which can form salt with

CO_2 . $NaOH$, KOH , $RbOH$, $CsOH$, $Ca(OH)_2$, $Sr(OH)_2$, $Sr(OH)_2$, $Ba(OH)_2$



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ADDITIONAL PRACTICE EXERCISE(LEVEL - I MAIN)(STRIGHT OBJECTIVE TYPE QUESTIONS)

1. Prefix 'alkali' for alkali metals denotes

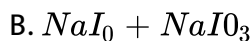
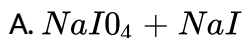
- A. Silvery lustre
- B. Metallic nature
- C. Ashes of plants
- D.

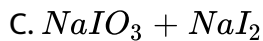
Answer: D



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





Answer: D



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3. KO_2 is used in space crafts and submarines because it

A. absorbs CO_2 and moisture to increase O_2 concentration

B. absorbs moisture

C. absorbs CO_2

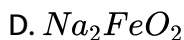
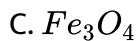
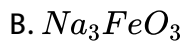
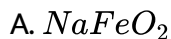
D. produces ozone

Answer: A



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4. $\text{Na}_2\text{CO}_3 + \text{Fe}_2\text{O}_3 \rightarrow \text{A} + \text{CO}_2$ What is A in the reaction?

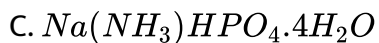


Answer: A



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5. Microcosmic salt is



Answer: A



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6. Indian Saltpetre is

A. KNO_3 ,

B. $NaNO_3$

C. $NaCl$

D. Na_2CO_3

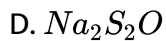
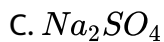
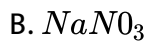
Answer: A



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7. Chile salt petre is

A. KNO_3

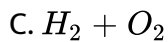
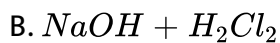
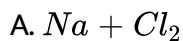


Answer: B



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



Answer: B



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9. 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. Both (b) and (c)

Answer: A



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

- A. $MF > MCl > MBr > MI$
- B. $MF > MCl > MI > MBr$
- C. $MI > MBr > MCl > MF$
- D. $MCl > MI > MBr > MF$

Answer: C



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11. The metallic lustre of sodium is explained by the presence of

- A. Na ions
- B. The oscillation of loosely bounded electrons
- C. Loosely held electrons
- D. bcc lattice

Answer: B



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12. Among the alkali metals, the strongest reducing agent in aqueous medium is

A. Li

B. Na

C. K

D. Rb

Answer: A



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13. Potassium gives a _____ colour to the Bunsen flame

A. violet

B. blue

C. apple green

D. brick red

Answer: A



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14. Which of the following is strongly hydrated in aqueous solution

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

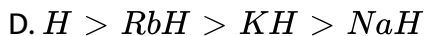
Answer: A



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

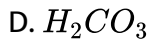
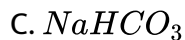
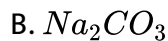
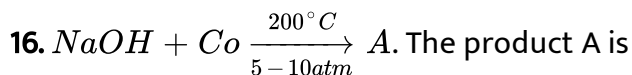
- A. $LiH > NaH > KH > RbH$
- B. $NaH > KH > RbH > LiH$
- C. $RbH > KH > NaH > LiH$



Answer: A



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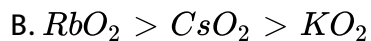


Answer: A



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

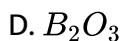
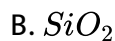


Answer: C



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18. Which of the following oxides is not expected to react with sodium hydroxide



Answer: A

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

A. Na

B. H_2O

C. CO_2

D. H_2

Answer: D

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20. Which of the following elements has the lowest melting point?

A. NaCl

B. NaF

C. NaBr

D. Na

Answer: D



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21. Oxone is

A. CaO

B. N_2O

C. Na_2O_2

D. $NaBO_3$

Answer: C



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

- A. weak oxidising agent
- B. strong reducing agents
- C. strong oxidising agents
- D. weak reducing agent

Answer: B



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

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

Answer: D



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24. Which of the following alkali metal has the highest tendency in the half reaction? $M(g) \rightarrow M^{+}(g) + e^{-}$

A. Na

B. Li

C. K

D. Cs

Answer: D



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25. Mark the incorrect statement about lithium

A. lithium metal is not affected by air

B. when burnt in oxygen, lithium metal form superoxide, LiO_2

C. lithium combines with nitrogen directly to form lithium nitride

lithium has great tendency to form hydrates

D. lithium has great tendency to form hydrate

Answer: B



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26. All the alkali metals give characteristic flame test. The decreasing order of frequency of light emitted by them is

A. $\text{Li} > \text{Na} > \text{K} > \text{Rb} > \text{Cs}$

B. $\text{Li} > \text{Na} = \text{K} = \text{Rb} > \text{Cs}$

C. $\text{Li} = \text{Na} > \text{K} > \text{Rb} = \text{Cs}$

D. $\text{Cs} > \text{Rb} > \text{K} > \text{Na} > \text{Li}$

Answer: D



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27. An alloy used in electric eye. which is used in television is made up of

A. Na, Ag

B. Cs. Ag

C. Cs, Au

D. Na, Au

Answer: B



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28. The role of mercury in Castner-Kellner process is

A. Hg is bad conductor

- B. mercury is metal
- C. Hg acts as an intermediate electrode
- D. Mercury is non toxic

Answer: C



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29. Causticising process is used in the preparation of

- A. Baryta
- B. Slaked lime
- C. Caustic soda
- D. Caustic Potash d) NaCl , H_2O

Answer: C



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30. The products formed when hot and cone. NaOH react with Cl_2

- A. NaCl, $NaClO_3$
- B. NaCl, NaOCl
- C. $NaClO_3$, NaOC
- D. NaCl, H_2O

Answer: A



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ADDITIONAL PRACTICE EXERCISE LEVEL-II(LECTURE SHEET (ADVANCED)MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS)

1. Which of the following compound is/are efflorescent

- A. Washing soda
- B. Caustic soda

C. Caustic potash

D. Epsom salt

Answer: A::D



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2. Brine solution on electrolysis will give

A. NaOH

B. Cl_2

C. O_2

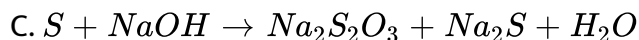
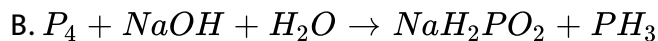
D. H_2

Answer: A::B::D



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3. Which of the following reaction(s) is/are correct?



