DPP - Daily Practice Problems

Chapter-wise Sheets

Date : Start Time : End Time :

CHEMISTRY CC10

SYLLABUS : s-Block Elements

Max. Marks : 180 **Marking Scheme :** + 4 for correct & (–1) for incorrect **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. Which of the following has lowest melting point?
   (a) Li (b) Na (c) K (d) Cs
2. Lithium is strongest reducing agent among alkali metals due to which of the following factor?
   (a) Ionization energy (b) Electron affinity
   (c) Hydration energy (d) Lattice energy
3. KO_2 (potassium super oxide) is used in oxygen cylinders in space and submarines because it
   (a) absorbs CO_2 and increases O_2 content
   (b) eliminates moisture
   (c) absorbs CO_2
   (d) produces ozone.
4. The alkali metals form salt-like hydrides by the direct synthesis at elevated temperature. The thermal stability of these hydrides decreases in which of the following orders ?
   (a) CsH > RbH > KH > NaH > LiH
   (b) KH > NaH > LiH > CsH > RbH
   (c) NaH > LiH > KH > RbH > CsH
   (d) LiH > NaH > KH > RbH > CsH
5. Match the columns

	Column-I (Metal)		Column-II (Oxide formed on burning)
A.	Caesium	I.	Superoxide
B.	Lithium	II.	Peroxide
C.	Sodium	III.	Monoxide

   (a) A – II; B – I; C – III
   (b) A – III; B – II; C – I
   (c) A – I; B – III; C – II
   (d) A – II; B – III; C – I

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Space for Rough Work

6. Which of the following alkaline earth metal hydroxides is amphoteric in character
(a) $Bc(OH)_2$ (b) $Ca(OH)_2$
(c) $Sr(OH)_2$ (d) $Ba(OH)_2$

7. Which of the following statements is **incorrect**?
(a) Pure sodium metal dissolves in liquid ammonia to give blue solution.
(b) NaOH reacts with glass to give sodium silicate
(c) Aluminium reacts with excess NaOH to give $Al(OH)_3$
(d) $NaHCO_3$ on heating gives Na_2CO_3

8. Which of the following statements about Na_2O_2 is not correct?
(a) It is diamagnetic in nature
(b) It is derivative of H_2O_2
(c) Na_2O_2 oxidises Cr^{3+} to CrO_4^{2-} in acid medium.
(d) It is the super oxide of sodium

9. Which of the following does not form an oxide on heating ?
(a) $ZnCO_3$ (b) $CaCO_3$
(c) Li_2CO_3 (d) Na_2CO_3

10. Sodium carbonate solution in water is alkaline due to
(a) hydrolysis of Na^+
(b) hydrolysis of CO_3^{2-}
(c) hydrolysis of both Na^+ and CO_3^{2-} ions
(d) None of these

11. A white solid reacts with dil.HCl to give colourless gas that decolourises aqueous bromine. The solid is most likely to be
(a) sodium carbonate (b) sodium chloride
(c) sodium acetate (d) sodium thiosulphate

12. Match the columns

Column-I (Alkali metal)		**Column-II (Colour imparted to an oxidizing flame)**
A. Cs	I.	Yellow
B. Rb	II.	Blue
C. K	III.	Violet
D. Na	IV.	Red violet
E. Li	V	Crimson red

(a) A – II; B – IV; C – III; D – I; E – V
(b) A – IV; B – II; C – III; D – I; E – V
(c) A – V; B – III; C – IV; D – I; E – II
(d) A – II; B – IV; C – III; D – I; E – V

13. Select the correct statements
(i) Cs^+ is more highly hydrated that the other alkali metal ions
(ii) Among the alkali metals Li, Na, K and Rb, lithium has the highest melting point
(iii) Among the alkali metals only lithium forms a stable nitride by direct combination with nitrogen
(a) (i), (ii) and (iii) (b) (i) and (ii)
(c) (i) and (iii) (d) (ii) and (iii)

14. When sulphur is heated with NaOH (aq). The compounds formed are
(a) Na_2S+H_2O
(b) $Na_2SO_3+H_2O$
(c) $Na_2S+Na_2S_2O_3+H_2O$
(d) $Na_2S_2O_3+H_2O$

15. The raw materials in Solvay Process are :
(a) Na_2CO_3, $CaCO_3$ and NH_3
(b) Na_2SO_4, $CaCO_3$ and NH_3
(c) NaCl, NH_3 and $CaCO_3$.
(d) NaOH, CaO and NH_3.

