

2. Mole Concept II

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Lab 2. Mole Concept II

Purpose:

To practice using the mole and making mole calculations.

Procedure:

A. Mass a penny. Assuming it is pure copper, calculate:

1. The number of moles of copper.
2. The number of copper atoms present in the penny.

B. Mass 20 drops of water from your eyedropper, calculate:

1. The number of moles of water present in only one drop of water.
2. The number of molecules of water present in that one drop of water.

C. Mass one of the small pieces of the polyvinyl chloride(PVC) pipe, C_2H_3Cl , calculate:

1. The number of moles of PVC in your sample.
2. The number of molecules of PVC in your sample.
3. The number of carbon atoms contained in your sample.
4. The total number of all the types of atoms in your sample.

D. Mass one of the Styrofoam cups which are made of polystyrene, C_8H_8 , calculate:

1. The number of moles of polystyrene in your cup.
2. The total number of all the types of atoms in your sample.

Data:

A.	3.07g	penny
B.	0.72g	20 drops of water

C.	6.49g	PVC
D.	3.61g	Styrofoam cup

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Analysis:

A. $3.07\text{g}/63.546\text{ amu} = \underline{0.0483\text{ mol}}$ <-1.

$0.0483\text{ mol} * 6.022 * 10^{23} = \underline{2.91 * 10^{22}\text{ atoms Cu}}$ <-2.

B. $0.72\text{g}/20 = 0.036\text{g}$ $0.036\text{g}/(1.00794 + 15.9994) = \underline{0.0021\text{ mol}}$ <-1.

$0.0021\text{ mol} * 6.022 * 10^{23} = \underline{1.26 * 10^{21}\text{ molecules}}$ <-2.

C. $6.49/[2(12.0107) + 3(1.00794)] = \underline{0.104\text{ mol PVC}}$ <-1.

$0.104 * 6.022 * 10^{23} = \underline{6.26 * 10^{22}\text{ molecules}}$ <-2.

$6.26 * 10^{22} * 2 = \underline{1.25 * 10^{23}\text{ carbon atoms}}$ <-3.

$6.26 * 10^{22} * 3 = \underline{1.88 * 10^{23}\text{ hydrogen atoms}}$ <-4.

D. $3.61\text{g}/(8 * 12.0107 + 8 * 1.00794) = \underline{0.0347\text{ mol}}$ <-1.

$0.0347 * 6.022 * 10^{23} = 2.090\text{ molecules}$

$2.090 * (8 + 8) = \underline{3.34\text{ atoms}}$

Conclusion:

Avogadro's number links the amount of atoms or molecules in a substance to the mole. the molar mass is used to convert between mass of a substance and the mole. $\{\text{mole}\} = \{\text{number of atoms or molecules}\} / \{\text{Avogadro's number}\}$ $\{\text{mole}\} = \{\text{mass(g)}\} / \{\text{molar mass(amu)}\}$ $\{\text{atoms}\} = \{\text{molecules}\} * \{\text{atoms per molecules}\}$ $\{\text{molecule}\} = \{\text{moles}\} * \{\text{Avogadro's number}\}$. Molecules are made of atoms.