Structure of the Atom – Study Guide

*sections 2.2 and 2.3 in OpenStax*

*sections X and Y in the textbook*

**Structure of the Atom (Section 2.2)**

Most of the mass of an atom is contained in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the atom.

Most of the volume of an atom is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ space.

The nucleus is surrounded by negatively charged \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (give the name of the particle).

A neutral atom must contain equal numbers of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Explain how Rutherford’s Gold Foil Experiment indicates the existence of the nucleus:

Define isotope:

**Subatomic Particles (Section 2.3)**

AMU stands for: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_and represents a very (circle one) **small or large** mass.

Complete the following table:

|  |  |  |
| --- | --- | --- |
| Particle | Mass (amu) | Charge (relative) |
| Proton | 1.00727 |  |
|  |  | 0 |
|  |  | -1 |

Based on this, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ have almost no mass compared to the other particles.

Practice Problems:

Give the atomic numbers for each of the following elements using a periodic table:

 C \_\_\_\_\_ Fe \_\_\_\_\_ Br \_\_\_\_\_

Mass number is equal to the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The mass number is NOT on the periodic table. Mass number only represents the mass of ONE isotope, not the masses of all isotopes found in nature. The mass number can be written in the following two formats.

 mass # $$or Cl-35 mass #

Ions are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ particles formed when an element gains or loses \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

For ions the number of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ does not equal the number of electrons.

An element with two more protons than electrons will have a 2+ charge.

 Positive ions are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_.

An element with three more electrons than protons will have a 3- charge.

 Negative ions are called \_\_\_\_\_\_\_\_\_\_\_\_\_.

***Watch video tutorial on*** [***Atomic Number and Isotopes***](http://www.screencast.com/t/RWh2hcfH)

Complete the following table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Symbol** | **Protons** | **Neutrons** | **Electrons**  | **Mass Number** | **Charge** |
| $$$$ |  |  |  |  |  |
| $$2+ |  |  |  |  |  |
|  |  | 34 |  | 65 | 3+ |
|  | 34 |  | 36 | 79 |  |

**Atomic Mass**

The atomic mass, unlike the mass number, is not a whole number because elements exist as

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of isotopes in nature.

The atomic mass listed on the periodic table is equal to:

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

*Practice Problem*: Calculate the atomic mass for lithium (Li) given the following information.

|  |  |  |
| --- | --- | --- |
| **Isotope** | **Mass** | **Abundance** |
| 6Li | 6.0151 amu | 7.59% |
| 7Li | 7.0160 amu | 92.41% |

**End of Chapter 2 Practice Problems**

#11, 17, 19, 23, 25, 43

For detailed solutions to these problems, go to the [OpenStax website](https://openstaxcollege.org/textbooks/chemistry/resources) and download the “Student Answer and Solution Guide.”