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CHEMISTRY · JEE MAIN

Chemical Bonding & Molecular Structure

Previous Year Questions with answers

304 questions · **179** papers · **2002–2026** · newest paper first

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What is in this PDF: every Chemical Bonding & Molecular Structure question we hold from past JEE Main and AIEEE papers, with its options and answer. Where an answer comes from a source other than the official final key, it says so next to the answer.

Step-by-step solutions for every question are free in the EdLoop JEE app (Google Play) and on app.edloop.in. More chapters: pyq.edloop.in/free-pdfs/

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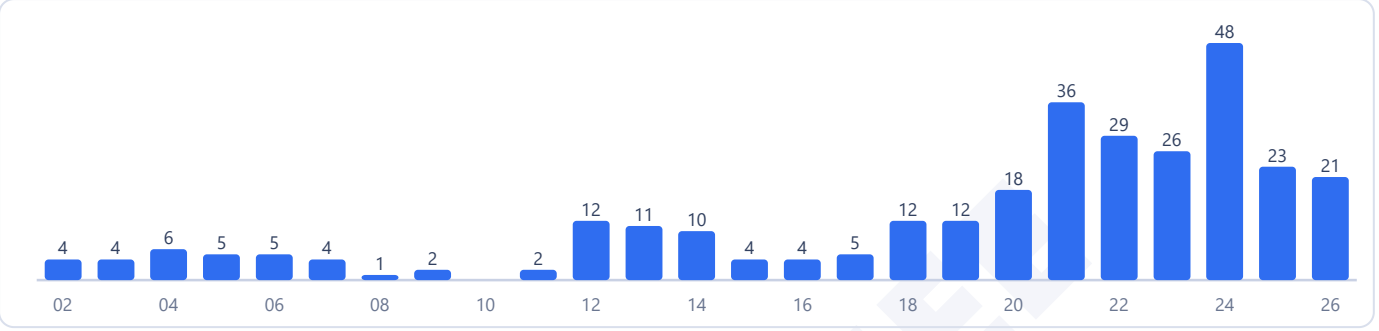
Chapter at a glance

4.7%	304	142 of 162	241 / 63
of Chemistry questions, 2019–2026	questions, 2002–2026	papers asked it, 2019–2026	MCQ / numerical, 2002–2026

Trend. Rising: 1.6 questions per paper in 2024–2026 against 1.2 in 2019–2023.

Questions per year



Counts are the questions we hold: 304 in 179 papers. 4 questions in this chapter came back in more than one paper.

Most-asked topics in this chapter (2002–2026)



How often it comes up

Chemical bonding and molecular structure underpins inorganic and organic chemistry under Unit 3: Chemical Bonding and Molecular Structure in the Class 11 curriculum, holding rank 6 among all 31 chemistry chapters with a 4.7 percent share of the entire chemistry section. In the computerized testing window from 2019 to 2026, chemical bonding supplied 213 questions across 162 papers, representing an average rate of 1.3 questions per sitting. The chapter appeared in 142 of those 162 papers, and questions were asked every single year throughout the cycle. During the recent 2024 to 2026 examination seasons, candidates encountered 92 questions across 58 papers, lifting the average to 1.6 questions per shift and achieving a 5.9 percent subject share. This reflects a trend that is up relative to the 4.7 percent share from the full 2019 to 2026 baseline. When compared against the earlier 2002 to 2018 era, which recorded 91 questions across 38 papers for a 6.8 percent share, the recent share is down. In 2026 alone, examiners presented 21 questions across 19 papers, showing up in 16 individual shifts. A total of 63 questions between 2019 and 2026 were formatted as numerical answer questions, requiring students to count lone pairs, bond orders, or calculate Born-Haber lattice enthalpies without options.

Most-asked topics

Questions in this chapter span six major theoretical domains:

- **VSEPR & Molecular Shapes**: 79 questions historically, with 59 appearing between 2019 and 2026, tested up to 2026. This leading topic evaluates steric numbers, electron geometry versus molecular shape, lone pair-bond pair repulsions, axial versus equatorial bond lengths in trigonal bipyramidal systems, and see-saw, T-shaped, and square planar geometries.

- **Molecular Orbital Theory**: 76 problems overall, including 50 from 2019 to 2026, continuing into 2026. Focus areas assess electronic configurations of homonuclear and heteronuclear diatomic species, bond order calculations, stability comparisons across ions of oxygen and nitrogen, and magnetic properties like paramagnetism and diamagnetism.
- **Covalent Bonding & Lewis Structures**: 52 lifetime problems, with 36 between 2019 and 2026, tested in 2026. Concepts examine Lewis octet rules, formal charge calculation on constituent atoms, resonance hybrid structures, dipole moments, and bond length ordering.
- **Valence Bond Theory & Hybridisation**: 45 questions since 2002, with 31 from 2019 to 2026, tested through 2026. Themes evaluate sp, sp2, sp3, sp3d, and sp3d2 hybridizations, percentage s-character influences on electronegativity and bond angles, and sigma and pi bond enumerations.
- **Hydrogen Bonding & Intermolecular Forces**: 27 questions overall, including 21 between 2019 and 2026, tested in 2026. Questions explore intermolecular versus intramolecular hydrogen bonding, boiling point trends across alcohols, amines, and hydrocarbons, and London dispersion forces.
- **Ionic Bonding**: 25 lifetime questions, with 16 asked between 2019 and 2026, tested in 2026. Areas cover Born-Haber cycle thermodynamic thermochemistry, lattice enthalpy, Fajan's rules of polarization, and covalent character in ionic compounds.

What the questions look like

JEE Main questions in chemical bonding combine structural drawings with molecular orbital rules:

- **Bond order and magnetic nature comparisons**: Evaluating homonuclear diatomic ions like superoxide, peroxide, and dinitrogen cation to identify pairs possessing identical bond orders and unpaired electrons.
- **Lewis formal charge evaluation**: Finding the formal charges on specific oxygen and nitrogen atoms within the Lewis electron dot representation of nitric acid or ozone.
- **Steric shape matching**: Selecting which molecules from a given list share identical geometries, such as matching see-saw geometry with sulfur tetrafluoride.
- **Lattice enthalpy from Born-Haber cycles**: Calculating the lattice energy of an alkali metal halide using sublimation, ionization, dissociation, and electron gain enthalpies.

How to practise it

Master Molecular Orbital Theory energy orderings. Remember that species with up to fourteen electrons follow the 2-1-2-1 filling pattern where pi 2px and pi 2py orbitals lie lower in energy than sigma 2pz. Species with more than fourteen electrons follow the 1-2-2-1 pattern where sigma 2pz is lower. Bond order equals one-half of bonding minus antibonding electrons.

For molecular shapes, calculate the steric number by summing sigma bonds and lone pairs on the central atom. Memorize the VSEPR geometry table thoroughly so you can instantly differentiate between electron pair geometry and actual molecular shape.

Use Fajan's rules to assess covalent character in ionic bonds: smaller cations, larger anions, higher charges, and pseudo-noble gas configurations favor greater polarization and higher covalent character.

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Q1 JEE Main 2026 · 8 Apr · Shift 2 MCQ

Bromine trifluoride autoionizes to form $BrF_2^{\oplus}$ and $BrF_4^{\ominus}$. The shapes of the cation and anion are respectively _____, and _____.

(A) bent, square planar
(B) linear, square planar
(C) bent, see-saw
(D) linear, tetrahedral

Answer: (A) bent, square planar · Official NTA final key

Q2 JEE Main 2026 · 6 Apr · Shift 1 MCQ

The pairs among
$A = [SO_3^{2-}, CO_3^{2-}]$, $B = [O_2^{2-}, F_2]$, $C = [CN^-, CO]$, $D = [NH_3, H_3O^+]$ and
$E = [MnO_4^{2-}, CrO_4^{2-}]$ that do not have similar Lewis dot structure are

(A) A, B and E
(B) A and E
(C) B, C and D
(D) C and D

Answer: (B) A and E · Official NTA final key

Q3 JEE Main 2026 · 6 Apr · Shift 1 MCQ

Arrange the following compounds according to increasing order of boiling points.

$n-C_4H_9OH$ (A), $n-C_4H_9NH_2$ (B), $n-C_4H_{10}$ (C) and $C_2H_5NHC_2H_5$ (D).

(A) C < B < A < D
(B) D < C < B < A
(C) C < D < B < A
(D) D < B < A < C

Answer: (C) C < D < B < A · Official NTA final key

Q4 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Given below are two statements :

Statement I : The number of compounds among SO_2, SO_3, SF_4, SF_6 and H_2S in which sulphur does not obey the Octet rule is 3.

Statement II : Among $[H_2O, ClF_3, SF_4]$, $[NH_3, BrF_5, SF_4]$, $[BrF_5, ClF_3, XeF_4]$ and $[XeF_4, ClF_3, H_2O]$, the number of sets in which all the molecules have one lone pair of electrons on the central atom is 1.

In the light of the above statements, choose the **correct** answer from the options given below :

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(A) Both **Statement I** and **Statement II** are true
(B) Both **Statement I** and **Statement II** are false
(C) **Statement I** is true but **Statement II** is false
(D) **Statement I** is false but **Statement II** is true

Answer: (D) Statement I is false but **Statement II** is true · Official NTA final key

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Q5 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Given below are two statements :

Statement I : $F_2O < H_2O < Cl_2O$ is the correct trend in terms of bond angle.

Statement II : SiF_4, SnF_4 and PbF_4 are ionic in nature.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) Both **Statement I** and **Statement II** are true
(B) Both **Statement I** and **Statement II** are false
(C) **Statement I** is true but **Statement II** is false
(D) **Statement I** is false but **Statement II** is true

Answer: (C) Statement I is true but **Statement II** is false · Official NTA final key

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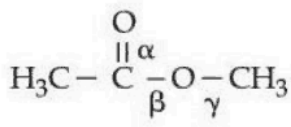
Q6 JEE Main 2026 · 6 Apr · Shift 2 MCQ

Shown below is the structure of methyl acetate with three different α, β and γ carbon - oxygen bonds.

(see the figure above)

The correct order of bond lengths of these bonds is :

Shown below is the structure of methyl acetate with three different α, β and γ carbon - oxygen bonds.



The correct order of bond lengths of these bonds is :

Options :

6911214299. $\alpha > \beta > \gamma$

6911214300. $\alpha < \beta < \gamma$

6911214301. $\alpha = \beta = \gamma$

6911214302. $\alpha < \beta = \gamma$

(A) $\alpha > \beta > \gamma$
(B) $\alpha < \beta < \gamma$
(C) $\alpha = \beta = \gamma$
(D) $\alpha < \beta = \gamma$

Answer: (B) $\alpha < \beta < \gamma$ · Official NTA final key

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Q7 JEE Main 2026 · 5 Apr · Shift 1 Numerical

Consider the following species:

BrF_5, XeF_5^-, BF_4^-, ICl_4^-, XeF_4, SF_4, NH_4^+, ClF_3, XeF_2, ICl_2^-

Number of species having sp^3d hybridized central atom is _____.

Numerical value type: the answer is a number.

Answer: 4. · Official NTA final key

Q8 JEE Main 2026 · 5 Apr · Shift 2 MCQ

The covalent radii of atoms A and B are r_A and r_B, respectively. The covalent bond length and total length of AB molecule are respectively

(A) $(r_A + r_B),\ 2(r_A + r_B)$
(B) $\frac{1}{2}(r_A + r_B),\ (r_A + r_B)$
(C) $(r_A + r_B),\ (r_A + r_B)$
(D) $2(r_A + r_B),\ \frac{1}{2}(r_A + r_B)$

Answer: (A) $(r_A + r_B),\ 2(r_A + r_B)$ · Official NTA final key

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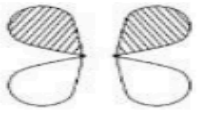
Q9 JEE Main 2026 · 4 Apr · Shift 2 MCQ

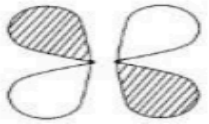
Which of the following pictorial diagram most correctly represents the π^* (π - antibonding) molecular orbital between two atoms if the internuclear axis is taken to be in the z-direction ($\xrightarrow{\text{z-axis}}$)?

Which of the following pictorial diagram most correctly represents the π^* (π - antibonding) molecular orbital between two atoms if the internuclear axis is taken to be in the z-direction ($\xrightarrow{\text{z-axis}}$) ?

Options :

6952781454. 

6952781455. 

6952781456. 

6952781457. 

(A) *see figure*

(B) *see figure*

(C) *see figure*

(D) *see figure*

Answer: (C) · Official NTA final key

Q10 JEE Main 2026 · 2 Apr · Shift 1 MCQ

Given below are two statements :

Statement (I) : The correct sequence of bond lengths in the following species is :

$$O_2^+ < O_2 < O_2^- < O_2^{2-}$$

Statement (II) : The correct sequence of number of unpaired electrons in the following species is :

$$O_2 > O_2^+ > O_2^- > O_2^{2-}$$

In the light of the above statements, choose the **correct answer** from the options given below :

(A) Both **Statement I** and **Statement II** are true

(B) Both **Statement I** and **Statement II** are false

(C) **Statement I** is true but **Statement II** is false

(D) **Statement I** is false but **Statement II** is true

Answer: (C) Statement I is true but **Statement II** is false · Official NTA final key

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Q11 JEE Main 2026 · 2 Apr · Shift 2 MCQ

SF_4 is isostructural with :

A. $BrF_4^{\ominus}$

B. CH_4

C. $IF_4^{\oplus}$

D. XeF_4

E. XeO_2F_2

Choose the **correct** answer from the options given below :

(A) C Only
(B) C and E Only
(C) A and D Only
(D) B and E Only

Answer: (B) C and E Only · Official NTA final key

Q12 JEE Main 2026 · 28 Jan · Shift 1 MCQ

Given below are two statements:

Statement I: The number of species among BF_4^-, SiF_4, XeF_4 and SF_4, that have unequal E−F bond lengths is two. Here, E is the central atom.

Statement II: Among O_2^-, O_2^{2-}, F_2 and O_2^+, O_2^- has the highest bond order.

In the light of the above statements, choose the ***correct*** answer from the options given below

(A) Both Statement I and Statement II are true
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are false
(D) Statement I is true but Statement II is false

Answer: (C) Both Statement I and Statement II are false · Official NTA final key

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Q13 JEE Main 2026 · 24 Jan · Shift 1 MCQ

Given below are statements about some molecules/ions.

Identify the **CORRECT** statements.

A. The dipole moment value of NF_3 is higher than that of NH_3.

B. The dipole moment value of BeH_2 is zero.

C. The bond order of O_2^{2-} and F_2 is same.

D. The formal charge on the central oxygen atom of ozone is -1.

E. In NO_2, all the three atoms satisfy the octet rule, hence it is very stable.

Choose the ***correct*** answer from the options given below:

(A) A, B, C, D & E
(B) B & C Only
(C) B, C & D Only
(D) A, C & D Only

Answer: (B) B & C Only · Official NTA final key

Q14 JEE Main 2026 · 24 Jan · Shift 2 MCQ

Pair of species among the following having same bond order as well as paramagnetic character will be-

(A) O_2^-, N_2^-
(B) O_2^+, N_2^{2-}
(C) O_2^-, N_2^+
(D) O_2^+, N_2^-

Answer: (D) O_2^+, N_2^- · Official NTA final key

Q15 JEE Main 2026 · 23 Jan · Shift 1 MCQ

Identify the molecule (X) with maximum number of lone pairs of electrons (obtained using Lewis dot structure) among HNO_3, H_2SO_4, NF_3 and O_3. Choose the **correct** bond angle made by the central atom of the molecule (X).

(A) 116°
(B) 120°
(C) 107°
(D) 102°

Answer: (D) 102° · Official NTA final key

Q16 JEE Main 2026 · 22 Jan · Shift 1 MCQ

Two p-block elements X and Y form fluorides of the type EF_3. The fluoride compound XF_3 is a Lewis acid and YF_3 is a Lewis base. The hybridizations of the central atoms of XF_3 and YF_3 respectively are

(A) Both sp^2
(B) Both sp^3
(C) sp^2 and sp^3
(D) sp^3 and sp^2

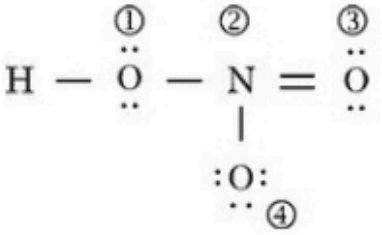
Answer: (C) sp^2 and sp^3 · Official NTA final key

Q17 JEE Main 2026 · 22 Jan · Shift 1 MCQ

The formal charges on the atoms marked as (1) to (4) in the Lewis representation of HNO_3 molecule respectively are

(see the figure above)

Q.63 The formal charges on the atoms marked as (1) to (4) in the Lewis representation of HNO_3 molecule respectively are



Options
1. $+1, 0, 0, -1$
2. $0, -1, 0, +1$
3. $0, +1, 0, -1$
4. $0, 0, -1, +1$

(A) $+1, 0, 0, -1$
(B) $0, -1, 0, +1$
(C) $0, +1, 0, -1$
(D) $0, 0, -1, +1$

Answer: (C) $0, +1, 0, -1$ · Official NTA final key

Q18 JEE Main 2026 · 22 Jan · Shift 2 MCQ

Among H_2S, H_2O, NF_3, NH_3 and $CHCl_3$, identify the molecule (X) with lowest dipole moment value. The number of lone pairs of electrons present on the central atom of the molecule (X) is :

(A) 1
(B) 0
(C) 3
(D) 2

Answer: (A) 1 · Official NTA final key

Q19 JEE Main 2026 · 22 Jan · Shift 2 Numerical

If the enthalpy of sublimation of Li is 155 kJ mol^{-1}, enthalpy of dissociation of F_2 is 150 kJ mol^{-1}, ionization enthalpy of Li is 520 kJ mol^{-1}, electron gain enthalpy of F is -313 kJ mol^{-1}, standard enthalpy of formation of LiF is -594 kJ mol^{-1}. The magnitude of lattice enthalpy of LiF is _____ kJ mol^{-1}. (Nearest Integer)

Numerical value type: the answer is a number.

Answer: 1031. · Official NTA final key

Q20 JEE Main 2026 · 21 Jan · Shift 1 MCQ

Given below are two statements :

Statement I :

The number of species among SF_4, NH_4^+, $[NiCl_4]^{2-}$, XeF_4, $[PtCl_4]^{2-}$, SeF_4 and $[Ni(CN)_4]^{2-}$, that have tetrahedral geometry is 3.

Statement II :

In the set $[NO_2, BeH_2, BF_3, AlCl_3]$, all the molecules have incomplete octet around central atom.

