Atoms

CHAPTER 12

TRY YOURSELF

ANSWERS

1. The classical method could not explain the atomic structure as the electron revolving around the nucleus are accelerated and emits energy as the result, the radius of the circular path goes on decreasing. Ultimately electrons fall into the nucleus, which is not in practicle.

2. The distance of closest approach of two objects is the distance between their centres when they are extremely tangent.

3. In 1913, Rutherford's post-doctral student Neils Bohr describes electron orbit.

4. When an electric current passes through a gas, it gives energy to the gas. This energy is than given out as light of several definite wavelengths (colours). This is called line emission spectrum.

5. A spectrum (as of light emitted by a white-hot lamp filament) having no apparent breaks or gaps throughout its wavelength range is known as continuous spectra.

6. Rydberg formula relates energy difference between the various levels of Bohr's model and the wavelength of absorbed or emitted photons. Its value is $1.09737 \times 10^7\ m^{-1}$.

7. This series is discovered by Theodore Lyman. It lies in ultraviolet region.

8. $E = -(13.6)\frac{Z^2}{n^2}\text{eV}$

9. According to de-Broglie that the electron in its circular orbit, as proposed by Bohr, must be seen as particle wave.

10. It is that accelerating potential which gives to a bombarding electron, sufficient energy to excite the target atom by raising one of its electron from an inner to an outer orbit.

First excitation potential of hydrogen

$= -3.4 - (-13.6) = 10.2\ V$

11. It is defined as the energy required to knock an electron completely out of the atom.

Ionisation energy of hydrogen

$= E_\infty - E_1 = 0 - (-13.6) = 13.6\ eV$

12. Electrons in atoms revolve around the nucleus. The electrons can only orbit stably, without radiating in certain orbits (called by stationary orbits) at as certain distance set of distances from the nucleus. These orbits are associated with definite energies and are also called energy shells or energy levels.

13. The excitation energy of an atom is defined as the energy required by its electron to jump from the ground state to any one of the excited state.

First excitation energy of hydrogen

$= E_2 - E_1$

$= -3.4 - (-13.6) = 10.2\ V$

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