

QB365

Important Questions - The s-Block Elements

11th Standard CBSE

Chemistry

Reg.No. :

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Time : 01:00:00 Hrs

Total Marks : 50

Section-A

- 1) Why are alkali metals not found in nature? 1
- 2) Why is KO_2 paramagnetic? 1
- 3) (i) Predict giving reason, the outcome of the reaction $\text{LiI} + \text{KF} \rightarrow \text{KI} + \text{LiF}$ 1
(ii) The reaction $-\overset{|}{\underset{|}{\text{C}}}-\text{Cl} + \text{MF} \rightarrow -\overset{|}{\underset{|}{\text{C}}}-\text{F} + \text{MCl}$ proceed better with KF than with NaF.
- 4) The second ionisation enthalpy of calcium is more than that of first and yet calcium forms MgCl_2 not MgCl . why? 1
- 5) The alkali metals have low densities. Explain 1
- 6) Give the chemical formula of quick lime, slaked lime and lime water. 1
- 7) Arrange the alkaline earth metal carbonates in the decreasing order of thermal stability. 1
- 8) In the Solvay process, can we obtain sodium carbonate directly by treating the solution containing $(\text{NH}_4)_2\text{CO}_3$ with sodium chloride? Explain. 1
- 9) Write the formulae of 1
Ablite
- 10) Write the formulae of 1
Chile salt petre

Section-B

- 11) Comment on each of the following observations. 2
(i) The mobilities of the alkali metal ions in aqueous solution are $\text{Li}^+ < \text{Na}^+ < \text{K}^+ < \text{Rb}^+ < \text{Cs}^+$
- 12) Lithium hydride can be used to prepare other useful hydrides. Beryllium hydride is one of them. Suggest a route for the preparation of beryllium hydride starting from lithium hydride. Write the chemical equations involved in the process. 2
- 13) What are the raw materials used for the manufacture of washing soda by Solvay process? 2
- 14) What happens when magnesium reacts with 2
(i) CO_2
- 15) How is sodium hydrogen carbonate manufactured? Write the equations involved. Give its two properties and two uses. 2
- 16) Identify A, B, C, and D and give their chemical formulae. 2
(i) $\text{A} + \text{NaOH} \rightarrow \text{NaCl} + \text{NH}_3 + \text{H}_2\text{O}$

- 17) Identify A,B,C, and D and give their chemical formulae. 2
 (iii) $B + NaCl \rightarrow C + NH_4Cl$
- 18) What happens when 2
 (i) Sodium metal is dropped in water ?
- 19) Compare the alkali metals and alkaline earth metals with respect to 2
 (i) ionisation enthalpy
- 20) Compare the alkali metals and alkaline earth metals with respect to 2
 (ii) basicity of oxides

Section-C

- 21) Dr.Sharma , cardiologist suggested his patienta to take more potassium ions for healthy heart. potassium ions are the most abundant cations within cell fluids, where they activate many enzymes, participate in the oxidation of glucose to pro duse ATP While sodiun ions are responsible for the transmission for nerve signals. What value is possessed by Dr. Sharma ? 5
- 22) When a white substance A was treated with dilute hydrochloric acid , a colourless gas B was evolved which turned moist litmus paper red. On bubbling B through lime water a precipitate C was formed, but passage of further gas resulted in a clear solution D.A small sample of A was moistened with concentrated hydrochloric acid and placed on a platinum wire and heated in a flame of Bunsen Burner, Where it caused a red colouration in the flame.On strong heating, A decomposed to give a white solid E which turned red litmus paper blue.Identify compound A to E . 5
- 23) Name the groups which constitute s-block elements. 5
- 24) What happens when K burns in air ? Give chemical equation. 5

Section-A

- 1) 1
 Alkali metals are highly reactive because of their very low ionisation energy. Due to high chemical reactivity alkali metals do not occur free in nature.They are found in the earth's crust in the form of halide,sulphate,corporate,siicate,borate,oxide ores etc.
- 2) 1
 Because superoxide (O_2^-) has one unpaired electron in $\pi^* 2p$ molecular orbital.Hence,paramagnetic in nature.
- 3) 1
 (i) Large cation (K^+) can stablise large anion (I^-). (ii)This is because the larger cation (K^+) can stablise large anion($C1^-$).
- 4) 1
 This is because, after removing two electrons from Mg, it acquire stable noble gas configuration or in other words, the higher enthalpy of lattice formation of Mg^{2+} is more than compensates the second ionisation enthalpy requires for the formation of divalent Mg^{2+} ions.
- 5) 1

