

NEET CHEMICAL BONDING AND MOLECULAR STRUCTURE — VSEPR THEORY AND MOLECULAR GEOMETRY — PYQS

Max. Marks: 136

Questions: 34

Section A (MCQ) — 34 questions

Q.1 Identify the correct statement about ClF_3 from the following options : [NEET (UG) 2026]

- (1) It has T-shaped geometry with three lone pairs on Cl atom.
- (2) It has T-shaped geometry with two lone pairs on Cl atom.
- (3) It has a trigonal pyramidal geometry with two lone pairs on Cl atom.
- (4) It has a planar trigonal geometry with two lone pairs on Cl atom.

Scan or tap for the
full solution



Q.2 Match the species in **List-I** with their geometry in **List-II**. [RE-NEET (UG) 2026]

List-I		List-II	
A.	PCl_5	I.	Tetrahedral
B.	BrF_5	II.	Square Planar
C.	BF_4^-	III.	Trigonal bipyramidal
D.	$[\text{Ni}(\text{CN})_4]^{2-}$	IV.	Square pyramidal

- (1) A-III, B-II, C-I, D-IV (2) A-IV, B-III, C-I, D-II
(3) A-III, B-IV, C-I, D-II (4) A-III, B-I, C-II, D-IV

Scan or tap for the
full solution



Q.3 Match **List I** with **List II**.

List I (Compound)		List II (Shape/geometry)	
A.	NH_3	I.	Trigonal Pyramidal
B.	BrF_5	II.	Square Planar
C.	XeF_4	III.	Octahedral
D.	SF_6	IV.	Square Pyramidal

Choose the correct answer from the options given below: [NEET (UG) 2024]

- (1) A-I, B-IV, C-II, D-III (2) A-II, B-IV, C-III, D-I
(3) A-III, B-IV, C-I, D-II (4) A-II, B-III, C-IV, D-I

Scan or tap for the
full solution



Q.4 Identify the incorrect statement about PCl_5 .

[RE-NEET (UG) 2024]

- (1) PCl_5 possesses two different Cl-P-Cl bond angles
- (2) All five P-Cl bonds are identical in length
- (3) PCl_5 exhibits sp^3d hybridisation
- (4) PCl_5 consists of five P-Cl (sigma) bonds

Scan or tap for the
full solution



Q.5 Amongst the following which one will have maximum 'lone pair - lone pair' electron repulsions? [NEET (UG) 2022]

- (1) ClF_3 (2) IF_5 (3) SF_4 (4) XeF_2

Scan or tap for the
full solution



Q.6 Match **List-I** with **List-II** :

List-I (Molecules)		List-II (Shape)	
a.	NH_3	i.	Square pyramidal
b.	ClF_3	ii.	Trigonal bipyramidal
c.	PCl_5	iii.	Trigonal pyramidal
d.	BrF_5	iv.	T-shape

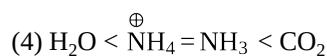
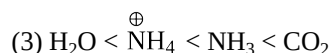
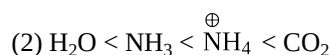
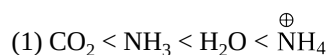
Choose the correct answer from the options given below : [NEET (UG) 2022 (Phase 2)]

- (1) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)
- (2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)
- (3) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)
- (4) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Scan or tap for the
full solution



Q.7 The correct order of bond angles in the following compounds/species is : [NEET (UG) 2022 (Phase 2)]



Scan or tap for the full solution



Q.8 Match List - I with List - II :

List - I		List - II	
a.	PCl_5	i.	Square pyramidal
b.	SF_6	ii.	Trigonal planar
c.	BrF_5	iii.	Octahedral
d.	BF_3	iv.	Trigonal bipyramidal

Choose the correct answer from the options given below.

[NEET (UG) 2021]

(1) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

(2) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

(3) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

(4) (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)

Scan or tap for the full solution



Q.9 In the structure of ClF_3 , the number of lone pairs of electrons on central atom 'Cl' is

[NEET 2018]

(1) one (2) two (3) four (4) three

Scan or tap for the full solution



Q.10 Which of the following pairs of compounds is isoelectronic and isostructural?

