QUESTION BANK ON

S-BLOCK ELMENTS

Q.1 Cs^+ ions impart violet colour to Bunsen flame. This is due to the fact that the emitted radiations are of
(A) high energy (B) lower frequencies (C) longer wave-lengths (D) zero wave number

Q.2 The compound(s) of alkaline earth metals, which are amphoteric in nature is/are
(A) BeO (B) MgO (C) $Be(OH)_2$ (D) $Mg(OH)_2$

Q.3 An alkaline earth metal (M) gives a salt with chlorine, which is insoluble in water at room temperature but soluble in boiling water. It also forms an insoluble sulphate whose mixture with a sulphide of a transition metal is called 'lithopone' -a white pigment. Metal M is
(A) Ca (B) Mg (C) Ba (D) Sr

Q.4 The reaction of an element A with water produces combustible gas B and an aqueous solution of C. When another substance D reacts with this solution C also produces the same gas B. D also produces the same gas even on reaction with dilute H_2SO_4 at room temperature. Element A imparts golden yellow colour to Bunsen flame. Then, A, B, C and D may be identified as
(A) Na, H_2, NaOH and Zn (B) K, H_2, KOH and Zn
(C) K, H_2, NaOH and Zn (D) Ca, H_2, $CaCOH_2$ and Zn

Q.5 The hydroxide of alkaline earth metal, which has the lowest value of solubility product (K_{sp}) at normal temperature (25°C) is
(A) $Ca(OH)_2$ (B) $Mg(OH)_2$ (C) $Sr(OH)_2$ (D) $Be(OH)_2$

Q.6 The correct statement is/are
(A) $BeCl_2$ is a covalent compound (B) $BeCl_2$ is an electron deficient molecule
(C) $BeCl_2$ can form dimer (D) the hybrid state of Be in $BeCl_2$ is sp^2

Q.7 $\text{(Yellow ppt) } T \xleftarrow{K_2CrO_4} X \xrightarrow{\text{dil. HCl}} Y\text{(Yellow ppt)} + Z \uparrow \text{ (pungent smelling gas)}$
If X gives green flame test. Then, X is
(A) $MgSO_4$ (B) BaS_2O_3 (C) $CuSO_4$ (D) PbS_2O_3

Q.8 Which of the following carbonate of alkali metals has the least thermal stability?
(A) Li_2CO_3 (B) K_2CO_3 (C) Cs_2CO_3 (D) Na_2CO_3

Q.9 The 'milk of magnesia' used as an antacid is chemically
(A) $Mg(OH)_2$ (B) MgO (C) $MgCl_2$ (D) MgO + $MgCl_2$

Q.10 The alkali metals which form normal oxide, peroxide as well as super oxides are
(A) Na, Li (B) K, Li (C) Li, Cs (D) K, Rb

Q.11 The pair of compounds, which cannot exist together in a solution is
(A) $NaHCO_3$ and NaOH (B) Na_2CO_3 and NaOH
(C) $NaHCO_3$ and Na_2CO_3 (D) $NaHCO_3$ and H_2O

Q.12 $Mg_2C_3 + H_2O \longrightarrow$ X (organic compound). Compound X is
(A) C_2H_2 (B) CH_4 (C) propyne (D) ethene

Q.13 The hydration energy of Mg^{2+} is
(A) more than that of Mg^{3+} ion (B) more than that of Na^+ ion
(C) more than that of Al^{3+} ion (D) more than that of Be^{2+} ion

Q.14 The golden yellow colour associated with NaCl to Bunsen flame can be explained on the basis of
(A) low ionisation potential of sodium
(B) emission spectrum
(C) photosensitivity of sodium
(D) sublimation of metallic sodium of yellow vapours

Q.15 Solution of sodium metal in liquid ammonia is a strong reducing agent due to presence of
(A) solvated sodium ions
(B) solvated hydrogen ions
(C) sodium atoms or sodium hydroxide
(D) solvated electrons

Q.16 Which of the property of alkali metals is not listed correctly?
(A) the least electronegative metal : Cs
(B) a natural radioactive metal : Fr
(C) the alkali metal with lowest density : K
(D) the heaviest alkali metal : Cs

