

Q. 1. $Ba(OH)_2$ is weaker base than $NaOH$. Why ?

Ans. Charge on Ba^{2+} is double of Na^+ but ionic radius is only 1.3 times, so ionic potential of Ba^{2+} is higher than that of Na^+ making $Ba(OH)_2$ relatively covalent and less ionic. Hence $Ba(OH)_2$ is weaker base than $NaOH$.

Q. 2. Ca , Sr and Ba salts are used in fire works. Why ?

Ans. Ca , Sr and Ba salts are used in fire works as they impart beautiful colourations to the flame.

Ca : brick red

Ba : pea green

Q. 3. Electrolytic reduction of $MgCl_2$ to Mg is done in an inert atmosphere of coal gas. Why ?

Ans. Mg reacts with O_2 or N_2 easily but is inert towards coal gas. So, its extraction must be done in an atmosphere of coal gas.

Q. 4. Magnesium is called a bridge element. Why ?

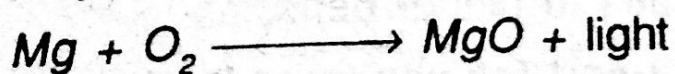
Ans. Mg is called a bridge element as it resembles to Ca , Sr , Ba and Ra of group IIA on one hand and to Zn , Cd and Hg of group IIB on the other in relation to physico-chemical properties.

Q. 5. Calcium carbonate is harder than calcium hydroxide. Why ?

Ans. $CaCO_3$ with Ca^{2+} and CO_3^{2-} having equal charge and comparable size has higher lattice energy than $Ca(OH)_2$ with Ca^{2+} and OH^- having unequal charge and size. Hence $CaCO_3$ is harder than $Ca(OH)_2$.

Q. 6. Magnesium is used in war time in tracer bullets and incendiaries. Why ?

Ans. Magnesium is used in war time in tracer bullets and in incendiaries due to its pyrophoric nature.



Q. 7. Why are elemental beryllium crystals much harder than the sodium and other elements of group IIA.

Ans. Beryllium has closely packed hexagonal structure whereas Ca, Sr and Ba have face centred cubic structure.

Q. 8. Which property dictates the use of magnesium in the aircraft industry ?

Ans. Low density and ability to form tough alloys with many metals are responsible for its use in aircraft industry.

Q. 9. Solubility of hydroxides of group IIA metals increases with increasing atomic number. Why ?

Ans. Solubility of group IIA metal hydroxides in water increases as we move down the group, lattice energy decreases more rapidly than decrease of hydration energy and so solubility increases.

Q. 10. Solubility of sulphates and carbonates of group IIA metals decreases in moving down the group. Why ?

Ans. Due to big ionic radius of SO_4^{2-} or CO_3^{2-} inter ionic distance, an important factor for lattice energy remains practically constant, so lattice energy decreases slowly in comparison to fast decreasing hydration energy. Hence, solubility decreases.

Q. 11. $MgCO_3$ is not obtained by the action of Na_2CO_3 on $MgSO_4 \cdot 7H_2O$. Why ?

Ans. $MgCO_3$ is not obtained by the action of Na_2CO_3 on $MgSO_4 \cdot 7H_2O$ but by the action of $NaHCO_3$ as Na_2CO_3 forms a hydrated basic carbonate.

Q. 12. Anhydrous $MgCl_2$ cannot be obtained by heating $MgCl_2 \cdot 6H_2O$. Why ?

Ans. Anhydrous $MgCl_2$ cannot be made by heating $MgCl_2 \cdot 6H_2O$ as the salt is hydrolysed by its own water of crystallisation to give an oxychloride.



Q. 13. Group IIA metals have higher density than group IA counterparts in the same period. Why ?

Ans. The smaller atomic radius of group IIA elements in comparison to IA results in higher densities.

Q. 14. Be is used for windows in X-ray apparatus. Why ?

Ans. *Be* is used for windows in X-ray apparatus due to its transparency to X-rays.

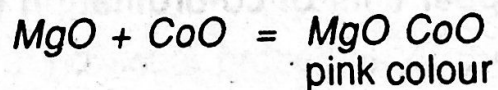
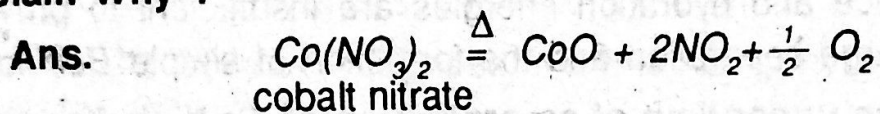
Q. 15. Stopping power of *Be* is the lowest among all suitable construction materials. Why ?

Ans. Stopping power of *Be* is the lowest among all suitable construction material as the absorption of electromagnetic radiation depends on the electron density in matter and beryllium has only 2 electrons surrounding its nucleus and both of which are moving in metallic lattice. Hence the fact.

Q. 16. Extraction of *Be* from electrolysis of fused $BeCl_2$ needs addition of *NaCl* with it. Why ?

Ans. Extraction of *Be* from electrolysis of fused $BeCl_2$ needs addition of *NaCl* in order to increase the conductivity and to lower the melting point.

Q. 17. MgO produces pink colour when heated with $Co(NO_3)_2$. Explain Why ?



Thus, colour is due to Co^{2+} and arises due to *d-d* transition.

Q. 18. *Be* has higher m.p. than *Mg*, but the m.p. of *Mg* is lower than that of *Ca*. Why ?

Ans. As radius increases, lattice energy decreases and consequently m.p. decreases. Hence *Mg* having larger radius compared to *Be*, has lower m.p. than *Be*. But due to involvement of *d*-orbitals in *Ca*, its m.p. is greater than that of *Mg*.

Q. 19. $CaCl_2$ is soluble, but $CaSO_4$ is insoluble in water. Why ?

Ans. For $CaCl_2$, lattice energy is lower than hydration energy and so it is soluble. But for $CaSO_4$, lattice energy is higher than hydration energy; hence it is insoluble in water.

Q. 20. $MgCO_3$ decomposes on heating to form CO_2 and MgO , but Na_2CO_3 does not. Why ?

Ans. Alkali metal carbonates due to their greater ionic character seldom decompose. So Na_2CO_3 possessing high bond energy does.