16. A metal X on heating in nitrogen gas gives Y. Y on treatment with H_2O gives a colourless gas which when passed through $CuSO_4$ solution gives a blue colour. Y is
(a) $Mg(NO_3)_2$ (b) Mg_3N_2
(c) NH_3 (d) MgO

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ				

Space for Rough Work

17. Acidified solution of sodium thiosulphate is unstable because in thiosulphate
(a) the sulphur atoms are at unstable oxidation state of + 2
(b) the two sulphur atoms are at different oxidation states of + 6 and – 2
(c) the S – S bond are unstable bonds.
(d) sulphur is in zero oxidation state.

18. Which one of the following is least soluble in water?
(a) BaF_2 (b) MgF_2 (c) CaF_2 (d) SrF_2

19. Bleaching powder is obtained by the interaction of chlorine with
(a) dil. solution of $Ca(OH)_2$
(b) dry CaO
(c) conc. solution of $Ca(OH)_2$
(d) dry slaked lime

20. Which of the following statement is false ?
(a) Strontium decomposes water readily than beryllium
(b) Barium carbonate melts at a higher temperature than calcium carbonate
(c) Barium hydroxide is more soluble in water than magnesium hydroxide
(d) Beryllium hydroxide is more basic than barium hydroxide.

21. Melting point of calcium halides decreases in the order
(a) $CaF_2 > CaCl_2 > CaBr_2 > CaI_2$
(b) $CaI_2 > CaBr_2 > CaCl_2 > CaF_2$
(c) $CaBr_2 > CaI_2 > CaF_2 > CaCl_2$
(d) $CaCl_2 > CaBr_2 > CaI_2 > CaF_2$

22. Which of the following are found in biological fluids Na^+, Mg^{2+}, Ca^{2+}, K^+, Sr^{2+}, Li^+ and Ba^{2+}
(a) Mg^{2+}, Ca^{2+}, and Sr^{2+}
(b) Na^{2+} and K^+
(c) Na^+, K^+, Mg^{2+} and Ca^{2+}
(d) Sr^+, Li and Ba^{2+}

23. Chemical A is used for water softening to remove temporary hardness. A reacts with Na_2CO_3 to generate caustic soda. When CO_2 is bubbled through A, it turns cloudly. What is the chemical formula of A
(a) $CaCO_3$ (b) CaO (c) $Ca(OH)_2$ (d) $Ca(HCO_3)_2$

24. Which of the following statements is incorrect?
(a) Alkali metal hydroxide are hygroscopic
(b) Dissolution of alkali metal hydroxide is endothermic
(c) Aqueous solution of alkali metal hydroxides are strongly basic
(d) Alkali metal hydroxides form ionic crystals

25. Which of the following statement(s) is/are correct regarding Li_2CO_3 and Na_2CO_3 ?
(a) Sodium salt evolve CO_2 at higher temperature.
(b) Polarization of Na^+ is lesser than that of Li^+.
(c) Both are are highly stable to heat
(d) All of the above

26. Calcitonin and parathyroid hormone regulate concentration of which of the following element in plasma?
(a) Calcium (b) Magnesium
(c) Sodium (d) Potassium

27. Oxygen is obtained from bleaching powder by
(a) the action of dilute acid
(b) the action of alkali
(c) heating it with lime
(d) heating it with cobalt salt

28. Substance which absorbs CO_2 and violently reacts with H_2O with sound is :
(a) H_2SO_4 (b) $CaCO_3$ (c) ZnO (d) CaO.

