

CHEMISTRY · JEE MAIN

p-Block Elements — Part I (Group 13 & 14)

Chapter-wise previous year questions, with answer key

41

PYQS

2020–2025

PAPERS

2

TOPICS

Group 14: Carbon Family

Group 13: Boron Family

- 1 Attempt each question on paper first — they're grouped by topic, newest papers first.
- 2 Check yourself against the answer key at the end.
- 3 Got one wrong? Tap “Step-by-step solution” under it for the full working.

Stuck on a question?

Every question has a free step-by-step solution on PrepWiser — tap “Step-by-step solution” under it.

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Group 14: Carbon Family · 12 PYQs

Q1 JEE Main 2025 · 7 Apr · Shift 1

The group 14 elements A and B have the first ionisation enthalpy values of 708 and 715 kJ mol^{-1} respectively. The above values are lowest among their group members. The nature of their ions A^{2+} and B^{4+} respectively is

- (A) both reducing (B) oxidising and reducing
(C) both oxidising (D) reducing and oxidising

Step-by-step solution ► [prepwiser.in/questions/pArp6DAxXp](https://www.prepwiser.in/questions/pArp6DAxXp)

Q2 JEE Main 2025 · 23 Jan · Shift 2

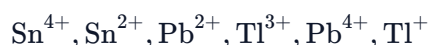
Given below are the atomic numbers of some group 14 elements. The atomic number of the element with lowest melting point is :

- (A) 14 (B) 50
(C) 6 (D) 82

Step-by-step solution ► [prepwiser.in/questions/62L3APnmRj](https://www.prepwiser.in/questions/62L3APnmRj)

Q3 JEE Main 2024 · 6 Apr · Shift 2

The number of ions from the following that are expected to behave as oxidising agent is :



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

Step-by-step solution ► [prepwiser.in/questions/ToV6iFiKMO](https://www.prepwiser.in/questions/ToV6iFiKMO)

Q4 JEE Main 2024 · 6 Apr · Shift 2

Evaluate the following statements related to group 14 elements for their correctness.

- (A) Covalent radius decreases down the group from C to Pb in a regular manner.
(B) Electronegativity decreases from C to Pb down the group gradually.
(C) Maximum covalance of C is 4 whereas other elements can expand their covalance due to presence of d orbitals.
(D) Heavier elements do not form $p\pi - p\pi$ bonds.
(E) Carbon can exhibit negative oxidation states.

Choose the correct answer from the options given below :

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

Step-by-step solution ► [prepwiser.in/questions/_6MxD7VwJS](https://www.prepwiser.in/questions/_6MxD7VwJS)

Q5 JEE Main 2024 · 1 Feb · Shift 2

Given below are two statements :

Statement (I) : SiO_2 and GeO_2 are acidic while SnO and PbO are amphoteric in nature.

Statement (II) : Allotropic forms of carbon are due to property of catenation and $p\pi - d\pi$ bond formation.

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

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

Step-by-step solution ► [prepwiser.in/questions/2jM9pYDUUnr](https://www.prepwiser.in/questions/2jM9pYDUUnr)

Q6 JEE Main 2024 · 31 Jan · Shift 1

Consider the oxides of group 14 elements SiO_2 , GeO_2 , SnO_2 , PbO_2 , CO and GeO . The amphoteric oxides are

- | | |
|-------------------------------------|-------------------------------------|
| (A) SnO_2 , CO | (B) SiO_2 , GeO_2 |
| (C) SnO_2 , PbO_2 | (D) GeO , GeO_2 |

Step-by-step solution ► [prepwiser.in/questions/t-HyNuWssQ](https://www.prepwiser.in/questions/t-HyNuWssQ)

Q7 JEE Main 2023 · 15 Apr · Shift 1

For a good quality cement, the ratio of silica to alumina is found to be :

- | | |
|---------|---------|
| (A) 1.5 | (B) 2 |
| (C) 3 | (D) 4.5 |

Step-by-step solution ► [prepwiser.in/questions/4tcv1pgJ2i](https://www.prepwiser.in/questions/4tcv1pgJ2i)