Q.17 The salt which finds uses in qualitative inorganic analysis is
(A) $CuSO_4 \cdot 5H_2O$ or $ZnSO_4 \cdot 5H_2O$
(B) $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$
(C) $Na(NH_4)HPO_4 \cdot 4H_2O$
(D) $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$

Q.18 Fire extinguishers contain
(A) conc. H_2SO_4 solution
(B) H_2SO_4 and $NaHCO_3$ solutions
(C) $NaHCO_3$ solution
(D) $CaCO_3$ solution

Q.19 $CsBr_3$ contains
(A) Cs–Br covalent bonds
(B) Cs^{3+} and Br^- ions
(C) Cs^+ and Br_3^- ions
(D) Cs^{3+} and Br_3^{3-} ions

Q.20 KO_2 finds use in oxygen cylinders used for space and submarines. The fact(s) related to such use of KO_2 is/are
(A) it produces O_2
(B) it produces O_3
(C) it absorbs CO_2
(D) it absorbs both CO and CO_2

Q.21 The compound(s) which have –O–O– bond(s) is/are
(A) BaO_2 (B) Na_2O_2 (C) CrO_5 (D) Fe_2O_3

Q.22 $Na + Al_2O_3 \xrightarrow{\text{High temperature}} X \xrightarrow[\text{water}]{CO_2 \text{ in}} Y$; compound Y is
(A) $NaAlO_2$ (B) $NaHCO_3$ (C) Na_2CO_3 (D) Na_2O_2

Q.23 The correct order of second ionisation potentials (IP) of Ca, Ba and K is
(A) K > Ca > Ba (B) Ba > Ca > K (C) K > Ba > Ca (D) K = Ba = Ca

Q.24 EDTA is used in the estimation of
(A) Mg^{2+} ions
(B) Ca^{2+} ions
(C) both Ca^{2+} and Mg^{2+} ions
(D) Mg^{2+} ions but not Ca^{2+} ions

Q.25 Highly pure dilute solution of sodium in ammonia
(A) shows blue colouration due to solvated electrons
(B) shows electrical conductivity due to both solvated electrons as well as solvated sodium ions
(C) shows red colouration due to solvated electrons but a bad conductor of electricity
(D) produces hydrogen gas or carbonate

Q.26 aq. NaOH + P_4 (white) $\longrightarrow$ PH_3 + X; compound X is
(A) NaH_2PO_2 (B) $NaHPO_4$ (C) Na_2CO_3 (D) $NaHCO_3$

Q.27 The correct order of solubility is
(A) $CaCO_3 < KHCO_3 < NaHCO_3$ (B) $KHCO_3 < CaCO_3 < NaHCO_3$
(C) $NaHCO_3 < CaCO_3 < KHCO_3$ (D) $CaCO_3 < NaHCO_3 < KHCO_3$

Q.28 The complex formation tendency of alkaline earth metals decreases down the group because
(A) atomic size increases (B) availability of empty d and f-orbitals increases
(C) nuclear charge to volume ratio increases (D) all the above

Q.29 The alkaline earth metals, which do not impart any colour to Bunsen flame are
(A) Be and Mg (B) Mg and Ca (C) Be and Ca (D) Be and Ba

Q.30 $Y \xleftarrow{\Delta, 205°C} CaSO_4 \cdot 2H_2O \xrightarrow{\Delta, 120°C} X$. X and Y are respectively
(A) plaster of paris, dead burnt plaster (B) dead burnt plaster, plaster of paris
(C) CaO and plaster of paris (D) plaster of paris, mixture of gases

Q.31 A metal M readily forms water soluble sulphate, and water insoluble hydroxide $M(OH)_2$. Its oxide MO is amphoteric, hard and having high melting point. The alkaline earth metal M must be
(A) Mg (B) Be (C) Ca (D) Sr

Q.32 When K_2O is added to water, the solution becomes basic in nature because it contains a significant concentration of
(A) K^+ (B) O^{2-} (C) OH^- (D) O_2^{2-}

