This question is based on a comparison of the two mirror nuclei: ^{31}P and ^{31}S .

1. Use the semiempirical mass formula with the coefficients in the textbook (p.38) to calculate a theoretical total binding energy of each nucleus.

2. Use the measured mass values $\Delta(^{31}P)$= -24440.88 and $\Delta(^{31}S)$= -19044.6 keV to calculate the experimental total binding energy of each nucleus.

3. Compare the difference in the total measured binding energies between these two nuclei to the difference between the calculated Coulomb potentials [that were part of the calculation of the total binding energies in part (a)].

4. Use the single-particle shell model to: (a) identify the orbital occupied by the odd neutron in ^{31}S, and (b) the spin and parity of the ground state of the ^{31}P nucleus.