Q8 JEE Main 2023 · 8 Apr · Shift 2

For a good quality cement, the ratio of lime to the total of the oxides of Si, Al and Fe should be as close as to :

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

Step-by-step solution ► [prepwiser.in/questions/OasbKboThF](https://www.prepwiser.in/questions/OasbKboThF)

Q9 JEE Main 2023 · 25 Jan · Shift 2

Given below are two statements, one is labelled as Assertion A and the other is labelled as Reason R
Assertion A : Carbon forms two important oxides - CO and CO₂. CO is neutral whereas CO₂ is acidic in nature

Reason R : CO₂ can combine with water in a limited way to form carbonic acid, while CO is sparingly soluble in water

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

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

[Step-by-step solution ► prepwiser.in/questions/w7-jFhCWjd](https://www.prepwiser.in/questions/w7-jFhCWjd)

Q10 JEE Main 2021 · 25 Jul · Shift 1

Which one of the following compounds of Group-14 elements is not known?

- (A) [GeCl₆]²⁻
- (B) [Sn(OH)₆]²⁻
- (C) [SiCl₆]²⁻
- (D) [SiF₆]²⁻

[Step-by-step solution ► prepwiser.in/questions/ql-aTkiin](https://www.prepwiser.in/questions/ql-aTkiin)

Q11 JEE Main 2021 · 16 Mar · Shift 2

The INCORRECT statement regarding the structure of C₆₀ is :

- (A) The five-membered rings are fused only to six-membered rings.
- (B) It contains 12 six-membered rings and 24 five-membered rings.
- (C) Each carbon atom forms three sigma bonds.
- (D) The six-membered rings are fused to both six and five-membered rings.

[Step-by-step solution ► prepwiser.in/questions/I1WmWp-Sfp](https://www.prepwiser.in/questions/I1WmWp-Sfp)

Q12 JEE Main 2021 · 26 Feb · Shift 1

Compound A used as a strong oxidizing agent is amphoteric in nature. It is the part of lead storage batteries. Compound A is :

- (A) PbO
- (B) PbO₂
- (C) PbSO₄
- (D) Pb₃O₄

[Step-by-step solution ► prepwiser.in/questions/1Lh1oXIPFb](https://www.prepwiser.in/questions/1Lh1oXIPFb)

Group 13: Boron Family · 29 PYQs

Q13 JEE Main 2025 · 7 Apr · Shift 2

The correct statements from the following are :

- (A) Tl^{3+} is a powerful oxidising agent
- (B) Al^{3+} does not get reduced easily
- (C) Both Al^{3+} and Tl^{3+} are very stable in solution
- (D) Tl^{1+} is more stable than Tl^{3+}
- (E) Al^{3+} and Tl^{1+} are highly stable

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

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

[Step-by-step solution ► prepwiser.in/questions/6Gar_cf9fF](https://www.prepwiser.in/questions/6Gar_cf9fF)

Q14 JEE Main 2025 · 4 Apr · Shift 1

Given below are the pairs of group 13 elements showing their relation in terms of atomic radius. ($B < Al$), ($Al < Ga$), ($Ga < In$) and ($In < Tl$) Identify the elements present in the incorrect pair and in that pair find out the element (X) that has higher ionic radius (M^{3+}) than the other one. The atomic number of the element (X) is

- | | |
|--------|--------|
| (A) 49 | (B) 81 |
| (C) 31 | (D) 13 |

[Step-by-step solution ► prepwiser.in/questions/bAA-xYMEjC](https://www.prepwiser.in/questions/bAA-xYMEjC)

Q15 JEE Main 2025 · 4 Apr · Shift 2

The elements of Group 13 with highest and lowest first ionisation enthalpies are respectively :

- | | |
|------------|------------|
| (A) B & Tl | (B) Tl & B |
| (C) B & In | (D) B & Ga |

[Step-by-step solution ► prepwiser.in/questions/cZQnemTRo7](https://www.prepwiser.in/questions/cZQnemTRo7)

Q16 JEE Main 2025 · 28 Jan · Shift 1

Consider the following elements In, Tl, Al, Pb, Sn and Ge . The most stable oxidation states of elements with highest and lowest first ionisation enthalpies, respectively, are

- | | |
|---------------|---------------|
| (A) +4 and +1 | (B) +4 and +3 |
| (C) +1 and +4 | (D) +2 and +3 |

[Step-by-step solution ► prepwiser.in/questions/MXs5rs8h51](https://www.prepwiser.in/questions/MXs5rs8h51)

Q17 JEE Main 2024 · 8 Apr · Shift 1

Give below are two statements: One is labelled as Assertion A and the other is labelled as Reason R:

Assertion A: The stability order of +1 oxidation state of Ga, In and Tl is $\text{Ga} < \text{In} < \text{Tl}$.

