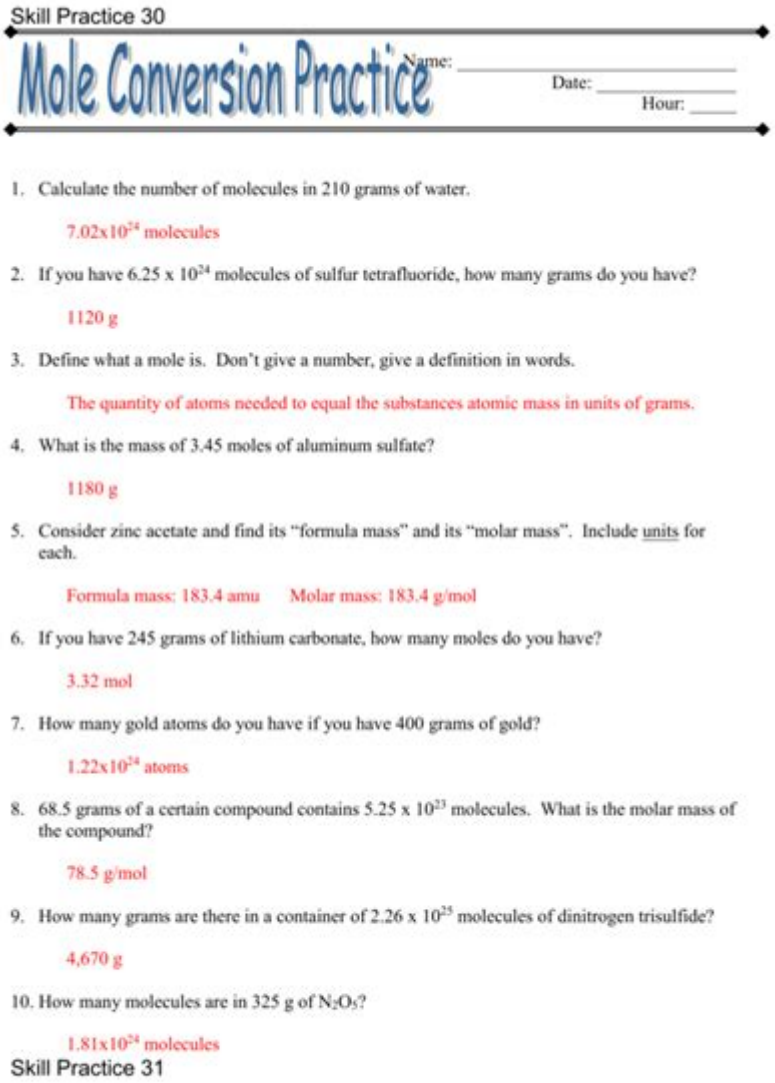
Skill Practice 30 Mole Conversion Practice Answers



Skill Practice 30

Mole Conversion Practice

Name: _____

Date: _____

Hour: ____

1. Calculate the number of molecules in 210 grams of water.

   7.02×10^{24} molecules

2. If you have 6.25×10^{24} molecules of sulfur tetrafluoride, how many grams do you have?

   1120 g

3. Define what a mole is. Don't give a number, give a definition in words.

   The quantity of atoms needed to equal the substances atomic mass in units of grams.

4. What is the mass of 3.45 moles of aluminum sulfate?

   1180 g

5. Consider zinc acetate and find its "formula mass" and its "molar mass". Include units for each.

   Formula mass: 183.4 amu Molar mass: 183.4 g/mol

6. If you have 245 grams of lithium carbonate, how many moles do you have?

   3.32 mol

7. How many gold atoms do you have if you have 400 grams of gold?

   1.22×10^{24} atoms

8. 68.5 grams of a certain compound contains 5.25×10^{23} molecules. What is the molar mass of the compound?

