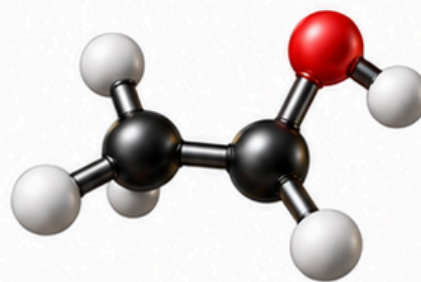


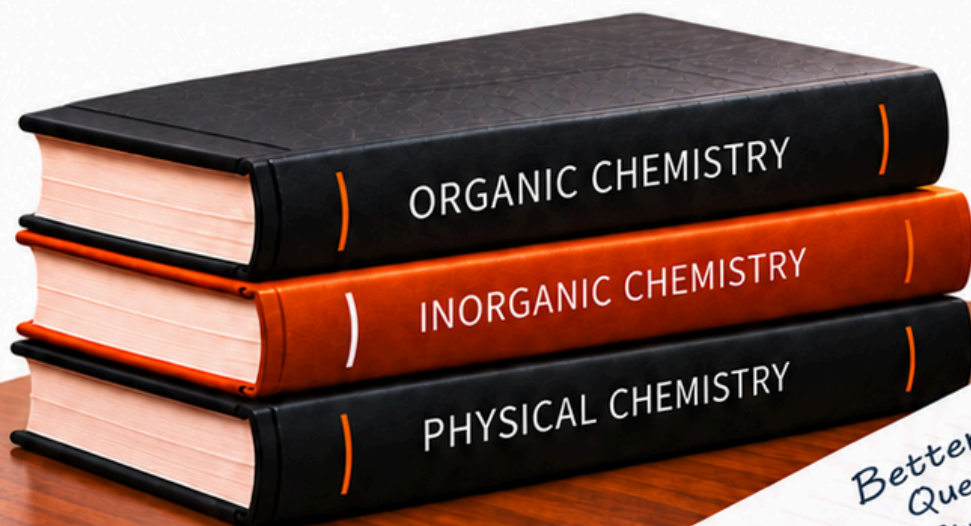
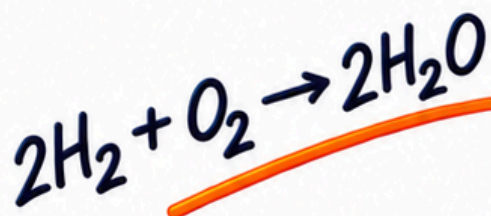
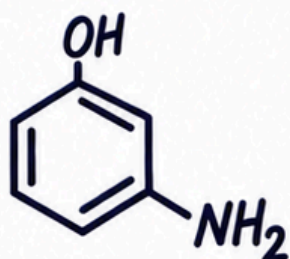


REACTIONS
CONCEPTS
QUESTIONS
HIGHER GOALS



JEE Main Chemistry

Bohr model of a hydrogen atom PYQ



PRACTICE
TODAY
A BRIGHTER
TOMORROW

Better
Questions
Stronger
Concepts
Brighter Future

Subject: Chemistry

Years: 2026-2002

Total Questions: 39

About this PYQ collection

What is inside

A complete topic-wise set of **39 previous year questions** on **Bohr model of a hydrogen atom** from **JEE Main (2026-2014)** and its predecessor **AIEEE (2012-2002)**, across **16 exam years**. **29 questions** are from 2019 onwards, so most of the set reflects the recent NTA pattern.

Questions are arranged to reduce unused page space, with newest-first priority and continuous numbering from 1. Each carries an exam date and shift tag to trace the original paper.

Topic-wise questions

TOPIC	QS	%
Bohr model of a hydrogen atom	39	100%

Question types

TYPE	QS	%
Single-correct MCQ	32	82%
Numerical value	7	18%

Numerical-value questions have no options; all 7 are from 2021 onwards.

How these questions help you

- **Know where the marks are:** bohr model of a hydrogen atom make up **39 of 39 questions (about 100%)**.
- **Build speed and accuracy:** practice the concepts and question styles used in previous papers.
- **Learn the patterns:** the same question styles return year after year.
- **Strengthen other chapters:** these concepts support further study in Chemistry.