29. The electric cookers have a coating that protects them against fire. The coating is made of
(a) Heavy lead (b) Zinc oxide
(c) Magnesium oxide (d) Sodium sulphate

30. Which among the following is most soluble in water?
(a) $CsClO_4$ (b) $NaClO_4$ (c) $LiClO_4$ (d) $KClO_4$

31. Which of the following is incorrect?
(a) Mg burns in air releasing dazzling light rich in UV rays.
(b) $CaCl_2.6H_2O$ when mixed with ice gives freezing mixture
(c) Mg cannot form complexes
(d) Be can form complexes due to its very small size

RESPONSE GRID					
	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ
	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ	25. ⓐⓑⓒⓓ	26. ⓐⓑⓒⓓ
	27. ⓐⓑⓒⓓ	28. ⓐⓑⓒⓓ	29. ⓐⓑⓒⓓ	30. ⓐⓑⓒⓓ	31. ⓐⓑⓒⓓ

Space for Rough Work

32. Electrolysis of fused KCl. $MgCl_2.6H_2O$ gives
(a) potassium only
(b) magnesium only
(c) magnesium and chlorine
(d) potassium, magnesium and chlorine

33. Beryllium shows diagonal relationship with aluminium. Which of the following similarity is incorrect?
(a) Be forms beryllates and Al forms aluminates
(b) $Be(OH)_2$ like $Al(OH)_3$ is basic.
(c) Be like Al is rendered passive by HNO_3.
(d) Be_2C like Al_4C_3 yields methane on hydrolysis.

34. Amongst the following hydroxides, the one which is insoluble is
(a) $Ca(OH)_2$ (b) $Mg(OH)_2$
(c) $Be(OH)_2$ (d) $Ba(OH)_2$

35. A and B are two salts. A with dil. HCl and A and B with conc. H_2SO_4 react to give reddish brown vapours, hence A and B respectively are :
(a) $NaNO_3$, NaBr (b) NaBr, $NaNO_3$
(c) NaBr, $NaNO_2$ (d) $NaNO_2$, NaBr

36. In crystals of which one of the following ionic compounds would you expect maximum distance between centres of cations and anions?
(a) LiF (b) CsF (c) CsI (d) LiI

37. Alkaline earth metal compounds are less soluble in water than corresponding alkali metal compounds because former have
(a) lower lattice energy
(b) higher I.P.
(c) higher covalent character
(d) lower covalent character.

38. The following compounds have been arranged in order of their increasing thermal stabilities. Identify the correct order.
(I) K_2CO_3 (II) $MgCO_3$
(III) $CaCO_3$ (IV) $BeCO_3$
(a) I < II < III < IV (b) IV < II < III < I
(c) IV < II < I < III (d) II < IV < III < I

39. Covalent radii of atoms varies in range of 72 pm to 133 pm from F to I while that of noble gases He to Xe varies from 120pm to 220pm. This is because in case of noble gases
(a) covalent radius is very large
(b) van der Waal radius is considered
(c) metallic radii is considered
(d) None of these

40. Among KO_2, AlO_2^-, BaO_2 and NO_2^+, unpaired electron is present in
(a) NO_2^+ and BaO_2 (b) KO_2 and AlO_2^-
(c) KO_2 only (d) BaO_2 only

41. A certain metal M is used to prepare an antacid, which is used as a medicine in acidity. This metal accidently catches fire which cannot be put out by using CO_2 based extinguishers. The metal M is
(a) Ca (b) Mg
(c) C (d) All of these

42. Choose the compound which does not possess a peroxide group
(a) Na_2O_2 (b) CrO_5 (c) Fe_2O_3 (d) BaO_2

43. Which of the following has correct increasing basic strength?
(a) MgO<BeO<CaO<BaO (b) BeO<MgO<CaO<BaO
(c) BaO<CaO<MgO<BeO (d) CaO<BaO<BeO<MgO

44. Which one of the following orders presents the correct sequence of the increasing basic nature of the given oxides?
(a) $Al_2O_3 < MgO < Na_2O < K_2O$
(b) $MgO < K_2O < Al_2O_3 < Na_2O$
(c) $Na_2O < K_2O < MgO < Al_2O_3$
(d) $K_2O < Na_2O < Al_2O_3 < MgO$

45. Which liberates ammonia when treated with water?
(a) Li_3N (b) Mg_3N_2 (c) $CaCN_2$ (d) All

RESPONSE GRID					
	32. ⓐⓑⓒⓓ	**33.** ⓐⓑⓒⓓ	**34.** ⓐⓑⓒⓓ	**35.** ⓐⓑⓒⓓ	**36.** ⓐⓑⓒⓓ
	37. ⓐⓑⓒⓓ	**38.** ⓐⓑⓒⓓ	**39.** ⓐⓑⓒⓓ	**40.** ⓐⓑⓒⓓ	**41.** ⓐⓑⓒⓓ
	42. ⓐⓑⓒⓓ	**43.** ⓐⓑⓒⓓ	**44.** ⓐⓑⓒⓓ	**45.** ⓐⓑⓒⓓ	

