Group Activity 2

Due: In class, August 31st

- 1. Considering the terms of the 5-paramter liquid drop model, which parameter is responsible for the following feature of the nuclear landscape:
 - a. Location of valley of stability for low A?
 - b. Bend of valley of stability away from N=Z for large A?
 - c. Large A/Z ratios?
 - d. Lack of ultra-high A nuclides?
 - e. Existence of nuclides at all?
- 2. Where is the proton drip-line for the chlorine isotopes? Prove it using proton-separation energy calculations.

Calculate the experimental binding energy difference between ¹⁵N and ¹⁵O.
Assuming this is due to the Coulomb term of the SEMF, what radius corresponds to A=15?
Note that compared to a point-charge, a uniformly charged sphere has U_{sphere} = (3/5)U_{point}.
Compare this to the usual approximation for the nuclear radius (using r₀=1.2fm).

 In 1939, Isidor Rabi's group measured Q_{deuteron}=0.002 *e*barns. Calculate the corresponding ratio of the semimajor to semiminor axes a/c, given that the mean radius of a spheroid is R²=(1/2)(a²+c²).