Answer: A::B::C



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4. When a mixture of LiO_2CO_3 and $Na_2CO_3 \cdot 10H_2O$ is heated strongly, there occurs a loss of mass due to

A. Decomposition of Li_2CO_3

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

C. Decomposition of $Na_2CO_3 \cdot 10H_2O$

D. All the above

Answer: A::B



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

A. NaH_2PO_4 and Na_2HPO_4

B. Na_2CO_3 and NaHCO_3

C. NaOH and NaH_2PO_4

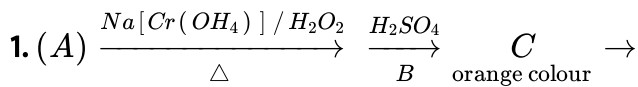
D. NaHCO_3 and NaOH

Answer: C::D



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ADDITIONAL PRACTICE EXERCISE LINKED COMPREHENSION TYPE QUESTIONS



(A) is

A. NaOH

B. NaCl

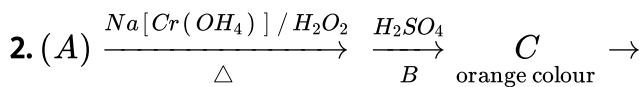
C. Na_2SO_4

D. All of these

Answer: A



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(A) is

A. $CrCl_3$

B. Na_2CrO_4

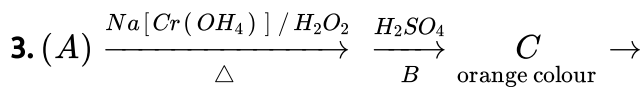
C. $Na_2Cr_2O_7$

D. All of these

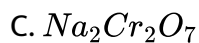
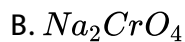
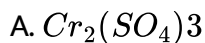
Answer: B



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(A) is



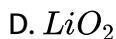
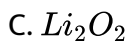
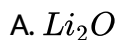
D. All of these

Answer: C



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4. 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. On heating in excess of oxygen, lithium gives



Answer: A



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5. 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. Na_2O_2 has light yellow colour. This is due to

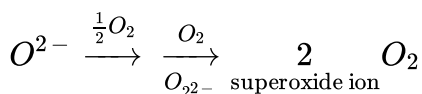
- A. Presence of unpaired electron in the molecule
- B. Presence of traces of NaO_2
- C. Presence of traces of Na_2O
- D. All

Answer: A



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6. Lithium forms monoxide only when heated in oxygen. Sodium forms monoxide and peroxide in excess of oxygen. Other alkali metals form superoxide with oxygen i.e MO_2 . The abnormal behaviour of lithium is due to small size. The larger size of nearer alkali metals also decides the role in formation of superoxides. The three ions are related to each other as follows



Lithium does not form stable peroxide because

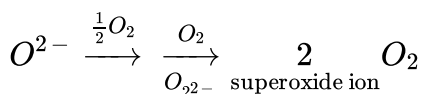
- A. of its small size
- B. d-orbitals are absent in it
- C. it is highly reactive and form superoxide in place of peroxide
- D. covalent nature of peroxide

Answer: A

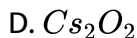
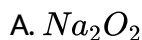


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7. Lithium forms monoxide only when heated in oxygen. Sodium forms monoxide and peroxide in excess of oxygen. Other alkali metals form superoxide with oxygen i.e MO_2 . The abnormal behaviour of lithium is due to small size. The larger size of nearer alkali metals also decides the role in formation of superoxides. The three ions are related to each other as follows



Lithium does not form stable peroxide because



Answer: B



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8. The first element of a group differs from 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



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9. Lithium exhibits many physical and chemical similarities with magnesium because

- 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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10. In dry air, lithium and sodium react to give

- A. Li_2O , Li_3N , Na_2O
- B. Li_2O , 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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11. Match the elements given in Column I with the colour they impart to the flame given in Column II

Column - I

- A) Cs
- B) Na
- C) K
- D) Ca

Column - II

- P) Violet
- Q) Brick red
- R) Yellow
- S) Blue



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12. Match the following columns

Column - I

- A) Crystal carbonate
- B) Black ash
- C) Gun powder
- D) Microcosmic salt

Column - II

- P) KNO_3 + charcoal + S
- Q) $\text{NaNH}_4\text{HPO}_4$
- R) $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$
- S) $\text{Na}_2\text{CO}_3 + \text{CaS}$



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1. Match the elements given in the Column - I with the properties mentioned in Column - II

Column - I

- A) Li
- B) Na
- C) Ca
- D) Ba

Column - II

- P) Insoluble sulphate
- Q) Strongest monoacidic base
- R) Most negative E° value among alkali metals
- S) Insoluble oxalate
- T) $6s^2$ outer electronic configuration



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2. Match the compound given in the Column - I with the uses mentioned in Column - II

Column - I

- A) Metal used in photoelectric cell
- B) Radioactive element
- C) Deliquescent
- D) Efflorescent

Column - II

- P) $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$
- Q) Francium
- R) NaOH
- S) Caesium



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ADDITIONAL PRACTICE EXERCISE PRACTICE SHEET (ADVANCED)(MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS)

1. Alkali metals 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::D



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2. Li has the following abnormal behaviour in its group

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

B. LiCl is covalent in nature

C. Li_3N is a stable compound

D. LiCl is a poor conductor of electricity in molten state

Answer: A::B::C



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3. Which among the following elements is paramagnetic

A. KO_2

B. K_2O_2

C. K_2O

D. NO_2

Answer: A::D



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4. 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



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5. The oxide(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



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ADDITIONAL PRACTICE EXERCISE ADDITIONAL QUESTIONS

1. On heating sodium metal in a current of dry ammonia gas, the compound formed is

- A. Sodium nitrate
- B. Sodium hydride
- C. Sodium amide
- D. Sodium azide

Answer: C



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2. Which alkali metal reacts with nitrogen to form nitride?

A. Li

B. Na

C. Cs

D. None of these

Answer: A



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3. Sodium carbonate is manufactured by Solvay process. The products those are recycled are

A. CO_2 and NH

B. CO_2 and NH_4Cl

C. NaCl and CaO

D. $CaCl_2$ and CaO

Answer: A



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4. Fusion of AgCl with Na_2CO_3 gives:

A. Ag_2CO_3

B. silver carbide

C. Ag

D. Ag_2O

Answer: C



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5. Potassium superoxide is used in oxygen cylinders in space and submarines because it

A. absorbs CO_2 and increase O_2 content

B. eliminate moisture

C. absorbs CO_2

D. Produces O_3

Answer: A



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6. The magnetic moment of KO_2 at room temperature is

A. 1.41 B.M

B. 1.73 B.M.

C. 2.23 B.M.

D. 2.64 B.M

Answer: B



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7. The solubility of alkali metal hydroxides follows the order



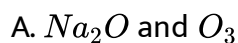
D. none of these

Answer: A



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8. Sodium peroxide which is a yellow solid, when exposed to air becomes white due to the formation of



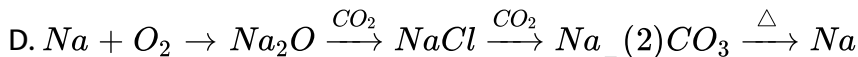
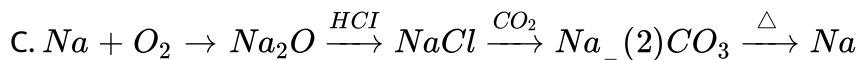
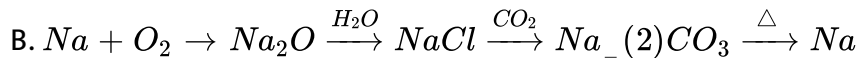
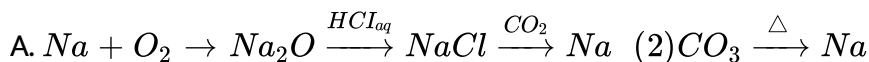
D. NaOH and H_2O_2

Answer: C



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9. Which sequence of reaction show chemical relation between sodium and its compound



Answer: A



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10. For alkali metals, which one of the following trends is incorrect