In the light of the above statements, choose the **correct** answer from the options given below :

(A) Both **Statement I** and **Statement II** are true
(B) Both **Statement I** and **Statement II** are false
(C) **Statement I** is false but **Statement II** is true
(D) **Statement I** is true but **Statement II** is false

Answer: (C) Statement I is false but **Statement II** is true · Official NTA final key

Q21 JEE Main 2026 · 21 Jan · Shift 2 MCQ

The correct increasing order of C−H(A), C−O(B), C=O(C) and C≡N(D) bonds in terms of covalent bond length is :

(A) $A < D < C < B$
(B) $A < B < C < D$
(C) $D < C < B < A$
(D) $D < C < A < B$

Answer: (A) $A < D < C < B$ · Official NTA final key

Q22 JEE Main 2025 · 7 Apr · Shift 1 MCQ

Match the LIST-I with LIST-I

LIST-I (Molecule/ion)	LIST-II (Bond pair : lone pair (on the central atom))
A. IC_2^-	I. 4 : 2
B. H_2O	II. 4 : 1
C. SO_2	III. 2 : 3
D XeF_4	IV. 2 : 2

Choose the correct answer from the options given below:

(A) A-III, B-IV, C-II, D-I
(B) A-III, B-IV, C-I, D-II
(C) A-IV, B-III, C-II, D-I
(D) A-II, B-I, C-IV, D-III

Answer: (A) A-III, B-IV, C-II, D-I · Key from source paper

Q23 JEE Main 2025 · 7 Apr · Shift 2 MCQ

The hydration energies of K^+ and Cl^- are $-x$ and $-y\,kJ/mol$ respectively. If lattice energy of KCl is $-z\,kJ/mol$, then the heat of solution of KCl is :

(A) $z-(x+y)$
(B) $x+y+z$
(C) $-z-(x+y)$
(D) $+x-y-z$

Answer: (A) $z-(x+y)$ · Key from source paper

Q24 JEE Main 2025 · 7 Apr · Shift 2 MCQ

In SO_2, NO_2^- and N_3^- the hybridizations at the central atom are respectively :

(A) sp^2, sp^2 and sp
(B) sp^2, sp and sp
(C) sp^2, sp^2 and sp^2
(D) sp, sp^2 and sp

Answer: (A) sp^2, sp^2 **and** sp · Key from source paper

Q25 JEE Main 2025 · 4 Apr · Shift 1 MCQ

Which of the following molecule(s) show/s paramagnetic behavior?

A. O_2 B. N_2 C. F_2 D. S_2 E. Cl_2

Choose the **correct** answer from the options given below:

(A) A & E Only
(B) B Only
(C) A & C only
(D) A & D Only

Answer: (D) A & D Only · Key from source paper

Q26 JEE Main 2025 · 4 Apr · Shift 2 MCQ

Given below are two statements :

Statement (I) : For $\ddot{C}lF_3$, all three possible structures may be drawn as follows.

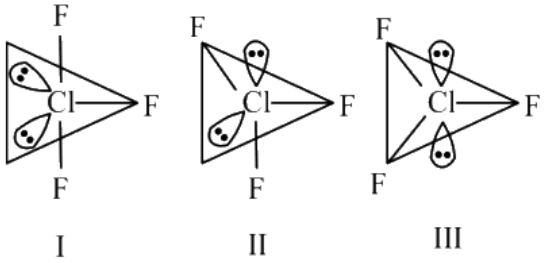
(see the figure above)

Statement (II) : Structure III is most stable, as the orbitals having the lone pairs are axial, where the lp - bp repulsion is minimum.

In the light of the above statements, choose the most appropriate answer from the options given below :

3. Given below are two statements :

Statement (I) : For $\ddot{\underset{\ddot{}}{\text{Cl}}}\text{F}_3$, all three possible structures may be drawn as follows.



Statement (II) : Structure III is most stable, as the orbitals having the lone pairs are axial, where the lp - bp repulsion is minimum.

In the light of the above statements, choose the most appropriate answer from the options given below :

(1) Both Statement I and Statement II are correct

(2) Statement I is correct but Statement II is incorrect

(3) Both Statement I and Statement II are incorrect

(4) Statement I is incorrect but Statement II is correct

(A) Both Statement I and Statement II are correct

(B) Statement I is correct but Statement II is incorrect

(C) Both Statement I and Statement II are incorrect

(D) Statement I is incorrect but Statement II is correct

Answer: (B) Statement I is correct but Statement II is incorrect · Key from source paper

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Q27 JEE Main 2025 · 3 Apr · Shift 1 MCQ

Match the LIST-I with LIST-II

List-I (Molecules/ion)	List-II (Hybridisation of central atom)
A. PF_5	I. dsp^2
B. SF_6	II. sp^3d
C. $Ni(CO)_4$	III. sp^3d^2
D. $[PtCl_4]^{2-}$	IV. sp^3

Choose the correct answer from the options given below:

(A) A-I, B-II, C-III, D-IV
(B) A-III, B-I, C-IV, D-II
(C) A-II, B-III, C-IV, D-I
(D) A-IV, B-I, C-II, D-III

Answer: (C) A-II, B-III, C-IV, D-I · Key from source paper

Q28 JEE Main 2025 · 3 Apr · Shift 2 MCQ

Given below are two statements:

Statement I : Wet cotton clothes made of cellulose based carbohydrate takes comparatively longer time to get dried than wet nylon polymer based clothes.

Statement II : Intermolecular hydrogen bonding with water molecule is more in nylon-based clothes than in the case of cotton clothes.

In the light of above statements, choose the correct answer from the options given below

(A) Both Statement I and Statement II are false
(B) Statement I is true but Statement II is false
(C) Both Statement I and Statement II are true
(D) Statement I is false but Statement II is true

Answer: (B) Statement I is true but Statement II is false · Key from source paper

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Q29 JEE Main 2025 · 2 Apr · Shift 1 MCQ

Among $SO_2, NF_3, NH_3, XeF_2, ClF_3$ and SF_4, the hybridization of the molecule with nonzero dipole moment and highest number of lone-pairs of electrons on the central atom is

(A) sp^3d
(B) dsp^2
(C) sp^3
(D) sp^3d^2

Answer: (A) sp^3d · Key from source paper

Q30 JEE Main 2025 · 2 Apr · Shift 2 MCQ

Which among the following molecules is (a) involved in sp^3d hybridization, (b) has different bond lengths and (c) has lone pair of electrons on the central atom ?

(A) SF_4
(B) XeF_4
(C) XeF_2
(D) PF_5

Answer: (A) SF_4 · Key from source paper

Q31 JEE Main 2025 · 29 Jan · Shift 1 Numerical

The sum of sigma (σ) and pi (π) bonds in Hex-1,3-dien-5-yne is _____ .

Numerical value type: the answer is a number.

Answer: 15. · Key from source paper

Q32 JEE Main 2025 · 29 Jan · Shift 2 MCQ

Total number of sigma (σ) and pi(π) bonds respectively present in hex-1-en-4-yne are :

(A) 3 and 13
(B) 11 and 3
(C) 13 and 3
(D) 14 and 3

Answer: (C) 13 and 3 · Key from source paper

Q33 JEE Main 2025 · 29 Jan · Shift 2 Numerical

Total number of non bonded electrons present in NO_2^- ion based on Lewis theory is

Numerical value type: the answer is a number.

Answer: 12. · Key from source paper

Q34 JEE Main 2025 · 28 Jan · Shift 1 MCQ

The molecules having square pyramidal geometry are

(A) $BrF_5 \& PCl_5$
(B) $SbF_5 \& PCl_5$
(C) $SbF_5 \& XeOF_4$
(D) $BrF_5 \& XeOF_4$

Answer: (D) $BrF_5 \& XeOF_4$ · Key from source paper

Q35 JEE Main 2025 · 28 Jan · Shift 1 MCQ

Consider ' n ' is the number of lone pair of electrons present in the equatorial position of the most stable structure of ClF_3. The ions from the following with ' n ' number of unpaired electrons are A. V^{3+} B. Ti^{3+} C. Cu^{2+} D. Ni^{2+} E. Ti^{2+} Choose the correct answer from the options given below:

(A) A and C Only
(B) A, D and E Only
(C) B and D Only
(D) B and C Only

Answer: (B) A, D and E Only · Key from source paper

Q36 JEE Main 2025 · 28 Jan · Shift 2 Numerical

Total number of molecules/species from following which will be paramagnetic is _____ . O_2, O_2^+, O_2^-, NO, NO_2, CO, $K_2[NiCl_4]$, $[Co(NH_3)_6]Cl_3$, $K_2[Ni(CN)_4]$

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q37 JEE Main 2025 · 24 Jan · Shift 1 MCQ

Which of the following statement is true with respect to H_2O, NH_3 and CH_4 ? A. The central atoms of all the molecules are sp^3 hybridized. B. The $H-O-H, H-N-H$ and $H-C-H$ angles in the above molecules are $104.5^\circ, 107.5^\circ$ and 109.5°, respectively. C. The increasing order of dipole moment is $CH_4 < NH_3 < H_2O$. D. Both H_2O and NH_3 are Lewis acids and CH_4 is a Lewis base. E. A solution of NH_3 in H_2O is basic. In this solution NH_3 and H_2O act as Lowry-Bronsted acid and base respectively. Choose the correct answer from the options given below:

(A) A, B and C Only
(B) A, D and E Only
(C) C, D and E Only
(D) A, B, C and E Only

Answer: (A) A, B and C Only · Key from source paper

Q38 JEE Main 2025 · 24 Jan · Shift 1 MCQ

Which of the following linear combination of atomic orbitals will lead to formation of molecular orbitals in homonuclear diatomic molecules [internuclear axis in z-direction] ? A. $2p_z$ and $2p_x$ B. 2 s and $2p_x$ C. 3 d_{xy} and 3 $d_{x^2-y^2}$ D. 2 s and $2p_z$ E. $2p_z$ and $3d_{x^2} - y^2$ Choose the correct answer from the options given below:

(A) A and B Only
(B) D Only
(C) E Only
(D) C and D Only

Answer: (B) D Only · Key from source paper

Q39 JEE Main 2025 · 24 Jan · Shift 2 MCQ

Given below are two statements : Statement (I): Experimentally determined oxygen-oxygen bond lengths in the O_3 are found to be same and the bond length is greater than that of a O = O (double bond) but less than that of a single (O – O) bond. Statement (II) : The strong lone pair-lone pair repulsion between oxygen atoms is solely responsible for the fact that the bond length in ozone is smaller than that of a double bond (O = O) but more than that of a single bond (O – O). In the light of the above statements, choose the correct answer from the options given below :

(A) Both Statement I and Statement II are false
(B) Statement I is false but Statement II is true
(C) Statement I is true but Statement II is false
(D) Both Statement I and Statement II are true

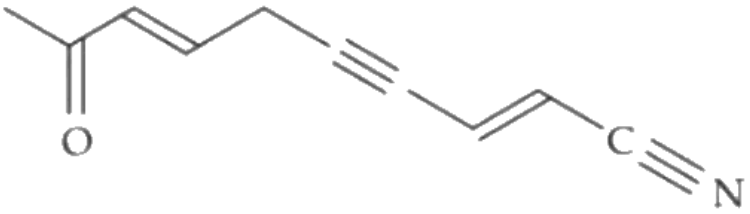
Answer: (C) Statement I is true but Statement II is false · Key from source paper

Q40 JEE Main 2025 · 24 Jan · Shift 2 MCQ

In the given structure, number of sp and sp^2 hybridized carbon atoms present respectively are :

(see the figure above)

Q62. In the given structure, number of sp and sp^2 hybridized carbon atoms present respectively are :



(1) 4 and 5
(2) 3 and 5
(3) 3 and 6
(4) 4 and 6

(A) 4 and 5
(B) 3 and 5
(C) 3 and 6
(D) 4 and 6

Answer: (B) 3 and 5 · Key from source paper

Q41 JEE Main 2025 · 23 Jan · Shift 1 MCQ

Match the LIST-I with LIST-II

LIST-I (Classification of molecules based on octet rule)	LIST-II (Example)
A. Molecules obeying octet rule	I. NO, NO_2
B. Molecules with incomplete octet	II. BCl_3, $AlCl_3$
C. Molecules with incomplete octet with odd electron	III. H_2SO_4, PCl_5
D. Molecules with expanded octet	IV. CCl_4, CO_2

Choose the correct answer from the options given below:

(A) A-IV, B-I, C-III, D-II
(B) A-IV, B-II, C-I, D-III
(C) A-II, B-IV, C-III, D-I
(D) A-III, B-II, C-I, D-IV

Answer: (B) A-IV, B-II, C-I, D-III · Key from source paper

Q42 JEE Main 2025 · 23 Jan · Shift 2 Numerical

The bond dissociation enthalpy of X_2 ΔH_{bond} calculated from the given data is _____ $kJmol^{-1}$. (Nearest integer)

$M^+X^-(s) \rightarrow M^+(g) + X^-(g)$ $\Delta H^*_{lattice} = 800\ kJ\ mol^{-1}$

$M(s) \rightarrow M(g)$ $\Delta H^\circ_{sub} = 100\ kJ\ mol^{-1}$

$M(g) \rightarrow M^+(g) + e^-(g)$ $\Delta H_i = 500\ kJ\ mol^{-1}$

$X(g) + e^-(g) \rightarrow X^-(g)$ $\Delta H^*_{eg} = -300\ kJ\ mol^{-1}$

$M(s) + \frac{1}{2}X_2(g) \rightarrow M^+X^-(s)$ $\Delta H^\circ_f = -400\ kJ\ mol^{-1}$ [Given : M^+X^- is a pure ionic compound and X forms a diatomic molecule X_2 in gaseous state]

Numerical value type: the answer is a number.

Answer: 200. · Key from source paper

Q43 JEE Main 2025 · 22 Jan · Shift 1 Numerical

The number of molecules/ions that show linear geometry among the following is _____
SO_2, $BeCl_2$, CO_2, N_3^-, NO_2, F_2O, XeF_2, NO_2^+, I_3^-, O_3

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q44 JEE Main 2025 · 22 Jan · Shift 2 MCQ

Arrange the following compounds in increasing order of their dipole moment : HBr, H_2S, NF_3 and $CHCl_3$

(A) $H_2S < HBr < NF_3 < CHCl_3$
(B) $NF_3 < HBr < H_2S < CHCl_3$
(C) $HBr < H_2S < NF_3 < CHCl_3$
(D) $CHCl_3 < NF_3 < HBr < H_2S$

Answer: (B) $NF_3 < HBr < H_2S < CHCl_3$ · Key from source paper

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Q45 JEE Main 2024 · 9 Apr · Shift 1 MCQ

In which one of the following pairs the central atoms exhibit sp^2 hybridization ?

(A) H_2O and NO_2
(B) BF_3 and NO_2^-
(C) NH_2^- and H_2O
(D) NH_2^- and BF_3

Answer: (B) BF_3 and NO_2^- · Key from source paper

Q46 JEE Main 2024 · 9 Apr · Shift 1 Numerical

The total number of species from the following in which one unpaired electron is present, is _____

$N_2, O_2, C_2^-, O_2^-, O_2^{2-}, H_2^+, CN^-, He_2^+$

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q47 JEE Main 2024 · 9 Apr · Shift 2 MCQ

The correct increasing order for bond angles among BF_3, PF_3 and ClF_3 is :

(A) $BF_3 < PF_3 < ClF_3$
(B) $ClF_3 < PF_3 < BF_3$
(C) $PF_3 < BF_3 < ClF_3$
(D) $BF_3 = PF_3 < ClF_3$

Answer: (B) $ClF_3 < PF_3 < BF_3$ · Key from source paper

Q48 JEE Main 2024 · 9 Apr · Shift 2 MCQ

The incorrect statement regarding ethyne is

(A) The C $-$ C bonds in ethyne is shorter than that in ethene
(B) Both carbons are sp hybridised
(C) Ethyne is linear
(D) The carbon - carbon bonds in ethyne is weaker than that in ethene

Answer: (D) The carbon - carbon bonds in ethyne is weaker than that in ethene · Key from source paper

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Q49 JEE Main 2024 · 9 Apr · Shift 2 Numerical

Total number of electrons present in (π^*) molecular orbitals of O_2, O_2^+ and O_2^- is _____.

