

## Mass Defect & Binding Energy Worksheet

Solve the following problems.

- Mass of a proton: 1.007825 units
- Mass of a neutron: 1.008665 units
- 1 amu = 931 MeV

| Match the following |                                                                                |    |                                                          |
|---------------------|--------------------------------------------------------------------------------|----|----------------------------------------------------------|
| i)                  | The Force used to keep protons together                                        | a) | Total binding energy                                     |
| ii)                 | The amount of energy needed to break a nucleus into protons and neutrons is... | b) | Distance                                                 |
| iii)                | Isotopes are ...                                                               | c) | Strong Nuclear Force                                     |
| iv)                 | Limitation of the Strong Nuclear Force                                         | d) | Atoms of the same element that can have different masses |

1. Tritium is an isotope of hydrogen. The mass of the tritium isotope, H-3, is 3.0160490 amu.
  - a. What is the mass defect of this isotope?
  - b. What is the binding energy of this isotope?
  - c. Find the binding energy per nucleon.
2. The mass of a C-12 nucleus is 12.00000 units.
  - a. What is the mass defect of this nucleus?
  - b. What is the binding energy of this nucleus?
  - c. Find the binding energy per nucleon.
3. An oxygen isotope, O-16, has a mass of 15.99491 units.
  - a. What is the mass defect of this isotope?
  - b. What is the binding energy of this isotope?
  - c. Find the binding energy per nucleon.
4. The mass of an iron-56 nucleus is 55.92066 units.
  - a. What is the mass defect of this nucleus?
  - b. What is the binding energy of the nucleus?
  - c. Find the binding energy per nucleon.
5. The binding energy of helium-4 is 28 MeV.
  - a. What is the mass of a helium nucleus (round to 5 decimal places)?