A. Hydrogen energy : $\text{Li} > \text{Na} > \text{K} > \text{Rb}$

B. Ionization energy : $\text{Li} > \text{Na} > \text{K} > \text{Rb}$

C. Density : $\text{Li} < \text{Na} < \text{K} < \text{Rb}$

D. Atomic size : $\text{Li} < \text{Na} < \text{K} < \text{Rb}$

Answer: C



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11. A compound of sodium does not give CO_2 when heated but it gives CO_2 when treated with dilute acids. A crystalline compound is found to have 37.1 percent Na and 1.6 percent H_2O . Hence the compound is

A. $\text{NaHCO}_3, 10\text{H}_2\text{O}$

B. $\text{NaHCO}_3 \cdot 5\text{H}_2\text{O}$

C. $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$

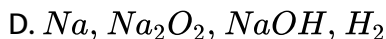
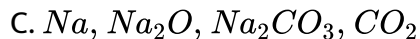
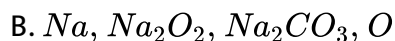
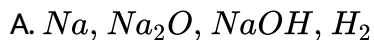


Answer: D



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12. Metal A reduces silica converting itself into B. B absorbs moisture and converts into C. When C is heated with the reduction product of silica liberates a gas. Then A,B,C and gas are



Answer: A



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13. LiF is less soluble in water than KF because

- A. LiF more is covalent than KF
- B. LiF has higher lattice energy than KF
- C. LiF has higher enthalpy of hydration than KF
- D. Li⁺ ions are not extensively hydrated than K⁺ ions

Answer: B



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14. $A + H_2O \rightarrow NaOH$, $A + O_2 \xrightarrow{400^\circ C} B \xrightarrow[at 25^\circ C]{H_2O} NaOH + O_2$ Which of the following statement is false regarding B.

- A. B turns green chromic salt solution to yellow
- B. B can be used to purify the air in submarines
- C. B can be used as an oxidizing agent

D. When crystallized from solution B is obtained as an anhydrous compound

Answer: D



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15. When a mixture of LiO_2CO_3 and $Na_2CO_3 \cdot 10H_2O$ is heated strongly, there occurs a loss of mass due to

A. it has lower m.pt than Na_2CO_3 and converts metal salts to carbonates which decompose to metal oxides

B. it has higher m.pt than K_2CO_3 and converts metal salts to carbonates, which decompose to metal oxides

C. it has lower melting point than both Na_2CO_3 and K_2CO_3 , and converts the metal salts to carbonates, which decompose to metal oxides

D. it has higher melting point than both Na_2CO_3 and K_2CO_3 and converts the metal salts to carbonates which decompose to metal oxide

Answer: C



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SUBJECTIVE EXERCISE 1 (LONG ANSWER QUESTIONS)

1. How are following properties of alkali metals varyig in the group (a) Ionisation enthalpy (b) atomic and ionic size (c) reaction with H_2 .



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2. Discuss a) Electronic configuration b) occurence

c) chemical reactivity with reference to alkalimetals hence justify the inclusion of alkali metals in the same group.



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3. Enumerate the anomalous behaviour of Li



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4. In what respects does Li show diagonal relationship with Mg?



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SUBJECTIVE EXERCISE 1 (SHORT ANSWER QUESTIONS)

1. How do alkali metals occur in nature? Discuss



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2. Mention IA group elements. Write the electronic configuration of any four of the alkalimetals.



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3. Mentiion any four aspects of anomalous behavious of Li



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4. Write a note on the variation of atomic radius in alkalimetals



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5. Why do the respective elements of the short periods show diagonal relation? Explain



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6. Explain how the radii of the alkali metals vary in the group? Are they obeying the periodic law.



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7. Write short note on the nature of alkali metals reaction with O_2



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8. Give three uses of sodium metal.



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SUBJECTIVE EXERCISE 1 (VERY SHORT ANSWER QUESTIONS)

1. How do the alkali metals occur in nature? Give the names and formulae of any two minerals of an alkali metal.



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2. Write the electronic configuration of K and Rb



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3. Why does the first element in a group show anomalous behaviour. Give a reason



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4. What elements show diagonal relationship? Give an example



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5. How are IE's changing in the 1st group elements and why?



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6. Sizes of alkali metals are the biggest in a given period. Why?



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7. An active metal (M) gives its only oxide MO_2 . Guess the metal.



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SUBJECTIVE EXERCISE 2 (LONG ANSWER QUESTIONS)

1. Write an essay on the manufacture of $NaOH$ by castner - kellner process.



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2. Describe Solvay process of preparing soda ash with suitable equations.



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SUBJECTIVE EXERCISE 2 (SHORT ANSWER QUESTIONS)

1. How do you convert lime stone into caustic soda? Give equations.



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2. What is the role of mercury in the manufacture of caustic soda. Give necessary equations.



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3. Which is better oxidizing agent $NaNO_3$ or $NaNO_2$? Give the reaction to show that.



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4. Write about an electrolytic method to prepare Na_2CO_3



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5. What is the role of alkali metal ions in biology



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6. Write the equations for the reaction of Carbon and Silicon with NaOH

.



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7. To an aluminium sulphate solution an excess of sodium hydroxide solution is slowly added with shaking. Write the reactions.



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8. How is common salt purified ?



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SUBJECTIVE EXERCISE 2 (VERY SHORT ANSWER QUESTIONS)

1. Why are the elements of group 1 called alkali metals ?



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2. Give equations for the formation of caustic soda from NaCl .



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3. Why is sodium hydroxide called caustic soda?



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4. An equimolecular mixture of Na_2CO_3 and $NaHCO_3$ is heated in rotary vaccum kiln. Explain what happens ?



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5. Write the difference between soda ash and washing soda.



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6. Write an equation for the reaction of Na_2CO_3 with S in a current of SO_2 gas



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7. Write the use of Na_2CO_3 in laundries ?



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8. How is sodium bicarbonate prepared in the laboratory ?



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9. What happens when sodium bicarbonate is strongly heated ?



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10. Aqueous solution of sodium carbonate is alkaline. Why?



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OBJECTIVE EXERCISE - 1

1. Which of the following ions, has polarizing power close to that of Mg^{2+}

A. Rb^{+}

B. K^+

C. Na^+

D. Li^+

Answer: D



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2. Alkali metals are

A. Representative elements

B. Metalloids

C. Inner transition elements

D. Noble metals

Answer: A



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3. The most abundant alkali metal in the earth's crust is

- A. Lithium
- B. Sodium
- C. Caesium
- D. Potassium

Answer: B



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4. The lightest metal among the following is

- A. Be
- B. Li
- C. H
- D. Na

Answer: B



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5. Among the following most reactive metal is

A. Mg

B. Na

C. CS

D. Ca

Answer: C



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6. Alkali metals are soft and have low melting point and boiling point due to

- A. Inter atomic bonds are weak
- B. Inter atomic bonds are strong
- C. Low ionisation potential
- D. Smaller atomic size

Answer: A



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7. The pair of elements with the following atomic numbers are chemically similar

- A. 13, 12
- B. 13, 15
- C. 3, 11
- D. 2, 8, 8.