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q50 JEE Main 2024 · 8 Apr · Shift 1 MCQ

Match List I with List II Choose the correct answer from the options given below:

List-I (Molecule)	List-II (Shape)

A. NH_3	I. Square pyramid
B. BrF_5	II. Tetrahedral
C. PCl_5	III. Trigonal pyramidal
D. CH_4	IV. Trigonal bipyramidal

(A) A-II, B-IV, C-I, D-III
(B) A-III, B-I, C-IV, D-II
(C) A-IV, B-III, C-I, D-II
(D) A-III, B-IV, C-I, D-II

Answer: (B) A-III, B-I, C-IV, D-II · Key from source paper

Q51 JEE Main 2024 · 8 Apr · Shift 1 · Numerical

Number of molecules from the following which are exceptions to octet rule is _____

$CO_2, NO_2, H_2SO_4, BF_3, CH_4, SiF_4, ClO_2, PCl_5, BeF_2, C_2H_6, CHCl_3, CBr_4$

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q52 JEE Main 2024 · 8 Apr · Shift 2 · MCQ

When ψ_A and ψ_B are the wave functions of atomic orbitals, then σ^* is represented by :

(A) $\psi_A + 2\psi_B$
(B) $\psi_A - \psi_B$
(C) $\psi_A + \psi_B$
(D) $\psi_A - 2\psi_B$

Answer: (B) $\psi_A - \psi_B$ · Key from source paper

Q53 JEE Main 2024 · 8 Apr · Shift 2 · Numerical

Number of molecules having bond order 2 from the following molecules is _____

$C_2, O_2, Be_2, Li_2, Ne_2, N_2, He_2$

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q54 JEE Main 2024 · 6 Apr · Shift 1 · MCQ

Match List I with List II Choose the correct answer from the options given below:

List - I (Hybridization)	List - II (Orientation in Space)
A. sp^3	I. Trigonal bipyramidal
B. dsp^2	II. Octahedral

C. sp^3 d	III. Tetrahedral
D. $sp^3\ d^2$	IV. Square planar

(A) A-IV, B-III, C-I, D-II
(B) A-III, B-IV, C-I, D-II
(C) A-III, B-I, C-IV, D-II
(D) A-II, B-I, C-IV, D-III

Answer: (B) A-III, B-IV, C-I, D-II · Key from source paper

Q55 JEE Main 2024 · 6 Apr · Shift 1 MCQ

Match List I with List II Choose the correct answer from the options given below:

List - I (Compound/Species)	List - II (Shape/Geometry)
A. SF_4	I. Tetrahedral
B. BrF_3	II. Pyramidal
C. BrO_3^-	III. See saw
D. NH_4^{++}KS	IV. Bent T-Shape

(A) A-II, B-III, C-I, D-IV
(B) A-II, B-IV, C-III, D-I
(C) A-III, B-IV, C-II, D-I
(D) A-III, B-II, C-IV, D-I

Answer: (C) A-III, B-IV, C-II, D-I · Key from source paper

Q56 JEE Main 2024 · 6 Apr · Shift 1 MCQ

Match List I with List II Choose the correct answer from the options given below:

List - I (Molecule/Species)	List - II (Property/Shape)
A. SO_2Cl_2	I. Paramagnetic
B. NO	II. Diamagnetic
C. NO_2^-	III. Tetrahedral
D. I_3^-	IV. Linear

(A) A-II, B-III, C-I, D-IV
(B) A-III, B-I, C-II, D-IV
(C) A-IV, B-I, C-III, D-II
(D) A-III, B-IV, C-II, D-I

Answer: (B) A-III, B-I, C-II, D-IV · Key from source paper

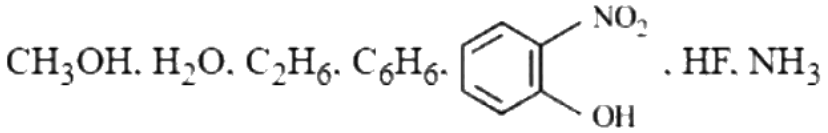
EdLoop JEE

Q57 JEE Main 2024 · 6 Apr · Shift 1 Numerical

Number of molecules from the following which can exhibit hydrogen bonding is _____ (nearest integer)

CH_3OH, H_2O, C_2H_6, C_6H_6, *(see the figure above)*, HF, NH_3

Q52. Number of molecules from the following which can exhibit hydrogen bonding is _____ (nearest integer)



Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q58 JEE Main 2024 · 6 Apr · Shift 2 MCQ

Given below are two statements : Statement I : PF_5 and BrF_5 both exhibit sp^3 d hybridisation. Statement II : Both SF_6 and $[Co(NH_3)_6]^{3+}$ exhibit $sp^3\ d^2$ hybridisation. In the light of the above statements, choose the correct answer from the options given below :

(A) Statement I is true but Statement II is false
(B) Statement I is false but Statement II is true
(C) Both Statement I and Statement II are true
(D) Both Statement I and Statement II are false

Answer: (D) Both Statement I and Statement II are false · Key from source paper

Q59 JEE Main 2024 · 6 Apr · Shift 2 Numerical

Total number of species from the following with central atom utilising sp^2 hybrid orbitals for bonding is _____ . NH_3, SO_2, SiO_2, $BeCl_2$, C_2H_2, C_2H_4, BCl_3, HCHO, C_6H_6, BF_3, $C_2H_4Cl_2$

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q60 JEE Main 2024 · 5 Apr · Shift 1 MCQ

Number of σ and π bonds present in ethylene molecule is respectively :

(A) 4 and 1
(B) 5 and 2
(C) 3 and 1
(D) 5 and 1

Answer: (D) 5 and 1 · Key from source paper

Q61 JEE Main 2024 · 5 Apr · Shift 1 Numerical

In the lewis dot structure for NO_2^-, total number of valence electrons around nitrogen is _____

Numerical value type: the answer is a number.

Answer: 8. · Key from source paper

Q62 JEE Main 2024 · 5 Apr · Shift 2 MCQ

Match List I with List II

List - I	List - II
(A) ICl	(I) T - shape
(B) ICl_3	(II) pyramidal
(C) ClF_5	(III) Pentagonal bipyramidal
(D) IF_7	(IV) Linear

Choose the correct answer from the options given below :

(A) (A)-(IV), (B)-(I), (C)-(II), (D)-(III)

(B) (A)-(I), (B)-(IV), (C)-(III), (D)-(II)

(C) (A)-(IV), (B)-(III), (C)-(II), (D)-(I)

(D) (A)-(I), (B)-(III), (C)-(II), (D)-(IV)

Answer: (A) (A)-(IV), (B)-(I), (C)-(II), (D)-(III) · Key from source paper

Q63 JEE Main 2024 · 5 Apr · Shift 2 MCQ

Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R). Assertion (A) : NH_3 and NF_3 molecule have pyramidal shape with a lone pair of electrons on nitrogen atom. The resultant dipole moment of NH_3 is greater than that of NF_3. Reason (R) : In NH_3, the orbital dipole due to lone pair is in the same direction as the resultant dipole moment of the $N-H$ bonds. F is the most electronegative element. In the light of the above statements, choose the correct answer from the options given below :

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)

(B) (A) is false but (R) is true

(C) Both (A) and (R) are true but (R) is NOT the correct explanation of (A)

(D) (A) is true but (R) is false

Answer: (A) Both (A) and (R) are true and (R) is the correct explanation of (A) · Key from source paper

Q64 JEE Main 2024 · 5 Apr · Shift 2 Numerical

Number of compounds from the following with zero dipole moment is _____ .

HF, H_2, H_2S, CO_2, NH_3, BF_3, CH_4, $CHCl_3$, SiF_4, H_2O, BeF_2

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q65 JEE Main 2024 · 4 Apr · Shift 1 MCQ

Which one of the following molecules has maximum dipole moment?

(A) NF_3
(B) CH_4
(C) PF_5
(D) NH_3

Answer: (D) NH_3 · Key from source paper

Q66 JEE Main 2024 · 4 Apr · Shift 1 MCQ

Number of molecules/ions from the following in which the central atom is involved in sp^3 hybridization is

$NO_3^-, BCl_3, ClO_2^-, ClO_3$

(A) 4
(B) 3
(C) 2
(D) 1

Answer: (C) 2 · Key from source paper

Q67 JEE Main 2024 · 4 Apr · Shift 1 Numerical

Number of molecules/species from the following having one unpaired electron is

$O_2, O_2^{-1}, NO, CN^{-1}, O_2^{2-}$

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q68 JEE Main 2024 · 4 Apr · Shift 2 MCQ

The correct statement/s about Hydrogen bonding is/are A. Hydrogen bonding exists when H is covalently bonded to the highly electro negative atom. B. Intermolecular H bonding is present in o-nitro phenol C. Intramolecular H bonding is present in HF. D. The magnitude of H bonding depends on the physical state of the compound. E. H-bonding has powerful effect on the structure and properties of compounds Choose the correct answer from the options given below:

(A) A, B, D only
(B) A, D, E only
(C) A only
(D) A, B, C only

Answer: (B) A, D, E only · Key from source paper

Q69 JEE Main 2024 · 4 Apr · Shift 2 MCQ

The number of species from the following that have pyramidal geometry around the central atom is _____.

$S_2O_3^{2-}$, SO_4^{2-}, SO_3^{2-}, $S_2O_7^{2-}$

(A) 4
(B) 3
(C) 2
(D) 1

Answer: (D) 1 · Key from source paper

Q70 JEE Main 2024 · 4 Apr · Shift 2 Numerical

Number of compounds / species from the following with non-zero dipole moment is _____

$BeCl_2, BCl_3, NF_3, XeF_4, CCl_4, H_2O, H_2S, HBr, CO_2, H_2, HCl$

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q71 JEE Main 2024 · 4 Apr · Shift 2 Numerical

The total number of 'sigma' and 'Pi' bonds in 2-oxohex-4-ynoic acid is _____

Numerical value type: the answer is a number.

Answer: 18. · Key from source paper

Q72 JEE Main 2024 · 1 Feb · Shift 1 MCQ

Arrange the bonds in order of increasing ionic character in the molecules. LiF, K_2O, N_2, SO_2 and ClF_3.

(A) $ClF_3 < N_2 < SO_2 < K_2O <$ LiF
(B) LiF $< K_2O < ClF_3 < SO_2 < N_2$
(C) $N_2 < SO_2 < ClF_3 < K_2O <$ LiF
(D) $N_2 < ClF_3 < SO_2 < K_2O <$ LiF

Answer: (C) $N_2 < SO_2 < ClF_3 < K_2O <$ **LiF** · Key from source paper

Q73 JEE Main 2024 · 1 Feb · Shift 1 MCQ

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.

Assertion A: PH_3 has lower boiling point than NH_3 .

Reason R: In liquid state NH_3 molecules are associated through Vander Waal's forces, but PH_3 molecules are associated through hydrogen bonding.

In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Both A and R are correct and R is not the correct explanation of A
(B) A is not correct but R is correct
(C) Both A and R are correct but R is the correct explanation of A
(D) A is correct but R is not correct

Answer: (D) A is correct but R is not correct · Key from source paper

Q74 JEE Main 2024 · 1 Feb · Shift 1 Numerical

The number of molecules/ion/s having trigonal bipyramidal shape is ..... .

PF_5, BrF_5, PCl_5, $PtCl_4^{2-}$, BF_3, $Fe(CO)_5$

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q75 JEE Main 2024 · 1 Feb · Shift 2 MCQ

Given below are two statements :

Statement (I) : A π bonding MO has lower electron density above and below the inter-nuclear axis.

Statement (II) : The π^* antibonding MO has a node between the nuclei.

In light of the above statements, choose the most appropriate answer from the options given below:

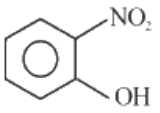
(A) Both Statement I and Statement II are false
(B) Both Statement I and Statement II are true
(C) Statement I is false but Statement II is true
(D) Statement I is true but Statement II is false

Answer: (C) Statement I is false but Statement II is true · Key from source paper

Q76 JEE Main 2024 · 1 Feb · Shift 2 MCQ

Select the compound from the following that will show intramolecular hydrogen bonding.

Q34. Select the compound from the following that will show intramolecular hydrogen bonding.

(1) H_2O
(2) NH_3
(3) C_2H_5OH
(4) 

(A) H_2O
(B) NH_3
(C) C_2H_5OH
(D) *see figure*

Answer: (D) · Key from source paper

Q77 JEE Main 2024 · 31 Jan · Shift 1 MCQ

The linear combination of atomic orbitals to form molecular orbitals takes place only when the combining atomic orbitals

A. have the same energy B. have the minimum overlap C. have same symmetry about the molecular axis D. have different symmetry about the molecular axis

Choose the most appropriate from the options given below:

(A) A, B, C only
(B) A and C only
(C) B, C, D only
(D) B and D only

Answer: (B) A and C only · Key from source paper

Q78 JEE Main 2024 · 31 Jan · Shift 1 Numerical

The number of species from the following in which the central atom uses sp^3 hybrid orbitals in its bonding is _____.

NH_3, SO_2, SiO_2, $BeCl_2$, CO_2, H_2O, CH_4, BF_3

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q79 JEE Main 2024 · 31 Jan · Shift 2 MCQ

Which of the following is least ionic?

(A) $BaCl_2$
(B) AgCl
(C) KCl
(D) $CoCl_2$

Answer: (B) AgCl · Key from source paper

Q80 JEE Main 2024 · 31 Jan · Shift 2 Numerical

A diatomic molecule has a dipole moment of 1.2 D. If the bond distance is 1Å, then fractional charge on each atom is _____ $\times 10^{-1}$ esu. (Given 1D = 10^{-18} esu cm)

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q81 JEE Main 2024 · 30 Jan · Shift 1 MCQ

Match List - I with List-II

List I (Molecule)	List II (Shape)
A. BrF_5	i. T-shape
B. H_2O	ii. See saw
C. ClF_3	iii. Bent
D. SF_4	iv. Square pyramidal

(A) (A)-I, (B)-II, (C)-IV, (D)-III
(B) (A) -II, (B)-I, (C)-III, (D)-IV
(C) (A)-III, (B)-IV, (C)-I, (D)-II
(D) (A)-IV, (B)-III, (C)-I, (D)-II

Answer: (D) (A)-IV, (B)-III, (C)-I, (D)-II · Key from source paper

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Q82 JEE Main 2024 · 30 Jan · Shift 1 Numerical

The total number of molecular orbitals formed from 2s and 2p atomic orbitals of a diatomic molecule

Numerical value type: the answer is a number.

Answer: 08. · Key from source paper

Q83 JEE Main 2024 · 30 Jan · Shift 2 MCQ

Given below are two statements:

Statement-I: Since fluorine is more electronegative than nitrogen, the net dipole moment of NF_3 is greater than NH_3.

Statement-II: In NH_3, the orbital dipole due to lone pair and the dipole moment of NH bonds are in opposite direction, but in NF_3 the orbital dipole due to lone pair and dipole moments of N-F bonds

are in same direction.

In the light of the above statements. Choose the most appropriate from the options given below.

(A) Statement I is true but Statement II is false.

(B) Both Statement I and Statement II are false.

(C) Both statement I and Statement II is are true.

(D) Statement I is false but Statement II is are true.

Answer: (B) Both Statement I and Statement II are false. · Key from source paper

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Q84 JEE Main 2024 · 30 Jan · Shift 2 MCQ

The molecule/ion with square pyramidal shape is:

(A) $Ni(CN)_4^{2-}$

(B) PCl_5

(C) BrF_5

(D) PF_5

Answer: (C) BrF_5 · Key from source paper

Q85 JEE Main 2024 · 29 Jan · Shift 1 Numerical

Number of compounds with one lone pair of electrons on central atom amongst following is _____.

O_3, H_2O, SF_4, ClF_3, NH_3, BrF_5, XeF_4

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q86 JEE Main 2024 · 29 Jan · Shift 1 Numerical

The number of species from the following which are paramagnetic and with bond order equal to one is

H_2, He_2^+, O_2^+, N_2^{2-}, O_2^{2-}, F_2, Ne_2^+, B_2

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q87 JEE Main 2024 · 29 Jan · Shift 2 Numerical

The total number of molecules with zero dipole moment among CH_4, BF_3, H_2O, HF, NH_3, CO_2 and SO_2 is _____.

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q88 JEE Main 2024 · 29 Jan · Shift 2 Numerical

The total number of 'Sigma' and Pi bonds in 2-formylhex-4-enoic acid is

Numerical value type: the answer is a number.

Answer: 22. · Key from source paper

Q89 JEE Main 2024 · 29 Jan · Shift 2 Numerical

The total number of anti bonding molecular orbitals, formed from $2s$ and $2p$ atomic orbitals in a diatomic molecule is _____.

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q90 JEE Main 2024 · 27 Jan · Shift 1 MCQ

Choose the polar molecule from the following :

(A) CCl_4
(B) CO_2
(C) $CH_2 = CH_2$
(D) $CHCl_3$

Answer: (D) $CHCl_3$ · Key from source paper

Q91 JEE Main 2024 · 27 Jan · Shift 1 Numerical

Sum of bond order of CO and NO^+ is

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q92 JEE Main 2024 · 27 Jan · Shift 2 Numerical

The number of non-polar molecules from the following is

HF, H_2O, SO_2, H_2, CO_2, CH_4, NH_3, HCl, $CHCl_3$, BF_3

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q93 JEE Main 2023 · 15 Apr · Shift 1 MCQ

Consider the following statement
(A) NF_3 molecules has a trigonal planar structure.
(B) Bond Length of N_2 is shorter than O_2.
(C) Isoelectronic molecules or ions have identical bond order.

(D) Dipole moment of H_2S is higher than that of water molecule.
Choose the correct answer from the options given below:

(A) (A) and (B) are correct
(B) (A) and (D) are correct
(C) (C) and (D) are correct
(D) (B) and (C) are correct

Answer: (D) (B) and (C) are correct · Key from source paper

Q94 JEE Main 2023 · 13 Apr · Shift 1 MCQ

In which of the following processes, the bond order increases and paramagnetic character changes to diamagnetic one?

(A) $O_2 \rightarrow O_2^+$
(B) $O_2 \rightarrow O_2^{2-}$
(C) $NO \rightarrow NO^+$
(D) $N_2 \rightarrow N_2^+$

Answer: (C) $NO \rightarrow NO^+$ · Key from source paper

Q95 JEE Main 2023 · 13 Apr · Shift 2 MCQ

Given below are two statements :
Statement I : SO_2 and H_2O both possess V-shaped structure
Statement II : The bond angle of SO_2 is less than that of H_2O.
In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Both Statement I and Statement II are incorrect
(B) Both Statement I and Statement II are correct
(C) Statement I is incorrect but Statement II is correct
(D) Statement I is correct but Statement II is incorrect

Answer: (D) Statement I is correct but Statement II is incorrect · Key from source paper

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Q96 JEE Main 2023 · 12 Apr · Shift 1 MCQ

The bond order and magnetic property of acetylide ion are same as that of

(A) O_2^+
(B) N_2^+
(C) NO^+
(D) O_2^-

Answer: (C) NO^+ · Key from source paper

Q97 JEE Main 2023 · 11 Apr · Shift 1 MCQ

Match List-I with List-II:

List-I Species

A. H_3O^+

B. Acetylide anion

C. NH_4^+

D. ClO_2^-

List-II Geometry/Shape

I. Tetrahedral

II. Linear

III. Pyramidal

IV. Bent

Choose the correct answer from the options given below:

(A) A(III), B(IV), C(I), D(II)

(B) A(III), B(I), C(II), D(IV)

(C) A(III), B(II), C(I), D(IV)

(D) A(III), B(IV), C(II), D(I)

Answer: (C) A(III), B(II), C(I), D(IV) · Key from source paper

Q98 JEE Main 2023 · 11 Apr · Shift 2 Numerical

The maximum number of lone pairs of electron on the central atom from the following species is _____

ClO_3^-, XeF_4, SF_4 and I_3^-

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q99 JEE Main 2023 · 10 Apr · Shift 1 MCQ

The pair from the following pairs having both compounds with net non-zero dipole moment is

(A) 1, 4-Dichlorobenzene, 1, 3-Dichlorobenzene

(B) cis-butene, trans-butene

(C) CH_2Cl_2, $CHCl_3$

(D) Benzene, anisidine

Answer: (C) CH_2Cl_2, $CHCl_3$ · Key from source paper

Q100 JEE Main 2023 · 10 Apr · Shift 1 Numerical

The number of bent-shaped molecule/s from the following is _____ N_3^-, NO_2^-, I_3^-, O_3, SO_2

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q101 JEE Main 2023 · 10 Apr · Shift 2 Numerical

The number of molecules from the following which contain only two lone pair of electrons is _____

$H_2O, N_2, CO, XeF_4, NH_3, NO, CO_2, F_2$

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q102 JEE Main 2023 · 8 Apr · Shift 1 MCQ

Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : Butan–1–ol has higher boiling point than ethoxyethane.
Reason R : Extensive hydrogen bonding leads to stronger association of molecules.
In the light of the above statements, choose the correct answer from the options given below :

(A) A is true but R is false
(B) Both A and R are true and R is the correct explanation of A
(C) Both A and R are true but R is not the correct explanation of A
(D) A is false but R is true

Answer: (B) Both A and R are true and R is the correct explanation of A · Key from source paper

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Q103 JEE Main 2023 · 8 Apr · Shift 1 Numerical

The number of following factors which affect the percent covalent character of the ionic bond is _____

A) Polarising power of cation
B) Extent of distortion of anion
C) Polarisability of the anion
D) Polarising power of anion

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q104 JEE Main 2023 · 6 Apr · Shift 1 Numerical

The number of species from the following which have square pyramidal structure is _____

$PF_5, BrF_4^-, IF_5, BrF_5, XeOF_4, ICl_4^-$

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

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Q105 JEE Main 2023 · 6 Apr · Shift 2 Numerical

The number of species having a square planar shape from the following is

XeF_4, SF_4, SiF_4, BF_4^-, BrF_4^-, $[Cu(NH_3)_4]^{2+}$, $[FeCl_4]^{2-}$, $[PtCl_4]^{2-}$

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

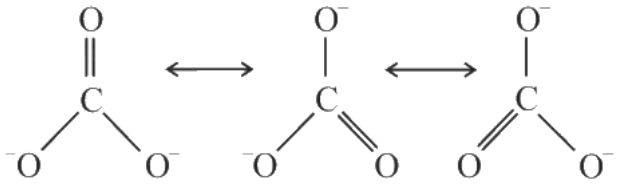
Q106 JEE Main 2023 · 1 Feb · Shift 1 MCQ

Resonance in carbonate ion CO_3^{2-} is

(see the figure above)

Which of the following is true?