   78.5 g/mol

9. How many grams are there in a container of 2.26×10^{25} molecules of dinitrogen trisulfide?

   4,670 g

10. How many molecules are in 325 g of N_2O_5?

    1.81×10^{24} molecules

Skill Practice 31

Skill practice 30 mole conversion practice answers is an essential topic for students and professionals in chemistry. Mastering mole conversions is crucial for solving various chemical problems and understanding stoichiometry, which is the quantitative relationship between reactants and products in a chemical reaction. This article will delve into the concept of moles, the significance of mole conversions, and provide a comprehensive guide to practicing mole conversions through 30 example problems and their answers.

Understanding Moles in Chemistry

Moles are a fundamental unit in chemistry that allows chemists to quantify substances. The mole is defined as the amount of substance that contains as many entities (atoms, molecules, ions, etc.) as there are in 12 grams of carbon-12. This number, known as Avogadro's number, is approximately 6.022×10^{23}.

Why Moles Matter

1. Quantitative Analysis: Moles enable chemists to convert between mass, volume, and the number of particles in a chemical reaction.
2. Stoichiometry: Understanding how reactants and products relate in a chemical equation is crucial for predicting the outcomes of reactions.
3. Reactivity and Yield: Moles help predict how much product can be formed from a given amount of reactant, allowing for efficient planning and resource management in laboratory settings.

Mole Conversion Basics

Mole conversions often involve three key relationships:

1. Moles to Grams: To convert moles to grams, use the formula:
$$
\text{grams} = \text{moles} \times \text{molar mass}
$$

2. Grams to Moles: To convert grams to moles, use the formula:
$$
\text{moles} = \frac{\text{grams}}{\text{molar mass}}
$$

3. Moles to Particles: To convert moles to particles (atoms, molecules, ions), use the formula:
$$
\text{particles} = \text{moles} \times \text{Avogadro's number}
$$

4. Particles to Moles: To convert particles to moles, use the formula:
$$
\text{moles} = \frac{\text{particles}}{\text{Avogadro's number}}
$$

30 Mole Conversion Practice Problems and Answers

To solidify your understanding of mole conversions, here are 30 practice problems along with their solutions. Each problem will follow the basic conversion formulas outlined above.

1. Convert 5 moles of NaCl to grams.

- Molar mass of NaCl = 58.44 g/mol
- Calculation: $5 \, \text{moles} \times 58.44 \, \text{g/g/mol} = 292.2 \, \text{g}$

2. Convert 250 grams of H2O to moles.

- Molar mass of H2O = 18.02 g/mol
- Calculation: $\frac{250 \, \text{g}}{18.02 \, \text{g/mol}} = 13.88 \, \text{moles}$

3. How many molecules are in 2 moles of CO2?

- Calculation: $2 \, \text{moles} \times 6.022 \times 10^{23} \, \text{molecules/mol} = 1.2044 \times 10^{24} \, \text{molecules}$

4. Convert 1500 grams of CaCO3 to moles.

- Molar mass of CaCO3 = 100.09 g/mol
- Calculation: $\frac{1500 \, \text{g}}{100.09 \, \text{g/mol}} = 14.99 \, \text{moles}$

5. How many grams are in 4 moles of C6H12O6?

- Molar mass of C6H12O6 = 180.18 g/mol
- Calculation: $4 \, \text{moles} \times 180.18 \, \text{g/mol} = 720.72 \, \text{g}$

6. Convert 0.5 moles of KCl to grams.

- Molar mass of KCl = 74.55 g/mol
- Calculation: $0.5 \, \text{moles} \times 74.55 \, \text{g/mol} = 37.28 \, \text{g}$

7. How many moles are in 100 grams of Fe?

- Molar mass of Fe = 55.85 g/mol
- Calculation: $\frac{100 \, \text{g}}{55.85 \, \text{g/mol}} = 1.79 \, \text{moles}$