Answer: C



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8. In certain respects, lithium differs from other alkali metals. The main reason for this is

- A. Small size of lithium atom and Li^+ ion
- B. Extremely high electro positivity of Li
- C. Greater hardness of Li
- D. Hydration of Li^+ ion

Answer: A



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9. Which of following reacts most voilently with water

- A. Na
- B. K

C. Cs

D. Rb

Answer: C



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10. (A) : Sodium metals is stored in kerosene

(R): The density of sodium is less than water

A. Both A and R are correct and 'R' is the correct explanation of A

B. Both A and R are correct and 'R' is not the correct explanation of A

C. A is correct but R is false

D. A is false but R is correct

Answer: B



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11. (A) : Alkali metals are good reducing agents

(R) : Alkali metals possess high oxidation potentials

- A. Both A and R are true, and R is correct explanation of A
- B. Both A and R are true, and R is not the correct explanation of A
- C. A is true but R is false
- D. A is false but R is true

Answer: A



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12. The first three elements of group 1 have the following atomic structure

- 1) Lithium : 3p, 4n , 2, 1 electrons
- 2) Sodium : 11p, 12n, 2,8,1 electrons
- 3) Potassium : 19p, 20n , 2, 8, 8, 1 electrons

Which of the following features causes them to have similar properties?

Each atom has

- A. The same number of protons
- B. More protons than electrons
- C. Two electrons in the first shell
- D. One electron in the outermost shell

Answer: D



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13. Mark the false statement

- A. The electropositive character of alkali metals decreases with increase in atomic number
- B. Lithium is a hard metal and cannot be cut with a knife
- C. Alkali metals are strong reducing agents

D. Electronegativities of all alkali metals lie between 1.0 and 0.7

Answer: A



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14. Identify the correct statement

- A. Elemental sodium can be prepared and isolated by electrolysis of an aqueous solution of NaCl
- B. Elemental Na is a strong oxidising agent
- C. Elemental Na is insoluble in NH_3
- D. Elemental Na is easily oxidised

Answer: D



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15. Pick up the correct statement about the solution of an alkali metal in liquid ammonia

- A. The solution shows paramagnetism which decreases with increasing concentration
- B. The solution is a good conductor of electricity whose conductivity increases on cooling
- C. The solution is a good reducing agent
- D. All are correct

Answer: D



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16. Potassium metal is - and then sodium?

- A. Lighter, softer, more reactive
- B. Heavier, softer, less reactive

C. Lighter, harder, more reactive

D. None of the above

Answer: A



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17. Statement-I: Lithium hydride is the stablest of all the alkali metal hydrides

Statement-II: The lattice energies of alkali metal halides decrease as the size of the halide ion increases

A. Both the statements are true

B. Both the statements are false

C. I is false and II is true

D. I is true and II is false

Answer: A



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18. Wrong match is

- A. K-density less than sodium
- B. K-photo electric cells
- C. Na-most abundant alkali metal in earth's crust
- D. Na-Present in Chlorophyll

Answer: D



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

- A. Sublimation enthalpy

B. Ionisation enthalpy

C. Hydration enthalpy

D. Electron gain enthalpy

Answer: D



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20. A colourless salt gives violet colour to Bunsen flame and also turns moist litmus paper blue. The salt is

A. Na_2CO_3

B. KNO_3

C. K_2CO_3

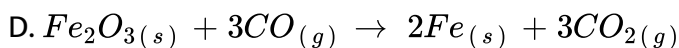
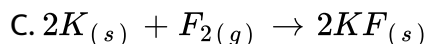
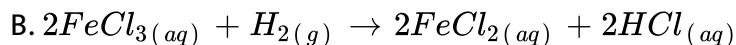
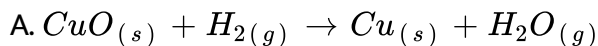
D. $Cu(OH)_2$

Answer: C



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21. In which of the following the metal is getting oxidised ?



Answer: C



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22. (A): Lithium reacts with water more vigorously than sodium

(R): Lithium possesses small size and very high hydration energy

The correct answer is

A. (A) is correct but (R) is not correct

B. (A) is not correct but (R) is correct

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

(A)

D. Both (A) and (R) are correct but (R) is not the correct explanation of

(A)

Answer: B



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23. Peroxides of alkali metals are

A. Paramagnetic

B. Diamagnetic

C. Acidic in nature

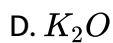
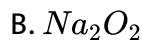
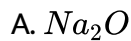
D. Amphoteric in nature

Answer: B



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24. Which of the following is paramagnetic ?



Answer: C



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25. The metal that gives mainly a monoxide when heated in excess of O_2 is



D. Li

Answer: D



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26. The oxidation statel of oxygen in superoxide is

A. -1

B. -2

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

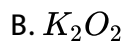
D. $+1$

Answer: C



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27. Potassium metal is heated strongly in O_2 . It produces



Answer: C



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28. (A): The lattice energy of superoxide of alkali metals increases with an increase in the size of the metal ion

(R) : Lattice energy is directly proportional to size of the metal ion

A. Both A and R are true, and R is correct explanation of A

B. Both A and R are true, and R is not the correct explanation of A

C. A is true but R is false

D. A is false but R is true

Answer: C



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29. The following compounds of all alkali metals are coloured

A. Chlorides

B. Carbonates

C. Oxides

D. Superoxides

Answer: D



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30. The species which contains unpaired electrons is

A. Oxide ion

B. Peroxide ion

C. Superoxide ion

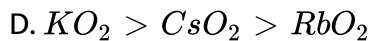
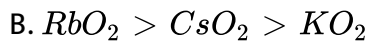
D. Suboxide ion

Answer: C



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

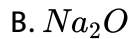
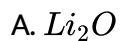


Answer: C



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32. Which among the following is coloured and paramagnetic

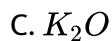
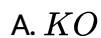


Answer: D



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33. The non existing compound is



Answer: A



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34. The least soluble hydroxide in H_2O is

A. $LiOH$

B. $NaOH$

C. $RbOH$

D. $CsOH$

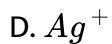
Answer: A



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35. Hydroxide of following ion is highly water soluble

A. Ni^{2+}

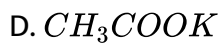
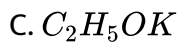
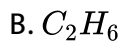
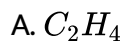


Answer: C



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36. The solution of KOH in ethyl alcohol contains

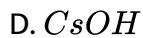
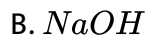


Answer: C



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37. The most basic hydroxide is



Answer: D



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38. The most stable hydroxide is

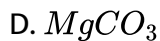
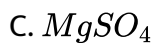
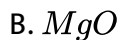
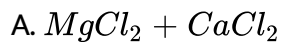


Answer: D



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39. Common table salt is hygroscopic due to the presence of



Answer: A



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40. Statement I: Crude common salt is hygroscopic because of impurities



Statement II : The increase in solubility of hydroxides down the group 2 elements is due to increase in lattice energy

- A. Both the statements are true
- B. Both the statements are false
- C. I is false and II is true
- D. I is true and II is false

Answer: B



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41. Considering greater polarization in LiCl compared to that in NaCl, which of the statements you would expect to be wrong?