Q34. Resonance in carbonate ion CO_3^{2-} is



Which of the following is true?

(1) It is possible to identify each structure individually by some physical or chemical method.

(2) All these structures are in dynamic equilibrium with each other.

(3) Each structure exists for equal amount of time.

(4) CO_3^{2-} has a single structure i.e., resonance hybrid of the above three structures.

(A) It is possible to identify each structure individually by some physical or chemical method.

(B) All these structures are in dynamic equilibrium with each other.

(C) Each structure exists for equal amount of time.

(D) CO_3^{2-} has a single structure i.e., resonance hybrid of the above three structures.

Answer: (D) CO_3^{2-} has a single structure i.e., resonance hybrid of the above three structures. · Key from source paper

Q107 JEE Main 2023 · 1 Feb · Shift 2 MCQ

O − O bond length in H_2O_2 is $\underline{X}$ than the O − O bond length in F_2O_2. The O − H bond length in H_2O_2 is $\underline{Y}$ than that of the O − F bond in F_2O_2. Choose the correct option for $\underline{X}$ and $\underline{Y}$ from the given below.

(A) X- shorter, Y— shorter
(B) X-shorter, Y-longer
(C) X-longer, Y-longer
(D) X-longer, Y - shorter

Answer: (D) X-longer, Y - shorter · Key from source paper

Q108 JEE Main 2023 · 31 Jan · Shift 1 MCQ

Match List I with List II

List I	List II
A. XeF_4	I. See-saw
B. SF_4	II. Square planar
C. NH_4^+	III. Bent T - shaped
D. BrF_3	IV. Tetrahedral

Choose the correct answer from the options given below :

(A) A - IV, B - III, C - II, D - I
(B) A - II, B - I, C - III, D - IV
(C) A - IV, B - I, C - II, D - III
(D) A - II, B - I, C - IV, D - III

Answer: (D) A - II, B - I, C - IV, D - III · Key from source paper

Q109 JEE Main 2023 · 31 Jan · Shift 2 Numerical

Amongst the following, the number of species having the linear shape is
XeF_2, I_3^+, C_3O_2, I_3^-, CO_2, SO_2, $BeCl_2$ and $BCl_2^\ominus$

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

Q110 JEE Main 2023 · 30 Jan · Shift 1 MCQ

For OF_2 molecule consider the following:
(A) Number of lone pairs on oxygen is 2.
(B) FOF angle is less than 104.5°.
(C) Oxidation state of O is -2.
(D) Molecule is bent 'V' shaped.
(E) Molecular geometry is linear.
Correct options are:

(A) C, D, E only
(B) B, E, A only
(C) A, C, D only
(D) A, B, D only

Answer: (D) A, B, D only · Key from source paper

Q111 JEE Main 2023 · 30 Jan · Shift 1 MCQ

Match List I with List II

List I (molecules/ions)
(A) IF_7
(B) ICl_4^-
(C) XeF_6
(D) XeF_2

List II (No. of lone pairs of e^- on central atom)
I. Three
II. One
III. Two
IV. Zero

Choose the correct answer from the options given below:

(A) A - II, B - III, C - IV, D - I
(B) A - IV, B - III, C - II, D - I
(C) A - II, B - I, C - IV, D - III
(D) A - IV, B - I, C - II, D - III

Answer: (B) A - IV, B - III, C - II, D - I · Key from source paper

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Q112 JEE Main 2023 · 29 Jan · Shift 1 Numerical

The number of molecules or ions from the following, which do not have odd number of electrons are _____ .

(A) NO_2
(B) ICl_4^-
(C) BrF_3
(D) ClO_2
(E) NO_2^+
(F) NO

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q113 JEE Main 2023 · 29 Jan · Shift 2 MCQ

According to MO theory the bond orders for O_2^{2-}, CO and NO^+ respectively, are

(A) 1, 3 and 3
(B) 1, 3 and 2
(C) 1, 2 and 3
(D) 2, 3 and 3

Answer: (A) 1, 3 and 3 · Key from source paper

Q114 JEE Main 2023 · 25 Jan · Shift 1 Numerical

The total number of lone pairs of electrons on oxygen atoms of ozone is

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q115 JEE Main 2023 · 25 Jan · Shift 2 MCQ

Statement I:- Dipole moment is a vector quantity and by convention it is depicted by a small arrow with tail on the negative centre and head pointing towards the positive centre.

Statement II:- The crossed arrow of the dipole moment symbolizes the direction of the shift of charges in the molecules.

In the light of the above statements, choose the most appropriate answer from the options given below:-

(A) Both Statement I and Statement II are correct.
(B) Statement I is incorrect but Statement II is correct.
(C) Both Statement I and Statement II are incorrect.
(D) Statement I is correct but Statement II is incorrect.

Answer: (A) Both Statement I and Statement II are correct. · Checked by our team

Q116 JEE Main 2023 · 24 Jan · Shift 1 MCQ

Decreasing order of the hydrogen bonding in following forms of water is correctly represented by

A. Liquid water

B. Ice

C. Impure water

(A) A = B > C
(B) B > A > C
(C) C > B > A
(D) A > B > C

Answer: (B) B > A > C · Key from source paper

Q117 JEE Main 2023 · 24 Jan · Shift 1 MCQ

Order of Covalent bond;

A. KF > KI; LiF > KF

B. KF < KI; LiF > KF

C. $SnCl_4$ > $SnCl_2$; CuCl > NaCl

D. LiF > KF; CuCl > NaCl

E. KF < KI; CuCl > NaCl

(A) C, E Only
(B) B, C Only
(C) B, C, E Only
(D) A, B Only

Answer: (C) B, C, E Only · Key from source paper

Q118 JEE Main 2023 · 24 Jan · Shift 2 MCQ

What is the number of unpaired electron(s) in the highest occupied molecular orbital of the following species :

N_2, N_2^+, O_2, O_2^+ ?

(A) 0, 1, 2, 1
(B) 2, 1, 2, 1
(C) 0, 1, 0, 1
(D) 2, 1, 0, 1

Answer: (A) 0, 1, 2, 1 · Key from source paper

Q119 JEE Main 2022 · 29 Jul · Shift 1 MCQ

Which of the following pair of molecules contain odd electron molecule and an expanded octet molecule?

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(A) BCl_3 and SF_6
(B) NO and H_2SO_4
(C) SF_6 and H_2SO_4
(D) BCl_3 and NO

Answer: (B) NO and H_2SO_4 · Key from source paper

Q120 JEE Main 2022 · 29 Jul · Shift 1 MCQ

Number of lone pairs of electrons in the central atom of SCl_2, O_3, ClF_3 and SF_6, respectively, are

(A) 0, 1, 2 & 2
(B) 2, 1, 2 & 0
(C) 1, 2, 2 & 0
(D) None of these

Answer: (B) 2, 1, 2 & 0 · Key from source paper

Q121 JEE Main 2022 · 29 Jul · Shift 2 Numerical

Consider, PF_5, BrF_5, PCl_3, SF_6, ICl_4^-, ClF_3 and IF_5
Amongst the above molecule(s) ion(s), the number of molecule(s)/ion(s) having sp^3d^2 hybridisation is

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q122 JEE Main 2022 · 28 Jul · Shift 1 Numerical

The number of paramagnetic species among the following is $B_2, Li_2, C_2, C_2^-, O_2^{2-}, O_2^+$ and He_2^+

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q123 JEE Main 2022 · 28 Jul · Shift 2 MCQ

Given below are two statements : One is labelled as Assertion A and the other is labelled as Reason R
Assertion A : Zero orbital overlap is an out of phase overlap.
Reason R : It results due to different orientation/ direction of approach of orbitals.
In the light of the above statements. Choose the correct answer from the options given below

(A) Both A and R are true and R is the correct explanation of A
(B) Both A and R are true but R is NOT the correct explanation of A
(C) A is true but R is false
(D) A is false but R is true

Answer: (A) Both A and R are true and R is the correct explanation of A · Key from source paper

Q124 JEE Main 2022 · 27 Jul · Shift 1 Numerical

Amongst the following the number of oxide(s) which are paramagnetic in nature is
Na_2O, KO_2, NO_2, N_2O, ClO_2, NO, SO_2, Cl_2O

Numerical value type: the answer is a number.

Answer: 4. · Key from source paper

Q125 JEE Main 2022 · 27 Jul · Shift 1 Numerical

According to MO theory, number of species/ions from the following having identical bond order is _____

CN^-, NO^+, O_2, O_2^+, O_2^{2+}

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q126 JEE Main 2022 · 27 Jul · Shift 2 MCQ

Match List-I with List-II

List-I		List-II
A	$\Psi_{MO} = \Psi_A - \Psi_B$	I Dipole moment
B	$\mu = Q \times r$	II Bonding molecular orbital
C	$\frac{N_b - N_a}{2}$	III Anti-bonding molecualr orbital
D	$\Psi_{MO} = \Psi_A + \Psi_B$	IV Bond order

(A) A – II, B – I, C – IV, D – III
(B) A – III, B – IV, C – I, D – II
(C) A – III, B – I, C – IV, D – II
(D) A – III, B – IV, C – II, D – I

Answer: (C) A – III, B – I, C – IV, D – II · Key from source paper

Q127 JEE Main 2022 · 27 Jul · Shift 2 Numerical

The number of molecule(s) or ion(s) from the following having non-planar structure is _____ .
NO_3^-, H_2O_2, BF_3, PCl_3, XeF_4,
SF_4, XeO_3, PH_4^+, SO_3, $[Al(OH)_4]^-$

Numerical value type: the answer is a number.

Answer: 6. · Key from source paper

Q128 JEE Main 2022 · 26 Jul · Shift 1 MCQ

Match List - I with List - II.

List-I (Compound)	List-II (Shape)

A BrF_5	I bent
B $[CrF_6]^{3-}$	II square pyramidal
C O_3	III trigonal bipyramidal
D PCl_5	IV octahedral

Choose the correct answer from the options given below

(A) (A) – (I), (B) – (II), (C) – (III), (D) – (IV)

(B) (A) – (IV), (B) – (III), (C) – (II), (D) – (I)

(C) (A) – (II), (B) – (IV), (C) – (I), (D) – (III)

(D) (A) – (III), (B) – (IV), (C) – (II), (D) – (I)

Answer: (C) (A) – (II), (B) – (IV), (C) – (I), (D) – (III) · Key from source paper

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Q129 JEE Main 2022 · 26 Jul · Shift 2 MCQ

Arrange the following in increasing order of their covalent character.

(A) CaF_2

(B) $CaCl_2$

(C) $CaBr_2$

(D) CaI_2

Choose the correct answer from the options given below.

(A) $B < A < C < D$

(B) $A < B < C < D$

(C) $A < B < D < C$

(D) $A < C < B < D$

Answer: (B) $A < B < C < D$ · Key from source paper

Q130 JEE Main 2022 · 25 Jul · Shift 1 Numerical

Among the following species N_2, N_2^+, N_2^-, N_2^{2-}, O_2, O_2^+, O_2^-, O_2^{2-} the number of species showing diamagnetism is

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q131 JEE Main 2022 · 25 Jul · Shift 1 Numerical

The number of sp^3 hybridised carbons in an acyclic neutral compound with molecular formula C_4H_5N is

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q132 JEE Main 2022 · 29 Jun · Shift 1 MCQ

Arrange the following in the decreasing order of their covalent character :
(A) LiCl
(B) NaCl
(C) KCl
(D) CsCl
Choose the most appropriate answer from the options given below

(A) (A) > (C) > (B) > (D)
(B) (B) > (A) > (C) > (D)
(C) (A) > (B) > (C) > (D)
(D) (A) > (B) > (D) > (C)

Answer: (C) (A) > (B) > (C) > (D) · Key from source paper

Q133 JEE Main 2022 · 29 Jun · Shift 2 MCQ

Consider the species CH_4, NH_4^+ and BH_4^-. Choose the correct option with respect to the there species:

(A) They are isoelectronic and only two have tetrahedral structures
(B) They are isoelectronic and all have tetrahedral structures
(C) Only two are isoelectronic and all have tetrahedral structures
(D) Only two are isoelectronic and only two have tetrahedral structures

Answer: (B) They are isoelectronic and all have tetrahedral structures · Key from source paper

Q134 JEE Main 2022 · 29 Jun · Shift 2 MCQ

Number of lone pair (s) of electrons on central atom and the shape of BrF_3 molecule respectively, are :

(A) 0 , triangular planar.
(B) 1 , pyramidal.
(C) 2 , bent T-shape.
(D) 1, bent T-shape

Answer: (C) 2 **, bent T-shape.** · Key from source paper

Q135 JEE Main 2022 · 28 Jun · Shift 1 Numerical

The hybridization of P exhibited in PF_5 is sp^xd^y. The value of y is

Numerical value type: the answer is a number.

Answer: 1. · Key from source paper

Q136 JEE Main 2022 · 28 Jun · Shift 2 MCQ

In the structure of SF_4, the lone pair of electrons on S is in.

(A) Equatorial position and there are two lone pair - bond pair repulsions at 90°.
(B) equatorial position and there are three lone pair - bond pair repulsions at 90°.
(C) axial position and there are three lone pair - bond pair repulsion at 90°.
(D) axial position and there are two lone pair - bond pair repulsion at 90°.

Answer: (A) Equatorial position and there are two lone pair - bond pair repulsions at 90°. · Key from source paper

Q137 JEE Main 2022 · 27 Jun · Shift 1 MCQ

Based upon VSEPR theory, match the shape (geometry) of the molecules in List-I with the molecules in List - II and select the most appropriate option.
List-I (Shape)
A T-shaped
B Trigonal planar
C Square planar
D See-saw
List-II (Molecules)
I. XeF_4
II. SF_4
III. ClF_3
IV. BF_3

(A) (A) – (I), (B) – (II), (C) – (III), (D) – (IV)
(B) (A) – (III), (B) – (IV), (C) – (I), (D) – (II)
(C) (A) – (III), (B) – (IV), (C) – (II), (D) – (I)
(D) (A) – (IV), (B) – (III), (C) – (I), (D) – (II)

Answer: (B) (A) – (III), (B) – (IV), (C) – (I), (D) – (II) · Key from source paper

Q138 JEE Main 2022 · 27 Jun · Shift 2 MCQ

Identify the incorrect statement for PCl_5 from the following.

(A) In this molecule, orbitals of phosphorous are assumed to undergo sp^3d hybridization.
(B) The geometry of PCl_5 is trigonal bipyramidal.
(C) PCl_5 has two axial bonds stronger than three equatorial bonds.
(D) The three equatorial bonds of PCl_5 lie in a plane.

Answer: (C) PCl_5 has two axial bonds stronger than three equatorial bonds. · Key from source paper

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Q139 JEE Main 2022 · 27 Jun · Shift 2 MCQ

The correct order of increasing intermolecular hydrogen bond strength is

(A) $HCN < H_2O < NH_3$
(B) $HCN < CH_4 < NH_3$
(C) $CH_4 < HCN < NH_3$
(D) $CH_4 < NH_3 < HCN$

Answer: (C) $CH_4 < HCN < NH_3$ · Key from source paper

Q140 JEE Main 2022 · 26 Jun · Shift 1 MCQ

Consider the ions/molecule $O_2^+, O_2, O_2^-, O_2^{2-}$. For increasing bond order the correct option is

(A) $O_2^- < O_2^{2-} < O_2 < O_2^+$
(B) $O_2^- < O_2^{2-} < O_2^+ < O_2$
(C) $O_2^- < O_2^+ < O_2^{2-} < O_2$
(D) $O_2^{2-} < O_2^- < O_2 < O_2^+$

Answer: (D) $O_2^{2-} < O_2^- < O_2 < O_2^+$ · Key from source paper

Q141 JEE Main 2022 · 26 Jun · Shift 2 Numerical

Amongst SF_4, XeF_4, CF_4 and H_2O, the number of species with two lone pairs of electrons is

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q142 JEE Main 2022 · 25 Jun · Shift 1 MCQ

Bonding in which of the following diatomic molecule(s) become(s) stronger, on the basis of MO Theory, by removal of an electron?
(A) NO
(B) N_2
(C) O_2
(D) C_2
(E) B_2
Choose the most appropriate answer from the options given below :

(A) A, B, C only
(B) B, C, E only
(C) A, C only
(D) D only

Answer: (C) A, C only · Key from source paper

EdLoop JEE

Q143 JEE Main 2022 · 25 Jun · Shift 1 MCQ

Number of electron deficient molecules among the following PH_3, B_2H_6, CCl_4, NH_3, LiH and BCl_3 is

(A) 0
(B) 1
(C) 2
(D) 3

Answer: (C) 2 · Key from source paper

Q144 JEE Main 2022 · 25 Jun · Shift 2 Numerical

How many of the following molecules are with non-zero net dipole moment, NH_3 , HCl, H_2O , BeF_2, BH_3, CCl_4

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q145 JEE Main 2022 · 24 Jun · Shift 2 MCQ

Metals generally melt at very high temperatures, Among the following which one has the highest melting point?

