De-Broglie Wave Theory, Heisenberg Uncertainity Principle

1. **Wavelength of the wave associated with a moving electron**

   1) Decreases as speed of electron Increases.

   2) Increases as speed of electron Increases.

   3) Independent of speed of electron.

   4) Is zero.

2. **If an electron and H-atom have the same de Broglie wavelength, then the ratio of their velocities is**

   1) 1836:1   2) 1:1836   3) 1:1   4) 1:2

3. **A hydrogen molecule and helium atom are moving with the same velocity. Then the ratio of their de Brogile wavelength is**

   1) 1:1   2) 1:27   3) 2:1   4) 2:3

4. **Wavelength of an electron is 5A°.Velocity of the electron is**

   1) 1.45×10^{8} cm/s   2) 1.6×10^{-8}cm/s

   3) 3.2×10^{-27}cm/s   4) 3.2×10^{27}cm/s

5. **The momentum of a particle of wavelength 10A° is**

   1) 6.625×10^{-27} g. cm.s^{-1} 2) 6.625×10^{-19} g. cm.s^{-1}

   3) 6.625×10^{-20} g. cm.s^{-1} 4) 6.625×10^{-23} g. cm.s^{-1}

6. **The de Broglie wavelength of a particle with mass 1 0mg and velocity 100 cm/s is**

   1) 6.63×10^{-27} cm   2) 6.63×10^{-27} A°

   3) 6.63×10^{-29} cm   4) 6.63×10^{-29} A°

7. **The de Broglie wave length of a an Iron ball of mass 2 mg moving with a velocity of 2Km/sec is**

1) $\frac{6.6\times10^{-34}}{4}$ m
2) $\frac{6.6\times10^{-31}}{4}$ m
3) $\frac{6.6\times10^{-30}}{4}$ m
4) $\frac{6.6\times10^{-27}}{4}$ m

8. **The de- Broglie's wavelength of a particle having momentum of 3.3125×10^{-24} kg.ms^{-1} will be**

1) 2×10^{-10}A° 2) 2 A° 3) 2×10^{-10}cm 4) 2 nm

9. **The de Broglie wavelength of a tennis ball of mass 6.625 g moving with a velocity of 100cm per second is**

1) 10^{-33} m 2) 10^{-31} m 3) 10^{-33} cm 4) 10^{-31} cm

10. **The de Broglie wavelength associated with a ball of mass, 200 g and moving at a speed of 5 metres/sec, is in the order of**

1) 10^{-32} m 2) 10^{-34} m 3) 10^{-31} m 4) 10^{-30} m

11. **If uncertainity in position is zero, the uncertainity in momentum of an electron will be**

1) Zero 2) Infinity
3) Unity 4) Zero or infinity

12. **The uncertainity in momentum of an electron is 1×10^{-5} kg.m/s. The uncertainity in its position will be**

1) 1.05×10^{-28} m 2) 1.05×10^{-26} m
3) 5.27×10^{-30} m 4) 5.27×10^{-28} m

13. If the wavelength of the electron is numerically equal to the distance travelled by it in one second, then

1) $\lambda = \sqrt{\frac{h}{m}}$ 2) $\lambda = \frac{h}{p^2}$ 3) $\lambda = \frac{h}{m}$ 4) $\lambda = \sqrt{\frac{h}{p}}$

14. Two particles A and B are in motion. If the wavelength associated with the particle "A" is 5 ´ 10^{-8} m, the wavelength of particle B having momentum half of "A" is

1) 2.5 x10^{-8} m 2) 1.0 x10^{-7} m

3) 1.25 x10^{-7} m 4) 1 x10^{-8} m

15. The de – Broglie wavelength of an electron in the second orbit of H – atom is

1) Equal to circumference of the second orbit

2) Equal to half of the circumference of the second orbit

3) Equal to double of the circumference of the second orbit

4) Equal to one fourth of the circumference of the second orbit

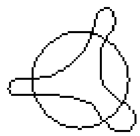
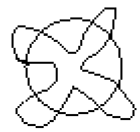
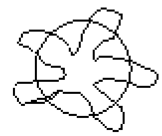
16. The two particles "A" and "B" have de - Broglie wavelengths 1 mm and 5 mm respectively. If mass of "A" is four times the mass of "B", the ratio of kinetic energies of "A and B" would be

1) 5: 1 2) 20: 1 3) 25: 4 4) 5: 4

17. If the kinetic energy of an electron is 4.55 × 10^{-25}J, find its wavelength (Planck's constant, h = 6.625 × 10^{-34} kgm^2 s^{-1}, m = 9.1 × 10^{-31} kg).

1) 662.5nm 2) 565.6nm 3)728nm 4) 465.8nm

18. The propagation of electronic wave in 'N' shell of hydrogen atom is shown by

1)  2)  3)  4) None

19. If the de Broglie wave length of electron in1st orbit of H -atom is λ, then the circumference of the 4th orbit is

1) 4λ 2) 16λ 3) $\frac{\lambda}{4}$ 4) $\frac{\lambda}{16}$

20. The uncertainities in the velocities of two particles A and B are 0.05 and 0.02m.sec^{-1} respectively. The mass of B is five times to that of mass A. What is the ratio of uncertainities $\left(\frac{\Delta x_A}{\Delta x_B}\right)$ in their positions?

1) 2 2) 0.25 3) 4 4) 1

KEY

1)1	**2) 1**	**3)3**	**4)1**	**5)3**	**6)1**	**7)2**
8)2	**9)2**	**10)2**	**11)2**	**12)2**	**13)1**	**14)2**
15)2	**16)3**	**17)3**	**18)2**	**19)2**	**20)1**	

HINTS

17. KE of electron, $1/2mv^2 = 4.55 \times 10^{-25}$ J.

Mass of electron, $m = 9.1 \times 10^{-31}$ kg

$v^2 = \frac{2 \times KE}{m} = \frac{2 \times 4.55 \times 10^{-25} J}{9.1 \times 10^{-31} kg}$, $v^2 = 10^6\ m^2 s^{-2}$, v = = $10^3 ms^{-1}$

$\therefore \lambda = \frac{h}{mv}$ i.e $\lambda = \frac{6.625 \times 10^{-34} Kgm^2 s^{-1}}{9.1 \times 10^{-31} kg \times 10^3 ms^{-1}} = 7.28 \times 10^{-7}$ m

18. The number of electron waves (or wave lengths) is equal to the principal quantum number "n".

19. Circumference$=n^2 \lambda = 4^2 \lambda = 16\lambda$

20. $\frac{\Delta x_A \Delta V_A}{\Delta x_B \Delta V_B} = \frac{m_B}{m_A}$