Reason R: The inert pair effect stabilizes the lower oxidation state down the group.

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

[Step-by-step solution ► prepwiser.in/questions/71lfe9fMGs](https://www.prepwiser.in/questions/71lfe9fMGs)

Q18 JEE Main 2024 · 6 Apr · Shift 1

Given below are two statements :

Statement I : Gallium is used in the manufacturing of thermometers.

Statement II : A thermometer containing gallium is useful for measuring the freezing point (256K) of brine solution.

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

[Step-by-step solution ► prepwiser.in/questions/28K1Scui8w](https://www.prepwiser.in/questions/28K1Scui8w)

Q19 JEE Main 2024 · 5 Apr · Shift 1

Given below are two statements:

Statement I: In group 13, the stability of +1 oxidation state increases down the group.

Statement II : The atomic size of gallium is greater than that of aluminium.

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

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

[Step-by-step solution ► prepwiser.in/questions/T_U5gVF6S4](https://www.prepwiser.in/questions/T_U5gVF6S4)

Q20 JEE Main 2024 · 5 Apr · Shift 1

The number of neutrons present in the more abundant isotope of boron is ' x '. Amorphous boron upon heating with air forms a product, in which the oxidation state of boron is ' y '. The value of $x + y$ is

_____ .

- (A) 9
- (B) 6
- (C) 4
- (D) 3

[Step-by-step solution ► prepwiser.in/questions/4Q8rrsk6jX](https://www.prepwiser.in/questions/4Q8rrsk6jX)

Q21 JEE Main 2024 · 5 Apr · Shift 2

The correct statements from the following are :

- (A) The decreasing order of atomic radii of group 13 elements is $Tl > In > Ga > Al > B$.
- (B) Down the group 13 electronegativity decreases from top to bottom.
- (C) Al dissolves in dil. HCl and liberates H_2 but conc. HNO_3 renders Al passive by forming a protective oxide layer on the surface.
- (D) All elements of group 13 exhibits highly stable +1 oxidation state.
- (E) Hybridisation of Al in $[Al(H_2O)_6]^{3+}$ ion is sp^3d^2 .

Choose the correct answer from the options given below :

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

[Step-by-step solution ► prepwisser.in/questions/x-Lg6Yc2G9](https://www.prepwisser.in/questions/x-Lg6Yc2G9)

Q22 JEE Main 2024 · 1 Feb · Shift 1

Among the following oxides of p-block elements, number of oxides having amphoteric nature is _____.

Cl_2O_7 , CO, PbO_2 , N_2O , NO, Al_2O_3 , SiO_2 , N_2O_5 , SnO_2

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/STRiF81mwt](https://www.prepwisser.in/questions/STRiF81mwt)

Q23 JEE Main 2024 · 31 Jan · Shift 2

Given below are two statements:

Statement I : Group 13 trivalent halides get easily hydrolyzed by water due to their covalent nature.

Statement II : $AlCl_3$ upon hydrolysis in acidified aqueous solution forms octahedral $[Al(H_2O)_6]^{3+}$ ion.

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

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

[Step-by-step solution ► prepwisser.in/questions/sD22UhCVNw](https://www.prepwisser.in/questions/sD22UhCVNw)

Q24 JEE Main 2024 · 27 Jan · Shift 1

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

Assertion (A) : Melting point of Boron (2453 K) is unusually high in group 13 elements.

Reason (R) : Solid Boron has very strong crystalline lattice.

