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SKILLS Toolkit

### Converting Between Amount in Moles and Number of Particles

1. Decide which quantity you are given: amount (in moles) or number of particles (in atoms, molecules, formula units, or ions).
2. If you are converting from amount to number of particles (going left to right), use the top conversion factor.
3. If you are converting from number of particles to amount (going right to left), use the bottom conversion factor.

The diagram illustrates the conversion between 'amount' and 'number of particles'. On the left, a box labeled 'amount' contains '? mol'. On the right, a box labeled 'number of particles' contains '? particles'. Two circular conversion factors are shown in the middle. The top circle contains  $\frac{6.022 \times 10^{23} \text{ particles}}{1 \text{ mol}}$  and an arrow points from the 'amount' box to the 'number of particles' box. The bottom circle contains  $\frac{1 \text{ mol}}{6.022 \times 10^{23} \text{ particles}}$  and an arrow points from the 'number of particles' box to the 'amount' box. A central oval labeled 'use Avogadro's number' is positioned between the two circles.

Questions from the PowerPoint lecture:

Using the information provided on Slide #3,

- a) 1 mole of any substance equals how many of that substance? \_\_\_\_\_
- b) 1 mole of water molecules contains how many H<sub>2</sub>O molecules? \_\_\_\_\_
- c) 1 mole of copper contains how many copper atoms? \_\_\_\_\_
- d) 1 mole of carbon contains how many atoms? \_\_\_\_\_
- e) 1 mole of sodium chloride contains how many NaCl formula units? \_\_\_\_\_
  - a. How many Na<sup>+</sup> ions? \_\_\_\_\_
  - b. How many Cl<sup>-</sup> ions? \_\_\_\_\_
- f) 1 mole of sodium dichromate contains how many K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> formula units? \_\_\_\_\_
  - a. How many K<sup>+</sup> ions? \_\_\_\_\_
  - b. How many Cr<sub>2</sub>O<sub>7</sub><sup>2-</sup> ions? \_\_\_\_\_

### In Summary:

1 mole of sucrose C<sub>12</sub>H<sub>22</sub>O<sub>11</sub> contains  $6.022 \times 10^{23}$  molecules.

1 mole of KBr contains \_\_\_\_ mole of KBr formula units, \_\_\_\_ mole of K<sup>+</sup> ions and \_\_\_\_ mole of Br<sup>-</sup> ions

1 mole of CaCl<sub>2</sub> contains \_\_\_\_ mole of CaCl<sub>2</sub> formula units, \_\_\_\_ mole of Ca<sup>+2</sup> ions and \_\_\_\_ moles of Cl<sup>-</sup> ions.

What's the difference between C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>, CaCl<sub>2</sub> and KBr?

## Practice

1. How many ions are there in 0.187 mol of  $\text{Na}^+$  ions?
2. How many atoms are there in  $1.45 \times 10^{-17}$  mol of arsenic?
3. How many moles of xenon do  $5.66 \times 10^{23}$  atoms equal?
4. How many moles do  $5.66 \times 10^{25}$  lithium ions,  $\text{Li}^+$ , equal?

