



Exercise-1

Marked questions are recommended for Revision.

PART - I : SUBJECTIVE QUESTIONS

Section (A) : Fajan's Rule and its applications

- A-1. Arrange the following in the increasing order of their covalent character.
 (a) NaF, Na₃N and Na₂O (b) NaCl, MgCl₂, AlCl₃, SiCl₄ and PCl₅
- A-2. SnCl₄ has melting point - 15°C where as SnCl₂ has melting point 535°C. Why?
- A-3. SnCl₂ is white but SnI₂ is red. Why ?

Section (B) : Dipole moment

- B-1. Inorganic benzene is more reactive than organic benzene. Why?
- B-2. trans-1, 2 dichloro ethene have zero dipole moment while its cis- form has some dipole moment. Explain.
- B-3. Why CCl₄ have zero dipole moment but CHCl₃ have some dipole moment ?
- B-4. Arrange in increasing order of dipole moment ; H₂O, H₂S, BF₃.
- B-5. Dipole moment of LiF was experimentally determined and was found to be 6.32 D. Calculate percentage ionic character in LiF molecule Li—F bond length is 156 pm.

Section (C) : Acidic & basic character

- C-1. (a) Write the formula of anhydride of the following acids :
 (i) Nitrous acid (HNO₂) (ii) Sulphuric acid (H₂SO₄)
 (b) What are amphoteric oxides ? Give 2 examples.
- C-2. Arrange in the increasing order of acidic character : CO₂, N₂O₅, SiO₂, SO₃.
- C-3. Arrange in the increasing order of basic character : MgO, SrO, K₂O, NiO, Cs₂O

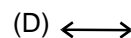
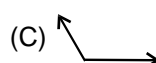
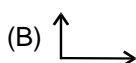
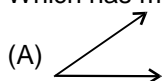
PART - II : ONLY ONE OPTION CORRECT TYPE

Section (A) : Fajan's Rule and its applications

- A-1. Which of the following is in order of increasing covalent character ?
 (A) CCl₄ < BeCl₂ < BCl₃ < LiCl (B) LiCl < CCl₄ < BeCl₂ < BCl₃
 (C) LiCl < BeCl₂ < BCl₃ < CCl₄ (D) LiCl < BeCl₂ < CCl₄ < BCl₃
- A-2. Which of the following combination of ion will have highest polarisation ?
 (A) Fe²⁺, Br⁻ (B) Ni⁴⁺, Br⁻ (C) Ni²⁺, Br⁻ (D) Fe, Br⁻
- A-3. The correct order of decreasing polarizability of ion is :
 (A) Cl⁻, Br⁻, I⁻, F⁻ (B) F⁻, I⁻, Br⁻, Cl⁻ (C) I⁻, Br⁻, Cl⁻, F⁻ (D) F⁻, Cl⁻, Br⁻, I⁻
- A-4. SnCl₄ is a covalent liquid because :
 (A) electron clouds of the Cl⁻ ions are weakly polarized to envelop the cation.
 (B) electron clouds of the Cl⁻ ions are strongly polarized to envelop the cation.
 (C) its molecules are attracted to one another by strong van der Waals forces.
 (D) Sn shows inert pair effect.

Section (B) : Dipole moment

- B-1. Which has maximum dipole moment ?





- B-2.** Of the following molecules, the one, which has permanent dipole moment, is :
 (A) SiF₄ (B) BF₃ (C) PF₃ (D) PF₅
- B-3.** Which of the following has the least dipole moment ?
 (A) NF₃ (B) CO₂ (C) SO₂ (D) NH₃
- B-4.** Which of the following compounds possesses zero dipole moment?
 (A) Benzene (C₆H₆) (B) Carbon tetrachloride
 (C) Boron trifluoride (D) All of these
- B-5.** The geometry of H₂S and its dipole moment are :
 (A) angular and non zero (B) angular and zero
 (C) linear and non zero (D) linear and zero
- B-6.** Which of the following has been arranged in order of decreasing dipole moment ?
 (A) CH₃Cl > CH₃F > CH₃Br > CH₃I (B) CH₃F > CH₃Cl > CH₃Br > CH₃I
 (C) CH₃Cl > CH₃Br > CH₃I > CH₃F (D) CH₃F > CH₃Cl > CH₃I > CH₃Br
- B-7.** The dipole moment of chlorobenzene is 1.73 D. The dipole moment of p-dichlorobenzene is expected to be:
 (A) 3.46 D (B) 0.00 D (C) 1.73 D (D) 1.00 D