- A. LiCl has lower melting point than NaCl
- B. LiCl dissolves more in organic solvents
- C. LiCl will ionize in water more than NaCl

D. Fused LiCl would be less conducting than fused NaCl

Answer: C



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42. The enthalpy of formation is more negative for

A. LiF

B. NaF

C. KF

D. CsF

Answer: D



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43. Which halide exists as a hydrated salt

A. $LiCl$

B. $NaCl$

C. KCl

D. $RbCl$

Answer: A



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44. Alkali metal halides can be prepared by the reaction of aqueous hydrohalic acid with

A. Alkali metal oxide

B. Alkalimetal hydroxide

C. Alkali metal carbonate

D. Any of the above

Answer: D

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45. The electrolyte used in the outer and the inner compartment in the Castner-Kellner cell are

- A. Brine solution and dil. NaOH
- B. Fused NaCl and conc. NaOH
- C. NaOH and NaCl
- D. Fused NaOH and Brine

Answer: A

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46. NaOH is least soluble in

- A. H_2O
- B. Ethanol

C. CCl_4

D. Dil. HCl

Answer: C



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47. $NaOH$ liberates NH_3 with

A. NH_4Cl

B. $(NH_4)_2SO_4$

C. $(NH_4)_2CO_3$

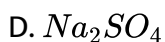
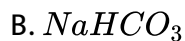
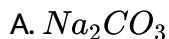
D. All the above

Answer: D



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48. CO_2 can be easily absorbed by



Answer: C



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49. The role of using mercury as cathode and anode at the bottom of the tank in the Castner-Kellner cell is

A. mercury is non toxic

B. mercury is a bad conductor

C. mercury acts as intermediate electrode and discharges Na easily

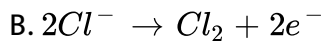
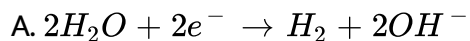
D. mercury is a metal

Answer: C



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50. In Castner Kellner cell, reaction at mercury cathode is



Answer: D



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51. $NaOH$ exhibits disproportionation reaction with



B. HCl

C. H_2SO_4

D. Cl_2

Answer: D



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52. When a crystal of $NaOH$ is exposed to air a liquid layer is developed on its surface because

A. Crystal melts

B. It loses water to the surroundings

C. It absorbs moisture and CO_2 from the surroundings

D. It undergoes sublimation

Answer: C



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53. When a crystal of NaOH is exposed to air a liquid layer is developed on its surface because

- A. crystal melts
- B. crystal loses water
- C. crystal absorbs moisture and CO_2
- D. crystal sublimates

Answer: C



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54. The main reason for using a mercury electrolytic cell in NaOH manufacture is that

- A. Hg is toxic
- B. Natis discharged at cathode

C. Hg has a high vapour pressure

D. Hg is a good conductor of electricity

Answer: B



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55. Caustic soda is

A. Efflorescent

B. Hygroscopic

C. Deliquescent

D. Oxidant

Answer: C



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56. In the Castner -Kellner process, the gases that are liberated at outer and middle compartment are respectively

A. H_2 and Cl_2

B. Cl_2 and H_2

C. Cl_2 and O_2

D. O_2 and Cl_2

Answer: B



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57. Soda ash is chemcially

A. Na_2CO_3

B. $Na_2CO_3 \cdot 10H_2O$

C. $Na_2CO_3 \cdot H_2O$

D. $NaHCO_3$

Answer: A



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58. Aqueous solution of Na_2CO_3 is

- A. Acidic
- B. Basic
- C. Neutral
- D. Highly acidic

Answer: B



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59. Alkali metals used in photoelectric cells

- A. Li

B. Li, Na

C. Li, Na, K

D. K, Cs

Answer: D



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60. Solvay process is used in the manufacture of

A. K_2CO_3

B. $KHCO_3$

C. Na_2CO_3

D. $CaCl_2$

Answer: C



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61. In Solvay's process NaHCO_3 separates out due to

- A. high lattice energy
- B. high solubility
- C. common ion effect
- D. less solubility of Na_2CO_3

Answer: C



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62. Aqueous solution of NaHCO_3 is alkaline

- A. because of cationic hydrolysis
- B. because of anionic hydrolysis
- C. because it is acidic salt
- D. because it is basic salt

Answer: B



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63. (A): Aqueous solution of Na_2CO_3 is acidic in nature

(R): Na^+ ion undergoes hydrolysis to produce $NaOH$ and H^+ ions

- A. Both A and R are true, and R is correct explanation of A
- B. Both A and R are true, and R is not the correct explanation of A
- C. A is true but R is false
- D. Both A and R are false

Answer: D



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64. Baking soda is

- A. sodium bisulphate
- B. sodium carbonate
- C. sodium bicarbonate
- D. potassium carbonate

Answer: C



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65. Which of the following set of raw materials are used in the manufacture of Na_2CO_3 by Solvay process?

- A. $Ca(OH)_2$, NH_3 , CO_2
- B. $CaCl_2$, NH_3 , CO_2
- C. $NaOH$, NH_3 , CO_2
- D. $NaCl$, NH_3 , CO_2

Answer: D



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66. Which of the following does not participate in the Solvay's process for the manufacture of Na_2CO_3 ?

A. NH_3

B. $NaCl$ solution

C. CO_2

D. H_2SO_4

Answer: D



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67. Which bicarbonate does not exist in solid state

A. $LiHCO_3$

B. $NaHCO_3$

C. $KHCO_3$

D. All

Answer: A



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68. When CO_2 is bubbled into an aqueous solution of $NaCO_3$ is formed

A. H_2O

B. OH^-

C. $NaHCO_3$

D. $NaOH$

Answer: C



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69. When washing soda is heated

- A. CO is released
- B. $CO + CO_2$ is released
- C. CO_2 is released
- D. water vapour is released

Answer: D



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70. The principle involved in Ammonia-solvay process is

- A. Low solubility of Na_2CO_3
- B. High solubility of Na_2HCO_3
- C. Low solubility of $NaHCO_3$
- D. High hydration energy and lattice energy of $NaHCO_3$

Answer: C



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71. When CO_2 is passed into aqueous solution of Na_2CO_3 the following is formed

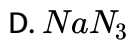
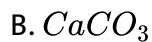
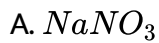


Answer: B



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72. Which of the following is used as nitrogeneous fertilizer in agriculture ?



Answer: A



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73. Which halide is found in sea water

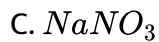
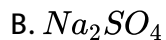


Answer: A



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74. Chile salt petre is

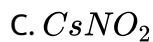
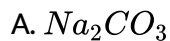


Answer: C



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75. Which of the following is not an oxo salt of alkali metals?



D. $RbCl$

Answer: D



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76. Statement-I: Li_2CO_3 decomposes on heating to give CO_2 gas

Statement-II: Carbonated of alkali metals give weakly alkaline solutions due to the hydrolysis of carbonate ion

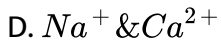
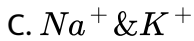
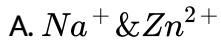
- A. Both the statements are true
- B. Both the statements are false
- C. I is false and II is true
- D. I is true and II is false

Answer: A



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77. Which ions are responsible for the electrical potential across the cells membrane ?



Answer: C



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78. K^+ ions are essential for

A. Metabolism of glucose inside the cell

B. The synthesis of proteins

C. Activation of certain enzymes

D. All

Answer: D



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79. The ion that is pumped out from the cells is

A. Na^{+}

B. K^{+}

C. both

D. none

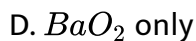
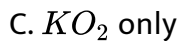
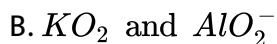
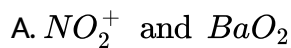
Answer: A



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OBJECTIVE EXERCISE - 2

1. Among KO_2 , AlO_2^- , BaO_2 and NO_2^+ , unpaired electron is present in

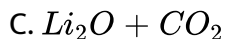
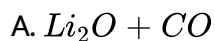


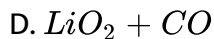
Answer: C



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2. What are the products formed when Li_2CO_3 undergoes decomposition?