(A) Ga
(B) Ag
(C) Hg
(D) Cs

Answer: (B) Ag · Key from source paper

Q146 JEE Main 2022 · 24 Jun · Shift 2 MCQ

The correct order of bond orders of C_2^{2-}, N_2^{2-} and O_2^{2-} is

(A) $C_2^{2-} > N_2^{2-} > O_2^{2-}$
(B) $O_2^{2-} > N_2^{2-} > C_2^{2-}$
(C) $N_2^{2-} > O_2^{2-} > C_2^{2-}$
(D) $C_2^{2-} > O_2^{2-} > N_2^{2-}$

Answer: (A) $C_2^{2-} > N_2^{2-} > O_2^{2-}$ · Key from source paper

Q147 JEE Main 2022 · 24 Jun · Shift 2 MCQ

Given below are two statements.
Statement I: The presence of weaker π-bonds make alkenes less stable than alkanes
Statement II: The strength of the double bond is greater than that of carbon-carbon single bond.
In the light of the above statements, choose the correct answer from the options : given below.

(A) Both Statement I and Statement II are correct.
(B) Both Statement I and Statement II are incorrect.
(C) Statement I is correct but Statement II is incorrect.
(D) Statement I is incorrect but Statement II is correct.

Answer: (A) Both Statement I and Statement II are correct. · Key from source paper

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Q148 JEE Main 2021 · 1 Sep · Shift 2 Numerical

The spin-only magnetic moment value of B_2^+ species is _____ $\times 10^{-2}$BM (Nearest integer)
[Given : $\sqrt{3} = 1.73$]

Numerical value type: the answer is a number.

Answer: 173. · Key from source paper

Q149 JEE Main 2021 · 31 Aug · Shift 2 Numerical

According to molecular orbital theory, the number of unpaired electron(s) in O_2^{2-} is _____.

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q150 JEE Main 2021 · 27 Aug · Shift 1 MCQ

Match List - I with List - II:
List-I (Species)
(a) XeF_2
(b) XeO_2F_2
(c) XeO_3F_2
(d) XeF_4
List-II (Number of lone pairs of electrons on the central atom)
(i) 0
(ii) 1
(iii) 2
(iv) 3
Choose the most appropriate answer from the options given below:

(A) (a) - (iii), (b) - (iv), (c) - (ii), (d) - (i)
(B) (a) - (iv), (b) - (i), (c) - (ii), (d) - (iii)
(C) (a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)
(D) (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii)

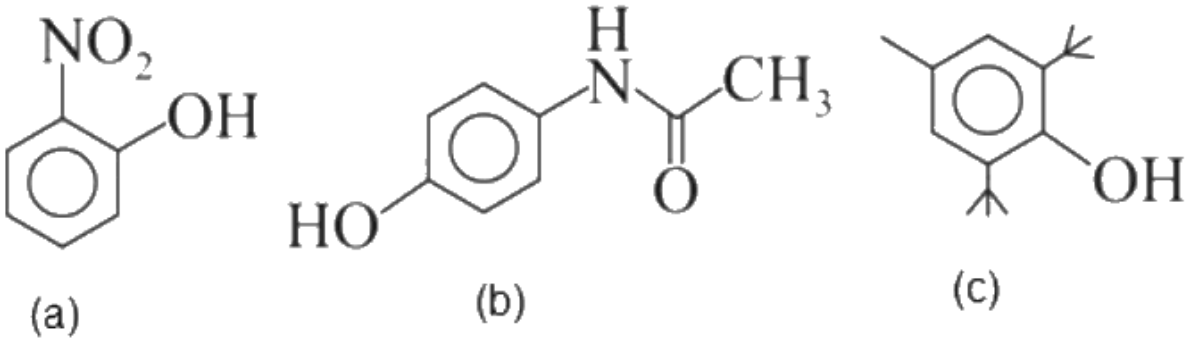
Answer: (D) (a) - (iv), (b) - (ii), (c) - (i), (d) - (iii) · Key from source paper

EdLoop JEE

Q151 JEE Main 2021 · 27 Aug · Shift 2 MCQ

The compound/s which will show significant intermolecular H-bonding is/are :
(see the figure above)

Q32. The compound/s which will show significant intermolecular H-bonding is/are :



(a) (b) (c)

(1) (a), (b) and (c)
(2) (b) only
(3) (c) only
(4) (a) and (b) only

(A) (a), (b) and (c)
(B) (b) only
(C) (c) only
(D) (a) and (b) only

Answer: (B) (b) only · Key from source paper

Q152 JEE Main 2021 · 27 Aug · Shift 2 Numerical

The number of species having non-pyramidal shape among the following is:
(A) SO_3
(B) NO_3^-
(C) PCl_3
(D) CO_3^{2-}

Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q153 JEE Main 2021 · 26 Aug · Shift 1 Numerical

AB_3 is an interhalogen T-shaped molecule. The number of lone pairs of electrons on A is (Integer answer)

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q154 JEE Main 2021 · 26 Aug · Shift 1 Numerical

The Born-Haber cycle for KCl is evaluated with the following data:
$\Delta_f H^{\ominus}$ for $KCl = -436.7\ kJmol^{-1}$; $\Delta_{sub} H^{\ominus}$ for $K = 89.2\ kJmol^{-1}$;
$\Delta_{ionization}\ H^{\ominus}$ for $K = 419.0\ kJ\ mol^{-1}$; $\Delta_{electron\ gain}\ H^{\ominus}$ for $Cl_{(g)} = -348.6\ kJmol^{-1}$
$\Delta_{bond}\ H^{\ominus}$ for $Cl_2 = 243.0\ kJmol^{-1}$
The magnitude of lattice enthalpy of KCl in $kJmol^{-1}$ is (Nearest integer)

Numerical value type: the answer is a number.

Answer: 718. · Key from source paper

Q155 JEE Main 2021 · 26 Aug · Shift 2 MCQ

The interaction energy of London forces between two particles is proportional to r^x, where r is the distance between the particles. The value of x is :

(A) 6
(B) -6
(C) 3
(D) -3

Answer: (B) -6 · Key from source paper

Q156 JEE Main 2021 · 26 Aug · Shift 2 MCQ

The bond order and magnetic behaviour of O_2^- ion are, respectively :

(A) 1.5 and diamagnetic.
(B) 1.5 and paramagnetic.
(C) 2 and diamagnetic.
(D) 1 and paramagnetic

Answer: (B) 1.5 **and paramagnetic.** · Key from source paper

Q157 JEE Main 2021 · 27 Jul · Shift 1 Numerical

In gaseous triethyl amine the $-C-N-C-$ bond angle is _____ degree.

Numerical value type: the answer is a number.

Answer: 108. · Key from source paper

Q158 JEE Main 2021 · 27 Jul · Shift 1 Numerical

The difference between bond orders of CO and $NO^{\oplus}$ is $\frac{x}{2}$ where x = (Round off to the Nearest Integer)

Numerical value type: the answer is a number.

Answer: 0. · Key from source paper

Q159 JEE Main 2021 · 27 Jul · Shift 2 Numerical

The total number of electrons in all bonding molecular orbitals of O_2^{2-} is _____ (Round off to the nearest integer)

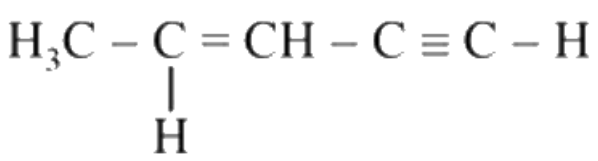
Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q160 JEE Main 2021 · 25 Jul · Shift 1 Numerical

The number of sigma bonds in *(see the figure above)* is _____.

Q57.



The number of sigma bonds in is _____.

Numerical value type: the answer is a number.

Answer: 10. · Key from source paper

Q161 JEE Main 2021 · 25 Jul · Shift 2 MCQ

In the following the correct bond order sequence is:

(A) $O_2^{2-} > O_2^{+} > O_2^{-} > O_2$

(B) $O_2^{+} > O_2^{-} > O_2^{2-} > O_2$

(C) $O_2^{+} > O_2 > O_2^{-} > O_2^{2-}$

(D) $O_2 > O_2^{-} > O_2^{2-} > O_2^{+}$

Answer: (C) $O_2^{+} > O_2 > O_2^{-} > O_2^{2-}$ · Key from source paper

Q162 JEE Main 2021 · 25 Jul · Shift 2 MCQ

Identify the species having one π -bond and maximum number of canonical forms from the following :

(A) SO_3

(B) O_2

(C) SO_2

(D) CO_3^{2-}

Answer: (D) CO_3^{2-} · Key from source paper

Q163 JEE Main 2021 · 22 Jul · Shift 1 MCQ

Match List-I with List-II

List - I (Elements) | List - II (Properties)

(a) SF_4 | (i) $sp^3 d^2$
(b) IF_5 | (ii) $d^2 sp^3$
(c) NO_2^+ | (iii) $sp^3 d$
(d) NH_4^+ | (iv) sp^3

(v) sp

Choose the correct answer from the options given below:

(A) (a)-(i), (b)-(ii), (c)-(v) and (d)-(iii)
(B) (a)-(ii), (b)-(i), (c)-(iv) and (d)-(v)
(C) (a)-(iii), (b)-(i), (c)-(v) and (d)-(iv)
(D) (a)-(iv), (b)-(iii), (c)-(ii) and (d)-(v)

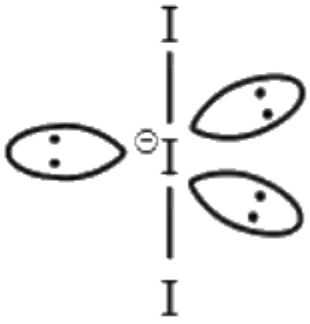
Answer: (C) (a)-(iii), (b)-(i), (c)-(v) and (d)-(iv) · Key from source paper

Q164 JEE Main 2021 · 20 Jul · Shift 1 Numerical

The number of lone pairs of electrons on the central I atom in I_3^- is
(see the figure above)

Q52. The number of lone pairs of electrons on the central I atom in I_3^- is

I_3^- :



Numerical value type: the answer is a number.

Answer: 3. · Key from source paper

Q165 JEE Main 2021 · 20 Jul · Shift 2 MCQ

The hybridisations of the atomic orbitals of nitrogen in NO_2^-, NO_2^+ and NH_4^+ respectively are.

(A) sp^3, sp^2 and sp
(B) sp, sp^2 and sp^3
(C) sp^3, sp and sp^2
(D) sp^2, sp and sp^3

Answer: (D) sp^2, sp and sp^3 · Key from source paper

Q166 JEE Main 2021 · 18 Mar · Shift 1 Numerical

AX is a covalent diatomic molecule where A and X are second row elements of periodic table. Based on Molecular orbital theory, the bond order of AX is 2.5. The total number of electrons in AX is _____ . (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Accepted answers: 15 or 13. · Key from source paper

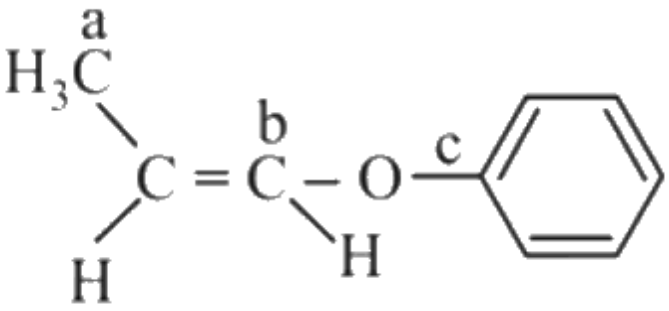
Q167 JEE Main 2021 · 18 Mar · Shift 2 MCQ

In the following molecules,

(see the figure above)

Hybridisation of carbon a, b and c respectively are :

Q37. In the following molecules,



Hybridisation of carbon a, b and c respectively are :

(1) sp^3, sp, sp
(2) sp^3, sp^2, sp
(3) sp^3, sp^2, sp^2
(4) sp^3, sp, sp^2

(A) sp^3, sp, sp
(B) sp^3, sp^2, sp
(C) sp^3, sp^2, sp^2
(D) sp^3, sp, sp^2

Answer: (C) sp^3, sp^2, sp^2 · Key from source paper

Q168 JEE Main 2021 · 18 Mar · Shift 2 Numerical

The number of species below that have two lone pairs of electrons in their central atom is _____
(Round off to the Nearest integer)
SF_4, BF_4^-, ClF_3, AsF_3, PCl_5, BrF_5, XeF_4, SF_6

Numerical value type: the answer is a number.

Answer: 2. · Key from source paper

Q169 JEE Main 2021 · 17 Mar · Shift 1 MCQ

A central atom in a molecule has two lone pairs of electrons and forms three single bonds. The shape of this molecule is

(A) see-saw
(B) planar triangular
(C) T-shaped
(D) trigonal pyramidal

Answer: (C) T-shaped · Key from source paper

Q170 JEE Main 2021 · 17 Mar · Shift 1 MCQ

Which of the following compound CANNOT act as a Lewis base?

(A) NF_3
(B) PCl_5
(C) SF_4
(D) ClF_3

Answer: (B) PCl_5 · Key from source paper

Q171 JEE Main 2021 · 17 Mar · Shift 2 MCQ

Amongst the following, the linear species is:

(A) NO_2
(B) Cl_2O
(C) O_3
(D) N_3^-

Answer: (D) N_3^- · Key from source paper

Q172 JEE Main 2021 · 17 Mar · Shift 2 Numerical

The total number of $C-C$ sigma bond/s in mesityl oxide $(C_6H_{10}O)$ is (Round off to the Nearest Integer).

Numerical value type: the answer is a number.

Answer: 5. · Key from source paper

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Q173 JEE Main 2021 · 16 Mar · Shift 1 MCQ

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R :
Assertion A : The $\mathrm{H}-\mathrm{O}-\mathrm{H}$ bond angle in water molecule is 104.5°.
Reason R : The lone pair $-$ lone pair repulsion of electrons is higher than the bond pair $-$ bond pair repulsion.

(A) A is false but R is true
(B) Both A and R are true, but R is not the correct explanation of A
(C) A is true but R is false
(D) Both A and R are true, and R is the correct explanation of A

Answer: (D) Both A and R are true, and R is the correct explanation of A · Key from source paper

Q174 JEE Main 2021 · 26 Feb · Shift 1 MCQ

Given below are two statements:
Statement I : o-Nitrophenol is steam volatile due to intramolecular hydrogen bonding.
Statement II : o-Nitrophenol has high melting due to hydrogen bonding.
In the light of the above statements, choose the most appropriate answer from the options given below:

(A) Both Statement I and Statement II are false
(B) Statement I is true but Statement II is false
(C) Statement I is false but Statement II is true
(D) Both Statement I and Statement II are true

Answer: (B) Statement I is true but Statement II is false · Checked by our team

Q175 JEE Main 2021 · 26 Feb · Shift 1 MCQ

Given below are two statements: one is labelled as Assertion A and the other is labelled as Reason R.
Assertion A : Dipole-dipole interactions are the only non-covalent interactions, resulting in hydrogen bond formation.
Reason R : Fluorine is the most electronegative element and hydrogen bonds in HF are symmetrical.
In the light of the above statements, choose the most appropriate answer from the options given below:

(A) A is false but R is true
(B) Both A and R are true but R is NOT the correct explanation of A
(C) A is true but R is false
(D) Both A and R are true and R is the correct explanation of A

Answer: (A) A is false but R is true · Key from source paper

Q176 JEE Main 2021 · 26 Feb · Shift 2 MCQ

Match List-I with List-II.

List-I (Molecule)	List-II (Bond order)
(a) Ne_2	(i) 1
(b) N_2	(ii) 2
(c) F_2	(iii) 0
(d) O_2	(iv) 3

Choose the correct answer from the options given below:

(A) (a) $\rightarrow$ (ii), (b) $\rightarrow$ (i), (c) $\rightarrow$ (iv), (d) $\rightarrow$ (iii)
(B) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (i), (d) $\rightarrow$ (ii)
(C) (a) $\rightarrow$ (i), (b) $\rightarrow$ (ii), (c) $\rightarrow$ (iii), (d) $\rightarrow$ (iv)
(D) (a) $\rightarrow$ (iv), (b) $\rightarrow$ (iii), (c) $\rightarrow$ (ii), (d) $\rightarrow$ (i)

Answer: (B) (a) $\rightarrow$ (iii), (b) $\rightarrow$ (iv), (c) $\rightarrow$ (i), (d) $\rightarrow$ (ii) · Key from source paper

Q177 JEE Main 2021 · 26 Feb · Shift 2 MCQ

In $\overset{1}{C}H_2 = \overset{2}{C} = \overset{3}{C}H - \overset{4}{C}H_3$ molecule, the hybridization of carbon 1, 2, 3 and 4 respectively, are :

(A) $sp^2,\ sp^3,\ sp^2,\ sp^3$
(B) $sp^2,\ sp,\ sp^2,\ sp^3$
(C) $sp^2,\ sp^2,\ sp^2,\ sp^3$
(D) $sp^3,\ sp^3,\ sp^3,\ sp^3$

Answer: (B) $sp^2,\ sp,\ sp^2,\ sp^3$ · Key from source paper

Q178 JEE Main 2021 · 25 Feb · Shift 1 MCQ

According to molecular orbital theory, the species among the following that does not exist is:

(A) He_2^-
(B) O_2^{2-}
(C) He_2^+
(D) Be_2

Answer: (D) Be_2 · Key from source paper

Q179 JEE Main 2021 · 25 Feb · Shift 1 Numerical

The ionization enthalpy of Na^+ formation from $Na_{(g)}$ is $495.8\ kJ\ mol^{-1}$, while the electron gain enthalpy of Br is $-325.0\ kJ\ mol^{-1}$. Given the lattice enthalpy of NaBr is $-728.4\ kJ\ mol^{-1}$. The energy for the formation of NaBr ionic solid is $(-)$ _____ $10^{-1}\ kJ\ mol^{-1}$.

Numerical value type: the answer is a number.

Answer: 5576. · Key from source paper

Q180 JEE Main 2021 · 25 Feb · Shift 2 MCQ

Which among the following species has unequal bond lengths?