[NEET 2017]

(1) TeI_2 , XeF_2

(2) IBr_2^- , XeF_2

(3) IF_3 , XeF_2

(4) BeCl_2 , XeF_2

Scan or tap for the full solution



Q.11 The species, having bond angles of 120° is

[NEET 2017]

(1) ClF_3

(2) NCl_3

(3) BCl_3

(4) PH_3

Scan or tap for the full solution



Q.12 Consider the molecules CH_4 , NH_3 and H_2O . Which of the given statements is false?

[NEET 2016 (Phase 1)]

(1) The H - O - H bond angle in H_2O is smaller than the H - N - H bond angle in NH_3 .

(2) The H - C - H bond angle in CH_4 is larger than the H - N - H bond angle in NH_3 .

(3) The H - C - H bond angle in CH_4 , the H - N - H bond angle in NH_3 , and the H - O - H bond angle in H_2O are all greater than 90° .

(4) The H - O - H bond angle in H_2O is larger than the H - C - H bond angle in CH_4 .

Scan or tap for the full solution



Q.13 Predict the correct order among the following :

[NEET 2016 (Phase 1)]

(1) bond pair - bond pair > lone pair - bond pair > lone pair - lone pair

(2) lone pair - bond pair > bond pair - bond pair > lone pair - lone pair

(3) lone pair - lone pair > lone pair - bond pair > bond pair - bond pair

(4) lone pair - lone pair > bond pair - bond pair > lone pair - bond pair

Scan or tap for the full solution



Q.14 Which of the following pairs of ions is isoelectronic and isostructural?

[NEET 2016 (Phase 2)]

(1) CO_3^{2-} , NO_3^-

(2) ClO_3^- , CO_3^{2-}

(3) SO_3^{2-} , NO_3^-

(4) ClO_3^- , SO_3^{2-}

Scan or tap for the full solution



Q.15 Among the following, which one is a wrong statement?

[NEET 2016 (Phase 2)]

(1) PH_5 and BiCl_5 do not exist.

(2) $\text{p}\pi - \text{d}\pi$ bonds are present in SO_2 .

(3) SeF_4 and CH_4 have same shape.

(4) I_3^+ has bent geometry.

Scan or tap for the full solution



Q.16 In which of the following pairs, both the species are not isostructural?

[AIPMT 2015]

(1) Diamond, Silicon carbide

(2) NH_3 , PH_3

(3) XeF_4 , XeO_4

(4) SiCl_4 , PCl_4^+

Scan or tap for the full solution



Q.17 Maximum bond angle at nitrogen is present in which of the following?

[AIPMT 2015 (Cancelled)]

(1) NO_2^+

(2) NO_3^-

(3) NO_2

(4) NO_2^-

Scan or tap for the full solution



Q.18 Which of the following pairs of ions are isoelectronic and isostructural ?

[AIPMT 2015 (Cancelled)]

- (1) SO_3^{2-} , NO_3^- (2) ClO_3^- , SO_3^{2-}
 (3) CO_3^{2-} , SO_3^{2-} (4) ClO_3^- , CO_3^{2-}

Scan or tap for the full solution



Q.19 Which one of the following species has plane triangular shape?

[AIPMT 2014]

- (1) N_3^- (2) NO_3^- (3) NO_2^- (4) CO_2

Scan or tap for the full solution



Q.20 XeF_2 is isostructural with

[NEET 2013]

- (1) SbCl_3 (2) BaCl_2 (3) TeF_2 (4) ICl_2^-

Scan or tap for the full solution



Q.21 Which of the following species contains three bond pairs and one lone pair around the central atom ?