Answer: C



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3. Metals having ns^1 as the valence electronic configuration

- A. act as strong oxidising agents
- B. are highly electronegative
- C. are highly electropositive
- D. have a first ionization potential of more than 10 eV/atom

Answer: C



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4. Alkali metals when exposed to air tarnish quickly due to the

- A. Formation of their hydroxides
- B. Formation of their carbonates
- C. Formation of their oxides
- D. All the above

Answer: D



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5. The alkali metal that can react differently in many reactions is

- A. *Na*
- B. *Rb*
- C. *K*
- D. *Li*

Answer: D



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6. Among alkali metal salts, the lithium salts are the poorest conductors of electricity in aqueous solution because of

- A. Easy diffusion of Li^+ ions
- B. Lower ability of Li^+ ions to polarize water molecules
- C. Lowest charge to radius ratio
- D. Higher degree of hydration of Li^+ ions

Answer: D



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7. Alkali metals impart colour to bunsen flame due to

- A. low ionization energies
- B. low melting points
- C. thier softness

D. the presence of one electron in the outer most shell

Answer: A



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8. The one which cannot be stored in water is

A. *Li*

B. *Na*

C. *K*

D. All

Answer: D



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9. Which of the following alloy is needed to make $PbEt_4$?

A. $Mg - Pb$

B. $Na - Pb$

C. $Mg - Al$

D. $Pb - Cs$

Answer: B



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10. Which of the following has highest conductivity in aqueous solution ?

A. Li^+ ion

B. Cs^+ ion

C. Na^+ ion

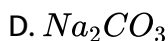
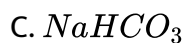
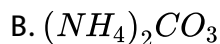
D. K^+ ion

Answer: B



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11. In solvay process when ammoniacal brine is saturated with CO_2 gas the product formed is

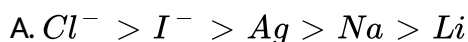


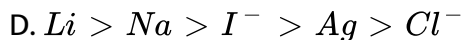
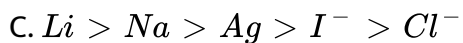
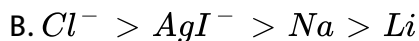
Answer: C



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12. E^0 values for $Cl_2, Cl^-, I_2^-, Ag^+, Ag, Na^+, Na, Li^+, Li$ are respectively $+1.36, +0.53, +0.79, -2.71$ and $-3.04V$. Correct decreasing order of reducing strength of I^-, Ag, Na and Li is





Answer: D



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13. The following are some statements about oxides of alkali metals

- i) The basic nature and solubility of these oxides increases from Li to Cs
- ii) The stability of superoxide of IA group elements increases down the group due to increase in lattice energy
- iii) KO_2 is orange red coloured and paramagnetic

A. only ii is correct

B. i and iii are correct

C. ii and iii are correct

D. all are correct

Answer: D



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14. The number of hydroxide ions produced by one molecule of Na_2CO_3 on hydrolysis

A. 4

B. 2

C. 3

D. 0

Answer: B



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15. The cathode in middle compartment of Castner-Kellner process is

A. Graphite

B. Mercury

C. Iron

D. Steel

Answer: C



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16. 'A' and 'B' are compounds of sodium. 'A' is thermally stable. On passing CO_2 through the solution of 'A', 'B' is formed. 'B' on heating gives 'A'. Phenolphthalein is added to the aqueous solution of 'A' and 'B'. The colours of solutions are

A. Colourless, Colourless

B. Pink, Colourless

C. Colourless, Pink

D. Pink, pink

Answer: B



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17. Sodium is heated in air at 300°C to form X, X absorbs CO_2 and forms Na_2CO_3 and Y. Which of the following is Y.

A. H_2

B. O_2

C. H_2O_2

D. O_3

Answer: B



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18. The most basic oxide amongst the following

A. BaO

B. MgO

C. BeO

D. CaO

Answer: A



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19. Alkali metals are so named because

A. of their large atomic sizes

B. of their oxides give strong bases in water

C. of their high reactivity in air

D. of their colours imparted in bunsen flame

Answer: B



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20. Sodium metal preserved under kerosine. This is to prevent

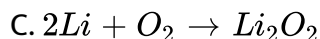
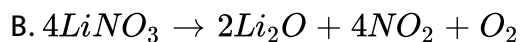
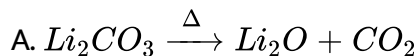
- A. volatility of metal
- B. reactivity in air
- C. reactivity with chlorine
- D. metallic luster

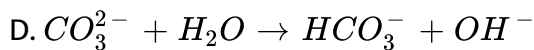
Answer: B



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21. Wrong reaction of the following





Answer: C



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22. The following some statments about IA group elements

- i) The redioactive IA group element is Fr
- ii) Alkali metals donot occurs in free state because of their high reactivity
- iii) The most abundant alkali metal in the earth is Na

A. only ii correct

B. i and ii are correct

C. All are correct

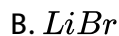
D. i and iii are correct

Answer: C



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23. Which of the following substances of lithium is most stable ?



Answer: A



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24. When a substance 'A' reacts with water it produces combustible gas B and a solution of a substance 'C' in water . A has no reaction with the solution of 'C' When another substance 'D' reacts with this solution of 'C' it also produces the same gas 'B' even on reaction with dilute sulphuric acid at room temperature . Here A,B,C and D are respectively.



B. K , H_2 , KOH and Na

C. Ca , O_2 , $Ca(OH)_2$ and Sn

D. CaI_2 , C_2H_2 , $Ca(OH)_2$ and Fe

Answer: C



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25. Which of the following hydrogen compounds is most ionic ?

A. LiH

B. CsH

C. HF

D. HI

Answer: B



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26. Sodium metal itself is used as

- A. oxidising agent
- B. dehydrating agents
- C. reducing agent
- D. bleaching agent

Answer: C



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27. Which of the following metal pairs liberate H_2 with $NaOH$

- A. Zn , Al
- B. Cu , Zn
- C. Ag , Zn
- D. Au , Zn

Answer: A



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28. The number of possible resonance forms for superoxide ion is

A. 2

B. 4

C. 3

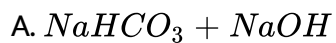
D. 1

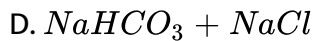
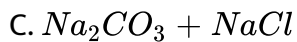
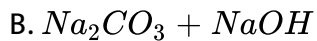
Answer: C



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29. Which of the following pair cannot exist together in solution ?



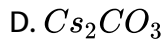
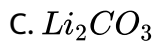
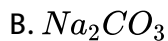
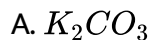


Answer: A



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30. The least soluble alkali metal carbonate is

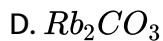
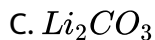
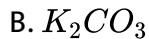
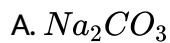


Answer: C



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31. Which one of the following decomposes easily on heating ?



