



Chemical Formulas and names:

1. Give the formula for each compound.

- a. Nitrogen dioxide: _____ d. Potassium acetate: _____
b. Tin(II) hydroxide: _____ e. Lead(IV) oxide: _____
c. Sodium phosphate: _____ f. Disulfur trioxide: _____

2. Name each compound.

- a. $Mg(CN)_2$: _____ d. $NiCO_3$: _____
b. $Ba(ClO_3)_2$: _____ e. Cl_2O : _____
c. $Fe(OH)_3$: _____ f. N_2O_5 : _____

3. Give the formula for these acids

Name these compounds as acids.

- a. Hydroiodic acid: _____ d. $HClO$: _____
b. Nitrous acid: _____ e. $HC_2H_3O_2$: _____
c. Phosphoric acid: _____ f. HF : _____
g. Sodium ascorbate is $NaC_6H_7O_6$. Name $HC_6H_7O_6$ as an acid: _____
h. Citric acid is $H_3C_6H_5O_7$. What is the formula for sodium citrate? _____

Combustion Review: Write the complete, balanced equation for these reactions:

4. a. Complete Combustion of Pentene gas, C_5H_{10}

b. Complete Combustion of ethanol (C_2H_5OH) in excess oxygen

c. Incomplete Combustion of Propane gas (C_3H_8) in limited oxygen

Density, Conversions

5. What is the volume of a piece of platinum foil that has a mass of 2.00 g? It measures 2.00 cm by 3.00 cm. How thick is it? (0.0932 cm³, 0.0155 cm)
6. You find a gold ingot that fell off an armored truck in the street. It measures 10.0 cm by 0.0350 m by 50.0 mm.
- a. What is the mass of the bar? (assuming it really is gold) (Hint: Change all to cm first:) (3380 g)
- b. If gold costs \$15,000 a kilogram, how much is the ingot worth? (\$50,700)
- c. How many gold atoms are in the bar? (1.03 x 10²⁵)
7. A pre-1982 penny contains 3.08 g of Cu. If you flatten a penny to a 5.00 cm diameter, how thick would it be (in μm)? (1.75 x 10⁻² cm, 175 μm)
8. a. A mini marshmallow is a cube that measures about 1 cm on a side. How many km³ would be the volume of a mole of mini marshmallows? (6.02x 10⁸ km³)
- b. If these mini marshmallows were spread out over the United States, how deep a pile would they make? Assume the US measures 4000 km by 2000 km. (75 km)

Ideal Gas Law Review : $PV=nRT$ P in atm, V in L, T in Kelvin, R = 0.0821 L atm /mol K

9. Liquefied natural gas (LNG) is mainly methane, CH_4 . You've invested in 250 kg of LNG because you hear fuel oil prices are going up. Now you have to store it. How big a tank would you need to store the CH_4 :

- a. As a liquid at -164°C and 1 atm pressure (density = 415 g/L) (602 L)
- b. As a gas at 25.0°C and 30.0 atm pressure: (1.27 x10⁴ L)
- c. Which is the more efficient way of storing Natural gas, as a liquid or a gas?

10. 400 mL of a gas has a mass of 0.300 g at 30°C and 0.900 atm. Calculate its formula weight.
(20.7 g/mol)

% Composition, Empirical Formulas

11. a. A compound containing just Copper and Bromine is heated to drive off the Bromine. Here is the data from the experiment. Calculate the % composition by mass of the compound.
(45.0% Cu, 55.0 %Br)

Empty crucible -	21.50 g:
Crucible + compound -	25.50 g:
Crucible + copper residue -	23.30 g

- b. What is the formula and name of the compound? : (CuBr, Copper(I) Bromide)

12. a. A 2.000 g sample of a compound (made of C's, H's and O's) was found to contain 0.818 g of Carbon and 0.092 g of Hydrogen. What is the % composition by mass of the compound?
(40.9 %C, 4,6 %H, 54,5% O)

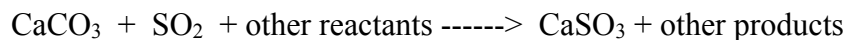
- b. Determine the empirical formula of the compound.: (C₃H₄O₃)

c. Another 3.50 g sample of this compound was vaporized and occupies a volume of 460 mL at 1.05 atm pressure and 25°C. What is the molecular weight of the gas? (177 g/mol)

d. What is the molecular formula of the compound?: ($C_6H_8O_6$, Ascorbic acid, *Vitamin C*)

Stoichiometry Review

13. Solid calcium carbonate, $CaCO_3$, is able to remove sulfur dioxide from waste gases by the reaction (balanced as written):



In a particular experiment, 255 g of $CaCO_3$ was exposed to 135 g of SO_2 in the presence of an excess amount of the other chemicals required for the reaction.

a. What is the theoretical yield of $CaSO_3$? (Hint: LR first!)

b. If only 198 g of $CaSO_3$ was isolated from the products, what was the percentage yield of $CaSO_3$ in this experiment?

14. Visit the NH state science fair website, <http://nhsee.org>, and begin thinking about which topic you would like to pursue for next year's science expo. It'll be here before you know it!