Questions – Bohr model of a hydrogen atom

1. The Bohr radius of a hydrogen like species is 70.53 pm . The species and the stationary state (n) are respectively
(Given : Hydrogen atom Bohr radius is 52.9 pm) (6 Apr 2026 | Shift 2)
- (A) Li^{2+} , 3 (B) He^+ , 3
(C) He^+ , 2 (D) Li^{2+} , 2
-
2. The species having identical radii according to the Bohr's theory are :
A. H (first orbit)
B. He^+ (first orbit)
C. He^+ (Second orbit)
D. Li^{2+} (first orbit)
E. Be^{3+} (Second orbit)
Choose the correct answer from the options given below : (4 Apr 2026 | Shift 2)
- (A) A and C Only (B) A and E Only
(C) B and E Only (D) C and D Only
-
3. What is the energy (in J atom^{-1}) required for the following process?
 $\text{Li}^{2+}(\text{g}) \rightarrow \text{Li}^{3+}(\text{g}) + \text{e}^-$
(Take the ionization energy for the H atom in the ground state as $2.18 \times 10^{-18} \text{ J atom}^{-1}$) (2 Apr 2026 | Shift 1)
- (A) 8.72×10^{-18} (B) 1.962×10^{-18}
(C) 1.962×10^{-17} (D) 6.54×10^{-17}
-
4. The wavelength of spectral line obtained in the spectrum of Li^{2+} ion, when the transition takes place between two levels whose sum is 4 and difference is 2 , is (24 Jan 2026 | Shift 2)
- (A) $1.14 \times 10^{-6} \text{ cm}$ (B) $2.28 \times 10^{-6} \text{ cm}$
(C) $1.14 \times 10^{-7} \text{ cm}$ (D) $2.28 \times 10^{-7} \text{ cm}$
-
5. The energy of an electron in the first Bohr orbit of the H-atom is -13.6 eV.
The magnitude of energy value of an electron in the first excited state of Be^{3+} is _____ eV (nearest integer value). (8 Apr 2025 | Shift 2)

6. Which of the following statements regarding the energy of the stationary state is true in the following one - electron systems ? (23 Jan 2026 | Shift 1)

- (A) $+2.18 \times 10^{-18}$ J for second orbit of He^+ ion
(B) $+8.72 \times 10^{-18}$ J for first orbit of He^+ ion
(C) -1.09×10^{-18} J for second orbit of H atom.
(D) -2.18×10^{-18} J for third orbit of Li^{2+} ion

7. The energy required by electrons, present in the first Bohr orbit of hydrogen atom to be excited to second Bohr orbit is ____ Jmol^{-1} .

Given: $R_H = 2.18 \times 10^{-11}$ ergs.

(22 Jan 2026 | Shift 1)

- (A) 9.835×10^{12}
(B) 1.635×10^{-11}
(C) 1.635×10^{-18}
(D) 9.835×10^5

8. Which of the following postulate of Bohr's model of hydrogen atom is not in agreement with quantum mechanical model of an atom? (3 Apr 2025 | Shift 1)

- (A) The electron in a H atom's stationary state moves in a circle around the nucleus.
(B) An atom can take only certain distinct energies E_1, E_2, E_3 , etc. These allowed states of constant energy are called the stationary states of atom.
(C) An atom in a stationary state does not emit electromagnetic radiation as long as it stays in the same state.
(D) When an electron makes a transition from a higher energy stationary state to a lower energy stationary state, then it emits a photon of light.

9. According to Bohr's model of hydrogen atom, which of the following statement is incorrect? (2 Apr 2025 | Shift 1)

- (A) Radius of 4th orbit is four times larger than that of 2nd orbit
(B) Radius of 8th orbit is four times larger than that of 4th orbit
(C) Radius of 6th orbit is three times larger than that of 4th orbit
(D) Radius of 3rd orbit is nine times larger than that of 1st orbit