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

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

[Step-by-step solution ► prepwisser.in/questions/Zt-SpSWBiv](https://www.prepwisser.in/questions/Zt-SpSWBiv)

Q25 JEE Main 2023 · 13 Apr · Shift 1

The incorrect statement from the following for borazine is :

- (A) It can react with water. (B) It is a cyclic compound.
(C) It has electronic delocalization. (D) It contains banana bonds.

[Step-by-step solution ► prepwisser.in/questions/gWexcTNGu_](https://www.prepwisser.in/questions/gWexcTNGu_)

Q26 JEE Main 2023 · 13 Apr · Shift 2

If the formula of Borax is $\text{Na}_2\text{B}_4\text{O}_x(\text{OH})_y \cdot z\text{H}_2\text{O}$, then $x + y + z =$ _____

Numerical answer — enter the value.

[Step-by-step solution ► prepwisser.in/questions/ipxCjFp45t](https://www.prepwisser.in/questions/ipxCjFp45t)

Q27 JEE Main 2023 · 12 Apr · Shift 1

Given below are two statements :

Statement I : Boron is extremely hard indicating its high lattice energy.

Statement II : Boron has highest melting and boiling point compared to its other group members.

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

[Step-by-step solution ► prepwisser.in/questions/eBuk_3VC0b](https://www.prepwisser.in/questions/eBuk_3VC0b)

Q28 JEE Main 2023 · 6 Apr · Shift 2

Group-13 elements react with O_2 in amorphous form to form oxides of type M_2O_3 (M = element). Which among the following is the most basic oxide?

- (A) Al_2O_3 (B) Ti_2O_3
(C) B_2O_3 (D) Ga_2O_3

[Step-by-step solution ► prepwisser.in/questions/YTacwpZpiS](https://www.prepwisser.in/questions/YTacwpZpiS)

Q29 JEE Main 2023 · 6 Apr · Shift 2

Which one of the following elements will remain as liquid inside pure boiling water?

- (A) Li (B) Br
(C) Cs (D) Ga

[Step-by-step solution ► prepwisser.in/questions/4sl9NvlsBQ](https://www.prepwisser.in/questions/4sl9NvlsBQ)

Q30 JEE Main 2023 · 31 Jan · Shift 2

Given below are two statements :

Statement I: Upon heating a borax bead dipped in cupric sulphate in a luminous flame, the colour of the bead becomes green

Statement II: The green colour observed is due to the formation of copper(I) metaborate

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

[Step-by-step solution ► prepwiser.in/questions/3L1TNzDKcx](https://www.prepwiser.in/questions/3L1TNzDKcx)

Q31 JEE Main 2022 · 27 Jul · Shift 2

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

Assertion (A) : Boron is unable to form BF_6^{3-} .

Reason (R) : Size of B is very small.

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

[Step-by-step solution ► prepwiser.in/questions/hRDj6w-nVy](https://www.prepwiser.in/questions/hRDj6w-nVy)

Q32 JEE Main 2022 · 26 Jul · Shift 1

Borazine, also known as inorganic benzene, can be prepared by the reaction of 3-equivalents of "X" with 6-equivalents of "Y". "X" and "Y", respectively are :

- (A) $\text{B}(\text{OH})_3$ and NH_3
- (B) B_2H_6 and NH_3
- (C) B_2H_6 and HN_3
- (D) NH_3 and B_2O_3

[Step-by-step solution ► prepwiser.in/questions/QEILTc6Jc](https://www.prepwiser.in/questions/QEILTc6Jc)

Q33 JEE Main 2022 · 26 Jul · Shift 2

The metal that has very low melting point and its periodic position is closer to a metalloid is :

- (A) Al
- (B) Ga
- (C) Se
- (D) In

[Step-by-step solution ► prepwiser.in/questions/ZVZpddQb4v](https://www.prepwiser.in/questions/ZVZpddQb4v)

Q34 JEE Main 2022 · 26 Jul · Shift 2

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

Assertion : Boric acid is a weak acid.

Reason R : Boric acid is not able to release H^+ ion on its own. It receives OH^- ion from water and releases H^+ ion.

In the light of the above statements, choose the most appropriate 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 correct but R is not correct.
- (D) A is not correct but R is correct.

