6) $F_m = qvB\sin\theta = 1.6\times10^{-19}\,C \cdot 6.2\times10^{6}\,m/s \cdot 50_{\mu}T \cdot \sin 90$

$= 5.1e^{-17}\ N \quad south$

33) $m_\alpha V_{o\alpha} = m_\alpha V_{f\alpha} + m_p V_{fp}$ $\qquad \frac{1}{2} m_\alpha V_{o\alpha}^2 = \frac{1}{2}(m_\alpha V_{f\alpha}^2 + m_p V_{fp}^2)$

$V_{o\alpha} = V_{f\alpha} + \frac{m_p}{m_\alpha} V_{fp}$ $\qquad V_{o\alpha}^2 = V_{f\alpha}^2 + \frac{m_p}{m_\alpha} V_{fp}^2$

~~$V_{f\alpha} + \frac{1}{4} V_{fp} = \sqrt{V_f}$~~

$V_{o\alpha}^2 = V_{f\alpha}^2 + \frac{1}{16} V_{fp}^2 + \frac{1}{2} V_{f\alpha} V_{fp} = V_{f\alpha}^2 + \frac{1}{4} V_{fp}^2$

$-\frac{3}{16} V_{fp}^2 + \frac{1}{2} V_{fp} V_{f\alpha} = 0$

$\frac{3}{8} V_{fp} = V_{f\alpha}$

$r = \frac{mv}{qB}$

$R_\alpha = R_p \cdot \frac{m_\alpha}{m_p} \cdot \frac{v_\alpha}{v_p} \cdot \frac{q_p}{q_\alpha} = R_p \cdot 4 \cdot \frac{3}{8} \cdot \frac{1}{2}$

$R_\alpha = \frac{3}{4} R_p$