INORGANIC CHEMISTRY

DPP
DAILY PRACTICE PROBLEMS

DPP No. 14

Total Marks : 32

Max. Time : 35 min.

Topic : Chemical Bonding

Type of Questions		M.M., Min.
Single choice Objective ('–1' negative marking) Q.1 to Q.4	(3 marks, 3 min.)	[12, 12]
Multiple choice objective ('–1' negative marking) Q.5 to Q.6	(4 marks, 4 min.)	[8, 8]
Match the Following (no negative marking) Q.7	(8 marks, 10 min.)	[8, 10]
Subjective Questions ('–1' negative marking) Q.8	(4 marks, 5 min.)	[4, 5]

1. Which of the following is ionic solid :

(A) XeF_6 (s) (B) PBr_5(s) (C) CaC_2(s) (D) All of these

2. Which of the following statements are correct :

(1) The number of sigma bonds in $CH_2 = C = C = CH_2$ is 7.

(2) All the hydrogen atoms in $CH_2 = C = C = CH_2$ lie in the same plane.

(A) Only (1) (B) Only (2) (C) Both (1) and (2) (D) Neither (1) nor (2)

3. Match the list-I with List–II and select the correct answer using the codes given below with the lists.

List–I (Compounds)	**List-II (Shape)**
(a) XeF_4	(i) Tetrahedral
(b) XeO_3	(ii) Square planar
(c) XeO_4	(iii) Trigonal bipyramidal
(d) XeO_3F_2	(iv) Pyramidal

(A) a – iv, b – iii, c – i, d – ii (B) a – ii, b – iv, c – i, d – iii

(C) a – i, b – iv, c – ii, d – iii (D) a – ii, b – i, c – iii, d – iv

4. Gaseous SO_3 molecule :

(A) is planar triangular in shape with three σ bonds from sp^2 – p overlap and three π-bonds formed by two $p\pi - p\pi$ overlap and one $p\pi - d\pi$ overlap.

(B) is planar triangular in shape with three σ-bonds from sp^2 – p overlap and three π-bonds formed by one $p\pi - p\pi$ overlap and two $p\pi - d\pi$ overlap.

(C) is a pyramidal molecule with one double bond and two single bonds

(D) is planar triangular in shape with two double bonds between S and O and one single bond

5.* Which of the following is a planar molecule :

(A) XeF_4 (B) $\ddot{N}H_3$ (C) BrO_3^- (D) $C\ell F_3$

6.* Identify pairs containing isomorphous species :

(A) $MgCO_3$, $NaNO_3$ (B) Na_2CO_3 , Na_2SO_3 (C) $BaSO_4$, $KMnO_4$ (D) $NaNO_3$, $KClO_3$

7. Match the following :

	Molecule / ion		**Hybridisation of central atom**
(A)	$IO_2F_2^-$	(p)	sp^3d
(B)	F_2SeO	(q)	sp^3
(C)	$ClOF_3$	(r)	sp^2
(D)	XeF_5^+	(s)	sp^3d^2

8. There will be three different flourine-flourine distances in molecule $F_2C=C=C=CF_2$. Assuming ideal bond angles for a particular hybridisation (assume no distortion due to double bonds), find out the two smaller flourine-flourine distances (in pm).

(Given that C–F bond length = 134 pm, C = C bond length = 134 pm, $\sqrt{3}$ = 1.7)

Answer Key

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1.	(D)	**2.**	(C)	**3.**	(B)	**4.**	(B)	**5.***	(AD)
6.*	(AC)	**7.**	(A – p, B – q, C – p, D – s)			**8.**	**228 pm , 536 pm**		

Hints & Solutions

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1. All are ionic solids

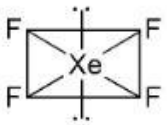
XeF_6 (S) consists XeF_5^+ & F^-

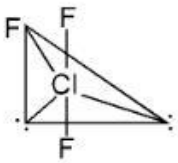
PBr_5 (s)..... PBr_4^+ & Br^-

CaC_2(s) ..... Ca^{++} & C_2^{--}

2. (1) Number of sigma bonds is 7.

(2) Odd number of consecutive double bonds. So, all the hydrogen atoms lie in same plane.

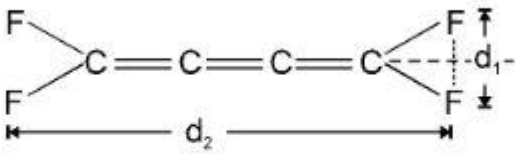
5.* 



6.* The compound containing same type of ions having same hybridization & sape is isomorphous to each other.

Species	Hybridisation	Shape
CO_3^{2-}	sp^2	Trigonal planar
NO_3^-	sp^2	Trigonal planar
SO_3^{2-}	sp^2	Pyramidal
SO_4^{2-}	sp^3	Tetrahedral
MnO_4^-	sp^3	Tetrahedral
ClO_4^-	sp^3	Tetrahedral

7. (A – p, B – q, C – p, D – s)

8. 

$d_1 = 2 \times 134 \times \sin 60°$ pm = 227.8 pm = 228 pm

$d_2 = 134 \times 3 + 2 \times 134 \cos 60°$ pm = 536 pm