Open Learning Initiative: Stoichiometry I

Answer Sheet
For full credit, be sure to show all steps and calculations involved for any problem. Simply showing the correct answer will earn you zero points for any particular question.

Module 2: The Mole
Complete Practice: The Mole
Did I Get This?
1. How many carbon dioxide molecules are in a mole of carbon dioxide (CO₂)?
2. Which has more molecules, a mole of hydrogen molecules (H₂) or a mole of water molecules (H₂O)?
3. If a half a dozen donuts is 6 donuts, how many doughnuts are in a half of a mole of donuts?
4. Which has more mass, a mole of gummy bears, or a mole of carbon atoms?

Module 4: Measuring arsenic in the lab
Learn by Doing: Measuring arsenic concentration
Activity 1: What is the concentration of arsenite (AsO₂) that is present in the well sample? (use three significant figures for your answer)

Module 5: Basic tools of stoichiometry
Did I Get This? Practice: Significant Figures
1. The universal gas constant is approximately 0.0821 L atm mol⁻¹ K⁻¹. How many significant figures are given here?
2. What is the correct answer (reported to the proper number of significant figures) to the following? 6.3 * 3.25 = _______
3. You add 0.6 ounces of milk to a cup with 8 ounces of coffee. How much liquid is now in the cup, to the correct amount of significant figures?
4. A wooden object has a mass of 10.782 g and occupies a volume of 13.72 mL. What is the density of the object determined to an appropriate number of significant figures? (Hint: density = mass / volume)
5. Which of the following has the same number of significant figures as the number 1.00580?

Did I Get This? Practice: Dimensional Analysis
1. There are four hydrogen atoms in a molecule of methane (CH₄). How many hydrogen atoms are there in two moles of methane?
2. How many moles of oxygen are there in ten million oxygen atoms? Use three significant figures.
3. There are _____ molecules of methane in 0.123 mol of methane (CH₄).
4. The recommended adult dose of Elixophyllin(tm), a drug used to treat asthma, is 6.0 mg/kg of body mass. Calculate the dose in milligrams for a 115-lb person (Note: 1 lb = 453.59 grams)

Did I Get This? Practice: Calculating Molecular Weight
1. Using the table above, calculate the molecular weight of water, H₂O.
2. Calculate the molecular weight of sodium nitrate, NaNO₃.
3. Calculate the molecular weight of calcium nitrate, Ca(NO₃)₂.
4. Calculate the molecular weight of chromium (III) carbonate, Cr₂(CO₃)₃.

Did I Get This? Practice: Using Molecular Weight
1. How many grams of compound are present in 3.942 moles of F₂?
2. What is the weight in grams of 7.03 moles of H₂SO₄?
3. How many moles of compound are present in 100.0 g of NaHCO₃?
4. A gold bar at Fort Knox weighs approximately 12.441 kg. How many atoms of gold are there in a Fort Knox gold bar?
5. How many moles of sodium carbonate are present in 1.773 x 10¹⁷ atoms of sodium carbonate, Na₂CO₃?

Did I Get This? Practice: Composition stoichiometry
1. Nitroglycerin has the chemical formula C₃H₅N₃O₉. How many moles of carbon are in there in 2.00 moles of nitroglycerin?
2. How many grams of nitrogen are in 2.00 grams of nitroglycerin C₃H₅N₃O₉?
3. What is the percent mass of the element oxygen in nitroglycerin C₃H₅N₃O₉?
4. How many carbon atoms are there in 52.06 g of carbon dioxide, CO₂?
5. An unknown nitrogen oxide compound is 63.65% nitrogen by mass. The molecular formula of this substance would be: ?

Did I Get This? Practice: Solution stoichiometry
1. What is the concentration of a sodium chloride (NaCl) solution prepared by dissolving 9.3 g of NaCl in sufficient water to give 350 mL of solution?
2. There are ____ mol of chloride ions in 0.500 L of a 0.300M solution of AlCl₃.
3. There are 0.625 moles of NaCl in 1.00 L of sea water. How many grams of NaCl are dissolved in 4.55 L of sea water?
4. Which of the following solutions has the highest number of sodium ions?
5. How many moles of potassium ion, K⁺, are present in 343 mL of a 1.410 M solution of K₃PO₄?

Module 6: Testing water for arsenic contamination
Learn by Doing: Checking for WHO compliance - I
Activity 1: How many micrograms per liter of As is in the sample?

Learn by Doing: Checking for WHO compliance - II
Note that in this problem, you have two sources of arsenic in the well water (AsO₂⁻ and AsO₄⁻³). You will calculate the concentration from each source and add them together.
Activity 1: How many micrograms per liter of arsenic are in the sample?