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(3) $\Delta p \Delta x \geq \frac{h}{4\pi}$

error in p

$\Delta p = (1.67 \times 10^{-27}\ kg)(.012 \times 10^{5})$

$= 2 \times 10^{-24}$

$\Delta x = \frac{h}{4\pi \Delta p}$

$= \frac{6.63 \times 10^{-34}}{4\pi (2 \times 10^{-24})}$

$= \underline{3 \times 10^{-11}}$

(5) $\Delta E \Delta t \geq \frac{h}{4\pi}$

$\Delta E = \frac{h}{4\pi \Delta t}$

$= \frac{6.63 \times 10^{-34}}{4\pi (10^{-8})}$

$= \frac{5.28 \times 10^{-27}\ J}{1.6 \times 10^{-19}} = \underline{3.3 \times 10^{-8}\ eV}$

(7) $\Delta E \Delta t \geq \frac{h}{4\pi}$

$\Delta E = \frac{h}{4\pi \Delta t}$

$= \frac{6.63 \times 10^{-34}}{4\pi (2.2 \times 10^{-6}\ s)} = \frac{2.398 \times 10^{-29}\ J}{1.6 \times 10^{-19}\ J eV^{-1}} = \underline{1.5 \times 10^{-10}\ eV/c^{2}}$