Q.33 $(\text{White ppt}) D \xleftarrow{Na_2CO_3} A \xrightarrow[(\text{in acetic acid})]{K_2CrO_4} B(\text{Yellow ppt})$
$\text{dil.} H_2SO_4 \downarrow$
$C(\text{White ppt})$
If A is the metallic salt, then the white ppt. of D must be of
(A) magnesium oxide (B) red lead (C) barium carbonate (D) calcium carbonate

Q.34 $(\text{Milky Cloud}) C \xleftarrow{CO_2} A + Na_2CO_3 \longrightarrow B + C$
The chemical formulae of A and B are
(A) NaOH and $Ca(OH)_2$ (B) $Ca(OH)_2$ and NaOH
(C) NaOH and CaO (D) CaO and $Ca(OH)_2$

Q.35 An aqueous solution of an halogen salt of potassium reacts with same halogen X_2 to give KX_3, a brown coloured solution, in which halogen exists as X_3^- ion, X_2 as a Lewis acid and X^- as a Lewis base, halogen X is
(A) chlorine (B) bromine (C) iodine (D) fluorine

Q.36 The correct order of basic-strength of oxides of alkaline earth metals is
(A) BeO > MgO > CaO > SrO (B) SrO > CaO > MgO > BeO
(C) BeO > CaO > MgO > SrO (D) SrO > MgO > CaO > BeO

Q.37 Which of the following compounds are paramagnetic in nature?
(A) KO_2 (B) K_2O_2 (C) Na_2O_2 (D) RbO_2

Q.38 The order of stability of chlorides of alkali metals is
(A) LiCl > NaCl > KCl < CsCl (B) LiCl > NaCl > KCl > CsCl
(C) NaCl > KCl > CsCl > LiCl (D) LiCl > NaCl > CsCl > KCl

Q.39 $NaOH(\text{Solid}) + CO \xrightarrow{200°C} X$; product X is
(A) $NaHCO_3$ (B) $NaHCO_2$ (C) HCOONa (D) H_2CO_3

Q.40 $X \xrightarrow{N_2, \Delta} Y \xrightarrow{H_2O} Z(\text{colourless gas}) \xrightarrow[CuSO_4]{} T(\text{blue colour})$

Then, substances Y and T are
(A) Y = Mg_3N_2 and T = $CuSO_4 \cdot 5H_2O$ (B) Y = Mg_3N_2 and T = $CuSO_4 \cdot 4NH_3$
(C) Y = $Mg(NO_3)_2$ and T = CuO (D) Y = MgO and T = $CuSO_4 \cdot 4NH_3$

Q.41 Weakest base among KOH, NaOH, $Ca(OH)_2$ and $Zn(OH)_2$ is
(A) $Ca(OH)_2$ (B) KOH (C) NaOH (D) $Zn(OH)_2$

Q.42 If X and Y are the second ionisation potentials of alkali and alkaline earth metals of same period, then
(A) X > Y (B) X < Y (C) X = Y (D) X << Y

Q.43 The aqueous solutions of lithium salts are poor conductor of electricity rather than other alkali metals because of
(A) high ionisation energy
(B) high electronegativity
(C) lower ability of Li^+ ions to polarize water molecules
(D) higher degree of hydration of Li^+ ions

Q.44 Sodium metal is highly reactive and cannot be stored under
(A) toluene (B) kerosene oil (C) alcohol (D) benzene

Q.45 Which of the following substance(s) is/are used in laboratory for drying purposes?
(A) anhydrous P_2O_5 (B) graphite (C) anhydrous $CaCl_2$ (D) Na_3PO_4

Q.46 Nitrogen dioxide cannot be prepared by heating
(A) KNO_3 (B) $AgNO_3$ (C) $Pb(NO_3)_2$ (D) $Cu(NO_3)_2$

Q.47 In $LiAlH_4$, metal Al is present in
(A) anionic part (B) cationic part
(C) in both anionic and cationic part (D) neither in cationic nor in anionic part

Q.48 $X \xrightarrow{CoCl_2} CaCl_2 + Y\uparrow$; the effective ingredient of X is
(A) OCl^- (B) Cl^- (C) OCl^+ (D) OCl_2^-

Q.49 Which one of the following fluoride of alkali metals has the highest lattice energy?
(A) LiF (B) CsF (C) NaF (D) KF

