



# CHEMISTRY

## BOOKS - BETTER CHOICE PUBLICATION

### STRUCTURE OF ATOM

#### Very Short Answer Type Questions

1. Name the series of hydrogen atom which lie in U.V. region.



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2. What is the order of radius of helium atom ?

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3. What is the Ionisation potential of hydrogen atom?

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4. What is the order of velocity of electron in a hydrogen atom in ground state?



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5. Name the series of hydrogen atom lying in infrared, visible and ultraviolet region?



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6. What is the energy possessed by electron for  $n = \infty$  ?



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7. What is the diameter of Hydrogen atom?



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8. What is the value of Rydberg constant?



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9. Name the series of hydrogen atom which falls in visible region.



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10. Name the series of hydrogen spectrum which has least wavelength.



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**11.** What is the significance of the negative energy of the electron in the orbit ?



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**12.** What is Bohr's frequency condition?



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**13.** Why are the electrons revolving around the nucleus of an atom?



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## Short Answer Type Questions

1. What were the observations and important conclusions drawn from a-scattering experiment?



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2. What conclusions are drawn from Rutherford's experiment on the scattering of  $\alpha$  particles from a thin gold foil



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3. Give the two drawbacks of Rutherford's atomic model.



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1. On the basis of Bohr's atomic model, find an expression for the radius of  $n$ th orbit of an atom.



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2. Explain how the Rutherford's experiment on scattering of  $\alpha$  -particles led to the estimation of the size of the nucleus.



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3. On the basis of Bohr's atomic model, find an expression for the wave number of a wave emitted by an electron when it jumps from an outer orbit to inner orbit.



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4. Write the main postulates of Rutherford's atomic model and cause of failure of this model.



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5. Discuss the Rutherford's experiment on the scattering of alpha particles. What are its consequences ?



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6. Explain Rutherford's experiment on scattering of  $\alpha$ -particles from a gold foil and state and significance of the results.



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7. Explain the energy level diagram for the hydrogen atom and show the different series in hydrogen atom spectrum.



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8. State Bohr's postulates for atomic model and derive an expression for radius of the electron in an orbit.



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9. Write the postulates of Bohr's atomic model.



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## Long Answer Type Questions

1. Write the postulates of Bohr's atomic model and find an expression for the total energy of an electron in the  $n$ th orbit of an atom.



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2. Write the postulates of Bohr's Atomic model and on the basis of this model find an expression for the wave number of a wave emitted by an electron when it jumps from an outer orbit to inner orbit.



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3. Obtain an expression for energy of orbital electron in hydrogen atom using Bohr's postulates.



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4. On the basis of Bohr's theory, derive an expression for binding the energy of an electron in a hydrogen atom.



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5. Explain the origin of spectral lines of hydrogen using Bohr's theory?



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6. What was the drawback of Rutherford's atomic model and how did Bohr remove it ?  
Derive a general relation for radii of Bohr's atom and prove that different orbits are not equally spaced



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7. Write the postulates of Bohr's Atomic model and on the basis of this model find an expression for the wave number of a wave



emitted by an electron when it jumps from an outer orbit to inner orbit.



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8. State postulates of Bohr's atomic model. Derive an expression for (a) radius (b) total energy (c) velocity of electron in  $n$ th orbit of hydrogen atom.



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## Numerical Problems

1. The ionisation energy of hydrogen atom is given to be 13.6 eV. A photon falls a hydrogen atom which is initially in the ground state and excites it to the  $n = 4$  state. Calculate the wavelength of the photon.



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2. Calculate the K.E. and P.E. of electron in the first orbit of hydrogen atom. Given

$e = 1.6 \times 10^{-19} \text{ C}$  and  $r = 0.53 \times 10^{-10} \text{ m}$ .



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**3.** Calculate the impact parameter of 5 MeV alpha particle scattered by  $10^\circ$  when it approached a gold nucleus. ( $Z = 79$  for gold).



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**4.** The first member of Balmer series in hydrogen spectrum has a wavelength of 6563

A. What will be the wavelength of 2nd member Lyman series in the same spectrum?



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5. The second member of Lyman series in hydrogen spectrum has wavelength of 5400 A. What is the wavelength of first member in the same series?



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6. Calculate the shortest wavelength of Balmer series in Hydrogen atom spectrum. Given

$$R = 10970000m^{-1} .$$



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