

PRACTICE A

Binding Energy

1. Calculate the total binding energy of $^{20}_{10}\text{Ne}$ and $^{40}_{20}\text{Ca}$. (Refer to Appendix H for this and the following problems.)
2. Determine the difference in the binding energy of ^3_1H and ^3_2He .
3. Calculate the binding energy of the last neutron in the $^{43}_{20}\text{Ca}$ nucleus. (Hint: Compare the mass of $^{43}_{20}\text{Ca}$ with the mass of $^{42}_{20}\text{Ca}$ plus the mass of a neutron.)
4. Find the binding energy per nucleon of $^{238}_{92}\text{U}$ in MeV.

SECTION REVIEW

1. Does the nuclear mass or the charge of the nucleus determine what element an atom is?
2. Oxygen has several isotopes. What do these isotopes have in common? How do they differ?
3. Of atomic number, mass number, and neutron number, which are the same for each isotope of an element, and which are different?
4. The protons in a nucleus repel one another with the Coulomb force. What holds these protons together?
5. Describe the relationship between the number of protons, the number of neutrons, and the stability of a nucleus.
6. Calculate the total binding energy of the following:
 - a. $^{93}_{41}\text{Nb}$
 - b. $^{197}_{79}\text{Au}$
 - c. $^{27}_{13}\text{Al}$(Refer to Appendix H.)
7. How many protons are there in the nucleus $^{14}_6\text{C}$? How many neutrons? How many electrons are there in the neutral atom?
8. **Critical Thinking** Two isotopes having the same mass number are known as *isobars*. Calculate the difference in binding energy per nucleon for the isobars $^{23}_{11}\text{Na}$ and $^{23}_{12}\text{Mg}$. How do you account for this difference?