DPP - Daily Practice Problems

Name : [   ]   Date : [   ]

Start Time : [   ]   End Time : [   ]

CHEMISTRY [06]

Max. Marks : 120   **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deducted for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 Which follows octet rule ?

    (a) SF_6 (b) PCl_5 (c) NH_3 (d) IF_7

Q.2 The crystal lattice of an electrovalent compound is composed of -

    (a) atoms

    (b) molecules

    (c) oppositely charged ions

    (d) both molecules and ions

Q.3 Which of the following is most covalent ?

    (a) AlF_3 (b) $AlCl_3$ (c) $AlBr_3$ (d) AlI_3

Q.4 Among $LiCl$, $BeCl_2$, BCl_3 and CCl_4, the covalent bond character follows the order -

    (a) $LiCl < BeCl_2 > BCl_3 > CCl_4$

    (b) $LiCl > BeCl_2 < BCl_3 < CCl_4$

    (c) $LiCl < BeCl_2 < BCl_3 < CCl_4$

    (d) $LiCl > BeCl_2 > BCl_3 > CCl_4$

Q.5 Which of the following bonds is most polar ?

    (a) $O – H$ (b) $P – H$

    (c) $C – F$ (d) $S – Cl$

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

Space for Rough Work

Q.6 Polarisibility of halide ions increases in the order

(a) F^-, I^-, Br^-, Cl^- (b) Cl^-, Br^-, I^-, F^-

(c) I^-, Br^-, Cl^-, F^- (d) F^-, Cl^-, Br^-, I^-

Q.7 What is the nature of the bond between B and O in $(C_2H_5)_2OBH_3$?

(a) Covalent (b) Co-ordinate covalent

(c) Ionic bond (d) Banana shaped bond

Q.8 The compound which contains both covalent and co-ordinate bond is -

(a) C_2H_5NC (b) C_2H_5CN

(c) HCN (d) None

Q.9 The type of bond present in N_2O_5 are -

(a) only covalent

(b) only ionic

(c) ionic and covalent

(d) covalent and coordinate

Q.10 No. of covalent and co-ordinate bonds in pyrosulphuric acid are -

(a) 6,4 (b) 6,6 (c) 4,4 (d) 4,6

Q.11 Ionic bonds are usually formed by combination of elements with

(a) high ionisation potential and low electron affinity

(b) low ionisation potential and high electron affinity

(c) high ionisation potential and high electron affinity

(d) low ionisation potential and low electron affinity

Q.12 Choose the correct statement

(a) A cation with non-noble gas configuration is more polarising than the cation with noble gas configuration.

(b) Small cation has minimum capacity to polarise an anion.

(c) Small anion has maximum polarizability.

(d) None of these

Q.13 Two elements X and Y have following electronic configuration-

$X\ 1s^2; 2s^2, 2p^6; 3s^2, 3p^6; 4s^2$

$Y\ 1s^2; 2s^2, 2p^6; 3s^2, 3p^5$

The expected compound formed by combination of X and Y will be expressed as-

(a) XY_2 (b) X_5Y_2 (c) X_2Y_5 (d) XY_5

Q.14 An atom of element A has three electrons in its outer shell and B has six electrons in its outermost shell. The formula of the compound formed between these will be-

(a) A_6B_6 (b) A_2B_3 (c) A_3B_2 (d) A_2B

Q.15 The electronegativity of H and Cl are 2.1 & 3.0 respectively. The correct statement(s) about the nature of HCl is/are

(a) 17% ionic (b) 83% ionic

(c) 50% ionic (d) 100% ionic

Q.16 The electronegativity of O, F, N, Cl and H are 3.5, 4.0, 3.0, 3.2 and 2.1 respectively. The strongest bond will be :

(a) $F - H$ (b) $H - Cl$ (c) $N - H$ (d) $O - H$

Q.17 In which solvent NaCl has maximum solubility?

(a) H_2O (b) C_2H_5OH

(c) CH_3COCH_3 (d) $C_2H_5OC_2H_5$

Q.18 Which has maximum covalent character?