Space for Rough Work

DAILY PRACTICE PROBLEMS — CHEMISTRY SOLUTIONS — DPP/CC10

1. **(d)** Melting point of alkali metals decreases with increase in size.
2. **(c)**
3. **(a)** $4KO_2 + 2CO_2 \rightarrow 2K_2CO_3 + 3O_2$.
   KO_2 is used as an oxidising agent. It is used as air purifier in space capsules. Submarines and breathing masks as it produces oxygen and remove carbon dioxide.
4. **(d)** The stability of alkali metal hydrides decreases from Li to Cs. It is due to the fact that M–H bonds become weaker with increase in size of alkali metals as we move down the group from Li to Cs. Thus the order of stability of hydrides is
   LiH> NaH> KH>RbH > CsH
   i.e. option (d) is correct answer.
5. **(c)** $Cs + O_2 \rightarrow CsO_2$ (Superoxide)
   $4Li + O_2 \rightarrow 2Li_2O$ (Oxide)
   $2Na + O_2 \rightarrow Na_2O_2$ (Peroxide)
6. **(a)** $Be(OH)_2$ is amphoteric while $Ca(OH)_2$, $Sr(OH)_2$ and $Ba(OH)_2$ are all basic.
7. **(c)** $2Al(s) + 2NaOH(aq) + 2H_2O(l) \longrightarrow \underset{\text{sod. meta aluminate}}{2NaAlO_2} + 3H_2$
8. **(d)** Na_2O_2 is peroxide of sodium not super oxide. The formula of sodium superoxide is NaO_2.
9. **(d)** Na_2CO_3 does not decompose to form Na_2O.
10. **(b)**
11. **(d)** $Na_2S_2O_3 + 2HCl \longrightarrow 2NaCl + H_2O + \underset{\text{colourless}}{SO_2} + S$
    $SO_2 + Br_2 + H_2O \longrightarrow HBr + H_2SO_4$
12. **(a)**
13. **(d)** Amongst alkali metal Li ions are highly hydrated.
14. **(c)** $4S + 6NaOH \rightarrow Na_2S_2O_3 + 2Na_2S + 3H_2O$
15. **(c)** NaCl (brine), NH_3 and CO_2 are rawmaterials. $CaCO_3$ is source of CO_2.
16. **(b)** $\underset{X}{3Mg} + N_2 \xrightarrow{\Delta} \underset{Y}{Mg_3N_2}$;
    $Mg_3N_2 + 6H_2O \longrightarrow 3Mg(OH)_2 + \underset{\text{(colourless)}}{2NH_3}\uparrow$
    $CuSO_4 + 4NH_3 \longrightarrow \underset{\text{Blue complex}}{[Cu(NH_3)_4]SO_4}$
17. **(b)** $Na_2S_2O_3 + 2HCl \rightarrow 2NaCl + SO_2 + S + H_2O$
    (Disproportionation)
18. **(b)** As we move down the group, the lattice energies of fluorides decrease more rapidly than the hydration energy and hence the solubilities of the fluorides increase from top to bottom within a group.
19. **(d)** When cold calcium hydroxide reacts with chlorine, then bleaching powder is obtained.
    $\underset{\text{slaked lime}}{3Ca(OH)_2} + 2Cl_2 \longrightarrow \underset{\text{Bleaching powder}}{Ca(OCl)_2.Ca(OH)_2.CaCl_2.2H_2O}$
20. **(d)** $Be(OH)_2$ is amphoteric, but the hydroxides of other alkaline earth metals are basic. The basic strength increases gradually.
21. **(a)** As the size of the anion increases, the covalent character increases and hence the m.p. decrease.
22. **(c)** Monovalent sodium and potassium ions and divalent magnesium and calcium ions are found in large proportions in biological fluids.
23. **(c)** $\underset{\text{temp. hardness}}{Ca(HCO_3)_2} + Ca(OH)_2 \longrightarrow 2CaCO_3\downarrow + 2H_2O$
    $\underset{A}{Ca(OH)_2} + Na_2CO_3 \longrightarrow \underset{\text{Caustic soda}}{2NaOH} + CaCO_3$
    $\underset{A}{Ca(OH)_2} + CO_2 \longrightarrow \underset{\text{milkiness}}{CaCO_3}\downarrow + H_2O$
24. **(b)** During the dissolution of alkali metal hydrides energy is released in large amount, i.e., it is exothermic in nature.
25. **(d)**
26. **(a)** The calcium concentration in plasma is regulated at about 100 mgL^{-1}. It is maintained by two hormones: calcitonin and parathyroid hormone.
27. **(a)** $2CaOCl_2 + dil.H_2SO_4 \rightarrow CaCl_2 + CaSO_4 + 2HClO$
    $HClO \rightarrow HCl + O$
28. **(d)** $CaO + CO_2 \longrightarrow CaCO_3$
    $CaO + H_2O \longrightarrow Ca(OH)_2$
    hissing sound and $\Delta H = -ve$
29. **(c)** MgO has high melting point and does not catch fire and hence protects the cooker against fire.
30. **(c)** The high solubility of $LiClO_4$ is mainly due to high heat of hydration of Li^+ ion.

