de-Broglie wave theory,Heisenberg uncertainity principle

1. The de Broglie wavelength of a ball of mass 1Kg having Kinetic enery 0.5j is

(AIIMS2006)

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

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

2. The uncertainity 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 (AIEEE2009)

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 (AIEEE2009)

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.Hencc 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

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. $\lambda = \frac{h}{mv.} = \frac{6.625\times 10^{-34}}{1\times 10} = 6.625\times 10^{-35} m$

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

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

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