Answer: C



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32. Except LiNO_3 , Nitrates of IA group on heating give



Answer: A



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33. Correct statement of the following is

- A. solubility of NaCl increass with increase in temperature
- B. Solubility of NaCl decreases with increase in temperature
- C. Solubility of NaCl does not change appreci-ably with increase in temperature
- D. NaCl is insoluble in water

Answer: C



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34. The addition of Na_2CO_3 , to the aqueous solution of an oxide produces CO_2 . This reaction indicates that

- A. Oxide is basic
- B. Oxide is neutral
- C. Oxide is that of a metal
- D. Oxide is that of a non-metal

Answer: D



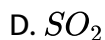
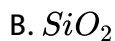
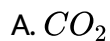
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35. In between the metals A and B, both form oxide but B also forms nitride, when both are heated in air. A and B are respectively

- A. *Cs, K*
- B. *Mg, Ca*
- C. *Li, Na*
- D. *K, Li*

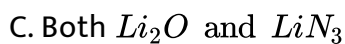
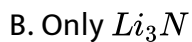
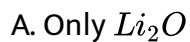
Answer: D

36. Which one of these is basic ?



Answer: D

37. Which of the following is formed when lithium is heated in air ?



D. Both Li_2O and Li_3N

Answer: C



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38. Which of the following is paramagnetic

A. Na_2O

B. Na_2O_2

C. KO_2

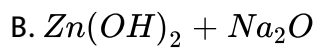
D. K_2O_2

Answer: C



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39. Zinc reacts with hot and concentrated NaOH and forms

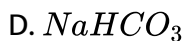
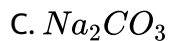
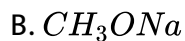


Answer: A



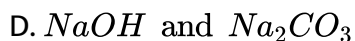
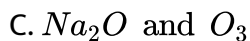
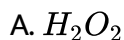
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40. The sodium hydroxide solution at the surface reacts with the CO_2 in the atmosphere to form



Answer: C

41. Sodium peroxide which is a yellow solid, when exposed to air becomes white due to the formation of



Answer: D

42. Sodium carbonate is soluble in water because

A. High lattice enthalpy

B. Low lattice enthalpy

C. Low molecular weight

D. High molecular weight

Answer: B



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43. Which of the following statements is not true for lithium ?

A. It is the hardest alkali metal

B. It reacts with nitrogen forming Li_3N

C. Li is the strongest reducing agent

D. Most of the compounds of Li are ionic

Answer: D



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44. Which of the following is not the correct use of caustic soda ?

- A. For mercerizing cotton
- B. In the manufacture of artificial silk
- C. In refrigeration
- D. To prepare soda lime

Answer: C



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45. Match the following

List - I

List - II

- | | |
|---------------|--------------------------|
| A) $NaOH$ | I) In fire extinguishers |
| B) $NaHCO_3$ | II) Water softner |
| C) Na_2CO_3 | III) Mercerising cotton |
| D) $NaCl$ | IV) Table salt |

A.

A	B	C	D
I	II	III	IV

B.

A	B	C	D
III	I	IV	II

- C. $\begin{matrix} A & B & C & D \\ III & I & II & IV \end{matrix}$
- D. $\begin{matrix} A & B & C & D \\ I & III & II & IV \end{matrix}$

Answer: C



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46. The statements regarding the compounds of sodium are

- (i) The mixture of NaOH and CaO is used as decarboxylating agent
- (ii) aq. NaOH reacts with silicon to form water glass

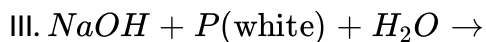
- A. only (i) is correct
- B. only (ii) is correct
- C. both (i) and (iii) are correct
- D. both (ii) and (iii) are wrong

Answer: D



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47. Consider the following reactions :



The correct set of reactions which gives gaseous product is :

A. I, II and III

B. Only I and II

C. Only I and III

D. Only II and III

Answer: A



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48. The following are statements regarding sodium carbonate

i) The formula of washing soda is $Na_2CO_3 \cdot 10H_2O$

ii) Black ash is a mixture of $\text{CaCO}_3 + \text{Na}_2\text{S}$

iii) The principal involved in the preparation of Na_2CO_3 by Solvay process is very low solubility of NaHCO_3 .

A. i and iii are correct

B. i and ii are correct

C. ii and iii are correct

D. all are correct

Answer: A



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49. Read the following statements

i) Crystal of NaOH are deliquescent

ii) The by product formed in Solvay process is CaCl_2

iii) NaHCO_2 is a mild antiseptic for skin infection

A. i and iii are correct

B. i and ii are correct

C. only iii are correct

D. all are correct

Answer: D



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50. Match the following

List - I

List - II

- | | |
|---------------|--------------------------|
| A) $NaOH$ | I) In fire extinguishers |
| B) $NaHCO_3$ | II) Water softner |
| C) Na_2CO_3 | III) Mercerising cotton |
| D) $NaCl$ | IV) Table salt |

A.

A	B	C	D
I	II	III	IV

B.

A	B	C	D
III	I	IV	II

C.

A	B	C	D
III	I	II	IV

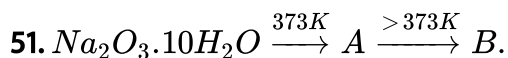
D.

A	B	C	D
I	III	II	IV

Answer: A



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'A' in the above reactions is

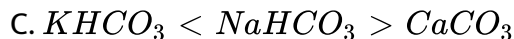
- A. Washing soda
- B. Monohydrate of Na_2CO_3
- C. Octahydrate of Na_2CO_3
- D. Soda ash

Answer: B



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52. Which of the following are arranged in increasing order of solubilities ?



Answer: B



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53. The following are the statements regarding NaOH i) It is prepared by Castner-Kelner process ii) The cathode in the outer compartments in mercury cathode method is Hg

A. both are correct

B. only (i) is correct

C. only (ii) is correct

D. both are wrong

Answer: A



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54. The metal that behaves odd when dissolved in a solution of caustic soda

A. *Al*

B. *Zn*

C. *Cu*

D. *Sn*

Answer: C



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55. The pair of compound which cannot exist together in solution is

A. NaHCO_3 and H_2O

B. Na_2CO_3 and NaOH

C. NaHCO_3 and NaOH

D. NaHCO_3 and Na_2CO_3

Answer: C



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OBJECTIVE EXERCISE - 3

1. The alkali metals form salt like hydrides by direct synthesis at elevated temperatures. The thermal stability of these hydrides decreases in which of the following orders?

A. $\text{KH} > \text{NaH} > \text{LiH} > \text{CsH} > \text{RbH}$

B. $\text{NaH} > \text{LiH} > \text{KH} > \text{RbH} > \text{CsH}$

C. $\text{LiH} > \text{NaH} > \text{KH} > \text{RbH} > \text{CsH}$



Answer: C



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2. Match List I (substance) with List II (processes) employed in the manufacture of the substance and select the correct option.

List - I (Substances)	List - II (Processes)
A) Sulphuric acid	i) Haber's process
B) Steel	ii) Bessemer's process
C) Sodium hydroxide	iii) Leblanc process
D) Ammonia	iv) Contact process

A. $(A - i), (B - iv), (C - ii), (D - iii)$

B. $(A - i), (B - ii), (C - iii), (D - iv)$

C. $(A - iv), (B - iii), (C - ii), (D - i)$

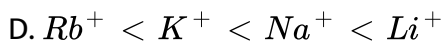
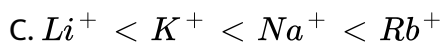
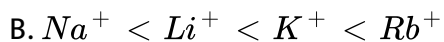
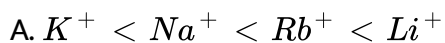
D. $(A - iv), (B - ii), (C - iii), (D - i)$

Answer: D



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3. The ease of adsorption of the hydrates alkali metal ions on an ion-exchange resins follows the order



Answer: D



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4. Which one of the alkali metals forms only the normal oxide, M_2O on heating in air ?



