

## **CHAPTER 3a & 21 STUDY STUFF TO KNOW & DO**

### **THINGS TO KNOW**

- Be able to compare and contrast Dalton's Atomic Theory with the Modern Atomic Theory.
- Know the three laws that are supported by Dalton's Atomic Theory, know their definitions, and be able to explain how Dalton's Atomic Theory supports them. Also, be able to give and identify examples of each of them.
- Know the people and what they discovered. Be able to describe their experiments and explain the connection between the experimental results and the conclusions the scientists formed. (Democritus, Dalton, Thompson, Millikan, Rutherford, Chadwick, Meitner, Becquerel, Curies, the Joliot-Curies, Leo Szilard, and Enrico Fermi)
- Know the properties of subatomic particles and the properties of the three isotopes of hydrogen. Especially memorize the information in the tables: *Properties of Subatomic Particles* and *Isotopes of Hydrogen*.
- Mass defect and how it relates to bond energy
- What  $E = mc^2$  means and who discovered it
- Define and describe the factors that influence nuclear stability – bond energy and neutron to proton ratio, band of stability
- Know the 5 properties of radioactive nuclides.
- Memorize the nuclear symbols for ALL the particles involved in radioactive decay: alpha particle, beta particle, positron, proton, neutron
- Distinguish between alpha particles, beta particles, and gamma radiation
- Know the units for measuring the different aspects of radiation
- Describe uses of radioactive isotopes
- Describe with a diagram how an ionizing (Am) smoke detector works
- Know the parts of a nuclear reactor and their uses: shielding, control rods, nuclear fuel, moderators, and coolants
- Define nuclear fission, chain reaction, and nuclear fusion and distinguish between them.

### **THINGS TO KNOW HOW TO DO**

- Average atomic mass:  $AAM = (RAM_1 \cdot \%_1) + (RAM_2 \cdot \%_2) + \dots$
- Know how to write and interpret the two types of symbols for isotopes – hyphen notation and nuclear symbols.
- Calculate neutron to proton ratio and determine if a nuclide is stable or not
- Write nuclear equations for alpha decay, beta decay, electron capture, positron emission, etc.
- Work half-life problems – calculate the amount of an isotope remaining, the amount of time that has passed, and the time for one half-life