

Mole Conversion Practice Test

Name:

Date:

Block:

$1 \text{ L} = 1000 \text{ mL}$

$1 \text{ kg} = 1000 \text{ g}$

$1 \text{ g} = 1000 \text{ mg}$

_____ 1. The percentage of calcium (by mass) in the molecule $\text{Ca}_3\text{Fe}_2(\text{SiO}_4)_3$ is

- a) 7.89 % b) 22.0 % c) 23.7 % d) 54.4 %

Show your work below:

_____ 2. A molecular formula tells us:

- a) The actual number of atoms of each element in a compound
b) The lowest ratio of atoms of each element in a compound
c) All possible multiples of an empirical formula
d) The concentration of that compound in a solution

_____ 3. What are the units for molarity?

- a) g / L b) mol / mL c) mol / L d) L / mol

_____ 4. The empirical formula tells us:

- a) the actual number of atoms in a compound
b) the concentration of a compound
c) the molar mass of a compound
d) the lowest ratio of each element in a compound

_____ 5. Another term for molarity is:

- a) concentration b) molar mass c) molecular formula d) moles/ gram

_____ 6. What is the mass of a single molecule of water?

- a) 3.0×10^{-23} grams b) 1.0 gram c) 6.0×10^{-22} gram d) 18.0 grams e) 2.9×10^{23} grams

_____ 7. At the same temperature and pressure, which sample of gas contains the same number of particles as one liter of oxygen, O_2 ?

- a) one liter of He
b) three liters of CO_2
c) two liters of Ne
d) two liters of H_2
e) four liters of SO_3

Written:

1. How many atoms are in $\text{Ni}(\text{H}_2\text{O})_2(\text{NH}_3)_3\text{Cl}_2$?
2. What is the mass of a 250.0 mL sample of hydrogen sulfide (H_2S) at STP?
3. At STP, argon gas has a molar volume of _____.
4. How many molecules of potassium iodide are in 10.0g of potassium iodide?
5. A 0.600 mol sample of an unknown gas has a mass of 52.8 g. This gas is a compound of carbon and fluorine. Find the molecular formula.
6. An experiment is conducted to calculate the molar volume. The following data is collected:

Moles of N_2 gas	0.00166 mol
Volume of N_2 collected	47.2 mL
Room temperature	21.0°C
Pressure	100.4 kPa

Calculate the molar volume of N_2 at 21.0°C and 100.4 kPa using the data.

7. Find the volume occupied by 21.6g of N_2H_4 gas at STP.

8. The molar volume of H_2 at $21.0^\circ C$, 100.4 kPa is 24.3 L/mol . Calculate the mass of 0.213 L of H_2 .
9. Aspartame is an artificial sweetener that is 160 times sweeter than sucrose (table sugar) when dissolved in water. It is marketed as NutraSweet. The molecular formula for aspartame is $C_{14}H_{18}N_2O_5$.
- Calculate the molar mass of aspartame.
 - How many moles of molecules are present in 10.0 g of aspartame?
 - Calculate the mass in grams of 1.56 mol of aspartame.
 - How many molecules are in 5.0 mg of aspartame?
10. Nitrosyl chloride ($NOCl$) is a gas used in the synthesis of some pharmaceutical compounds. Find the mass of a 5.62 mL sample of nitrosyl chloride at STP.

11. Find the empirical formula for the following compounds:

a) 15.9% B, 84.1% F

b) 70.0% Fe, 30.0% O

12. What molar concentration of KCl is produced by measuring out 1.0g KCl and adding water up to 0.350L of solution?