Section (C) : Acidic & basic character

- C-1.** Which of the following is the strongest oxy-acid among the following :
 (A) H₂SO₄ (B) H₃PO₄ (C) HClO₄ (D) H₂SiO₃
- C-2.** Which of the following is the anhydride of Nitric acid (HNO₃) :
 (A) NO₂ (B) N₂O₃ (C) N₂O₅ (D) N₂O
- C-3.** The order of basic character of given oxides is :
 (A) Na₂O > MgO > CuO > SiO₂ (B) MgO > SiO₂ > CuO > Na₂O
 (C) SiO₂ > MgO > CuO > Na₂O (D) CuO > Na₂O > MgO > SiO₂
- C-4.** Amphoteric behaviour is shown by the oxides of :
 (A) Al and Ca (B) Pb and Ba (C) Cr and Mg (D) Sn and Zn
- C-5.** Which one of the following oxides is neutral ?
 (A) CO (B) SnO₂ (C) ZnO (D) SiO₂

PART - III : MATCH THE COLUMN

1. Match the column:

	Column-I		Column-II
(A)	CsCl, CsBr, CsI	(p)	Increasing order of covalent character
(B)	LiOH, NaOH, KOH	(q)	Decreasing order of thermal stability
(C)	LiH, NaH, KH	(r)	Decreasing order of lattice energy
(D)	Mg ₃ N ₂ , Ca ₃ N ₂ , Sr ₃ N ₂	(s)	Increasing order of thermal stability
		(t)	Increasing order of ionic character

Exercise-2

- Marked questions are recommended for Revision.

PART - I : ONLY ONE OPTION CORRECT TYPE

1. Among the following compounds the one that is polar and has central atom with sp³ hybridisation is :
 (A) H₂CO₃ (B) SiF₄ (C) BF₃ (D) HClO₂
2. Which of the following are polar.
 (A) XeF₄ (B) SO₃ (C) XeOF₄ (D) ICl₄⁻