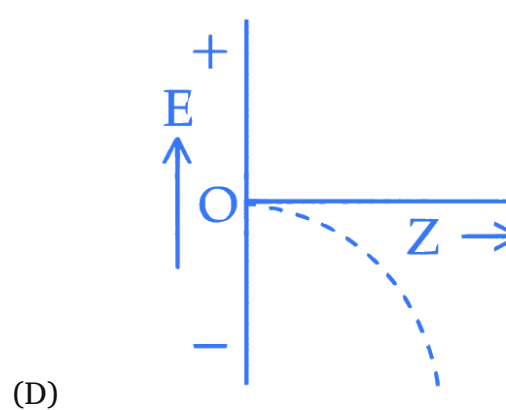
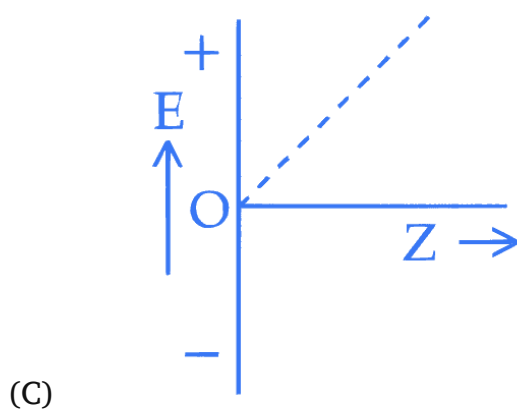
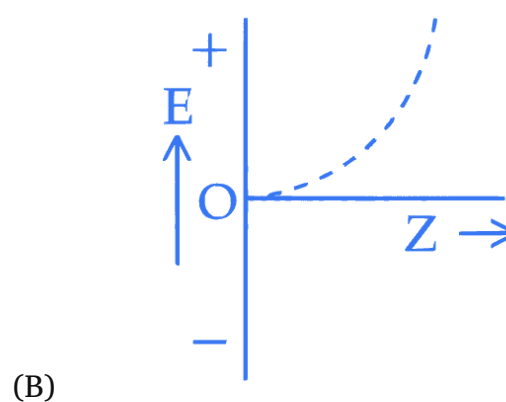
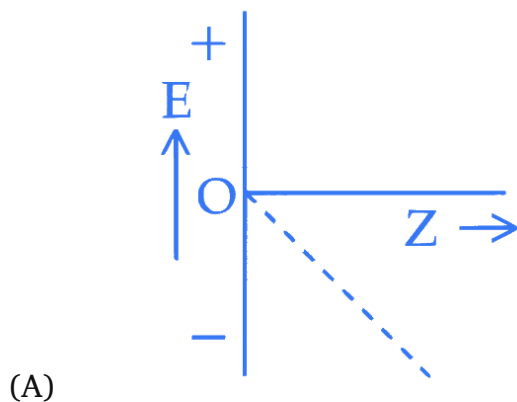
10. Radius of the first excited state of Helium ion is given as : $a_0 \rightarrow$ radius of first stationary state of hydrogen atom. (22 Jan 2025 | Shift 1)

- (A) $r = \frac{a_0}{4}$
(B) $r = 2a_0$
(C) $r = 4a_0$
(D) $r = \frac{a_0}{2}$

11. For hydrogen like species, which of the following graphs provides the most appropriate representation of E vs Z plot for a constant n ?

[E : Energy of the stationary state, Z : atomic number, n = principal quantum number]

(29 Jan 2025 | Shift 2)



12. For hydrogen atom, energy of an electron in first excited state is -3.4 eV, K.E. of the same electron of hydrogen atom is x eV. Value of x is $\text{_____} \times 10^{-1}$ eV. (Nearest integer)

(6 Apr 2024 | Shift 2)

13. The value of Rydberg constant (R_H) is 2.18×10^{-18} J. The velocity of electron having mass 9.1×10^{-31} kg in Bohr's first orbit of hydrogen atom = $\text{_____} \times 10^5$ ms^{-1} (nearest integer).

(5 Apr 2024 | Shift 1)

14. The energy of an electron in the first Bohr orbit of hydrogen atom is -2.18×10^{-18} J. Its energy in the third Bohr orbit is _____.

(13 Apr 2023 | Shift 1)

(A) One third of this value

(B) Three times of this value

(C) $\frac{1}{9}$ th of this value

(D) $\frac{1}{27}$ of this value

15. Given below are two statements:

Statement I : According to Bohr's model of hydrogen atom, the angular momentum of an electron in a given stationary state is quantised.

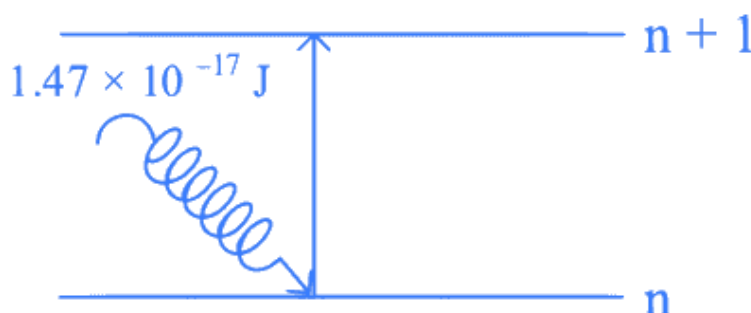
Statement II : The concept of electron in Bohr's orbit, violates the Heisenberg uncertainty principle.