(A) SiF_4
(B) SF_4
(C) XeF_4
(D) BF_4

Answer: (B) SF_4 · Key from source paper

Q181 JEE Main 2021 · 24 Feb · Shift 1 MCQ

Which of the following are isostructural pairs?
A. SO_4^{2-} and CrO_4^{2-}
B. $SiCl_4$ and $TiCl_4$
C. NH_3 and NO_3^-
D. BCl_3 and $BrCl_3$

(A) A and C only
(B) B and C only
(C) A and B only
(D) C and D only

Answer: (C) A and B only · Key from source paper

Q182 JEE Main 2021 · 24 Feb · Shift 2 MCQ

The correct set from the following in which both pairs are in correct order of melting point is:

(A) $LiF > LiCl$; $NaCl > MgO$
(B) $LiCl > LiF$; $MgO > NaCl$
(C) $LiCl > LiF$; $NaCl > MgO$
(D) $LiF > LiCl$; $MgO > NaCl$

Answer: (D) $LiF > LiCl$; $MgO > NaCl$ · Key from source paper

Q183 JEE Main 2021 · 24 Feb · Shift 2 MCQ

The correct shape and $I-I-I$ bond angles respectively in I_3^- ion are:

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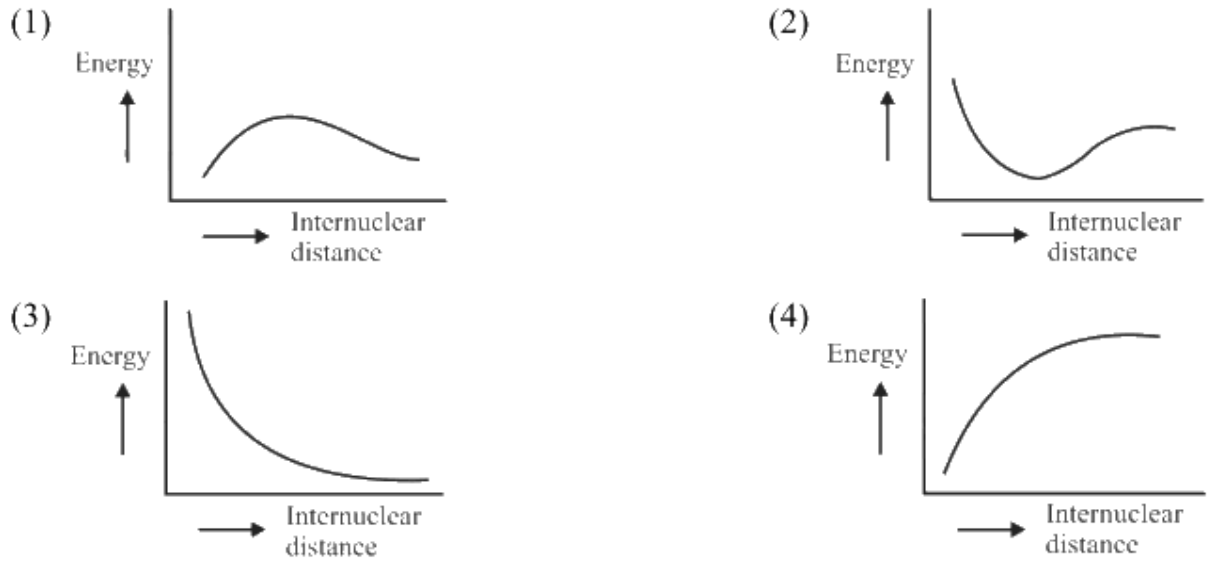
(A) T-shaped; 180° and 90°
(B) Distorted trigonal planar; 135° and 90°
(C) Trigonal planar; 120°
(D) Linear; 180°

Answer: (D) Linear; 180° · Key from source paper

Q184 JEE Main 2020 · 5 Sep · Shift 1 MCQ

The potential energy curve for the H_2 molecule as a function of internuclear distance is:
(see the figure above)

Q28. The potential energy curve for the H_2 molecule as a function of internuclear distance is:



(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (B) · Key from source paper

Q185 JEE Main 2020 · 5 Sep · Shift 2 MCQ

The compound that has the largest $H\text{–}M\text{–}H$ bond angle ($M = N, O, S, C$), is :

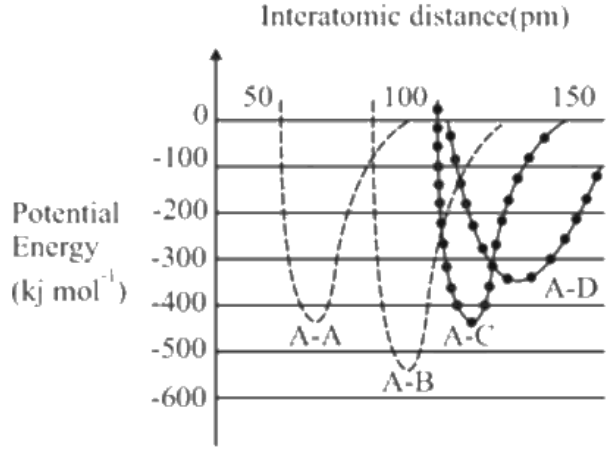
(A) H_2O
(B) NH_3
(C) H_2S
(D) CH_4

Answer: (D) CH_4 · Key from source paper

Q186 JEE Main 2020 · 4 Sep · Shift 1 MCQ

The intermolecular potential energy for the moleculesA ,B , C and D given below suggests that:
(see the figure above)

Q29. The intermolecular potential energy for the moleculesA ,B , C and D given below suggests that:



(1) A − D has the shortest bond length
(2) A − A has the largest bond enthalpy
(3) D is more electronegative than other atoms.
(4) A − B has the stiffest bond.

(A) A − D has the shortest bond length
(B) A − A has the largest bond enthalpy
(C) D is more electronegative than other atoms.
(D) A − B has the stiffest bond.

Answer: (D) A − B has the stiffest bond. · Key from source paper

Q187 JEE Main 2020 · 4 Sep · Shift 2 MCQ

The reaction in which the hybridisation of the underlined atom is affected is

(A) $\underline{\mathrm{P}}\mathrm{H_3PO_2} \xrightarrow{\text{Disproportionation}}$
(B) $\underline{\mathrm{S}}\mathrm{H_2SO_4} + \mathrm{NaCl} \xrightarrow{420\ \mathrm{K}}$
(C) $\underline{\mathrm{N}}\mathrm{H_3} \xrightarrow{\mathrm{H^+}}$
(D) $\underline{\mathrm{Xe}}\mathrm{F_4} + \mathrm{SbF_5} \rightarrow$

Answer: (D) $\underline{\mathrm{Xe}}\mathrm{F_4} + \mathrm{SbF_5} \rightarrow$ · Key from source paper

Q188 JEE Main 2020 · 3 Sep · Shift 1 MCQ

If the boiling point of $\mathrm{H_2O}$ is 373 K, and the boiling point of $\mathrm{H_2S}$ will be :

(A) less than 300 K
(B) equal to 373 K
(C) more than 373 K
(D) greater than 300 K but less than 373 K

Answer: (A) less than 300 K · Key from source paper

Q189 JEE Main 2020 · 3 Sep · Shift 1 MCQ

Of the species, NO, NO^+, NO^{2+} and NO^-, the one with minimum bond strength is :

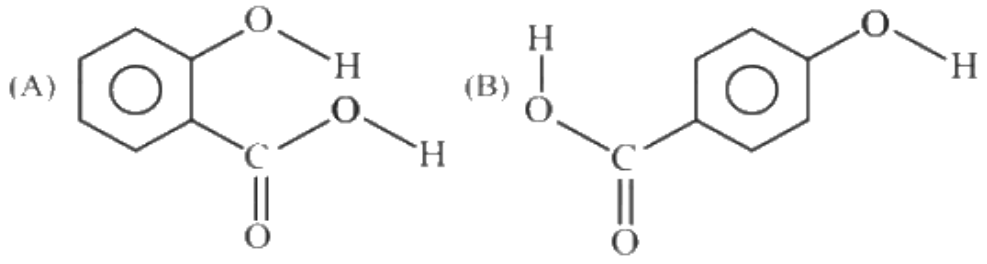
(A) NO^+
(B) NO
(C) NO^{2+}
(D) NO^-

Answer: (D) NO^- · Key from source paper

Q190 JEE Main 2020 · 3 Sep · Shift 2 MCQ

Consider the following molecules and statements related to them:
(see the figure above)
(a) (B) is more likely to be crystaline than (A)
(b) (B) has higher boiling point than (A)
(c) (B) dissolves more readily than (A) in water
Identify the correct option from below:

Q29. Consider the following molecules and statements related to them:



(a) (B) is more likely to be crystaline than (A)
(b) (B) has higher boiling point than (A)
(c) (B) dissolves more readily than (A) in water
Identify the correct option from below:
(1) (a) and (b) are true
(2) (a) and (c) are true
(3) only (a) is true
(4) (b) and (c) are true

(A) (a) and (b) are true
(B) (a) and (c) are true
(C) only (a) is true
(D) (b) and (c) are true

Answer: (D) (b) and (c) are true · Key from source paper

Q191 JEE Main 2020 · 2 Sep · Shift 1 MCQ

If AB_4 molecule is a polar molecule, a possible geometry of AB_4 is :

(A) Square pyramidal
(B) Tetrahedral
(C) Rectangular planar
(D) Square planar

Answer: (A) Square pyramidal · Key from source paper

Q192 JEE Main 2020 · 2 Sep · Shift 2 MCQ

Match the type of interaction in column A with the distance dependence of their interaction energy in column B :

A	B
(i) ion - ion	(a) $\frac{1}{r}$
(ii) Dipole - dipole	(b) $\frac{1}{r^2}$
(iii) London dispersion	(c) $\frac{1}{r^3}$
	(iv) $\frac{1}{r^6}$

(A) (i) – (b); (ii) – (d); (iii) – (c)
(B) (i) – (a); (ii) – (b); (iii) – (d)
(C) (i) – (a); (ii) – (b); (iii) – (c)
(D) (i) – (a); (ii) – (c); (iii) – (d)

Answer: (D) (i) – (a); (ii) – (c); (iii) – (d) · Key from source paper

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Q193 JEE Main 2020 · 2 Sep · Shift 2 MCQ

The molecular geometry of SF_6 is octahedral. What is the geometry of SF_4 (including lone pair(s) of electrons, if (any)?

(A) Tetrahedral
(B) Trigonal bipyramidal
(C) Pyramidal
(D) Square planar

Answer: (B) Trigonal bipyramidal · Key from source paper

Q194 JEE Main 2020 · 9 Jan · Shift 1 MCQ

If the magnetic moment of a di-oxygen species is 1.73 B. M., it may be

(A) O_2^- or O_2^+.
(B) O_2 or O_2^+.
(C) O_2 or O_2^-.
(D) O_2, O_2^- or O_2^+.

Answer: (A) O_2^- or O_2^+. · Key from source paper

Q195 JEE Main 2020 · 9 Jan · Shift 2 MCQ

The number of sp^2 hybrid orbitals in a molecule of benzene is:

(A) 24
(B) 6
(C) 18
(D) 12

Answer: (C) 18 · Key from source paper

Q196 JEE Main 2020 · 8 Jan · Shift 1 MCQ

The predominant intermolecular forces present in ethyl acetate, a liquid, are:

(A) London dispersion and dipole-dipole
(B) hydrogen bonding and London dispersion
(C) Dipole-dipole and hydrogen bonding
(D) London dispersion, dipole-dipole and hydrogen bonding

Answer: (A) London dispersion and dipole-dipole · Key from source paper

Q197 JEE Main 2020 · 8 Jan · Shift 2 MCQ

Arrange the following bonds according to their average bond energies in descending order:
$C-Cl, C-Br, C-F, C-I$

(A) $C-F > C-Cl > C-Br > C-I$
(B) $C-Br > C-I > C-Cl > C-F$
(C) $C-I > C-Br > C-Cl > C-F$
(D) $C-Cl > C-Br > C-I > C-F$

Answer: (A) $C-F > C-Cl > C-Br > C-I$ · Key from source paper

Q198 JEE Main 2020 · 8 Jan · Shift 2 Numerical

Complexes (ML_5) of metals Ni and Fe have ideal square pyramidal and trigonal bipyramidal geometries, respectively. The sum of the $90^\circ, 120^\circ$ and 180° L − M − L angles in the two complexes

is_____

Numerical value type: the answer is a number.

Answer: 20. · Key from source paper

Q199 JEE Main 2020 · 7 Jan · Shift 1 MCQ

The dipole moments of CCl_4, $CHCl_3$ and CH_4 are in the order

(A) $CHCl_3 < CH_4 = CCl_4$
(B) $CCl_4 < CH_4 < CHCl_3$
(C) $CH_4 < CCl_4 < CHCl_3$
(D) $CH_4 = CCl_4 < CHCl_3$

Answer: (D) $CH_4 = CCl_4 < CHCl_3$ · Key from source paper

Q200 JEE Main 2020 · 7 Jan · Shift 1 MCQ

The relative strength of the interionic/ intermolecular forces in a decreasing order is:

(A) dipole-dipole > ion-dipole > ion-ion
(B) ion-dipole > ion-ion > dipole-dipole
(C) ion-dipole > dipole-dipole > ion-ion
(D) ion-ion > ion-dipole > dipole-dipole

Answer: (D) ion-ion > ion-dipole > dipole-dipole · Key from source paper

Q201 JEE Main 2020 · 7 Jan · Shift 2 MCQ

The bond order and the magnetic characteristic of CN^- are

(A) $2\frac{1}{2}$, diamagnetic
(B) 3, diamagnetic
(C) 3, paramagnetic
(D) $2\frac{1}{2}$, paramagnetic

Answer: (B) 3, diamagnetic · Key from source paper

Q202 JEE Main 2019 · 10 Apr · Shift 1 MCQ

During the change of O_2 to O_2^- , the incoming electron goes to the orbital:

(A) $\pi\ 2p_x$
(B) $\pi^*\ 2p_x$
(C) $\pi\ 2p_y$
(D) $\sigma^*\ 2p_z$

Answer: (B) $\pi^*\ 2p_x$ · Key from source paper

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Q203 JEE Main 2019 · 9 Apr · Shift 1 MCQ

Among the following, the molecule expected to be stabilized by anion formation is: C_2, O_2, NO, F_2

(A) F_2
(B) C_2
(C) O_2
(D) NO

Answer: (B) C_2 · Key from source paper

Q204 JEE Main 2019 · 9 Apr · Shift 2 MCQ

Among the following species, the diamagnetic molecule is:

(A) CO
(B) B_2
(C) O_2
(D) NO

Answer: (A) CO · Key from source paper

Q205 JEE Main 2019 · 9 Apr · Shift 2 MCQ

HF has highest boiling point among hydrogen halides, because it has:

(A) lowest dissociation enthalpy
(B) strongest van der Waals' interactions
(C) strongest hydrogen bonding
(D) lowest ionic character

Answer: (C) strongest hydrogen bonding · Key from source paper

Q206 JEE Main 2019 · 8 Apr · Shift 2 MCQ

Among the following molecules/ ions,
C_2^{2-}, N_2^{2-}, O_2^{2-}, O_2
Which one is diamagnetic and has the shortest bond length?

(A) N_2^{2-}
(B) O_2^{2-}
(C) O_2
(D) C_2^{2-}

Answer: (D) C_2^{2-} · Key from source paper

Q207 JEE Main 2019 · 8 Apr · Shift 2 MCQ

The ion that has sp^3d^2 hybridization for the central atom is:

(A) BrF_2^-
(B) ICl_4^-
(C) IF_6^-
(D) ICl_2^-

Answer: (B) ICl_4^- · Key from source paper

Q208 JEE Main 2019 · 8 Apr · Shift 2 MCQ

The correct statement about ICl_5 and ICl_4^- is:

(A) ICl_5 is trigonal bipyramidal and ICl_4^- is tetrahedral.
(B) Both are isostructural.
(C) ICl_5 is square pyramidal and ICl_4^- is tetrahedral.
(D) ICl_5 is square pyramidal and ICl_4^- is square planar.

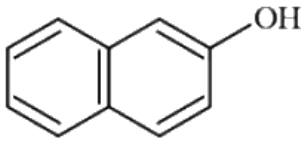
Answer: (D) ICl_5 **is square pyramidal and** ICl_4^- **is square planar.** · Key from source paper

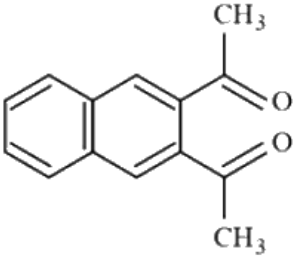
Q209 JEE Main 2019 · 12 Jan · Shift 1 MCQ

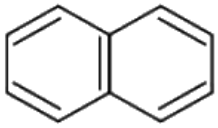
Among the following four aromatic compounds, which one will have the lowest melting point?

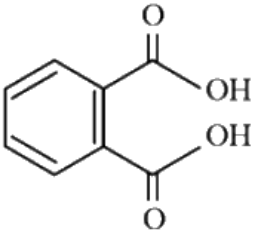
(see the figure above)

Q41. Among the following four aromatic compounds, which one will have the lowest melting point?

(1) 

(2) 

(3) 

(4) 

(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (C) · Key from source paper

Q210 JEE Main 2019 · 10 Jan · Shift 1 MCQ

The type of hybridization and no. of lone pair(s) of electron of Xe in $XeOF_4$, respectively, are:

(A) sp^3d^2 and 1
(B) sp^3d^2 and 2
(C) sp^3d and 2
(D) sp^3d and 1

Answer: (A) sp^3d^2 and 1 · Key from source paper

Q211 JEE Main 2019 · 10 Jan · Shift 1 MCQ

Two pi and half sigma bonds are present in:

(A) O_2^-
(B) N_2^+
(C) N_2
(D) O_2

Answer: (B) N_2^+ · Key from source paper

Q212 JEE Main 2019 · 9 Jan · Shift 1 MCQ

According to molecular orbital theory, which of the following is true with respect to Li_2^+ and Li_2^- ?

(A) Li_2^+ is stable and Li_2^- is unstable
(B) Both are unstable
(C) Both are stable
(D) Li_2^+ is unstable and Li_2^- is stable

Answer: (C) Both are stable · Key from source paper

Q213 JEE Main 2019 · 9 Jan · Shift 2 MCQ

In which of the following processes, the bond order has increased and paramagnetic character has changed to diamagnetic?

(A) $O_2 \rightarrow O_2^+$
(B) $NO \rightarrow NO^+$
(C) $O_2 \rightarrow O_2^-$
(D) $N_2 \rightarrow N_2^+$

Answer: (B) $NO \rightarrow NO^+$ · Key from source paper

Q214 JEE Main 2018 · 16 Apr · Online MCQ

Which of the following conversions involves change in both shape and hybridisation?