C. Rb

D. K

Answer: A



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5. Which of the statements is not true?

A. $K_2Cr_2O_7$ solution in acidic medium is orange

B. $K_2Cr_2O_7$ solution becomes yellow on increasing the pH beyond 7

C. On passing H_2S through acidified $K_2Cr_2O_7$ solution, a milky color is observed

D. Na_2Cr_2O is preferred over $K_2Cr_2O_7$ in volumetric analysis in the replacement reaction

Answer: D



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6. The reaction will be most favourable of M happens to be

A. Na

B. K

C. DRb

D. Li

Answer: C

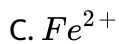


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7. The function of "Sodium pump" is a biological process operating in each and every cell of all animals. Which of the following biologically important ions is also a constituent of this pump?

A. Mg^{2+}

B. K^{+}

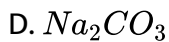
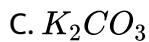
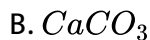
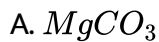


Answer: B



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8. On heating which of the following releases CO_2 most easily?



Answer: A



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1. Explain the general characteristics of alkali metal.



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2. Why are the elements of group 1 called alkali metals ?



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3. Write the electronic configuration of alkali metals. How is the configuration useful in explaining oxidation state and reactivity?



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4. What are the three types of oxides of alkali metals? Give their characteristics.



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5. Explain the chemical properties of alkali metals with respect to oxides and hydroxides.



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6. Distinguish between carbonates and bicarbonates of alkali metals.



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7. How do alkali metal salts give characteristic flame colours?



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8. Discuss on the anomalous behaviour of Li.



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9. Write similarities between lithium and magnesium.



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10. Lithium salts are mostly hydrated . Why ?



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11. Which of the alkali metals shows abnormal density ? What is the order of the variation of density among the IA group elements ?



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12. Lithium react with water less vigorously than sodium. Give your reason.



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13. Lithium Iodide is the most covalent among the alkali metal halides .
Give the reason.



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14. Write a short note on the reactivity of alkali metals towards air.



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15. Justify the inclusion of alkali metals in the same group of the periodic table with reference to the following.

(i) Electronic configuration.



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16. Discuss the similarities between alkaline earth metals and gradation in the following aspects: (i) Electronic configuration.



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17. Discuss on : (i) Carbonates.



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Exercise - 2.1.2

1. In the Castner's process of extraction of sodium, cathode is



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2. Sodium is a strong reducing agent'. Justify thhis with four examples.



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3. Sodium is tarnished in air. Why?





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4. Sodium catches fire in water. Why?



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5. How does sodium metal react with (a) sulphur, (b) alumina, (c) carbondioxides and (d) acetylene?



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6. Write four important minerals of sodium and write their composition.



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7. Write any four uses of sodium metal.



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Exercise - 2.1.3

1. Describe the Nelson's cell method for the preparation of chlorine.



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2. Write different reactions that occur at different electrodes of Castner-Kellner's cell.



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3. Describe the manufacture of caustic soda using Kellner-Solvay's cell.



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4. How does sodium hydroxide react with metals?



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5. Discuss the reactions of sodium hydroxide with the following non-metals : (a) chlorine, (b) sulphur, (c) phosphorus and (d) silicon.

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6. Write the reactions of caustic soda with different types of salts.

 [Watch Video Solution](#)

7. Describe Le Blanc process.

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8. What are different stages in Solvay's process?

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9. What happens when sodium carbonate (a) is treated with sulphuric acid, (b) fused with silica, (c) treated with sulphur dioxide and sulphur and (d) treated with magnesium chloride?



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10. Describe the important uses of caustic soda.



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11. Describe the important uses of sodium carbonate.



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12. How is sodium sulphate prepared? Write its uses.



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13. Mention the preparation and uses of sodium nitrate and sodium nitrite.



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14. In what respects lithium hydrogen carbonate differs from other alkali metal hydrogen carbonates?



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15. Lithium carbonate is not so stable to heat as the other alkali metal carbonates. Explain.



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16. Potassium carbonate cannot be prepared by Solvay process. Why?



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17. Give an account of the properties of washing soda.



Watch Video Solution

18. Mention some uses of sodium carbonate.



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19. How do you obtain pure sodium chloride from a crude sample?



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20. Aqueous solution of sodium carbonate is alkaline. Why?



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21. Starting with sodium chloride how would you proceed to prepare

(1) Sodium metal.



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Exercise - 2.1.4

1. Write four important minerals of potassium.



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2. Write the principle of preparing potassium from potassium chloride by electrolysis.



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3. Mention the important uses of caustic potash.



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4. Give three uses of sodium metal.



[Watch Video Solution](#)

5. How are sodium and potassium biologically important ?



[Watch Video Solution](#)

Questions for descriptive answers

1. How are sodium carbonate and sodium bicarbonate interconverted?



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2. Active metals like sodium can be extracted only by the electrolysis of fused salts. Why?



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3. $Na_2CO_3 \xrightarrow[-CO_2]{+SO_2} A \xrightarrow[Boil]{+S} B$. What are A and B. Calculate the oxidation state of sulphur in B.



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4. $AlCl_3 \xrightarrow{+NaOH} X \downarrow \xrightarrow{\text{excess } NaOH} Y$ (Clear solution).



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5. A white solid is either Na_2O or Na_2O_2 . A piece of red litmus turns white when it is dipped into a freshly made aqueous solution of the white solid. What is the white solid ?



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6. How is the possible reaction between sodium and chlorine prevented in Down's cell ?



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7. Lithium is the strongest reductant in aqueous solutions. Why ?



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8. Alkali metals are paramagnetic but their salts are diamagnetic. Substantiate.



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9. Why sodium metal can be used for drying diethyl ether but not ethanol ?



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10. how is pure sodium hydroxide prepared ?



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11. Why strand solution of NaOH cannot be prepared by direct weighing ?



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12. Why is sodium fire in the laboratory not extinguished by water ?



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13. $Al(OH)_3$ is insoluble in excess of NH_4OH but soluble in excess of NaOH. Explain.



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14. Why alkali metal except lithium can not form complex ions ?



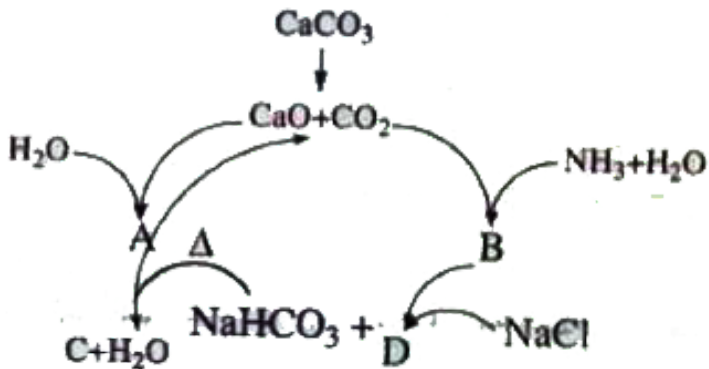
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15. What is electric eye ? How alkali metals are related to this ?



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16. Solvay process can be represented by the following scheme Identify A, B, C and D :



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17. During the titration of a mixture of Na_2CO_3 and NaHCO_3 against HCl

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