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

(15 Apr 2023 | Shift 1)

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

16.



The electron in the n^{th} orbit of Li^{2+} is excited to $(n + 1)$ orbit using the radiation of energy $1.47 \times 10^{-17} \text{ J}$ (as shown in the diagram). The value of n is _____

Given: $R_{\text{H}} = 2.18 \times 10^{-18} \text{ J}$

(10 Apr 2023 | Shift 2)

17. Assume that the radius of the first Bohr orbit of hydrogen atom is $0.6 \text{ \AA}$. The radius of the third Bohr orbit of He^+ is _____ picometer. (Nearest Integer)

(29 Jan 2023 | Shift 2)

18. The radius of the 2^{nd} orbit of Li^{2+} is x . The expected radius of the 3^{rd} orbit of Be^{3+} is

(25 Jan 2023 | Shift 1)

- (A) $\frac{16}{27}x$
- (B) $\frac{4}{9}x$
- (C) $\frac{9}{4}x$
- (D) $\frac{27}{16}x$

19. If the radius of the 3^{rd} Bohr's orbit of hydrogen atom is r_3 and the radius of 4^{th} Bohr's orbit is r_4 . Then :

(26 Jun 2022 | Shift 1)

- (A) $r_4 = \frac{9}{16}r_3$
- (B) $r_4 = \frac{16}{9}r_3$
- (C) $r_4 = \frac{3}{4}r_3$
- (D) $r_4 = \frac{4}{3}r_3$

20. Identify the incorrect statement from the following. (28 Jul 2022 | Shift 1)
- (A) A circular path around the nucleus in which an electron moves is proposed as Bohr's orbit. (B) An orbital is the one electron wave function (ψ) in an atom.
- (C) The existence of Bohr's orbits is supported by hydrogen spectrum. (D) Atomic orbital is characterised by the quantum numbers n and l only.
-
21. The longest wavelength of light that can be used for the ionisation of lithium atom (Li) in its ground state is $x \times 10^{-8}$ m. The value of x is _____. (Nearest Integer).
(Given : Energy of the electron in the first shell of the hydrogen atom is -2.2×10^{-18} J ; $h = 6.63 \times 10^{-34}$ Js and $c = 3 \times 10^8$ ms $^{-1}$) (25 Jun 2022 | Shift 1)
-
22. The kinetic energy of an electron in the second Bohr orbit of a hydrogen atom is equal to $\frac{h^2}{xma_0^2}$. The value of $10x$ is _____. (a_0 is radius of Bohr's orbit) (Nearest integer)
[Given : $\pi = 3.14$] (27 Aug 2021 | Shift 1)
-
23. Given below are two statements.
Statement I : According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in positive charges on the nucleus as there is no strong hold on the electron by the nucleus.
Statement II : According to Bohr's model of an atom, qualitatively the magnitude of velocity of electron increases with decrease in principal quantum number.
In the light of the above statements, choose the most appropriate answer from the options given below : (26 Aug 2021 | Shift 1)
- (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
-
24. The de Broglie wavelength of an electron in the 4th Bohr orbit is : (9 Jan 2020 | Shift 1)
- (A) $2\pi a_0$ (B) $6\pi a_0$
- (C) $8\pi a_0$ (D) $4\pi a_0$

25. Given below are two statements :

Statement I : Rutherford's gold foil experiment cannot explain the line spectrum of hydrogen atom.

Statement II : Bohr's model of hydrogen atom contradicts Heisenberg's uncertainty principle.

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

(27 Jul 2021 | Shift 1)

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

26. Given below are two statements :

Statement I : Bohr's theory accounts for the stability and line spectrum of Li^+ ion.

Statement II : Bohr's theory was unable to explain the splitting of spectral lines in the presence of a magnetic field.

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

(18 Mar 2021 | Shift 2)

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

27. According to Bohr's atomic theory :

(A) Kinetic energy of electron is $\propto \frac{Z^2}{n^2}$.

(B) The product of velocity (v) of electron and principal quantum number (n), $'vn' \propto Z^2$.

(C) Frequency of revolution of electron in an orbit is $\propto \frac{Z^3}{n^3}$.

(D) Coulombic force of attraction on the electron is $\propto \frac{Z^3}{n^4}$.

