1) \[ B.E. = a V A - a N A^{2/3} - a_o \frac{Z^2}{A^{1/3}} - a (\frac{A - 2}{A}) + c \]

\[ BE(3^1\rho) = 15.52 (31) - 17.23 (31)^{2/3} - 0.7 \frac{15^2}{(31)^{1/3}} - 23.285 \frac{(31-15)^2}{31} \]

\[ BE(3^1\rho) = 261.44 \text{ MeV} \]

\[ BE(3^1s) = 15.52 (31) - 17.23 (31)^{2/3} - 0.7 \frac{15^2}{(31)^{1/3}} - 23.285 \frac{(31-16)^2}{31} \]

\[ BE(3^1s) = 254.53 \text{ MeV} \] (only difference is Coulomb term)

2) \[ BE = (2 m_H + m_m - m_A) c^2 \]

\[ BE = 2 \Delta H + N \Delta m - \Delta A \]

\[ \Delta m = 7.288.97 \text{ keV} \]

\[ \Delta m = 8.61.32 \text{ keV} \]

\[ BE(3^1\rho) = 15 + 7.28897 + 16 \times 8.61.32 = (- 24.44088) \text{ MeV} \]

\[ BE(3^1\rho) = 262.917 \text{ MeV} \]

\[ BE(3^1s) = 16 \times \Delta H + 15 \Delta N - 19.8446 \text{ MeV} \]

\[ BE(3^1s) = 256.739 \]

3) Difference measured \[ BE(3^1\rho) - BE(3^1s) = 6.18 \text{ MeV} \]

Difference calc in (1) = 6.91 \text{ MeV}

Is slightly larger as seen in lecture for other minor nuclei

4) \[ 3^1s_{1/2} \pi (\Delta^2 P^4 P^2 d^6 \Delta^2) \sim (\Delta^2 P^4 P^2 d^6 \Delta^2) \]

\[ \pi \left[ _{2}^{16}O \right] (\Delta^2 P^4 P^2 d^6 \Delta_{1/2}) \sim \left[ _{8}^{16}O \right] (\Delta^2 P^4 P^2 d^6 \Delta_{1/2}) \]

(a) \[ 16 \times 15 \pi (\Delta^2 P^4 P^2 d^6 \Delta^2) \sim (\Delta^2 P^4 P^2 d^6 \Delta^2) \]

(b) \[ 31^1p \]

15/16 ground odd proton \[ 1^1s_{1/2} \rightarrow j = \frac{1}{2} \text{ Parity = even} \]