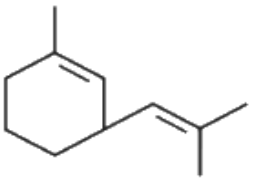
(A) $H_2O \rightarrow H_3O^+$
(B) $BF_3 \rightarrow BF_4^-$
(C) $CH_4 \rightarrow C_2H_6$
(D) $NH_3 \rightarrow NH_4^+$

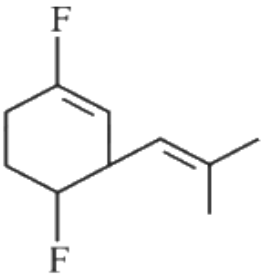
Answer: (B) $BF_3 \rightarrow BF_4^-$ · Key from source paper

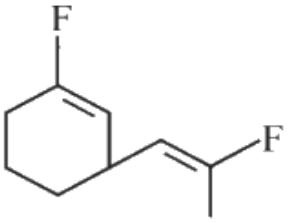
Q215 JEE Main 2018 · 16 Apr · Online MCQ

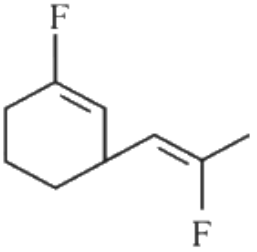
The most polar compound among the following is:
(see the figure above)

Q34. The most polar compound among the following is:

(1) 

(2) 

(3) 

(4) 

(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (C) · Key from source paper

Q216 JEE Main 2018 · 16 Apr · Online MCQ

The incorrect geometry is represented by:

(A) NF_3 - trigonal planar
(B) BF_3 - trigonal planar
(C) AsF_5 - trigonal bipyramidal
(D) H_2O - bent

Answer: (A) NF_3 **- trigonal planar** · Key from source paper

Q217 JEE Main 2018 · 15 Apr · Shift 1 MCQ

In the molecular orbital diagram for the molecular ion, N_2^+, the number of electrons in the σ_{2p} molecular orbital is :

(A) 0
(B) 2
(C) 3
(D) 1

Answer: (D) 1 · Key from source paper

Q218 JEE Main 2018 · 15 Apr · Shift 1 MCQ

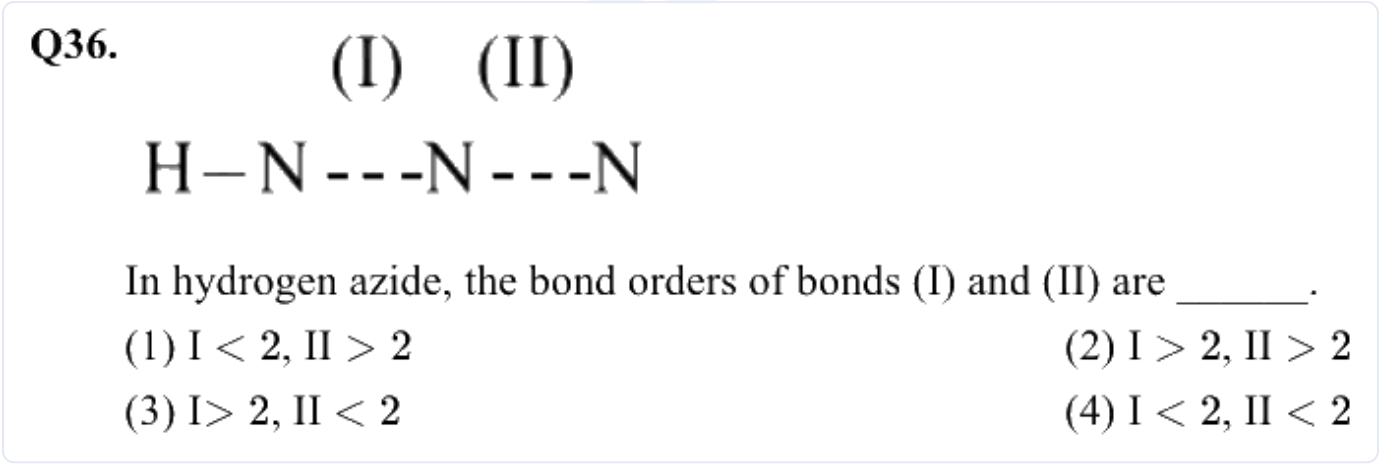
Identify the pair in which the geometry of the species is T-shape and square pyramidal, respectively

(A) ICl_2^- and ICl_5
(B) IO_3^- and $IO_2F_2^-$
(C) ClF_3 and IO_4^-
(D) $XeOF_2$ and $XeOF_4$

Answer: (D) $XeOF_2$ and $XeOF_4$ · Key from source paper

Q219 JEE Main 2018 · 15 Apr · Shift 1 MCQ

see figure



(A) $I < 2,\ II > 2$
(B) $I > 2,\ II > 2$
(C) $I > 2,\ II < 2$
(D) $I < 2,\ II < 2$

Answer: (A) $I < 2,\ II > 2$ · Key from source paper

Q220 JEE Main 2018 · 15 Apr · Shift 1 MCQ

In graphite and diamond, the percentage of p characters of the hybrid orbitals in hybridization are respectively:

(A) 33 and 25
(B) 67 and 75
(C) 50 and 75
(D) 33 and 75

Answer: (B) 67 and 75 · Key from source paper

Q221 JEE Main 2018 · 15 Apr · Shift 1 MCQ

The decreasing order of bond angles in BF_3, NH_3, PF_3 and I_3^- is :

(A) $I_3^- > BF_3 > NH_3 > PF_3$
(B) $BF_3 > I_3^- > PF_3 > NH_3$
(C) $BF_3 > NH_3 > PF_3 > I_3^-$
(D) $I_3^- > NH_3 > PF_3 > BF_3$

Answer: (A) $I_3^- > BF_3 > NH_3 > PF_3$ · Key from source paper

Q222 JEE Main 2018 · 15 Apr · Shift 2 MCQ

see figure

Q34.



Which of the following best describes the diagram of molecular orbital?

(1) A bonding π orbital
(2) A non-bonding orbital
(3) An antibonding σ orbital
(4) An antibonding π orbital

(A) A bonding π orbital
(B) A non-bonding orbital
(C) An antibonding σ orbital
(D) An antibonding π orbital

Answer: (D) An antibonding π orbital · Key from source paper

Q223 JEE Main 2018 · 8 Apr · Offline MCQ

According to molecular orbital theory, which of the following molecule will not be available?

(A) H_2^{2-}
(B) He_2^{2+}
(C) He_2^{+}
(D) H_2^{-}

Answer: (A) H_2^{2-} · Key from source paper

Q224 JEE Main 2018 · 8 Apr · Offline MCQ

Which of the following compounds contain(s) no covalent bond(s)?
$KCl,\ PH_3,\ O_2,\ B_2H_6,\ H_2SO_4$

(A) $KCl,\ B_2H_6$
(B) $KCl,\ B_2H_6,\ PH_3$
(C) $KCl,\ H_2SO_4$
(D) KCl

Answer: (D) KCl · Key from source paper

Q225 JEE Main 2018 · 8 Apr · Offline MCQ

Total number of lone pair of electrons in I_3^- ion is:

(A) 12
(B) 3
(C) 6
(D) 9

Answer: (D) 9 · Key from source paper

Q226 JEE Main 2017 · 9 Apr · Online MCQ

The group having triangular planar structure is:

(A) $BF_3,\ NF_3,\ CO_3^{2-}$
(B) $CO_3^{2-},\ NO_3^-,\ SO_3$
(C) $NH_3,\ SO_3,\ CO_3^{2-}$
(D) $NCl_3,\ BCl_3,\ SO_3$

Answer: (B) $CO_3^{2-},\ NO_3^-,\ SO_3$ · Key from source paper

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Q227 JEE Main 2017 · 9 Apr · Online MCQ

The increasing order of the boiling points for the following compounds is:
(I) C_2H_5OH (II) C_2H_5Cl (III) $C_2H_5CH_3$ (IV) $C_2H_5OCH_3$

(A) (IV) < (III) < (I) < (II)
(B) (III) < (II) < (I) < (IV)
(C) (III) < (IV) < (II) < (I)
(D) (II) < (III) < (IV) < (I)

Answer: (C) (III) < (IV) < (II) < (I) · Key from source paper

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Q228 JEE Main 2017 · 8 Apr · Online MCQ

Which of the following is paramagnetic?

(A) CO
(B) NO^{+}
(C) O_2^{2-}
(D) B_2

Answer: (D) B_2 · Key from source paper

Q229 JEE Main 2017 · 8 Apr · Online MCQ

sp^3d^2 hybridization is not displayed by

(A) SF_6
(B) BrF_5
(C) PF_5
(D) $[CrF_6]^{3-}$

Answer: (C) PF_5 · Key from source paper

Q230 JEE Main 2017 · 2 Apr · Offline MCQ

Which of the following species is not paramagnetic?

(A) CO
(B) O_2
(C) B_2
(D) NO

Answer: (A) CO · Key from source paper

Q231 JEE Main 2016 · 10 Apr · Online MCQ

The bond angle H-X-H is the greatest in the compound :

(A) PH_3
(B) CH_4
(C) NH_3
(D) H_2O

Answer: (B) CH_4 · Key from source paper

Q232 JEE Main 2016 · 9 Apr · Online MCQ

The group of molecules having identical shape is:

(A) PCl_5, IF_5, XeO_2F_2
(B) BF_3, PCl_3, XeO_3
(C) SF_4, XeF_4, CCl_4
(D) $ClF_3, XeOF_2, XeF_3^+$

Answer: (D) $ClF_3, XeOF_2, XeF_3^+$ · Key from source paper

Q233 JEE Main 2016 · 9 Apr · Online MCQ

Which intermolecular force is most responsible in allowing xenon gas to liquefy?

(A) London forces
(B) Ion-dipole
(C) Ionic
(D) Dipole-dipole

Answer: (A) London forces · Key from source paper

Q234 JEE Main 2016 · 3 Apr · Offline MCQ

The species in which the N atom is a state of sp hybridization is:

(A) NO_3^-
(B) NO_2
(C) NO_2^+
(D) NO_2^-

Answer: (C) NO_2^+ · Key from source paper

Q235 JEE Main 2015 · 11 Apr · Online MCQ

Molecule AB has a bond length of 1.617 Å and a dipole moment of 0.38 D. The fractional charge on each atom(absolute magnitude) is: ($e_0 = 4.802 \times 10^{-10}$ esu)

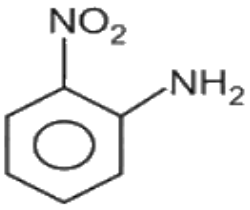
(A) 0.5
(B) 0.05
(C) 0
(D) 1.0

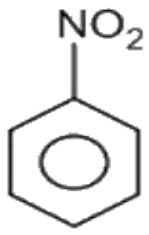
Answer: (B) 0.05 · Key from source paper

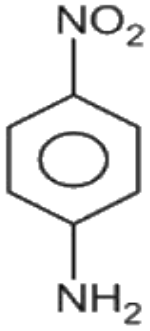
Q236 JEE Main 2015 · 11 Apr · Online MCQ

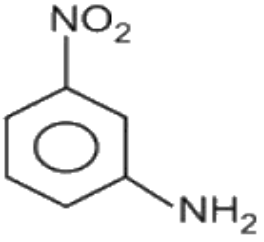
Which compounds exhibits maximum dipole moment among the following?

Q36. Which compounds exhibits maximum dipole moment among the following?

(1) 

(2) 

(3) 

(4) 

(A) *see figure*
(B) *see figure*
(C) *see figure*
(D) *see figure*

Answer: (C) · Key from source paper

Q237 JEE Main 2015 · 10 Apr · Online MCQ

After understanding the assertion and reason, choose the correct option.
Assertion: In the bonding molecular orbital (MO) of H_2, electron density is increased between the nuclei.
Reason: The bonding MO is $\psi_A + \psi_B$, which shows destructive interference of the combining electron waves.

(A) Assertion and Reason are correct, but Reason is not the correct explanation for the Assertion.
(B) Assertion and Reason are correct and Reason is the correct explanation for the Assertion.
(C) Assertion is incorrect, Reason is correct.
(D) Assertion is correct, Reason is incorrect.

Answer: (D) Assertion is correct, Reason is incorrect. · Key from source paper

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Q238 JEE Main 2015 · 4 Apr · Offline MCQ

The intermolecular interaction that is dependent on the inverse cube of distance between the molecules is:

(A) Hydrogen bond
(B) Ion-ion interaction
(C) Ion-dipole interaction
(D) London force

Answer: (A) Hydrogen bond · Key from source paper

Q239 JEE Main 2014 · 19 Apr · Online MCQ

Which one of the following molecules is paramagnetic?

(A) N_2
(B) O_3
(C) CO
(D) NO

Answer: (D) NO · Key from source paper

Q240 JEE Main 2014 · 19 Apr · Online MCQ

Amongst LiCl, RbCl, $BeCl_2$ and $MgCl_2$ the compounds with the greatest and the least ionic character, respectively are :

(A) $MgCl_2$ and $BeCl_2$
(B) RbCl and $MgCl_2$
(C) LiCl and RbCl
(D) RbCl and $BeCl_2$

Answer: (D) RbCl and $BeCl_2$ · Key from source paper

Q241 JEE Main 2014 · 12 Apr · Online MCQ

Which of the following molecules has two sigma (σ) and two pi (π) bonds?

(A) C_2H_4
(B) $N_2\ F_2$
(C) $C_2H_2Cl_2$
(D) HCN

Answer: (D) HCN · Key from source paper

Q242 JEE Main 2014 · 11 Apr · Online MCQ

The correct order of bond dissociation energy among N_2, O_2, O_2^- is shown in which of the following arrangements?

(A) $N_2 > O_2^- > O_2$
(B) $O_2^- > O_2 > N_2$
(C) $N_2 > O_2 > O_2^-$
(D) $O_2 > O_2^- > N_2$

Answer: (C) $N_2 > O_2 > O_2^-$ · Key from source paper

Q243 JEE Main 2014 · 11 Apr · Online MCQ

In allene (C_3H_4), the type(s) of hybridization of the carbon atoms is (are) :

(A) sp and sp^3
(B) sp^2 and sp
(C) only sp^2
(D) sp^2 and sp^3

Answer: (B) sp^2 and sp · Key from source paper

Q244 JEE Main 2014 · 9 Apr · Online MCQ

The number and type of bonds in C_2^{2-} ion in CaC_2 are:

(A) Two σ-bonds and two π-bonds
(B) One σ-bond and two π-bonds
(C) One σ-bond and one π-bond
(D) Two σ-bonds and one π-bond

Answer: (B) One σ-bond and two π-bonds · Key from source paper

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Q245 JEE Main 2014 · 9 Apr · Online MCQ

Which of the following has unpaired electron(s)?

(A) O_2^-
(B) N_2^{2+}
(C) O_2^{2-}
(D) N_2

Answer: (A) O_2^- · Key from source paper

Q246

JEE Main 2014 · 9 Apr · Online · MCQ

For the compounds CH_3Cl, CH_3Br, CH_3I and CH_3F, the correct order of increasing C-halogen bond length is :

(A) $CH_3F < CH_3Br < CH_3Cl < CH_3I$
(B) $CH_3F < CH_3I < CH_3Br < CH_3Cl$
(C) $CH_3F < CH_3Cl < CH_3Br < CH_3I$
(D) $CH_3Cl < CH_3Br < CH_3F < CH_3I$

Answer: (C) $CH_3F < CH_3Cl < CH_3Br < CH_3I$ · Key from source paper

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Q247

JEE Main 2014 · 6 Apr · Offline · MCQ

Which one of the following properties is **not** shown by NO ?

(A) It is diamagnetic in gaseous state
(B) It is a neutral oxide
(C) It combines with oxygen to form nitrogen dioxide
(D) It's bond order is 2.5

Answer: (A) It is diamagnetic in gaseous state · Key from source paper

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Q248

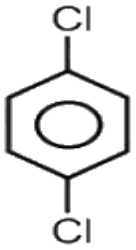
JEE Main 2014 · 6 Apr · Offline · MCQ

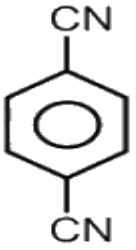
For which of the following molecule significant $\mu \neq 0$?

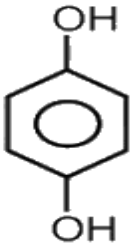
(see the figure above)

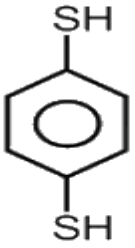
EdLoop JEE

Q34. For which of the following molecule significant $\mu \neq 0$?

(a) 

(b) 

(c) 

(d) 

(1) Only (a)
(2) (a) and (b)
(3) Only (c)
(4) (c) and (d)

(A) Only (a)
(B) (a) and (b)
(C) Only (c)
(D) (c) and (d)

Answer: (D) (c) and (d) · Key from source paper

Q249 JEE Main 2013 · 25 Apr · Online MCQ

In which of the following sets, all the given species are isostructural ?

(A) CO_2, NO_2, ClO_2, SiO_2
(B) $PCl_3, AlCl_3, BCl_3, SbCl_3$
(C) BF_3, NF_3, PF_3, AlF_3
(D) $BF_4^-, CCl_4, NH_4^+, PCl_4^+$

Answer: (D) $BF_4^-, CCl_4, NH_4^+, PCl_4^+$ · Key from source paper

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Q250 JEE Main 2013 · 25 Apr · Online MCQ

The internuclear distances in $O - O$ bonds for O_2^+, O_2, O_2^- and O_2^{2-} respectively are :

(A) 1.30 Å, 1.49 Å, 1.12 Å, 1.21 Å
(B) 1.49 Å, 1.21 Å, 1.12 Å, 1.30 Å
(C) 1.21 Å, 1.12 Å, 1.49 Å, 1.30 Å
(D) 1.12 Å, 1.21 Å, 1.30 Å, 1.49 Å

Answer: (D) 1.12 Å, 1.21 Å, 1.30 Å, 1.49 Å · Key from source paper

Q251 JEE Main 2013 · 23 Apr · Online MCQ

The shape of IF_6^- is :

(A) Trigonally distorted octahedron
(B) Pyramidal
(C) Octahedral
(D) Square antiprism

Answer: (A) Trigonally distorted octahedron · Key from source paper

Q252 JEE Main 2013 · 23 Apr · Online MCQ

Bond distance in HF is 9.17×10^{-11} m. Dipole moment of HF is 6.104×10^{-30} Cm. The percentage ionic character in HF will be : (electron charge = 1.60×10^{-19} C)

(A) 61.0%
(B) 38.0%
(C) 35.5%
(D) 41.5%

Answer: (D) 41.5% · Key from source paper

Q253 JEE Main 2013 · 22 Apr · Online MCQ

Bond order normally gives idea of stability of a molecular species. All the molecules viz. H_2, Li_2 and B_2 have the same bond order yet they are not equally stable. Their stability order is :

(A) $H_2 > B_2 > Li_2$
(B) $Li_2 > H_2 > B_2$
(C) $Li_2 > B_2 > H_2$
(D) None of these

Answer: (A) $H_2 > B_2 > Li_2$ · Checked by our team

Q254 JEE Main 2013 · 22 Apr · Online MCQ

Given Reaction Energy Change (in kJ):
$Li(s) \rightarrow Li(g)$: 161
$Li(g) \rightarrow Li^+(g)$: 520
$\frac{1}{2} F_2(g) \rightarrow F(g)$: 77
$F(g) + e^- \rightarrow F^-(g)$: (Electron gain enthalpy)
$Li^+(g) + F^-(g) \rightarrow LiF(s)$: -1047
$Li(s) + \frac{1}{2} F_2(g) \rightarrow LiF(s)$: -617
Based on data provided, the value of electron gain enthalpy of fluorine would be :

(A) $-300\ \text{kJ mol}^{-1}$
(B) $-350\ \text{kJ mol}^{-1}$
(C) $-328\ \text{kJ mol}^{-1}$
(D) $-228\ \text{kJ mol}^{-1}$

Answer: (C) $-328\ \text{kJ mol}^{-1}$ · Key from source paper

Q255 JEE Main 2013 · 9 Apr · Online MCQ

Which one of the following molecules is polar?

