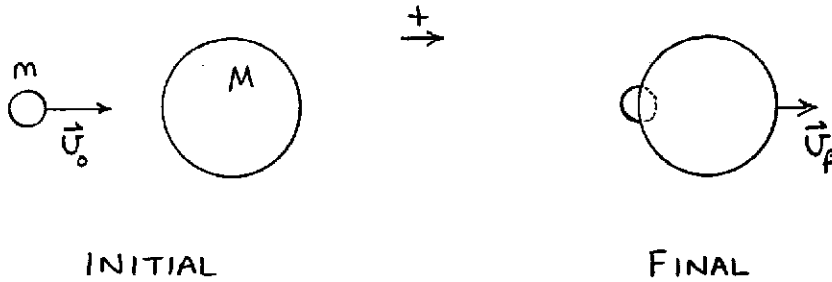


C1.



Comet embeds itself in Callisto. \therefore Completely Inelastic.

(a) Momentum is conserved.

$$\vec{p}_f = \vec{p}_i$$

$$(m+M)u_f = mu_0 + 0 \Rightarrow u_f = \frac{mu_0}{(m+M)}$$

$$u_f = \frac{(1.96 \times 10^{13} \text{ kg})(6.50 \times 10^4 \text{ m/s})}{(1.96 \times 10^{13} \text{ kg} + 1.08 \times 10^{23} \text{ kg})} = 1.18 \times 10^{-5} \text{ m/s}$$

(b) $\Delta KE = KE_f - KE_i$

$$\Delta KE = \frac{1}{2}(m+M)u_f^2 - \frac{1}{2}mu_0^2$$

$$\Delta KE = \frac{1}{2}(1.96 \times 10^{13} \text{ kg} + 1.08 \times 10^{23} \text{ kg})(1.18 \times 10^{-5} \text{ m/s})^2 - \frac{1}{2}(1.96 \times 10^{13} \text{ kg})(6.50 \times 10^4 \text{ m/s})^2$$

$$\Delta KE = -4.14 \times 10^{22} \text{ J}$$

means KE was lost (released)