

Periodic Table Hopscotch Laboratory:

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Students' Guide

Goals

- Visualize the concept of the mole
- Gain experience in calculating grams and moles

The Activity

In this activity, you will visualize the concept of the mole using a mole of chalk as a model. You will practice calculations of moles and grams, and end up with a better understanding of what a mole is and how chemists use it.

Materials for Each Group

- Data book and pencil
- A chunk of chalk
- Semi-analytical balance
- Electronic balance, if available
- A table of atomic masses
- A calculator

SAFETY

No special safety considerations are required.

Instructions

1. Take a chunk of chalk and measure its mass on the balance: _____
2. Go outside and draw something on the sidewalk.
3. Go back in class and weigh the unused chalk: _____
4. Based on the initial mass of the chalk and the mass at the end, calculate how many grams of chalk you left out on the sidewalk: _____
5. Write down the molecular formula of the chalk: _____
6. Get the masses of the atoms: _____
7. Calculate the chalk's molar mass: _____
8. Using this data, calculate:
 - a. How many moles of chalk did you leave on the sidewalk? _____
 - b. How many molecules of chalk did you leave on the sidewalk? _____
 - c. How many atoms of calcium did you use? _____
 - d. How many atoms of carbon did you use? _____
 - e. How many atoms of oxygen did you use? _____

Molar Mass Worksheet

Calculate the molar masses of the following chemicals:

- 1) Cl_2
- 2) KOH
- 3) BeCl_2
- 4) FeCl_3
- 5) BF_3
- 6) CCl_2F_2
- 7) $\text{Mg}(\text{OH})_2$
- 8) UF_6
- 9) SO_2
- 10) H_3PO_4
- 11) $(\text{NH}_4)_2\text{SO}_4$
- 12) CH_3COOH
- 13) $\text{Pb}(\text{NO}_3)_2$
- 14) $\text{Ga}_2(\text{SO}_3)_3$

Moles Worksheet

- 1) Define "mole".
- 2) How many moles are present in 34 grams of $\text{Cu}(\text{OH})_2$?
- 3) How many moles are present in 2.45×10^{23} molecules of CH_4 ?
- 4) How many grams are there in 3.4×10^{24} molecules of NH_3 ?
- 5) How much does 4.2 moles of $\text{Ca}(\text{NO}_3)_2$ weigh?
- 6) What is the molar mass of MgO ?
- 7) How are the terms "molar mass" and "atomic mass" different from one another?
- 8) Which is a better unit for expressing molar mass, "amu" or "grams/mole"?

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Chemistry: Mole Problems #1

General Questions

10.0 mole Li = ___ g Li

1.

3.00 mole of Mg = ___ atoms Mg

2.

5.00×10^{23} atoms C = ___ mole C

3.

7.25 g Cu = ___ atoms Cu

4.

2.22×10^{25} atoms Pb = ___ mole Pb

5.

15.0 mole K = ___ atoms K

6.

4.65×10^{22} atoms S = ___ mole S

7.

333 g Mg = ___ mole Mg

8.

48.0×10^{23} atoms O = ___ grams O

9.

0.250 mole Br = ___ atoms Br

10.

Define mole.

11.

Define molar mass.

12.

State Avogadro's number.

13.

Check Your Answers

E Saylor

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Mole Calculation Worksheet

- 1) How many moles are in 15 grams of lithium?
- 2) How many grams are in 2.4 moles of 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?

What are the molecular weights of the following compounds?

- | | |
|-----------------------|---|
| 9) NaOH | 12) H ₃ PO ₄ |
| 10) H ₂ O | 13) Mn ₂ Se ₇ |
| 11) MgCl ₂ | 14) (NH ₄) ₂ SO ₄ |

- 15) How many grams are in 4.5 moles of sodium fluoride, NaF?
- 16) How many moles are in 98.3 grams of aluminum hydroxide, Al(OH)₃?
- 17) How many grams are in 0.02 moles of beryllium iodide, BeI₂?
- 18) How many moles are in 68 grams of copper (II) hydroxide, Cu(OH)₂?
- 19) How many grams are in 3.3 moles of potassium sulfide, K₂S?
- 20) How many moles are in 1.2×10^3 grams of ammonia, NH₃?
- 21) How many grams are in 2.3×10^{-4} moles of calcium phosphate, Ca₃(PO₃)₂?
- 22) How many moles are in 3.4×10^{-7} grams of silicon dioxide, SiO₂?
- 23) How many grams are in 1.11 moles of manganese sulfate, Mn₃(SO₄)₇?