[Step-by-step solution ► prepwiser.in/questions/ZPwc7HKvVW](https://www.prepwiser.in/questions/ZPwc7HKvVW)

Q35 JEE Main 2022 · 29 Jun · Shift 2

Aqueous solution of which of the following boron compounds will be strongly basic in nature?

- (A) $NaBH_4$
- (B) $LiBH_4$
- (C) B_2H_6
- (D) $Na_2B_4O_7$

[Step-by-step solution ► prepwiser.in/questions/IGJYqpnMIn](https://www.prepwiser.in/questions/IGJYqpnMIn)

Q36 JEE Main 2022 · 26 Jun · Shift 1

Choose the correct stability order of group 13 elements in their + 1 oxidation state :

- (A) $Al < Ga < In < Tl$
- (B) $Tl < In < Ga < Al$
- (C) $Al < Ga < Tl < In$
- (D) $Al < Tl < Ga < In$

[Step-by-step solution ► prepwiser.in/questions/I2eg8T4Vg](https://www.prepwiser.in/questions/I2eg8T4Vg)

Q37 JEE Main 2021 · 27 Aug · Shift 1

In which one of the following molecules strongest back donation of an electron pair from halide to boron is expected?

- (A) BCl_3
- (B) BF_3
- (C) BBr_3
- (D) BI_3

[Step-by-step solution ► prepwiser.in/questions/IDhW2J7SiY](https://www.prepwiser.in/questions/IDhW2J7SiY)

Q38 JEE Main 2021 · 22 Jul · Shift 2

Given below are the statements about diborane

- (a) Diborane is prepared by the oxidation of NaBH_4 with I_2
- (b) Each boron atom is in sp^2 hybridized state
- (c) Diborane has one bridged 3 centre-2-electron bond
- (d) Diborane is a planar molecule

The option with correct statements is :

- (A) (c) and (d) only
- (B) (a) only
- (C) (c) only
- (D) (a) and (b) only

[Step-by-step solution ► prepwisser.in/questions/9Hx-Npvf0Z](https://www.prepwisser.in/questions/9Hx-Npvf0Z)

Q39 JEE Main 2021 · 26 Feb · Shift 2

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

Assertion A : In TlI_3 , isomorphous to CsI_3 , the metal is present in +1 oxidation state.

Reason R : Tl metal has fourteen f electrons in its electronic configuration.

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

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

[Step-by-step solution ► prepwisser.in/questions/oLU8-Y3gog](https://www.prepwisser.in/questions/oLU8-Y3gog)

Q40 JEE Main 2021 · 25 Feb · Shift 1

The correct statement about B_2H_6 is :

- (A) Its fragment, BH_3 , behaves as a Lewis base.
- (B) All B—H—B angles are of 120° .
- (C) The two B—H—B bonds are not of same length.
- (D) Terminal B—H bonds have less p-character when compared to bridging bonds.

[Step-by-step solution ► prepwisser.in/questions/uqK-zDpEgf](https://www.prepwisser.in/questions/uqK-zDpEgf)

The reaction of $\text{H}_3\text{N}_3\text{B}_3\text{Cl}_3$ (A) with LiBH_4 in tetrahydrofuran gives inorganic benzene (B). Further, the reaction of (A) with (C) leads to $\text{H}_3\text{N}_3\text{B}_3(\text{Me})_3$. Compounds (B) and (C) respectively, are :

(A) Borazine and MeBr

(B) Diborane and MeMgBr

(C) Boron nitride and MeBr

(D) Borazine and MeMgBr

Step-by-step solution ► [prepwisar.in/questions/Dvi2Gryk73](https://www.prepwisar.in/questions/Dvi2Gryk73)

Answer key — p-Block Elements — Part I (Group 13 & 14)

Numbers match the question numbers above. For full working, open the solution link under each question.

1	D	2	B	3	C	4	C	5	D	6	C	7	C	8	B
9	C	10	C	11	B	12	B	13	A	14	C	15	C	16	B
17	D	18	B	19	B	20	A	21	B	22	3	23	B	24	B
25	D	26	17	27	D	28	B	29	D	30	A	31	B	32	B
33	B	34	A	35	D	36	A	37	B	38	B	39	C	40	D
41	D														

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