Q.50 Crown ethers and cryptands form
(A) complexes with alkali metals
(B) salts of alkali metals
(C) hydroxides of alkali metals used for inorganic quantitative analysis
(D) organic salts of alkali metals

Q.51 White heavy precipitates are formed when $BaCl_2$ is added to a clear solution of compound A. Precipitates are insoluble in dilute HCl. Then, the compound A is
(A) a bicarbonate (B) a carbonate (C) a sulphate (D) a chloride

Q.52 Among $MgCl_2$, RbCl, $BeCl_2$ and LiCl, the compouds with the highest and the lowest % of ionic characters are
(A) $MgCl_2$ and $BeCl_2$ (B) RbCl and $BeCl_2$ (C) $BeCl_2$ and $MgCl_2$ (D) RbCl and LiCl

Q.53 $X + C + Cl_2 \xrightarrow[\text{of about } 1000\,K]{\text{High temperature}} Y + CO$; $Y + 2H_2O \rightarrow Z + 2HCl$
Compound Y is found in polymeric chain structure and is an electron deficient molecule. Y must be
(A) BeO (B) $BeCl_2$ (C) $Be(OH)_2$ (D) $BeO \cdot Be(OH)_2$

Q.54 The correct order of degree of hydration of M^+ ions of alkali metals is
(A) $Li^+ < K^+ < Na^+ < Rb^+ < Cs^+$ (B) $Li^+ < Na^+ < K^+ < Rb^+ < Cs^+$
(C) $Cs^+ < Rb^+ < K^+ < Na^+ < Li^+$ (D) $Cs^+ < Rb^+ < Na^+ < K^+ < Li^+$

Q.55 $BeCl_2 + LiAlH_4 \longrightarrow X + LiCl + AlCl_3$
(A) X is LiH (B) X is BeH_2
(C) X is $BeCl_2 \cdot 2H_2O$ (D) none

Q.56 The order of thermal stability of carbonates of IIA group is
(A) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$ (B) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
(C) $CaCO_3 > SrCO_3 > BaCO_3 > MgCO_3$ (D) $MgCO_3 = CaCO_3 > SrCO_3 = BaCO_3$

Q.57 A pair of substances which gives the same products on reaction with water is
(A) Mg and MgO (B) Sr and SrO (C) Ca and CaH_2 (D) Be and BeO

Q.58 Na_2SO_4 is water soluble but $BaSO_4$ is insoluble because
(A) the hydration energy of Na_2SO_4 is higher than that of its lattice energy
(B) the hydration energy of Na_2SO_4 is less than that of its lattice energy
(C) the hydration energy of $BaSO_4$ is less than that of its lattice energy
(D) the hydration energy of $BaSO_4$ is higher than that of its lattice energy

Q.59 Which of the following is not a anomalous property of lithium?
(A) Hydrated lithium ion is the largest among alkali metals
(B) The melting and boiling points of lithium are comparatively high
(C) Lithium is softer than that of other alkali metals
(D) The ionisation potential and electronegativity of lithium are higher than those of other alkali metals

Q.60 The incorrect statement(s) is/are
(A) Mg cannot form complexes
(B) Be can form complexes due to a very small atomic size
(C) the first ionisation potential of Be is higher than that of Mg
(D) Mg forms an alkaline hydroxide while Be forms amphoteric oxides

Q.61 The commercial method of preparation of potassium by reduction of molten KCl with metallic sodium at 850°C is based on the fact that
(A) potassium is solid and sodium distils off at 850 °C
(B) potassium being more volatile and distils off thus shifting the reaction forward
(C) sodium is more reactive than potassium at 850 °C
(D) sodium has less affinity to chloride ions in the presence of potassium ion

Q.62 $Be_2C + H_2O \longrightarrow BeO + X$
$CaC_2 + H_2O \longrightarrow Ca(OH)_2 + Y$; then X and Y are respectively
(A) CH_4, CH_4 (B) CH_4, C_2H_6 (C) CH_4, C_2H_2 (D) C_2H_2, CH_4

Q.63 Which of the following statements are false?
(A) $BeCl_2$ is a linear molecule in the vapour state but it is polymeric in the solid state
(B) Calcium hydride is called hydrolith.
(C) Carbides of both Be and Ca react with water to form acetylene
(D) Oxides of both Be and Ca are amphoteric.