[AIPMT 2012 (Prelims)]

- (1) H_2O (2) BF_3 (3) NH_2^- (4) PCl_3

Scan or tap for the full solution



Q.22 The correct order of increasing bond angles in the following species is

[AIPMT 2010 (Prelims)]

- (1) $\text{Cl}_2\text{O} < \text{ClO}_2 < \text{ClO}_2^-$ (2) $\text{ClO}_2 < \text{Cl}_2\text{O} < \text{ClO}_2^-$
 (3) $\text{Cl}_2\text{O} < \text{ClO}_2^- < \text{ClO}_2$ (4) $\text{ClO}_2^- < \text{Cl}_2\text{O} < \text{ClO}_2$

Scan or tap for the full solution



Q.23 The correct order of increasing bond angles in the following triatomic species is

[AIPMT 2008]

- (1) $\text{NO}_2^+ < \text{NO}_2 < \text{NO}_2^-$ (2) $\text{NO}_2^+ < \text{NO}_2^- < \text{NO}_2$
 (3) $\text{NO}_2^- < \text{NO}_2^+ < \text{NO}_2$ (4) $\text{NO}_2^- < \text{NO}_2 < \text{NO}_2^+$

Scan or tap for the full solution



Q.24 In which of the following pairs, the two species are isostructural?

[AIPMT 2007]

- (1) SO_3^{2-} and NO_3^- (2) BF_3 and NF_3
 (3) BrO_3^- and XeO_3 (4) SF_4 and XeF_4

Scan or tap for the full solution



Q.25 Which of the following is not a correct statement?

[AIPMT 2006]

- (1) Multiple bonds are always shorter than corresponding single bonds.
 (2) The electron-deficient molecules can act as Lewis acids.
 (3) The canonical structures have no real existence.
 (4) Every AB_5 molecule does in fact have square pyramid structure.

Scan or tap for the full solution



Q.26 Which of the following is not isostructural with SiCl_4 ?

[AIPMT 2006]

- (1) NH_4^+ (2) SCl_4 (3) SO_4^{2-} (4) PO_4^{3-}

Scan or tap for the full solution



Q.27 Which of the following species has a linear shape?

[AIPMT 2006]

- (1) O_3 (2) NO_2^- (3) SO_2 (4) NO_2^+

Scan or tap for the full solution



Q.28 In which of the following molecules are all the bonds not equal?

[AIPMT 2006]

- (1) NF_3 (2) ClF_3 (3) BF_3 (4) AlF_3

Scan or tap for the full solution



Q.29 Which of the following molecules has trigonal planar geometry?

[AIPMT 2005]

- (1) BF_3 (2) NH_3 (3) PCl_3 (4) IF_3

Scan or tap for the full solution



Q.30 Among the following, the pair in which the two species are not isostructural is

[AIPMT 2004]

- (1) SiF_4 and SF_4 (2) IO_3^- and XeO_3
 (3) BH_4^- and NH_4^+ (4) PF_6^- and SF_6

Scan or tap for the full solution



Q.31 In a regular octahedral molecule, MX_6 , the number of $\text{X} - \text{M} - \text{X}$ bonds at 180° is

[AIPMT 2004]

- (1) three (2) two (3) six (4) four

Scan or tap for the full solution



Q.32 In BrF_3 molecule, the lone pairs occupy equatorial positions to minimize

[AIPMT 2004]

- (1) lone pair - bond pair repulsion only
 (2) bond pair - bond pair repulsion only
 (3) lone pair - lone pair repulsion and lone pair - bond pair repulsion
 (4) lone pair - lone pair repulsion only.

Scan or tap for the full solution



Q.33 Which of the following two are isostructural?

[AIPMT 2001]

- (1) XeF_2 , IF_2^- (2) NH_3 , BF_3
 (3) CO_3^{2-} , SO_3^{2-} (4) PCl_5 , ICl_5

Scan or tap for the
full solution



Q.34 In which of the following bond angle is maximum ?

[AIPMT 2001]

- (1) NH_3 (2) NH_4^+ (3) PCl_3 (4) SCl_2

Scan or tap for the
full solution



ANSWER KEY

Ques.	1	2	3	4	5	6	7
Ans.	2	3	1	2	4	3	2
Ques.	8	9	10	11	12	13	14
Ans.	2	2	2	3	4	3	1, 4
Ques.	15	16	17	18	19	20	21
Ans.	3	3	1	2	2	4	4
Ques.	22	23	24	25	26	27	28
Ans.	4	4	3	4	2	4	2
Ques.	29	30	31	32	33	34	
Ans.	1	1	1	4	1	2	