31. **(c)**

32. **(d)** K and Mg are formed at cathode

$K^+ + e^- \longrightarrow K$

$Mg^{2+} + 2e^- \longrightarrow Mg$.

Chlorine is formed at anode $2Cl^- - 2e^- \longrightarrow Cl_2$.

33. **(b)** The $Be(OH)_2$ and $Al(OH)_3$ are amphoteric in nature.

34. **(c)** $Be(OH)_2$ is insoluble in water value.

35. **(d)** Nitrites gives NO_2 (brown) with dil. acids. The nitrites and bromides give brown vapours of NO_2 and Br_2 with conc. acids.

36. **(c)** As Cs^+ ion has larger size than Li^+ and I^- has larger size than F^-, therefore maximum distance between centres of cations and anions is in CsI.

37. **(c)** The higher the covalent character, the lower the solubility of compound in water.

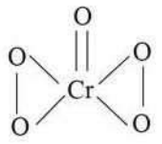
38. **(b)**

39. **(b)** In case of halogens covalent radius is considered this bond is formed by overlapping of electron clouds; while noble gases remain monoatomic, in this case only way to obtain radius is through van der Waal radii.

40. **(c)** In NO_2^+ odd (unpaired) electron is removed. In peroxides $\left(O_2^{2-}\right)$ no unpaired electrons are persent $\left(AlO_2^-\right)$ containing $Al^{3+}(2s^2p^6)$ configuration and 2 oxides (O^{2-}) ions each of which does not contain unpaired electron. Superoxide O_2^- has one unpaired electron.

41. **(b)** Magnesium hydroxide is used to prepare an antacid which is used as medicine for stomach acidity. Hence, the metal M is Mg.

42. **(c)** Na_2O_2 is $Na^{\oplus}\,O^{\ominus} - O^{\ominus}\,Na^{\oplus}$; Cr_2O_5 is



BaO_2 is $Ba^{+2}\left(O^{\ominus} - O^{\ominus}\right)$ while Fe_2O_3 consists of only Fe^{3+} and O^{2-} ions. Thus, Fe_2O_3 does not contain a peroxide $\left(O^{\ominus} - O^{\ominus}\right)$ linkage.

43. **(b)** The basic character of oxides increases down the group.

44. **(a)** On moving across a period ionisation energy increases hence the electropositive nature of metals decreases therefore the ease of formation of ion also decreases and hence the basic character decreases. Further basic character of alkali metals oxides increases from Li_2O to Cs_2O. Hence the correct order will be

$Al_2O_3 < MgO < Na_2O < K_2O$

45. **(d)** All nitrides react with H_2O to give NH_3

$Li_3N + 3H_2O \longrightarrow 3LiOH + NH_3$

$Mg_3N_2 + 6H_2O \longrightarrow 3Mg(OH)_2 + 2NH_3$

$CaNCN + 3H_2O \longrightarrow CaCO_3 + 2NH_3$