

**Part 1: What are unit conversions?**

- How many minutes are in 2 hours?
- How many shoes are in 5 pairs?
- How many moles of sodium chloride (NaCl) are in 2.5 g of sodium chloride (NaCl)?



The first two questions you can probably answer without giving it too much thought. The last question can be challenging if you don't know the relationship between moles of NaCl and grams of NaCl. How are these unit conversions performed? (Unit conversion: anytime we need to convert from one unit to another)

Step 1: Write down what you are starting with, including the units.

2 hours

Step 2: What units are you trying to achieve? Is there a way to relate hours to minutes?

2 hours                      ? minutes = ? hours  
60 minutes = 1 hour

Step 3: Create a conversion factor. In this example, minutes can be on the top with hours on the bottom OR hours can be on the top with minutes on the bottom. Make sure your numbers match the appropriate units.

2 hours                      ? minutes = ? hours  
60 minutes = 1 hour

$\frac{60 \text{ minutes}}{1 \text{ hour}}$                       OR                       $\frac{1 \text{ hour}}{60 \text{ minutes}}$

Step 4: Decide which conversion factor to use based on the units you have and the units you are trying to find. In this example, we are starting with hours but we want to end up with minutes. We want the hours units to cancel out, so we should use the conversion factor with hours units on the bottom. This will leave us with minutes, which is what we wanted to end up with.

2 hours                      ? minutes = ? hours  
60 minutes = 1 hour

$\frac{60 \text{ minutes}}{1 \text{ hour}}$                       OR                       $\frac{1 \text{ hour}}{60 \text{ minutes}}$

2 hours x  $\frac{60 \text{ minutes}}{1 \text{ hour}}$  = 120 minutes

Here is the process repeated for the second question, "how many shoes are in 5 pairs?"

5 pairs                      ? shoes = ? pairs  
2 shoes = 1 pair

$\frac{2 \text{ shoes}}{1 \text{ pair}}$                       OR                       $\frac{1 \text{ pair}}{2 \text{ shoes}}$

5 pairs x  $\frac{2 \text{ shoes}}{1 \text{ pair}}$  = 10 shoes

## Part 2: Making Unit Conversion Cards

You are going to make your own unit conversion cards using the equalities listed below. These kinds of conversions are very common in chemistry. For each equality, you should come up with 2 possible conversion factors. List the conversion factors next to the equalities.

*Example:* 1 mole of NaCl = 58.4 grams  $\frac{1 \text{ mole NaCl}}{58.4 \text{ grams NaCl}}$  OR  $\frac{58.4 \text{ grams NaCl}}{1 \text{ mole NaCl}}$

1. 1 mole of NaCN = 49.0 grams

2. 1 mole of KCN = 65.1 grams

3. 1 mole of KAu(CN)<sub>2</sub> = 288.1 grams

4. 1 mole of Mg(CN)<sub>2</sub> = 76.3 grams

You should have 4 index cards, one for each equality listed above. On one side of the index card you should copy one of the conversion factors. List the other conversion factor (for the same equality) on the back side of the same card. Make one card for each equality.

*Example:*

Front (g to mol)

$$\frac{1 \text{ mol NaCl}}{58.4 \text{ g NaCl}}$$

Back (mol to g)

$$\frac{58.4 \text{ g NaCl}}{1 \text{ mol NaCl}}$$

## Part 3: Using your conversion factor cards to solve mass $\leftrightarrow$ mole conversions

Spread out your unit conversion cards so you can see the values they have. You will use the cards to learn how to solve mass mole conversions. *For example,*

How many moles of NaCl are in 2.5 grams of NaCl?

### WORK SHOWN

$$2.5 \text{ g NaCl} \times \frac{1 \text{ mol NaCl}}{58.4 \text{ g NaCl}} = 2.5 \text{ g NaCl} \times \frac{1 \text{ mol NaCl}}{58.4 \text{ g NaCl}} = .04380 = 4.4 \times 10^{-2} \text{ mol NaCl}$$

- Always show your work as in the example.
- Always include units and chemical symbols and formulas.
- Show your final answer in scientific notation.