Atomic Mass and Molar Mass – Study Guide

*section 3.1 in OpenStax*

**Molar Mass (Section 3.1)**

The **formula mass** of a compound is defined as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The units commonly used to express formula mass are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Avogadro’s number = 1 mole = \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ particles

This number can be used as a conversion factor to convert between moles and particles (atoms, ions, molecules).

Write the two possible conversion factors using Avogadro’s number:

The **molar mass** of a compound is defined as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The units commonly used to express molar mass are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

How is the molar mass of a compound *similar* to its formula mass?

How is the molar mass of a compound *different* from its formula mass?

Molar Mass is the mass of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The value of an element’s molar mass is numerically equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

*For example*, the molar mass of sodium can be obtained from the periodic table: 22.99 g/mol.

How would you calculate the molar mass of a **compound**?

What is the molar mass of Ca(NO3)2? *(ans. 164.10 g/mole)*

The molar mass of a compound can be used as a *conversion factor* to convert between \_\_\_\_\_\_\_\_\_\_\_

and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

Write the two possible conversion factors that can be obtained from the molar mass for oxygen.

***Watch video tutorial on*** [***Moles-to-grams Conversions***](https://www.youtube.com/watch?v=aQw-2oPvfK0)

Now solve the following problems using dimensional analysis:

1. Calculate the number of moles of iron in a 15.0 g sample of iron.

*(ans: 0.269 mol)*

1. Calculate the number of atoms in 0.25 mol of silicon.

*(ans: 1.5 x 1023 atoms)*

1. Calculate the mass in grams needed to have 2.65 x 1022 atoms of calcium.

*(ans: 1.76 g Ca)*

**End of Chapter 3 Practice Problems**

#1, 5, 11, 15, 17, 19, 23, 29, 31

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.”