Choose the most appropriate answer from the options given below : (24 Feb 2021 | Shift 2)

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

28. The difference between the radii of 3rd and 4th orbits of Li^{2+} is R_1 . The difference between the radii of 3rd and 4th orbits of He^+ is ΔR_2 .
Ratio $\Delta R_1 : \Delta R_2$ is : (5 Sept 2020 | Shift 1)
- (A) 8 : 3 (B) 3 : 2
(C) 2 : 3 (D) 3 : 8
-

29. The radius of the second Bohr orbit, in terms of the Bohr radius, a_0 , in Li^{2+} is : (8 Jan 2020 | Shift 2)
- (A) $\frac{2a_0}{9}$ (B) $\frac{2a_0}{3}$
(C) $\frac{4a_0}{9}$ (D) $\frac{4a_0}{3}$
-

30. The de-Broglie's wavelength of electron present in first Bohr orbit of 'H' atom is : (15 Apr 2018 | Shift 2)
- (A) $0.529 \text{ \AA}$ (B) $2\pi \times 0.529 \text{ \AA}$
(C) $\frac{0.529}{2\pi} \text{ \AA}$ (D) $4 \times 0.529 \text{ \AA}$
-

31. The radius of the second Bohr orbit for hydrogen atom is:
(Planck's Const. $h = 6.6262 \times 10^{-34} \text{ Js}$; mass of electron = $9.1091 \times 10^{-31} \text{ kg}$; charge of electron (e) = $1.60210 \times 10^{-19} \text{ C}$; permittivity of vacuum (ϵ_0) = $8.854185 \times 10^{-12} \text{ kg}^{-1} \text{ m}^{-3} \text{ A}^2$) (2 Apr 2017 | Single sitting)
- (A) $4.76 \text{ \AA}$ (B) $2.12 \text{ \AA}$
(C) $0.529 \text{ \AA}$ (D) $1.65 \text{ \AA}$
-

32. Which of the following is the energy of a possible excited state of hydrogen? (4 Apr 2015 | Single sitting)
- (A) -6.8 eV (B) -3.4 eV
(C) $+6.8 \text{ eV}$ (D) $+13.6 \text{ eV}$
-

33. If m and e are the mass and charge of the revolving electron in the orbit of radius r for hydrogen atom, their total energy of the revolving electron will be
(12 Apr 2014 | Single slot)
- (A) $(1)/(2)(e^2)/(r)$ (B) $-(e^2)/(r)$
(C) $(me^2)/(r)$ (D) $-(1)/(2)(e^2)/(r)$
-
34. The energy of an electron in first Bohr's orbit of H atom is -13.6 eV. The energy value of electron in the first excited state of Li^{2+} is
(9 Apr 2014 | Single slot)
- (A) 27.2 eV (B) -30.6 eV
(C) 30.6 eV (D) -27.2 eV
-
35. If the radius of first orbit of atom is a_0 , the deBroglie wavelength of an electron in the third orbit is
(12 May 2012 | Single slot)
- (A) $4\pi a_0$ (B) $8\pi a_0$
(C) $6\pi a_0$ (D) $2\pi a_0$
-
36. Ionisation energy of He^+ is $19.6 \times 10^{-18} \text{ J atom}^{-1}$. The energy of the first stationary state ($n = 1$) of Li^{2+} is
(25 Apr 2010 | Single sitting)
- (A) $4.41 \times 10^{-16} \text{ J atom}^{-1}$ (B) $-4.41 \times 10^{-17} \text{ J atom}^{-1}$
(C) $-2.2 \times 10^{-15} \text{ J atom}^{-1}$ (D) $8.82 \times 10^{-17} \text{ J atom}^{-1}$
-
37. According to Bohr's theory, the angular momentum of an electron in 5th orbit is
(30 Apr 2006 | Single sitting)
- (A) $10 h/\pi$ (B) $2.5 h/\pi$
(C) $25 h/\pi$ (D) $1.0 h/\pi$
-
38. In Bohr series of lines of hydrogen spectrum, the third line from the red end corresponds to which one of the following inter-orbit jumps of the electron for Bohr orbits in an atom of hydrogen
(26 Apr 2003 | Single sitting)
- (A) $5 \rightarrow 2$ (B) $4 \rightarrow 1$
(C) $2 \rightarrow 5$ (D) $3 \rightarrow 2$

39. In a hydrogen atom, if energy of an electron in ground state is -13.6 eV , then that in the 2nd excited state is (19 May 2002 | Single sitting)
- (A) -1.51 eV (B) -3.4 eV
(C) -6.04 eV (D) -13.6 eV