

CHM 100 Chapter 8 Study Guide / Learning Objectives

Chapter 8 in your textbook deals with the mole concept. The mole is important in chemical calculations because (as a number of atoms) it relates directly to the coefficients in chemical equations. We discussed what a mole was, and how to relate it to the mass of a substance using formula weight. We also discussed how to determine the percentage composition by mass of a substance.

You are responsible for all the material in sections 8.1 through 8.6. Read the other sections, but don't worry about doing these calculations. I will not hold you responsible for the calculations in sections 8.7 - 8.9.

In addition to the material above, you are also responsible for the material on molarity (a concentration unit for solutions) covered in section 15.4 of your textbook. This material will allow you to relate volumes of solutions to the number of moles of solute they contain.

At the end of this chapter, you should be able to ...

[Terminology]

- Define terms related to the mass of atoms and molecules: **formula weight**, **molecular weight**.
- Define a **mole** and **molar mass**.
- Define **percentage composition**.
- Define **molarity**.

[Formula weight]

- Calculate the **formula weights** of **atoms**, **molecules**, or **ionic compounds** given the chemical formula and a periodic table.

[The mole]

- Calculate the **molar mass** of a compound. (*Hint: This is the same thing as calculating its formula weight*)
- Calculate the **moles of formula units in a given mass** of compound.
- Calculate the **grams of a compound necessary to have a given number of moles**.

[Percentage composition]

- Calculate the **percentage composition** of a compound given its chemical formula.
Example: What is the percentage of oxygen (by mass) in magnesium oxide, MgO?

[Molarity]

- Calculate the **number of moles** solute in a given volume of solution.
- Calculate the **volume** of a solution that contains a given number of moles of solute.

- Calculate the **mass solute** in a given volume of solution.
- Calculate the **molarity** of a solution given either the mass or moles of solute and the volume of solution.

[Practice]

- (p239-247) Q&P 10, 14, 20, 22, 28, 30, 34, 36, 38, 44, 46, 50
- (p504-505) Q&P 30, 32, 34, 36, 38, 44, 46, 52
- A few extra practice problems are included with this study guide.

<i>Find the molar mass of ...</i>	<i>Answers</i>
MgCl ₂	95.21 g
Mg(NO ₃) ₂	148.33 g
Mg	24.31 g
C ₂ H ₄	28.05 g

<i>Find the number of moles in ...</i>	<i>Answers</i>
15.0 g MgCl ₂	0.158 mol MgCl ₂
173.5 g Mg(NO ₃) ₂	1.170 mol Mg(NO ₃) ₂
1.4x10 ³ g C ₂ H ₄	5.0x10 ¹ mol C ₂ H ₄
24.02 g C	2.000 mol C

<i>Find the mass of ...</i>	<i>Answers</i>
1.50 mol MgCl ₂	143 g MgCl ₂
0.0421 mol Mg(NO ₃) ₂	6.24 g Mg(NO ₃) ₂
4.215 mol Mg	102.5 g Mg
1.4x10 ⁻³ mol C ₂ H ₄	3.9x10 ⁻² g C ₂ H ₄ (0.039 g)

<i>What is the percentage composition by mass of ...</i>	<i>Answers</i>
Oxygen in MgO	39.7% O by mass
Fluorine in MgF ₂	61.0 % F by mass