

9. The Heisenberg uncertainty principle specifies the minimum uncertainty as

$$\Delta p \Delta x = h$$

Divide both sides of the equation by Δx to get Δp

$$\Delta p = h / \Delta x$$

$$\Delta p = (6.626 \times 10^{-34} \text{ J s}) / (0.000001 \text{ m})$$

$$\Delta p = 6.626 \times 10^{-28} \text{ kg m / s}$$

Despite the fact that the position was known to great accuracy, within 0.000001 m, the uncertainty in the momentum is a very small value. This explains why we do not encounter any difficulty in accurately measuring position and momentum simultaneously for macroscopic sized objects. We must go to the atomic scale to see the results of these effects.