3. Which of the following statements is true?
 (A) The dipole moment of NF_3 is zero (B) The dipole moment of NF_3 is less than NH_3
 (C) The dipole moment of NF_3 is more than NH_3 (D) The dipole moment of NH_3 is zero
4. Which of the following would be expected to have a dipole moment of zero on the basis of symmetry?
 (A) SOCl_2 (B) OF_2 (C) SeF_6 (D) ClF_5
5. If molecule MX_3 has Zero dipole moment, the hybrid orbitals used by M (Atomic No. < 21) are
 (A) Pure p (B) sp hybrid (C) sp^2 hybrid (D) sp^3 hybrid
6. Which of the following are incorrect for dipole moment ?
 (A) Lone pair of elements present on central atom can give rise to dipole moment
 (B) Dipole moment is vector quantity
 (C) $\text{PF}_5(\text{g})$ molecule has non zero dipole moment
 (D) Difference in electronegativities of combining atom can lead to dipole moment
7. Which of the following has minimum melting point
 (A) CsF (B) HCl (C) HF (D) LiF
8. Which of the following is false ?
 (A) Van der Waals forces are responsible for the formation of molecular crystals.
 (B) Branching lowers the boiling points of isomeric organic compounds due to reduction in the van der Waals force of attraction.
 (C) In graphite, van der Waals forces act between the carbon layers.
 (D) Boiling point of NH_3 is greater than SbH_3 .
9. Which of the following contains both electrovalent and covalent bonds ?
 (A) CH_4 (B) H_2O_2 (C) NH_4Cl (D) none
10. The correct order of the increasing ionic character is :
 (A) $\text{BeCl}_2 < \text{MgCl}_2 < \text{CaCl}_2 < \text{BaCl}_2$ (B) $\text{BeCl}_2 < \text{MgCl}_2 < \text{BaCl}_2 < \text{CaCl}_2$
 (C) $\text{BeCl}_2 < \text{BaCl}_2 < \text{MgCl}_2 < \text{CaCl}_2$ (D) $\text{BaCl}_2 < \text{MgCl}_2 < \text{CaCl}_2 < \text{BeCl}_2$
11. Least melting point is shown by the compound :
 (A) PbCl_2 (B) SnCl_4 (C) NaCl (D) AlCl_3
12. Cu_2 is unstable even at ordinary temperature because :
 (A) the Cu^{2+} ion with a comparatively small radius has a strong polarising power.
 (B) the Cu^{2+} ion with a 17 electron outer shell has weak polarising power.
 (C) the I^- ion with a larger radius has a high polarisability.
 (D) both (A) and (C)
13. **S₁** : Oxidation number of N in N_2O_5 is 5
S₂ : The anhydride of Hypochlorous acid is Cl_2O
S₃ : As the electronegativity of central atom in a molecule having same hybridisation state and same terminal atoms increases, bond angle always increases.
S₄ : For heteronuclear diatomic species A–B, the bond length decreases as the difference in electronegativity values increases (considering A and B of similar size) in all compound.
 (A) T T T F (B) F T T T (C) F F T F (D) T T F T

PART - II : SINGLE OR DOUBLE INTEGER TYPE

1. Find total no. of polar molecules.
 (a) PF_3Cl_2 (b) SF_4 (c) PCl_5 (d) PCl_3F_2
 (e) SF_6 (f) XeF_2 (g) NO_2^+ (h) BF_2Cl (i) BF_3
2. How many of the following compounds are planar as well as non polar compound :
 (a) C_3O_2 (b) $\text{CH}_2=\text{C}=\text{CH}_2$ (c) BF_3 (d) CCl_4
 (e) SF_6 (f) XeF_4 (g) IF_5 (h) IF_7
 (i) SF_4 (j) ClF_3



3. How many of the following are correct orders of property indicated against it ?
- (i) $I^- > Br^- > Cl^- > F^-$ (order of polarizability)
 (ii) $Li^+ > Na^+ > K^+ > Cs^+$ (order of polarising power)
 (iii) $Li^+ > Mg^{2+} > Al^{3+}$ (order of polarising power)
 (iv) $LiI > NaI > KI$ (order of ionic character)
 (v) $AgI > AgBr > AgCl$ (order of solubility in water)
 (vi) (Si–Si bond) $Si > SiO_2$ (Si–O bond) (order of % covalent character of bond).
4. How many of the following oxides are acidic ?
- (a) Mn_2O_7 (b) SO_2 (c) CO (d) N_2O
 (e) NO_2 (f) PbO_2 (g) Na_2O (h) CrO_3
 (i) ZnO (j) Fe_2O_3 (k) SiO_2 (l) SnO

