Problem Set #3 (NOT GRADED/NOT SCORED) - Moles, N_A, Compound Names
Chemistry 3A Fall 2025 (Secs 43957 & 43958)
3 pages

This is ungraded practice as a preliminary to a scored/graded homework assignment to follow. I suggest you do the problems quickly and submit them, and I will review and respond to them so that you know how to perform for the work to be scored.
YOU DON'T HAVE TO DO ALL OF THEM, although it is recommended. You can decide if you "know something enough" and skip it. I will only review what you respond to.

These problems focus on calculations only, which are often thought to be more difficult. The follow-up scored homework will include your knowledge of concepts.

NOTE: Avogadro's Number can refer to number of (i) particles, (ii) atoms, (iii) molecules, and also—adding this—(iv) formula units (!)

---

1. Write the molecular or formula unit formulas for the following named compounds, and next to the formula, write if it is "ionic" or "not ionic":
   a. Diphosphorus pentoxide
   b. Calcium chloride
   c. Sulfur dioxide
   d. Aluminum bromide
   e. Nitrogen triiodide
   f. Zinc sulfide
   g. Carbon tetrachloride
   h. Dinitrogen monoxide
   i. Silicon dioxide
   j. Phosphorus trichloride
   k. Sulfur hexafluoride
   l. Magnesium nitride
   m. Iron(III) oxide
   n. Sodium sulfate
   o. Potassium phosphate
   p. Ammonium carbonate
2. Write the names of the following compounds:
   a. N_2O_4
   b. PCl_3
   c. Ca_3PO_4
   d. MgO
   e. CCl_4
   f. $(NH_4)_2SO_4$
   g. $CuCl_2$
   h. SO_2

i. Na_2CO_3
j. N_2O_5
k. LiI
l. CO_2
m. FeO
n. P_2O_5
o. H_2O

3. You have 3.011×10^{23} atoms of pure iron (Fe). How many moles of Fe do you have?

4. You have 3.011×10^{24} molecules of water (H_2O). How many moles of water do you have?

5. You have 0.254 mol calcium carbonate
   a. write the structure (formula of the formula unit) of calcium carbonate

   b. calculate the number of formula units of calcium carbonate you have

   c. using the Periodic Table, calculate the molar mass of calcium carbonate

6. You have 9.50 mol of carbon dioxide
   a. write the molecular formula of carbon dioxide

   b. calculate the number of molecules of carbon dioxide you have

   c. using the Periodic Table, calculate the molar mass of carbon dioxide

7. Convert:
   a. 1.02 *nmol* to *mol*. Use scientific notation

   b. 2.34×10^{-6} *mol* to *mmol*

   c. 0.0092 *mol* to *mmol*

d. 1.0×10^6 *nmol* to *mol*

8. You have 3 nmol of Fe_2O_3
   a. What is the name of the compound?

   b. How many moles do you have? Use scientific notation if the numbers is greater than 100 or less than 0.01

   c. How many formula units do you have?

   d. What is the molar mass of the compound?

   e. How many grams of Fe_2O_3 do you have?

   f. How many micrograms (µg) of Fe_2O_3 do you have?

9. You have 100.0 g of dichlorine heptaoxide
   a. What is the molecular formula of this compound?

   b. What is the molar mass of this compound?

   c. What is the number of millimoles of this compound?

10. You have 2×10^{20} molecules of PCl_5
    a. What is the name of this compound?

    b. What is the molar mass of this compound?

    c. What is the number of moles of this compound?

    d. How many grams of PCl_5 do you have?