PROBLEMS

1. Substituting the correct value for a_3 into equation (8-7) gives a relation between Z_A and A. Compare points predicted by this equation with the corresponding values for about ten known stable isotopes. Make the comparison graphical.

2. Dempster, in Physical Review 53:870 (1938), gives a curve of the packing fraction vs. the mass number. Using equation (8-8), plot packing fractions expected "theoretically" along with Dempster's experimental curve and note the degree of agreement.

3. Calculate the binding energies of neutrons to Th^{232}, Au^{197}, Sm^{149}, In^{115}, and Mn^{55}. Use the formula for M(A,Z), as was done at the end of Section 8.1. Sufficiently accurate *experimental* data for nuclear masses (for such an application as this) exist only for the lightest nuclei.

4. At what atomic number is instability reached according to the inequality of equation (8-10)? Use the expression for Z_A, the proper value of Z for a nucleus of weight A, that has been developed in equation (8-7).

5. Derive an energy distribution curve for fission neutrons, assuming a velocity V for the fission fragment and a Maxwell distribution of energies in the center of gravity system. Also assume that the probability of neutron escape is proportional to their velocity.

a-93-1c