PART - III : ONE OR MORE THAN ONE OPTION CORRECT TYPE

1. The halogen form compounds among themselves with formula XX' , XX'_3 , XX'_5 and XX'_7 where X is the heavier halogen. Which of the following pairs representing their structures and being polar and non-polar are correct?
- (A) XX' – Linear – polar (B) XX'_3 – T-shaped – polar
 (C) XX'_5 – square pyramidal – polar (D) XX'_7 – Pentagonal bipyramidal – non-polar
2. Which of the following is/are correct statement(s) for dipole moment ?
- (A) Lone pair of electrons present on central atom can give rise to dipole moment.
 (B) Dipole moment is vector quantity.
 (C) CO_2 molecule has dipole moment.
 (D) Difference in electronegativities of combining atoms can lead to dipole moment.
3. Which of the following are polar ?
- (A) XeF_4 (B) XeF_6 (C) $XeOF_4$ (D) XeF_5^-
4. Which of the following compounds contain(s) both ionic and covalent bonds?
- (A) NH_4Cl (B) KCN (C) $CuSO_4 \cdot 5H_2O$ (D) $NaOH$
5. Which of the following factors do not favour electrovalency ?
- (A) Low charge on ions (B) High charge on ions
 (C) Large cation and small anion (D) Small cation and large anion
6. Which statement(s) is/are correct ?
- (A) Polarising power refers to cation.
 (B) Polarisability refers to anion.
 (C) Small cation is more efficient to polarise anion.
 (D) Molecules in which cation having pseudo inert gas configuration are more covalent.

PART - IV : COMPREHENSION

Read the following passage carefully and answer the questions.

Comprehension # 1

The degree of polarity of a covalent compound is measured by the dipole moment (μ_{bond}) of the bond defined as:

$$\mu_{\text{bond}} = \text{Charge on one of the poles} \times \text{bond length}$$

μ_{bond} is a vector quantity. The dipole moment of a molecule is the vector addition of all the bond dipole moments present in it. For a triatomic molecule, containing two bond's like H_2O , μ_{molecule} is given by

$$\mu_{\text{molecule}}^2 = \mu_{\text{bond}}^2 + \mu_{\text{bond}}^2 + 2\mu_{\text{bond}} \cdot \mu_{\text{bond}} \cos \theta$$

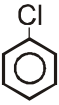
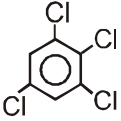
$$\theta = \text{bond angle}$$

The % ionic character of a bond is calculated using the equations

$$\% \text{ ionic character} = \frac{\mu_{\text{obs}}}{\mu_{\text{ionic}}} \times 100$$

μ_{ionic} = dipole moment when the molecule is assumed to be completely ionic.



1. Which of the following molecule has non-zero dipole moment -
 (A) XeF_2 (B) ClF_3 (C) XeO_2F_4 (D) XeF_4
2. The dipole moment of  is 1.5 D. The dipole moment of  will be -
 (A) 0 D (B) 1.5 D (C) 2.86 D (D) 2.25 D
3. Which of the following compound has Zero dipole moment -
 (A) PCl_3 (B) PCl_2F_3 (C) PCl_3F_2 (D) PClF_4

Comprehension # 2

Molecular geometry is the general shape of a molecule as determined by the relative positions of the atomic nuclei. VSEPR model predicts the shape of the molecules & ions in which valence shell electron pairs are arranged about the atom as far away from one another as possible, thus minimizing pair repulsion information about the geometry of a molecule can sometimes be obtained from an experimental quantity called dipole moment.

4. The dipole moment of a triatomic molecule AX_2 was found to be equal to the bond moment of A-X bond. Which of the following information regarding geometry of the molecule can be drawn from the above observation.
 (A) Molecule is linear
 (B) Molecule is V shaped with $\angle \text{X-A-X} = 90^\circ$
 (C) Molecule is V shaped with $\angle \text{X-A-X} = 120^\circ$
 (D) Molecular geometry can not be predicted with the given information
5. Which of the following inter-halogen compounds is non-polar in nature:
 (A) ClF_3 (B) BrF_5 (C) IF_7 (D) BrCl

Comprehension # 3

A covalent bond in which electrons are shared unequally and the bonded atoms acquire a partial positive and negative charge, is called a polar covalent bond. Bond polarity is described in terms of ionic character.

Similarly in ionic bond, some covalent character is introduced because of the tendency of the cation to polarise the anion. The magnitude of covalent character in the ionic bond depends upon the extent of polarization caused by cations.

In general :

- (i) Smaller the size of cation, larger is its polarizing power.
 (ii) Larger the anion, more will be its polarisability.
 (iii) Among two cations of similar size, the polarizing power of cations with pseudo - inert gas configuration ($ns^2np^6nd^{10}$) is larger than cation with noble gas configuration (ns^2np^6) e.g. polarizing power of Ag^+ is more than K^+ .

