Nuclear Physics Review – Binding Energy and Mass Defect (#1 p. 902)

Find the binding energies of $^{20}_{10}Ne$ and $^{40}_{20}Ca$.

$^{20}_{10}Ne$ $Z = 10$, $N = 20 - 10 = 10$ $^{40}_{20}Ca$ $Z = 20$, $N = 40 - 20 = 20$

$m_{Ne20} = 19.992435\,u$ $m_{Ca40} = 39.962591\,u$

$m_H = 1.007825u$
$m_n = 1.008665u$ $c^2 = 931.50 \frac{MeV}{u}$

$\Delta m = Z m_H + N m_n - m_{atomic}$ $E_{bind} = \Delta m\, c^2$

For $^{20}_{10}Ne$: $\Delta m = 10(1.007825u) + 10(1.008665u) - 19.992435u$
$\Delta m = 0.172465u$

$E_{bind} = (0.172465u)(931.50 \frac{MeV}{u})$

$\boxed{E_{bind} = 160.7\ MeV}$

For $^{40}_{20}Ca$: $\Delta m = 20(1.007825u) + 20(1.008665u) - 39.962591u$
$\Delta m = 0.367209u$

$E_{bind} = (0.367209u)(931.5 \frac{MeV}{u})$

$\boxed{E_{bind} = 342.1\ MeV}$