De-Broglie Wave Theory,

Heisenberg Uncertainty Principle

1. **The de Broglie wavelength of a ball of mass 1Kg having Kinetic emery 0.5j is (AIIMS 2006)**

   1) $6.626X10^{-34}$ m 2) $13.2X10^{-34}$ m

   3) $10.28X10^{-21}$ cm 4) $6.626X10^{-34}$A°

2. **The uncertainty in measurement of velocity of an electron with in a distance of 0.1A° is (AIPMT2006)**

   1) $5.79X10^{8}ms^{-1}$ 2) $5.79X10^{5}ms^{-1}$

   3) $5.79X10^{6}ms^{-1}$ 4) $5.79X10^{7}ms^{-1}$

3. **In an atom, an electron is moving with a speed of 600m/s with an accuracy 0.005%, the uncertainity in its position will be (AIEEE 2009)**

   1) $1.52X10^{-4}m$ 2) $5.10X10^{-3}m$

   3) $1.92X10^{-3}m$ 4) $3.84X10^{-3}m$

4. **Calculate the wavelength associated with a proton moving at $1.0X10^{3}$m/s (AIEEE 2009)**

   1) 0.032nm 2) 0.40nm 3) 2.5nm 4) 14.0nm

5. **A body of mass x Kg is moving with a speed of 100m/s.Its de Broglie wavelength is $6.626X10^{-35}$m. Hence x is (Karnataka 2009)**

   1) 0.25kg 2) 0.15kg 3) 0.2kg 4) 0.1kg

6. **If the de Broglie wavelength of a particle of mass m is 100 times its velocity, then its value in terms of m and h is (j&k 2009)**

   1) $\frac{1}{10}\sqrt{\frac{m}{h}}$ 2) $10\sqrt{\frac{h}{m}}$ 3) $\frac{1}{10}\sqrt{\frac{h}{m}}$ 4) $10\sqrt{\frac{m}{h}}$

7. The de-Broglie wavelength associated with a particle of mass 1 kg moving with a velocity of 10 ms^{-1} is (M 98)

1) 6.63×10^{-35}m
2) 6.63×10^{-34}m
3) 6.65×10^{-33} m
4) 6.63×10^{-32}m

8. Which of the following has the largest de Broglie wavelength provided all have equal velocity? (M2005)

1) Carbon dioxide molecule
2) Ammonia molecule
3) Oxygen molecule
4) Nitrogen molecule

9. The de Broglie wavelength of a particle with mass 1 gm and velocity 100 m/s is (AFMC 99)

1) 6.63 x m
2) 6.63 x m
3) 6.63 x m
4) 6.65 x m

10. Uncertainity in position and momentum of a particle are equal. Uncertainity in its velocity is (AIPMT2008)

1) $\sqrt{\frac{h}{\pi}}$
2) $\frac{1}{2}\sqrt{\frac{h}{\pi}}$
3) $\frac{1}{2m}\sqrt{\frac{h}{\pi}}$
4) $2m\sqrt{\frac{h}{\pi}}$

KEY

1)1 2) 3 3)3 4)2 5)4

6)2 7) 1 8)4 9)3 10)3

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Hints

1. $\lambda = \frac{h}{\sqrt{2mkE}}$

2. $\Delta v = \frac{h}{4\pi \Delta x . m}$

3. $\Delta x = \frac{h}{4\pi m.\Delta V}$

4. $\lambda = \frac{h}{mv}$

5. $m = \frac{h}{\lambda v}$

6. $\lambda = \frac{h}{mv}$

7. $\lambda = \frac{h}{mv.} = \frac{6.625\times10^{-34}}{1\times10} = 6.625\times10^{-35} m$

8. $\lambda \alpha \frac{1}{m}$

9. $\lambda = \frac{h}{mv}$

10. $\Delta x = \Delta p$, $\Delta x = m\Delta v$, $\Delta V = \frac{h}{4\pi m.\Delta x}$, $\Delta V = \frac{h}{4\pi m.m\Delta V}$, $\Delta V^2 = \frac{h}{4\pi m^2}$, $\Delta V = \frac{1}{2m}\sqrt{\frac{h}{\pi}}$

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