6. Which of the following will be most covalent ?
 (A) NaCl (B) Na_2S (C) MgCl_2 (D) MgS
7. Which of the following is least ionic ?
 (A) BeI_2 (B) BeCl_2 (C) BeBr_2 (D) BeF_2
8. Arrange the following compounds in increasing order of their ionic character :
 $\text{SnCl}_2, \text{SnCl}_4, \text{SiCl}_4, \text{SnF}_4, \text{SnF}_2$
 (A) $\text{SnF}_2 < \text{SnCl}_2 < \text{SnF}_4 < \text{SnCl}_4 < \text{SiCl}_4$ (B) $\text{SnF}_2 < \text{SnCl}_2 < \text{SnF}_4 < \text{SiCl}_4 < \text{SnCl}_4$
 (C) $\text{SiCl}_4 < \text{SnCl}_4 < \text{SnF}_4 < \text{SnCl}_2 < \text{SnF}_2$ (D) $\text{SnCl}_4 < \text{SnF}_4 < \text{SnCl}_2 < \text{SnF}_2 < \text{SiCl}_4$
9. Which is the correct order of covalent character
 (A) $\text{BeF}_2 < \text{BeCl}_2 < \text{BeBr}_2 < \text{BeI}_2$ (B) $\text{BeCl}_2 < \text{BeF}_2 < \text{BeI}_2 < \text{BeBr}_2$
 (C) $\text{BeI}_2 < \text{BeBr}_2 < \text{BeCl}_2 < \text{BeF}_2$ (D) $\text{BeI}_2 < \text{BeCl}_2 < \text{BeBr}_2 < \text{BeF}_2$
10. Which of the following combination of cation and anion has maximum covalent character.
 (A) K^+, Cl^- (B) Na^+, Cl^- (C) Cs^+, Cl^- (D) $\text{Mg}^{2+}, \text{Cl}^-$



Comprehension # 4

Answer 11, 12 and 13 by appropriately matching the information given in the three columns of the following table.

According to Fajan covalency is favoured by :

- (i) Small size of cation
- (ii) Large size of anion
- (iii) High charge on cation, anion or both
- (iv) Cation with non-noble gas configuration

Column-1		Column-2		Column-3	
(I)	NaF, NaCl, NaBr, NaI	(i)	Size of cation increases	(P)	Covalent character increases
(II)	NaCl, MgCl ₂ , AlCl ₃	(ii)	Size of anion increases	(Q)	Ionic character increases
(III)	MgCO ₃ , CaCO ₃ , SrCO ₃ , BaCO ₃	(iii)	Charge on anion increases	(R)	Melting point increases
(IV)	LiOH, NaOH, KOH, RbOH	(iv)	Charge density decreases (Magnitude)	(S)	Solubility increases

11. Which of the following combination is incorrect ?
 (A) I, ii, P (B) I, iv, P (C) I, ii, R (D) IV, i, S
12. Which of the following is correct combination ?
 (A) II, i, P (B) II, iv, Q (C) III, iv, D (D) III, i, Q
13. The incorrect combination is
 (A) III, iv, Q (B) IV, iv, S (C) IV, iv, Q (D) III, iv, P

Exercise-3

* Marked Questions may have more than one correct option.