(a) NaCl (b) $SiCl_4$ (c) $AlCl_3$ (d) $MgCl_2$

Q.19 The dipole moment of HBr is 2.6×10^{-30} cm and the interatomic spacing is 1.41 Å. The percentage of ionic character in HBr is-

(a) 10.5 (b) 11.5 (c) 12.5 (d) 13.5

RESPONSE GRID	6. ⓐⓑ©ⓓ	7. ⓐⓑ©ⓓ	8. ⓐⓑ©ⓓ	9. ⓐⓑ©ⓓ	10. ⓐⓑ©ⓓ
	11. ⓐⓑ©ⓓ	12. ⓐⓑ©ⓓ	13. ⓐⓑ©ⓓ	14. ⓐⓑ©ⓓ	15. ⓐⓑ©ⓓ
	16. ⓐⓑ©ⓓ	17. ⓐⓑ©ⓓ	18. ⓐⓑ©ⓓ	19. ⓐⓑ©ⓓ	

Space for Rough Work

Q.20 BF_3 and NF_3 both molecules are covalent, but BF_3 is non-polar and NF_3 is polar. Its reason is

   (a) In uncombined state boron is metal and nitrogen is gas

   (b) B - F bond has no dipole moment whereas N - F bond has dipole moment

   (c) The size of boron atom is smaller than nitrogen

   (d) BF_3 is planar whereas NF_3 is pyramidal

Q.21 The decreasing order of solubility of silver halide is

   (a) $AgI > AgBr > AgCl > AgF$

   (b) $AgF > AgCl > AgBr > AgI$

   (c) $AgCl > AgF > AgBr > AgI$

   (d) $AgBr > AgF > AgI > AgCl$

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

Codes :

(a) 1, 2 and 3 are correct   **(b)** 1 and 2 are correct

(c) 2 and 4 are correct   **(d)** 1 and 3 are correct

Q.22 Which of the following statements is true for ionic compounds ?

   (1) High melting point

   (2) Least solubility in organic compounds

   (3) Soluble in water

   (4) Least lattice energy

Q.23 Which of the following statements regarding covalent bond is true ?

   (1) The electrons are shared between atoms.

   (2) The strength of the bond depends upon the extent of overlapping.

   (3) The bond formed may or may not be polar.

   (4) The bond is non-directional.

Q.24 Polarization is the distortion of the shape of an anion by an adjacently placed cation. Which of the following statements is not correct ?

   (1) Minimum polarization is brought about by a cation of low radius.

   (2) A large cation is likely to bring about a large degree of polarization.

   (3) A small anion is likely to undergo a large degree of polarization.

   (4) Maximum polarization is brought about by a cation of high charge.

DIRECTIONS (Q.25-Q.27) : Read the passage given below and answer the questions that follows :

When a cation approaches an anion closely, the positive charge of a cation attract the electron cloud of the anion towards itself, due to the electrostatic force of attraction between them. At the same time cation also repels the positively charge nucleus of anion.

Due to this combined effect, cloud of anion is bulged or elongated towards the cation. This is called distortion, deformation or polarization of the anion by the cation and anion is said to be polarised.

Polarizability :

(I) Ability of anion to get polarised by the cation.

(II) Polarisation of anion causes some sharing of electron between the ions, so ionic bond acquires certain covalent character.

(III) Polarisation $\propto$ Covalent character

(IV) Magnitude of polarisation depends upon a number of factors, suggested by Fajan and are known as Fajan's rule.

Q.25 Compound with maximum ionic character is formed from -

   (a) Na and Cl (b) Cs and F (c) Cs and I (d) Na and F

Q.26 Out of the following which one has the highest values of covalent character?

   (a) $ZnCl_2$ (b) $CaCl_2$ (c) $CdCl_2$ (d) $CuCl$

RESPONSE GRID	20. ⓐⓑⓒⓓ	21. ⓐⓑⓒⓓ	22. ⓐⓑⓒⓓ	23. ⓐⓑⓒⓓ	24. ⓐⓑⓒⓓ
	25. ⓐⓑⓒⓓ	26. ⓐⓑⓒⓓ			

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Q.27 Compound having highest M.Pt. is

(a) $BeCl_2$ (b) $MgCl_2$ (c) $CaCl_2$ (d) $SrCl_2$

DIRECTIONS (Q. 28-Q.30) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.

(c) Statement -1 is False, Statement-2 is True.

(d) Statement -1 is True, Statement-2 is False.

Q.28 Statement-1 : Order of lattice energy for some halides are as LiX > NaX > KX.

Statement-2 : Size of alkaline metal decreases for Li to K.

Q.29 Statement-1 : The crystal structure gets stabilized even though the sum of electron gain enthalpy and ionization enthalpy is positive.

Statement-2 : Energy is absorbed during the formation of crystal lattice.

Q.30 Statement-1 : According to Fajan's rule, covalent character is favoured by small cation and small anion.

Statement-2 : The magnitude of covalent character in the ionic bond depends upon the extent of polarisation.