8. Convert 6.022 x 10^24 molecules of H2 to moles.

- Calculation: $\frac{6.022 \times 10^{24} \, \text{molecules}}{6.022 \times 10^{23} \, \text{molecules/mol}} = 10 \, \text{moles}$

9. How many grams are in 3 moles of NH3?

- Molar mass of NH3 = 17.03 g/mol
- Calculation: $3 \, \text{moles} \times 17.03 \, \text{g/mol} = 51.09 \, \text{g}$

10. Convert 80 grams of Ag to moles.

- Molar mass of Ag = 107.87 g/mol
- Calculation: $\frac{80 \, \text{g}}{107.87 \, \text{g/mol}} = 0.74 \, \text{moles}$

11. Convert 0.25 moles of CH4 to grams.

- Molar mass of CH4 = 16.04 g/mol
- Calculation: $0.25 \, \text{moles} \times 16.04 \, \text{g/mol} = 4.01 \, \text{g}$

12. How many molecules are in 1.5 moles of O2?

- Calculation: $1.5 \, \text{moles} \times 6.022 \times 10^{23} \, \text{molecules/mol} = 9.033 \times 10^{23} \, \text{molecules}$

13. Convert 200 grams of C to moles.

- Molar mass of C = 12.01 g/mol
- Calculation: $\frac{200 \, \text{g}}{12.01 \, \text{g/mol}} = 16.64 \, \text{moles}$

14. How many grams are in 2.5 moles of NaOH?

- Molar mass of NaOH = 40.00 g/mol
- Calculation: $2.5 \, \text{moles} \times 40.00 \, \text{g/mol} = 100.00 \, \text{g}$

15. Convert 1200 molecules of water to moles.

- Calculation: $\frac{1200 \, \text{molecules}}{6.022 \times 10^{23} \, \text{molecules/mol}} = 1.99 \times 10^{-21} \, \text{moles}$

16. Convert 100 grams of C3H8 to moles.

- Molar mass of C3H8 = 44.10 g/mol
- Calculation: $\frac{100 \, \text{g}}{44.10 \, \text{g/mol}} = 2.27 \, \text{moles}$

17. How many grams are in 0.75 moles of H2SO4?

- Molar mass of H2SO4 = 98.08 g/mol
- Calculation: $0.75 \, \text{moles} \times 98.08 \, \text{g/mol} = 73.56 \, \text{g}$

18. Convert 5.5 moles of K to grams.

- Molar mass of K = 39.10 g/mol
- Calculation: $5.5 \, \text{moles} \times 39.10 \, \text{g/mol} = 215.05 \, \text{g}$

19. How many moles are in 800 grams of C2H5OH?

- Molar mass of C2H5OH = 46.

Frequently Asked Questions

What is the purpose of mole conversion practice?

Mole conversion practice helps students understand and apply the concept of moles in chemistry, allowing them to convert between moles, mass, and number of particles effectively.

How do you convert moles to grams?

To convert moles to grams, you multiply the number of moles by the molar mass of the substance (in grams per mole). The formula is: grams = moles × molar mass.

What is the molar mass of water (H2O) for mole conversion?

The molar mass of water (H2O) is approximately 18.02 grams per mole,

calculated by adding the molar masses of hydrogen (1.01 g/mol) and oxygen (16.00 g/mol).

How can you practice mole conversions effectively?

Effective practice can be achieved by working on a variety of problem sets, utilizing online resources and quizzes, and collaborating with peers to solve conversion problems.

What is Avogadro's number and its significance in mole conversion?

Avogadro's number is 6.022×10^{23}, which represents the number of particles in one mole of a substance. It is essential for converting between moles and the number of atoms, molecules, or ions.

Can you provide an example of a mole conversion problem?

Sure! For example, to convert 2 moles of sodium chloride (NaCl) to grams, multiply 2 moles by the molar mass of NaCl (58.44 g/mol): 2 moles × 58.44 g/mol = 116.88 grams.

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