PART - I : JEE (ADVANCED) / IIT-JEE PROBLEMS (PREVIOUS YEARS)

1. Arrange the following compounds in order of increasing dipole moment toluene (I), m-dichlorobenzene (II), o-dichlorobenzene (III), p-dichlorobenzene (IV) : [IIT JEE 1996]
 (A) I < IV < II < III (B) IV < I < II < III (C) IV < I < III < II (D) IV < II < I < III
2. Which contains both polar and non-polar bonds ? [IIT JEE 1997]
 (A) NH₄Cl (B) HCN (C) H₂O₂ (D) CH₄
3. The geometry of H₂S and its dipole moment are : [IIT JEE 1999]
 (A) angular and non-zero (B) angular and zero
 (C) linear and non-zero (D) linear and zero
- 4.* The molecules that will have dipole moment are [IIT JEE 1992]
 (A) 2, 2-dimethyl propane (B) trans-2-pentene
 (C) cis-3-hexene (D) 2, 2, 3, 3-tetramethyl butane
5. The correct order of acidic strength is : [JEE-2000, 1/135]
 (A) Cl₂O₇ > SO₃ > P₄O₁₀ (B) CO₂ > N₂O₅ > SO₃
 (C) Na₂O > MgO > Al₂O₃ (D) K₂O > CaO > MgO

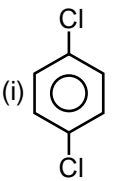




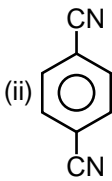
6. The set with correct order of acidity is : [JEE-2001, 1/135]
 (A) $\text{HClO} < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}_4$ (B) $\text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2 < \text{HClO}$
 (C) $\text{HClO} < \text{HClO}_4 < \text{HClO}_3 < \text{HClO}_2$ (D) $\text{HClO}_4 < \text{HClO}_2 < \text{HClO}_3 < \text{HClO}$
7. Identify the correct order of acidic strengths of CO_2 , CuO , CaO , H_2O . [JEE-2002, 3/150]
 (A) $\text{CaO} < \text{CuO} < \text{H}_2\text{O} < \text{CO}_2$ (B) $\text{H}_2\text{O} < \text{CuO} < \text{CaO} < \text{CO}_2$
 (C) $\text{CaO} < \text{H}_2\text{O} < \text{CuO} < \text{CO}_2$ (D) $\text{H}_2\text{O} < \text{CO}_2 < \text{CaO} < \text{CuO}$
- 8.* The correct statement(s) regarding, (i) HClO , (ii) HClO_2 , (iii) HClO_3 and (iv) HClO_4 is(are) [JEE(Advanced) 2015, 4/168]
 (A) The number of $\text{Cl}=\text{O}$ bonds in (ii) and (iii) together is two
 (B) The number of lone pairs of electrons on Cl in (ii) and (iii) together is three
 (C) The hybridization of Cl in (iv) is sp^3
 (D) Amongst (i) to (iv), the strongest acid is (i)

PART - II : JEE (MAIN) / AIEEE PROBLEMS (PREVIOUS YEARS)

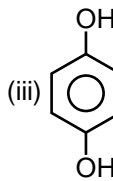
JEE(MAIN) OFFLINE PROBLEMS

1. Which one of the following is an amphoteric oxide? [AIEEE-2003, 3/225]
 (1) ZnO (2) Na_2O (3) SO_2 (4) B_2O_3 .
2. Which of the following pair of molecules will have permanent dipole moments for both members? [AIEEE-2003, 3/225]
 (1) SiF_4 and NO_2 (2) NO_2 and CO_2 (3) NO_2 and O_3 (4) SiF_4 and CO_2
3. Among Al_2O_3 , SiO_2 , P_2O_3 and SO_2 the correct order of acid strength is : [AIEEE-2004, 3/225]
 (1) $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{SO}_2 < \text{P}_2\text{O}_3$ (2) $\text{SiO}_2 < \text{SO}_2 < \text{Al}_2\text{O}_3 < \text{P}_2\text{O}_3$
 (3) $\text{SO}_2 < \text{P}_2\text{O}_3 < \text{SiO}_2 < \text{Al}_2\text{O}_3$ (4) $\text{Al}_2\text{O}_3 < \text{SiO}_2 < \text{P}_2\text{O}_3 < \text{SO}_2$
4. The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences represents the increasing order of the polarizing power of these cationic species, K^+ , Ca^{2+} , Mg^{2+} , Be^{2+} ? [AIEEE-2007, 3/120]
 (1) $\text{K}^+ < \text{Ca}^{2+} < \text{Mg}^{2+} < \text{Be}^{2+}$ (2) $\text{Ca}^{2+} < \text{Mg}^{2+} < \text{Be}^{2+} < \text{K}^+$
 (3) $\text{Mg}^{2+} < \text{Be}^{2+} < \text{K}^+ < \text{Ca}^{2+}$ (4) $\text{Be}^{2+} < \text{K}^+ < \text{Ca}^{2+} < \text{Mg}^{2+}$
5. Among the following the maximum covalent character is shown by the compound : [AIEEE-2011, 4/120]
 (1) FeCl_2 (2) SnCl_2 (3) AlCl_3 (4) MgCl_2
6. For which of the following molecule significant $\mu \neq 0$? [JEE(Main)-2014, 4/120]
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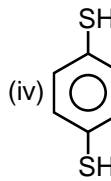
(i)



