

Mole to Grams, Grams to Moles Conversions Worksheet

What are the molecular weights of the following compounds? (all masses must be to nearest hundredth)

- | | |
|----------------------|--|
| 1) NaOH | 2) H ₃ PO ₄ |
| 3) H ₂ O | 4) Mn ₂ Se ₇ |
| 5) MgCl ₂ | 6) (NH ₄) ₂ SO ₄ |

There are three definitions (equalities) of mole. They are:

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ particles}$$

$$1 \text{ mole} = \text{molar mass (could be atomic mass from periodic table or molecular mass)}$$

$$1 \text{ mole} = 22.4 \text{ L of a gas at STP (You do not need to worry about this yet)}$$

Each definition can be written as a set of two conversion factors. They are:

$$1 \text{ mole} = \text{molar mass(g)} \text{ can be written as } \left(\frac{1 \text{ mole}}{\text{molar mass (g)}} \right) \text{ OR } \left(\frac{\text{molar mass (g)}}{1 \text{ mole}} \right)$$

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ particles can be written as } \left(\frac{1 \text{ mole}}{6.02 \times 10^{23}} \right) \text{ OR } \left(\frac{6.02 \times 10^{23}}{1 \text{ mole}} \right)$$

Solve the following:

- 1) **How many moles** are in 15 grams of lithium? (**molar mass of lithium is 6.94 g/mole**)

$$\cancel{15 \text{ grams}} \times \frac{1 \text{ mole}}{\cancel{6.94 \text{ grams}}} = 2.1614 \text{ moles lithium} = \boxed{2.2 \text{ moles Li}}$$

- 2) **How many grams** are in 2.4 moles of sulfur? (**molar mass of sulfur is 32.07 g/ mole**)

$$\cancel{2.4 \text{ moles}} \times \frac{\cancel{32.07 \text{ grams}}}{1 \text{ mole}} = 76.97 \text{ grams sulfur} = \boxed{77 \text{ g Sulfur}}$$

- 3) **How many moles** are in 22 grams of argon?
- 4) **How many grams** are in 88.1 moles of magnesium?
- 5) **How many moles** are in 2.3 grams of phosphorus?

6) **How many grams** are in 11.9 moles of chromium?

7) **How many moles** are in 9.8 grams of calcium?

8) **How many grams** are in 238 moles of arsenic?

Solve the following:

9) How many grams are in 4.5 moles of sodium fluoride, NaF?

(molar mass of NaF is $22.99 + 19.00 = 41.99$ g/ mole)

$$\cancel{4.5 \text{ moles}} \times \frac{\cancel{41.99 \text{ grams}}}{\cancel{1 \text{ mole}}} = 188.955 \text{ g NaF} =$$

190 g NaF

10) How many moles are in 98.3 grams of aluminum hydroxide, Al(OH)₃?

(molar mass of Al(OH)₃ is $26.98 + (3 \times 16.00) + (3 \times 1.01) = 78.01$ g/ mole)

$$\cancel{98.3 \text{ grams}} \times \frac{\cancel{1 \text{ mole}}}{\cancel{78.01 \text{ grams}}} = 1.2601 \text{ moles Al(OH)}_3 =$$

1.26 moles Al(OH)₃

11) How many grams are in 0.02 moles of beryllium iodide, BeI₂?

12) How many moles are in 68 grams of copper (II) hydroxide, Cu(OH)₂?

13) How many grams are in 3.3 moles of potassium sulfide, K₂S?

14) How many moles are in 1.2×10^3 grams of ammonia, NH₃?

15) How many grams are in 2.3×10^{-4} moles of calcium phosphate, Ca₃(PO₃)₂?

16) How many moles are in 3.4×10^{-7} grams of silicon dioxide, SiO₂?

Mole Calculation Worksheet – Answer Key

What are the molecular weights of the following compounds?

- 1) NaOH $22.99 + 16.00 + 1.01 = 40.00$ grams/mol 2) H₃PO₄ $3(1.01) + 30.97 + 4(16.00) = 98.00$ grams
3) H₂O $2(1.01) + 16.00 = 18.02$ grams 4) Mn₂Se₇ $2(54.94) + 7(78.96) = 662.60$ grams
5) MgCl₂ $= 24.31 + 2(35.45) = 95.21$ grams 6) (NH₄)₂SO₄ $2(14.01) + 8(1.01) + 32.07 + 4(16.00) = 132.17$ grams

Solve the following:

- 1) How many moles are in 15 grams of lithium? 2.161 moles = **2.2 moles**
2) How many grams are in 2.4 moles of sulfur? 76.968 g = **77 grams**
3) How many moles are in 22 grams of argon? 0.550688 moles = **0.55 moles**
4) How many grams are in 88.1 moles of magnesium? 2141.711 grams = **2140 g**
5) How many moles are in 2.3 grams of phosphorus? 0.074265 moles = **0.074 moles**
6) How many grams are in 11.9 moles of chromium? 618.8 grams = **619 g**
7) How many moles are in 9.8 grams of calcium? 0.24451 moles = **0.24 moles**
8) How many grams are in 238 moles of arsenic? $17,830.96$ grams = **17,800 g**
9) How many grams are in 4.5 moles of sodium fluoride, NaF? 188.955 g NaF = **190 g**
10) How many moles are in 98.3 grams of aluminum hydroxide, Al(OH)₃? 1.2601 moles = **1.26 moles**
11) How many grams are in 0.02 moles of beryllium iodide, BeI₂? 5.2562 grams = **5 g**
12) How many moles are in 68 grams of copper (II) hydroxide, Cu(OH)₂? 0.6969 moles = **0.70 moles**
13) How many grams are in 3.3 moles of potassium sulfide, K₂S? 363.891 grams = **360 g**
14) How many moles are in 1.2×10^3 grams of ammonia, NH₃? 70.5882 moles = **71 moles**
15) How many grams are in 2.3×10^{-4} moles of calcium phosphate, Ca₃(PO₃)₂? 0.06398 g = **0.064 g**
16) How many moles are in 3.4×10^{-7} grams of silicon dioxide, SiO₂? 5.6582×10^{-9} mol = **5.7×10^{-9} mol**
17) How many grams are in 1.11 moles of manganese sulfate, Mn₃(SO₄)₇? $1.11 \times 837 = 929.07$ grams
Bad formula