

Name _____

Counting Atoms Study Guide

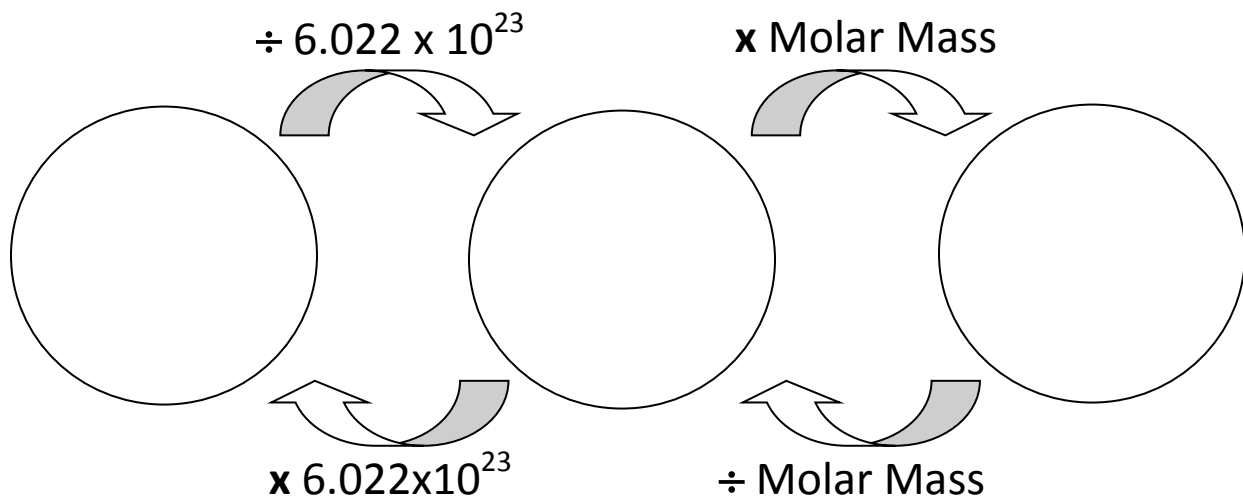
Part I - Definitions:

A mole is defined as the number of atoms in _____ grams of Carbon-12. The number of atoms or molecules in a mole is known as _____ number, and is equal to _____. A mole is the SI unit for _____ of a pure substance.

A mole has a different _____ depending upon the substance it is measuring: just as a dozen bowling balls weigh more than a dozen ping-pong balls. The mass of a mole of a particular substance is the _____ mass of that substance. Molar mass has _____ of grams/mole. The molar mass of an element is a mass in _____ numerically equal to the _____ mass for that element in the Periodic Table. The molar mass of a compound is equal, in grams, to the _____ of the atomic masses of the atoms which make up the compound.

Word Bank: 6.022×10^{23} , 12, molar, grams, units, amount, Avogadro's, mass, atomic, element, sum

Part II - Mole, Grams, and Particle Calculations



Number of moles in 10 grams of HF:

$$12 \text{ g} \div \text{___ g/mol} = \text{___ mol}$$

Number of atoms in 5 moles of Cu:

$$5 \text{ mol Cu} \times \text{_____} = \text{_____ atoms}$$

Number of atoms in 56 grams of Si:

$$(56 \text{ g Si} \div \text{___ g/mol}) \times \text{_____} \\ = \text{_____ atoms}$$

Number of grams in 2 moles of H_2O :

$$2 \text{ mol} \times \text{___ g/mol} = \text{___ g}$$

Number of moles in 1.2044×10^{22} atoms of Al:

$$1.2044 \times 10^{22} \text{ atoms} \div \text{_____} = \text{___ mol}$$

Number of grams in 3.011×10^{24} atoms of U:

$$(3.011 \times 10^{24} \text{ atoms} \div \text{_____}) \times \text{___ g/mol} \\ = \text{_____ grams}$$

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More Practice:

How many moles are in 90 grams of water (H₂O)?

How many grams of mass do 3 moles of NH₃ have?

How many atoms are in 0.1 moles of an element?

What is the mass in grams of 10²⁶ atoms of lithium (Li)? _____

Formulas and Moles:

A chemist wants to prepare the compound BH₃. She has 21.6 grams of boron (B). How many grams of Hydrogen does she need?

$$21.6 \text{ g B} \div \text{ ______ g/mol} = \text{ ______ mol B} \quad \text{ ______ mol B} \times \text{ ______} = \text{ ______ mol H}$$

$$\text{ ______ mol H} \times \text{ ______ g/mol} = \text{ ______ g H}$$

A chemist wants to prepare the compound LiBr. She has 0.694 grams of Li. How many grams of Bromine does she need?

HONORS: A cube of titanium (Ti) has a volume of one cubic centimeter. The density of titanium is 4.506 grams/cm³.

How many atoms of Titanium are in this cube?

Assuming these atoms are arranged in an NxNxN cubic lattice, what is N?

Assuming that the spacing of the lattice is equal to one atomic diameter, what is the diameter of a Ti atom?