(ii)



(iii)



(iv)
- (1) Only (i) (2) (i) and (ii) (3) Only (iii) (4) (iii) and (iv)
7. In the following reactions, ZnO is respectively acting as a/an : [JEE(Main)-2017, 4/120]
 (a) $\text{ZnO} + \text{Na}_2\text{O} \longrightarrow \text{Na}_2\text{ZnO}_2$ (b) $\text{ZnO} + \text{CO}_2 \longrightarrow \text{ZnCO}_3$
 (1) base and base (2) acid and acid (3) acid and base (4) base and acid





8. Which of the following compounds contain(s) no covalent bond(s) ? **[JEE(Main)-2018, 4/120]**
KCl, PH₃, O₂, B₂H₆, H₂SO₄
(1) KCl (2) KCl, B₂H₆ (3) KCl, B₂H₆, PH₃ (4) KCl, H₂SO₄

JEE(MAIN) ONLINE PROBLEMS

1. Amongst LiCl, RbCl, BeCl₂ and MgCl₂ the compounds with the greatest and the least ionic character respectively are : **[JEE(Main) 2014 Online (19-04-14), 4/120]**
(1) LiCl and RbCl (2) RbCl and BeCl₂ (3) MgCl₂ and BeCl₂ (4) RbCl and MgCl₂
2. Which of the alkaline earth metal halides given below is essentially covalent in nature ? **[JEE(Main) 2015 Online (11-04-15), 4/120]**
(1) SrCl₂ (2) CaCl₂ (3) BeCl₂ (4) MgCl₂
3. Molecule AB has a bond length of 1.61 Å and a dipole moment of 0.38 D. The fractional charge on each atom (absolute magnitude) is : ($\epsilon_0 = 4.802 \times 10^{-10}$ esu) **[JEE(Main) 2015 Online (11-04-15), 4/120]**
(1) 0.5 (2) 0.05 (3) 0 (4) 1.0
4. Which intermolecular force is most responsible in allowing xenon gas to liquefy? **[JEE(Main) 2016 Online (09-04-16), 4/120]**
(1) Instantaneous dipole-induced dipole (2) Ionic
(3) Ion-dipole (4) Dipole-dipole
5. Which of the following is a Lewis acid ? **[JEE(Main) 2018 Online (15-04-18), 4/120]**
(1) PH₃ (2) NF₃ (3) NaH (4) B(CH₃)₃

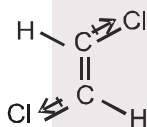


Answers

EXERCISE - 1

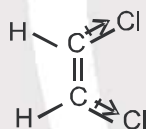
PART - I

- A-1** (a) $\text{NaF} < \text{Na}_2\text{O} < \text{Na}_3\text{N}$ (b) $\text{NaCl} < \text{MgCl}_2 < \text{AlCl}_3 < \text{SiCl}_4 < \text{PCl}_5$
- A-2.** According to Fajan's rule, as charge on cation increases its polarising power increases resulting in to the greater polarisation of anion. Thus covalent character increases and melting point decreases.
- A-3.** Bigger anion has higher polarisability; more polarisation greater is the intensity of colour (valence shell electrons are loosely bound with the nucleus).
- B-1.** Inorganic benzene ($\text{N}_3\text{B}_3\text{H}_6$) contains polar covalent B–N bonds while benzene (C_6H_6) contains non-polar covalent C–C bonds.