(A) XeF_4
(B) IF_5
(C) SbF_5
(D) CF_4

Answer: (B) IF_5 · Key from source paper

Q256 JEE Main 2013 · 9 Apr · Online MCQ

In which of the following ionization processes the bond energy has increased and also the magnetic behaviour has changed from paramagnetic to diamagnetic ?

(A) $NO \rightarrow NO^+$
(B) $N_2 \rightarrow N_2^+$
(C) $C_2 \rightarrow C_2^+$
(D) $O_2 \rightarrow O_2^+$

Answer: (A) $NO \rightarrow NO^+$ · Key from source paper

Q257 JEE Main 2013 · 7 Apr · Offline MCQ

Stability of the species Li_2, Li_2^- and Li_2^+ increases in the order of

(A) $Li_2 < Li_2^- < Li_2^+$
(B) $Li_2^- < Li_2 < Li_2^+$
(C) $Li_2 < Li_2^+ < Li_2^-$
(D) $Li_2^- < Li_2^+ < Li_2$

Answer: (D) $Li_2^- < Li_2^+ < Li_2$ · Key from source paper

Q258 JEE Main 2013 · 7 Apr · Offline MCQ

Which one of the following molecules is expected to exhibit paramagnetic behaviour?

(A) O_2
(B) O_2^{-2}
(C) C_2
(D) N_2

Answer: (A) O_2 · Key from source paper

Q259 JEE Main 2013 · 7 Apr · Offline MCQ

In which of the following pairs of molecules/ions, both the species are not likely to exist?

(A) H_2^{2+}, He_2
(B) H_2^{-}, He_2^{2+}
(C) H_2^{+}, He_2^{2-}
(D) H_2^{-}, He_2^{2-}

Answer: (A) H_2^{2+}, He_2 · Key from source paper

Q260 AIEEE 2012 · 26 May · Online MCQ

Among the following species which two have trigonal pyramidal shape? (I) NI_3 (II) I_3^- (III) SO_3^{2-} (IV) NO_3^-

(A) I and III
(B) III and IV
(C) I and IV
(D) II and III

Answer: (A) I and III · Key from source paper

Q261 AIEEE 2012 · 26 May · Online MCQ

Dipole moment is shown by

(A) 1,2-dichlorobenzene
(B) trans 2, 3-dichloro-2-butene
(C) 1,4-chlorobenzene
(D) trans-1,2-dinitroethene

Answer: (A) 1,2-dichlorobenzene · Key from source paper

Q262 AIEEE 2012 · 19 May · Online MCQ

Among the following, the molecule with the lowest dipole moment is

(A) $CHCl_3$
(B) CH_3Cl
(C) CH_2Cl_2
(D) CCl_4

Answer: (D) CCl_4 · Key from source paper

Q263 AIEEE 2012 · 19 May · Online MCQ

Which of the following has the square planar structure?

(A) XeF_4
(B) NH_4^+
(C) BF_4^-
(D) CCl_4

Answer: (A) XeF_4 · Key from source paper

Q264 AIEEE 2012 · 12 May · Online MCQ

The formation of molecular complex $BF_3 - NH_3$ results in a change in hybridization of boron

(A) from sp^2 to dsp^2
(B) from sp^2 to sp^3
(C) from sp^3 to sp^2
(D) from sp^3 to sp^3d

Answer: (B) from sp^2 to sp^3 · Key from source paper

Q265 AIEEE 2012 · 12 May · Online MCQ

Although CN^- ion and N_2 molecule are isoelectronic, yet N_2 molecule is chemically inert because of

(A) presence of more number of electrons in bonding orbitals
(B) lone (sic) bond energy
(C) absence of bond polarity
(D) uneven electron distribution.

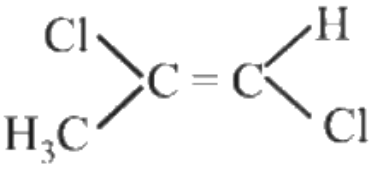
Answer: (C) absence of bond polarity · Key from source paper

Q266 AIEEE 2012 · 12 May · Online MCQ

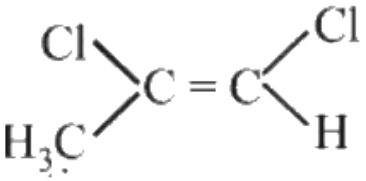
Among the following chloro-compound having the lowest dipole moment is

Q37. Among the following chloro-compound having the lowest dipole moment is

(1) CH_3Cl

(2) 

(3) CH_2Cl_2

(4) 

(A) CH_3Cl
(B) *see figure*
(C) CH_2Cl_2
(D) *see figure*

Answer: (B) · Checked by our team

Q267 AIEEE 2012 · 7 May · Online MCQ

Among the following, the species having the smallest bond is

(A) NO^-
(B) NO^+
(C) O_2
(D) NO

Answer: (B) NO^+ · Key from source paper

Q268 AIEEE 2012 · 7 May · Online MCQ

Based on lattice energy and other considerations, which one of the following alkali metal chloride is expected to have the highest melting point?

(A) NaCl
(B) KCl
(C) LiCl
(D) RbCl

Answer: (A) NaCl · Key from source paper

Q269 AIEEE 2012 · Offline MCQ

The molecule having smallest bond angle is :

(A) NCl_3
(B) $AsCl_3$
(C) $SbCl_3$
(D) PCl_3

Answer: (C) $SbCl_3$ · Key from source paper

Q270 AIEEE 2012 · Offline MCQ

In which of the following pairs the two species are not isostructural?

(A) CO_3^{2-} and NO_3^-
(B) PCl_4^+ and $SiCl_4$
(C) PF_5 and BrF_5
(D) AlF_6^{3-} and SF_6

Answer: (C) PF_5 and BrF_5 · Key from source paper

Q271 AIEEE 2012 · Offline MCQ

Ortho-Nitrophenol is less soluble in water than p− and m− Nitrophenols because :

(A) o−Nitrophenol is more volatile in steam than those of m− and p− isomers
(B) o−Nitrophenol shows Intramolecular H−bonding
(C) o− Nitrophenol shows Intermolecular H−bonding
(D) Melting point of o−Nitrophenol is lower than those of m− and p− isomers.

Answer: (B) o−Nitrophenol shows Intramolecular H−bonding · Key from source paper

Q272 AIEEE 2011 MCQ

Among the following the maximum covalent character is shown by the compound:

(A) $SnCl_2$
(B) $AlCl_3$
(C) $MgCl_2$
(D) $FeCl_2$

Answer: (B) $AlCl_3$ · Key from source paper

Q273 AIEEE 2011 MCQ

The hybridization of orbitals of N atom in NO_3^-, NO_2^+ and NH_4^+ are respectively :

(A) sp^2, sp, sp^3
(B) sp, sp^3, sp^2
(C) sp^2, sp^3, sp
(D) sp, sp^2, sp^3

Answer: (A) sp^2, sp, sp^3 · Key from source paper

Q274 AIEEE 2009 MCQ

Using MO theory predict which of the following species has the shortest bond length ?

(A) O_2^{2+}
(B) O_2^{+}
(C) O_2^{-}
(D) O_2^{2-}

Answer: (A) O_2^{2+} · Key from source paper

Q275 AIEEE 2009 MCQ

The bond dissociation energy of B $-$ F in BF_3 is 646 kJ mol^{-1} whereas that of C $-$ F in CF_4 is 515 kJ mol^{-1}. The correct reason for higher B-F bond dissociation energy as compared to that of C - F is :

(A) smaller size of B-atom as compared to that of C-atom
(B) stronger σ bond between B and F in BF_3 as compared to that between C and F in CF_4
(C) significant $p\pi - p\pi$ interaction between B and F in BF_3 whereas there is no possibility of such interaction between C and F in CF_4.
(D) lower degree of $p\pi - p\pi$ interaction between B and F in BF_3 than that between C and F in CF_4.

Answer: (C) significant $p\pi - p\pi$ interaction between B and F in BF_3 whereas there is no possibility of such interaction between C and F in CF_4. · Key from source paper

Q276 AIEEE 2008 MCQ

Which one of the following pairs of species have the same bond order?

(A) CN^- and NO^+
(B) CN^- and CN^+
(C) O_2^- and CN^-
(D) NO^+ and CN^+

Answer: (A) CN^- and NO^+ · Key from source paper

Q277 AIEEE 2007 MCQ

In which of the following ionization processes, the bond order has increased and the magnetic behaviour has changed?

(A) $C_2 \longrightarrow C_2^+$
(B) $NO \longrightarrow NO^+$
(C) $O_2 \longrightarrow O_2^+$
(D) $N_2 \longrightarrow N_2^+$

Answer: (B) $NO \longrightarrow NO^+$ · Key from source paper

Q278 AIEEE 2007 MCQ

Which of the following hydrogen bonds is the strongest?

(A) $O - H.....N$
(B) $F - H.....F$
(C) $O - H.....O$
(D) $O - H.....F$

Answer: (B) $F - H.....F$ · Key from source paper

Q279 AIEEE 2007 MCQ

Which of the following species exhibits the diamagnetic behaviour?

(A) O_2^{2-}
(B) O_2^+
(C) O_2
(D) NO

Answer: (A) O_2^{2-} · Key from source paper

Q280 AIEEE 2007 MCQ

The charge/size ratio of a cation determines its polarizing power. Which one of the following sequences represents the increasing order of the polarizinig order of the polarizing power of the cationic species, $K^+, Ca^{2+}, Mg^{2+}, Be^{2+}$?

(A) $Mg^{2+}, Be^{2+}, K^+, Ca^{2+}$
(B) $Be^{2+}, K^+, Ca^{2+}, Mg^{2+}$
(C) $K^+, Ca^{2+}, Mg^{2+}, Be^{2+}$
(D) $Ca^{2+}, Mg^{2+}, Be^{2+}, K^+$

Answer: (C) $K^+, Ca^{2+}, Mg^{2+}, Be^{2+}$ · Key from source paper

Q281 AIEEE 2006 MCQ

The decreasing values of bond angles from NH_3 $(106°)$ to SbH_3 $(101°)$ down group-15 of the periodic table is due to

(A) increasing bp-bp repulsion
(B) increasing p-orbital character in sp^3
(C) decreasing lp-bp repulsion
(D) decreasing electronegativity

Answer: (D) decreasing electronegativity · Key from source paper

Q282 AIEEE 2006 MCQ

Which of the following molecules/ions does not contain unpaired electrons?

(A) O_7^{2-} (sic)
(B) B_2
(C) N_2^+
(D) O_2

Answer: (A) O_7^{2-} (sic) · Key from source paper

Q283 AIEEE 2006 MCQ

Among the following mixtures, dipole-dipole as the major interaction, is present in

(A) benzene and ethanol
(B) acetonitrile and acetone
(C) KCl and water
(D) benzene and carbon tetrachloride

Answer: (B) acetonitrile and acetone · Key from source paper

Q284 AIEEE 2006 MCQ

A metal, M forms chlorides in its +2 and +4 oxidation states. Which of the following statements about these chlorides is correct?

(A) MCl_2 is more volatile than MCl_4
(B) MCl_2 is more soluble in anhydrous ethanol than MCl_4
(C) MCl_2 is more ionic than MCl_4
(D) MCl_2 is more easily hydrolysed than MCl_4

Answer: (C) MCl_2 is more ionic than MCl_4 · Key from source paper

Q285 AIEEE 2006 MCQ

In which of the following molecules/ions are all the bonds not equal?

(A) SF_4
(B) SiF_4
(C) XeF_4
(D) BF_4^-

Answer: (A) SF_4 · Key from source paper

Q286 AIEEE 2005 MCQ

Which one of the following species is diamagnetic in nature?

(A) He_2^+
(B) H_2
(C) H_2^+
(D) H_2^-

Answer: (B) H_2 · Key from source paper

Q287 AIEEE 2005 MCQ

Lattice energy of an ionic compounds depends upon

(A) Charge on the ion only
(B) Size of the ion only
(C) Packing of ions only
(D) Charge on the ion and size of the ion

Answer: (D) Charge on the ion and size of the ion · Key from source paper

Q288 AIEEE 2005 MCQ

The molecular shapes of SF_4, CF_4 and XeF_4 are

(A) the same with 2,0 and 1 lone pairs of electrons on the central atom, respectively
(B) the same with 1, 1 and 1 lone pair of electrons on the central atoms, respectively
(C) different with 0, 1 and 2 lone pair of electrons on the central atoms, respectively
(D) different with 1, 0 and 2 lone pairs of electron on the central atoms respectively

Answer: (D) different with 1, 0 and 2 lone pairs of electron on the central atoms respectively · Key from source paper

Q289 AIEEE 2005 MCQ

Based on lattice energy and other considerations which one of the following alkali metal chlorides is expected to have the highest melting point.

(A) $LiCl$
(B) $NaCl$
(C) KCl
(D) $RbCl$

Answer: (B) $NaCl$ · Key from source paper

Q290 AIEEE 2005 MCQ

The number and type of bonds between two carbon atoms in calcium carbide are

(A) One sigma, one pi
(B) One sigma, two pi
(C) Two sigma, one pi
(D) Two sigma, two pi

Answer: (B) One sigma, two pi · Key from source paper

Q291 AIEEE 2004 MCQ

The correct order of bond angles (smallest first) in H_2S, NH_3, BF_3 and SiH_4 is

(A) $H_2S < SiH_4 < NH_3 < BF_3$
(B) $H_2S < NH_3 < BF_3 < SiH_4$
(C) $H_2S < NH_3 < SiH_4 < BF_3$
(D) $NH_3 < H_2S < SiH_4 < BF_3$

Answer: (C) $H_2S < NH_3 < SiH_4 < BF_3$ · Key from source paper

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Q292 AIEEE 2004 MCQ

The bond order in NO is 2.5 while that in NO^+ is 3 . Which of the following statements is true for these two species?

(A) Bond length in NO^+ is greater than in NO
(B) Bond length is unpredictable
(C) Bond length in NO^+ in equal to that in NO
(D) Bond length in NO is greater than in NO^+

Answer: (D) Bond length in NO is greater than in NO^+ · Key from source paper

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Q293 AIEEE 2004 MCQ

The states of hybridization of boron and oxygen atoms in boric acid (H_3BO_3) are respectively

(A) sp^2 and sp^2
(B) sp^3 and sp^3
(C) sp^3 and sp^2
(D) sp^2 and sp^3

Answer: (D) sp^2 and sp^3 · Key from source paper

Q294 AIEEE 2004 MCQ

Which one of the following has the regular tetrahedral structure?

(A) XeF_4
(B) $[Ni(CN)_4]^{2-}$
(C) ${BF_4}^{-4}$
(D) SF_4

Answer: (C) ${BF_4}^{-4}$ · Key from source paper

Q295 AIEEE 2004 MCQ

The maximum number of 90° angles between bond pair of electrons is observed in

(A) dsp^3 hybridization
(B) $sp^3\,d^2$ hybridization
(C) dsp^2 hybridization
(D) $sp^3\,d$ hybridization

Answer: (B) $sp^3\,d^2$ **hybridization** · Key from source paper

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Q296 AIEEE 2004 MCQ

Which one the following does not have sp^2 hybridized carbon?

(A) Acetone
(B) Acetamide
(C) Acetonitrile
(D) Acetic acid

Answer: (C) Acetonitrile · Key from source paper

Q297 AIEEE 2003 MCQ

Which one of the following pairs of molecules will have permanent dipole moments for both members?

(A) NO_2 and CO_2
(B) NO_2 and O_3
(C) SiF_4 and CO_2
(D) SiF_4 and NO_2

Answer: (B) NO_2 and O_3 · Key from source paper

Q298 AIEEE 2003 MCQ

Which one of the following compounds has the smallest bond angle in its molecule?

(A) OH_2
(B) SH_2
(C) NH_3
(D) SO_2

Answer: (B) SH_2 · Key from source paper

Q299 AIEEE 2003 MCQ

The pair of species having identical shapes for molecules of both species is

(A) XeF_2, CO_2
(B) BF_3, PCl_3
(C) PF_5, IF_5
(D) CF_4, SF_4

Answer: (A) XeF_2, CO_2 · Key from source paper

Q300 AIEEE 2003 MCQ

In the anion $HCOO^-$ the two carbon-oxygen bonds are found to be of equal length. What is the reason for it?

(A) The $C=O$ bond is weaker than the $C-O$ bond
(B) The anion $HCOO^-$ has two resonating structures
(C) The anion is obtained by removal of a proton from the acid molecule
(D) Electronic orbitals of carbon atom are hybridised

Answer: (B) The anion $HCOO^-$ has two resonating structures · Key from source paper

Q301 AIEEE 2002 MCQ

In which of the folloiwng species the interatomic bond angle is $109^\circ 28'$?

(A) $NH_3, (BF_4)^{-1}$
(B) $(NH_4)^+, BF_3$
(C) NH_3, BF_4
(D) $(NH_2)^{-1}, BF_3$

Answer: (A) $NH_3, (BF_4)^{-1}$ · Key from source paper

Q302 AIEEE 2002 MCQ

Which of the following are arranged in an increasing order of their bond strengths ?

(A) $O_2^- < O_2 < O_2^+ < O_2^{2-}$
(B) $O_2^{2-} < O_2^- < O_2 < O_2^+$
(C) $O_2^- < O_2^{2-} < O_2 < O_2^+$
(D) $O_2^+ < O_2 < O_2^- < O_2^{2-}$

Answer: (B) $O_2^{2-} < O_2^- < O_2 < O_2^+$ · Key from source paper

Q303 AIEEE 2002 MCQ

Which of the following statements is true ?

(A) HF is less polar than HBr
(B) absolutely pure water does not contain any ions
(C) chemical bond formation take place when forces of attraction overcome the forces of repulsion
(D) in covalency transference of electron takes place

Answer: (C) chemical bond formation take place when forces of attraction overcome the forces of repulsion · Key from source paper

Q304 AIEEE 2002 MCQ

In which of the following species is the underlined carbon having sp^3 hybridisation?

(A) $CH_3\underline{C}OOH$
(B) $CH_3\underline{C}H_2OH$
(C) $CH_3\underline{C}OCH_3$
(D) $CH_2 = \underline{C}H - CH_3$

Answer: (B) $CH_3\underline{C}H_2OH$ · Key from source paper