RESPONSE GRID	27.ⓐⓑⓒⓓ	28.ⓐⓑⓒⓓ	29.ⓐⓑⓒⓓ	30.ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM SHEET 6 - CHEMISTRY

| Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	36	Qualifying Score	64
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

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(06)

(1) **(c)** Because in other compounds there are more than 8 e⁻ in outermost shell of the central atom.

(2) **(c)** It is the fact that electrovalent compounds are made of ions.

(3) **(d)** As the size of anion increases covalent character increases.

(4) **(c)** The covalent character increases according to charge on cation.

(5) **(c)** Due to maximum electronegativity difference.

(6) **(d)** As the size of anion increases, polarity character increases.

(7) **(b)**

(8) **(a)** Though all compounds have covalent bond but there is coordination bond also between N and C in C_2H_5 NC, $C_2H_5 N \rightleftharpoons C$

(9) **(d)** The structure of N_2O_5 clears about it

$$O \leftarrow N - O - N \rightarrow O$$
$$\quad\ \ \parallel \qquad\quad \parallel$$
$$\quad\ \ O \qquad\quad O$$
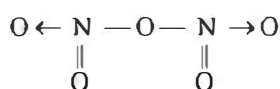
(10) **(a)** Structure of $H_2S_2O_7$ is as follows

$$
\begin{array}{ccc}
 & O & & O \\
 & \uparrow & & \uparrow \\
H-O-&S&-O-&S&-O-H \\
 & \downarrow & & \downarrow \\
 & O & & O \\
\end{array}
$$
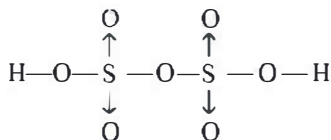
(11) **(b)**

(12) **(a)** A cation with non-noble gas configuration is more polarising than the cation with noble gas configuration and so these cation favours covalency.

(13) **(a)** Valency of element X is 2(2 electrons in the outermost shell) while that of element Y is 1(1 electron required in the outermost shell to complete octet). So the formula of the compound between X and Y is XY_2.

(14) **(b)** In this case the valence electrons in the atom A is three and hence its valency is generally 3. In the atom B the number of valence electrons is six. Hence, its valency is usually 2. Hence the formula of the molecule formed from A and B could be A_2B_3. An example of two such elements are Al and O and the formula of aluminium oxide is Al_2O_3.

(15) **(a)** % ionic character = $16(X_A-X_B)+ 3.5 (X_A-X_B)^2$
$= 16(3.0-2.1)+3.5(3.0-2.1)^2$
$= 14.4+2.83=17.235 \approx 17\%$

(16) **(a)** Bond strength $\propto$ difference in electronegativity of atoms

(17) **(a)** NaCl is an ionic compound. Solubility of an ionic compound depends on the value of dielectric constant of the solvent. Higher the value of dielectric constant of the solvent more is the solubility of the ionic compound.

Solvent	H_2O	C_2H_5OH	CH_3COCH_3	$C_2H_5OC_2H_5$
Dielectric constant	80	27	21	4.1

(18) **(b)** Polarisation in the molecule increases with increase of charge and decreases in size of the cation when the anion is same.

(19) **(b)** % ionic character = $\dfrac{\text{Observed dipole moment}}{\text{Theoretical dipole moment}}\times 100$

Theoretical dipole moment of a 100% ionic character
$= e \times d = (1.6 \times 10^{-19} C) \times (1.41 \times 10^{-10} m)$
$= 2.256 \times 10^{-29}$ cm

% ionic character $= \dfrac{2.6 \times 10^{-30}}{2.256 \times 10^{-29}} = 11.5$

(20) **(d)** BF_3 is planar while NF_3 is pyramidal due to the presence of lone pair of electron on nitrogen in NF_3.

(21) **(b)** AgI has maximum covalent character [∵ I⁻ is a large anion], while AgF has minimum covalent character, therefore, it has more solubility.

(22) **(a)**

(23) **(a)** Covalent bond is directional.

(24) **(a)** According to Fajan's rule, polarisation of anion is influenced by charge and size of cation. More is the charge on cation, more is polarisation of anion.

(25) **(b)** Using Fajan's rule, larger cation and smaller anion will have maximum ionic character.

(26) **(a)** Because Zn^{+2} has smallest size among the all.

(27) **(d)** As the size of cation increases, polarizing power decreases hence ionic character increases.

(28) **(d)** The size of alkali metal increases from Li to K. So, statement-1 is true & statement-2 is false.

(29) **(d)** Energy is released during the formation of the crystal lattice. It is qualitative measure of the stability of an ionic compound so statement-1 is true & statement-2 is false.

(30) **(c)** Covalent character is favoured by small cation and larger anion.