trans-form

Two chlorine atom lie opposite direction, so net dipole moment will be zero



cis-form

Two chlorine atom lie on the same side of C = C. So there will be some net dipole moment

- B-2.**
- B-3.** CCl_4 is a symmetrical and non polar molecule while CHCl_3 is an unsymmetrical and polar molecule.
- B-4.** $\text{BF}_3 < \text{H}_2\text{S} < \text{H}_2\text{O}$.
- B-5.** 84.5%
- C-1.** (a) (i) N_2O_3 (ii) SO_3
- C-2.** As ΔE_n (difference in electronegativities between element and oxygen) decreases, the acidic character increases. So, $\text{SiO}_2 < \text{CO}_2 < \text{N}_2\text{O}_5 < \text{SO}_3$.
- C-3.** Higher the metallic character, greater will be the basic character of its oxide as ΔE_n (difference in electronegativities between element and oxygen) increases. So, $\text{NiO} < \text{MgO} < \text{SrO} < \text{K}_2\text{O} < \text{Cs}_2\text{O}$

PART - II

- | | | | | |
|-----------------|-----------------|-----------------|-----------------|-----------------|
| A-1. (C) | A-2. (B) | A-3. (C) | A-4. (B) | B-1. (A) |
| B-2. (C) | B-3. (B) | B-4. (D) | B-5. (A) | B-6. (A) |
| B-7. (B) | C-1. (C) | C-2. (C) | C-3. (A) | C-4. (D) |
| C-5. (A) | | | | |

PART - III

1. (A – p,q,r) ; (B – s,t) ; (C –q,r,t) ; (D – s,t)



EXERCISE - 2

PART - I

- | | | | | |
|---------|---------|---------|--------|---------|
| 1. (D) | 2. (C) | 3. (B) | 4. (C) | 5. (C) |
| 6. (C) | 7. (B) | 8. (D) | 9. (C) | 10. (A) |
| 11. (B) | 12. (D) | 13. (D) | | |

PART - II

- | | | | |
|----------------|----------------|------------------|----------------------|
| 1. 3 (a, b, h) | 2. 3 (a, c, f) | 3. 3 (i, ii, vi) | 4. 5 (a, b, e, h, k) |
|----------------|----------------|------------------|----------------------|

PART - III

- | | | | | |
|-----------|----------|---------|-----------|---------|
| 1. (ABCD) | 2. (ABD) | 3. (BC) | 4. (ABCD) | 5. (BD) |
| 6. (ABCD) | | | | |

PART - IV

- | | | | | |
|---------|---------|---------|--------|---------|
| 1. (B) | 2. (B) | 3. (C) | 4. (C) | 5. (C) |
| 6. (D) | 7. (A) | 8. (C) | 9. (A) | 10. (D) |
| 11. (C) | 12. (D) | 13. (D) | | |

EXERCISE - 3

PART - I

- | | | | | |
|--------|--------|----------|----------|--------|
| 1. (B) | 2. (C) | 3. (A) | 4.* (BC) | 5. (A) |
| 6. (A) | 7. (A) | 8.* (BC) | | |

PART - II

JEE(MAIN) OFFLINE PROBLEMS

- | | | | | |
|--------|--------|--------|--------|--------|
| 1. (1) | 2. (3) | 3. (4) | 4. (1) | 5. (3) |
| 6. (4) | 7. (3) | 8. (1) | | |

JEE(MAIN) ONLINE PROBLEMS

- | | | | | |
|--------|--------|--------|--------|--------|
| 1. (2) | 2. (3) | 3. (2) | 4. (1) | 5. (4) |
|--------|--------|--------|--------|--------|