Q.64 Which of the following are ionic carbides?
(A) CaC_2 (B) Al_4C_3 (C) SiC (D) Be_2C

Q.65 Which of the following groups of elements have chemical properties that are most similar
(A) Na, K, Ca (B) Mg, Sr, Ba (C) Be, Al, Ca (D) Be, Ra, Cs

Q.66 $MgBr_2$ and MgI_2 are soluble in acetone because of
(A) Their ionic nature (B) Their coordinate nature
(C) Their metallic nature (D) Their covalent nature

Q.67 Which of the following is not the characteristic of barium?
(A) It emits electrons on exposure to light
(B) It is a silvery white metal
(C) It forms $Ba(NO_3)_2$ which is used in preparation of green fire
(D) Its ionization potential is lower than radium.

Question No. 68 to 74

Questions given below consist of two statements each printed as Assertion (A) and Reason (R); while answering these questions you are required to choose any one of the following four responses:
(A) if both (A) and (R) are true and (R) is the correct explanation of (A)
(B) if both (A) and (R) are true but (R) is not correct explanation of (A)
(C) if (A) is true but (R) is false
(D) if (A) is false and (R) is true

Q.68 **Assertion** : Beryllium does not impart any characteristic colour to the bunsen flame.
Reason : Due to its very high ionization energy, beryllium requires a large amount of energy for exciation of the electrons.

Q.69 **Assertion** : In fused state, calcium chloride cannot be used to dry alcohol or NH_3.
Reason : $CaCl_2$ is not a good desiccant.

Q.70 **Assertion** : Best diagonal relationship is shown between Be and Al.
Reason : Ionization energy of Be is almost the same as that of Al.

Q.71 **Assertion** : Beryllium halides dissolve in organic solvents.
Reason : Beryllium halides are ionic in character.

Q.72 **Assertion** : $BeCl_2$ fumes in moist air.
Reason : $BeCl_2$ reacts with moisture to form HCl gas.

Q.73 **Assertion** : Calcium carbide on hydrolysis gives methane.
Reason : Calcium carbide contains C_2^{2-} anion.

Q.74 **Assertion** : When CO_2 is passed through lime water, it first turns milky and then the solution becomes clear when the passage of CO_2 is continued.
Reason : The milkiness is due to the formation of insoluble $CaCO_3$ which then changes to soluble $Ca(HCO_3)_2$ when excess of CO_2 is present.

Q.75 **Assertion** : $MgCO_3$ is soluble in water when a current of CO_2 is passed.
Reason : The solubility of $MgCO_3$ is due to the formation of $Mg(HCO_3)_2$.

ANSWER KEY

Q.1	A	Q.2	A,C	Q.3	C	Q.4	A	Q.5	D
Q.6	A,B,C	Q.7	B	Q.8	A	Q.9	A	Q.10	D
Q.11	A	Q.12	C	Q.13	B	Q.14	A	Q.15	D
Q.16	C	Q.17	C	Q.18	B	Q.19	C	Q.20	A,C
Q.21	A,B,C	Q.22	C	Q.23	A	Q.24	C	Q.25	A,B
Q.26	A	Q.27	D	Q.28	A	Q.29	A	Q.30	A
Q.31	B	Q.32	C	Q.33	C	Q.34	B	Q.35	C
Q.36	B	Q.37	A,D	Q.38	C	Q.39	C	Q.40	B
Q.41	D	Q.42	A	Q.43	D	Q.44	C	Q.45	A,C
Q.46	A	Q.47	A	Q.48	A	Q.49	A	Q.50	A
Q.51	C	Q.52	B	Q.53	B	Q.54	C	Q.55	B
Q.56	A	Q.57	C	Q.58	A,C	Q.59	C	Q.60	A
Q.61	B	Q.62	C	Q.63	C,D	Q.64	A,B,D	Q.65	B
Q.66	D	Q.67	A	Q.68	A	Q.69	C	Q.70	A
Q.71	C	Q.72	A	Q.73	D	Q.74	A	Q.75	A