- 6) Quick lime is CaO, slaked lime is Ca(OH)₂ and lime water is an aqueous solution of Ca(OH)₂. 1
- 7) The decreasing order of thermal stability is BaCO₃>SrCO₃>CaCO₃>MgCO₃>BeCO₃ 1
- 8) 1
- No, (NH₄)₂CO₃ reacts with NaCl as
- $$(NH_4)_2CO_3 + 2NaCl \rightleftharpoons Na_2CO_3 + 2NH_4Cl$$
- Because the products obtained Na₂CO₃ and NH₄Cl are highly soluble and the equilibrium will not shift in forward direction. That's why in the Solvay process, we cannot obtain sodium carbonate directly by treating the solution containing (NH₄)₂CO₃ with sodium chloride.
- 9) Albite → NaAlSi₃O₈ 1
- 10) Chile salt petre → NaNO₃ 1

Section-B

- 11) 2
- Smaller the size of the ion, more highly it is hydrated and greater the hydration of the ion, lower is its ionic mobility.
- Since, the extent of hydration decreases in the order
- $$Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$$
- Therefore, ionic mobility increases in the reverse order
- $$Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$$
- 12) 2
- BeH₂ can be prepared from the corresponding halides by the reduction with complex alkali metal hydrides such as lithium aluminium hydride LiAlH₄.
- $$8LiH + Al_2Cl_6 \longrightarrow 2LiAlH_4 + 6LiCl$$
- $$2BeCl_2 + LiAlH_4 \longrightarrow 2BeH_2 + LiCl + AlCl_3$$
- 13) Raw materials used for the manufacture of washing soda by Solvay process are NaCl, CaCO₃ and NH₃. 2
- 14) (i) $2Mg + CO_2 \xrightarrow{\Delta} MgO + C$ 2
- 15) 2
- 16) NH₄Cl + NaOH → NaCl + NH₃ + H₂O 2
- Thus, A is ammonium chloride.
- 17) NH₄HCO₃ + NaCl → NH₄Cl + NaHCO₃ 2
- Thus, C is sodium bicarbonate
- 18) H₂ gas is evolved which catches fire due to the liberation of extreme heat in the reaction. 2
- $$2Na(s) + 2H_2O(l) \longrightarrow 2NaOH(aq) + H_2(g)$$
- 19) 2
- Ionisation enthalpy** The first ionisation enthalpy of the alkaline earth metals is higher than those of the corresponding alkali metals. This is due to their small size as compared to the corresponding alkali metals. But second ionisation enthalpy of the alkaline earth metals are smaller than those of the corresponding alkali metals.

20)

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Basicity of oxides The oxides of the alkali and alkaline earth metals dissolve in water to form basic hydroxides. The alkaline earth metal hydroxides are however less basic and less stable than alkali metal hydroxides

Section-C

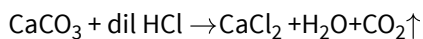
21) He is concerned with health of his patients

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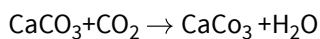
22) Appearance of milkiness on passing gas B in the solution of lime water and precipitate C is formed.

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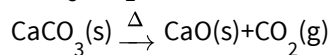
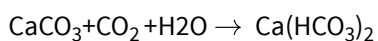
This indicates that gas B is carbon dioxide, precipitate C is CaCO_3 and substance A is also CaCO_3 .



On bubbling gas B (CO_2) through lime water a precipitate formed.



Passage of further gas resulted in a clear solution.



Calcium oxide (i.e. CaO) is basic in nature that's why it turns red litmus paper to blue

23) s-block contains only two groups; group 1 (alkali metals) and group 2 (alkaline earth metals)

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24) $\text{K} + \text{O}_2 \rightarrow \text{KO}_2$, potassium superoxide will be formed.

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