

Notes: Nov 18 - 21, 2013

Molar Mass, Moles, Stoichiometry

Formula Mass Examples

a. $\text{H}_2\text{ClO}_3 = \underline{2}\text{H}, \quad \underline{1}\text{Cl}, \quad \underline{3}\text{O}$
 $(2 * 1.008) + (1 * 35.453) + (3 * 16) = 84.469 \text{ g/mol}$

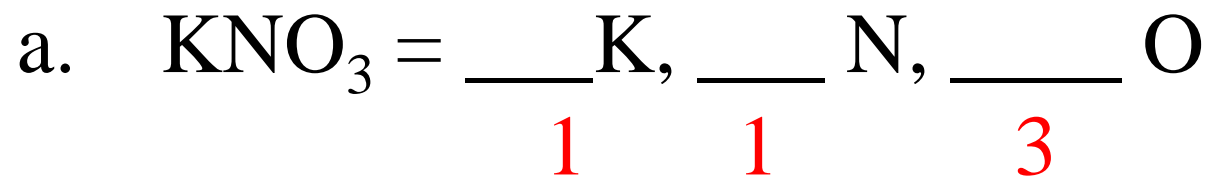
b. $\text{Pb}(\text{NO}_3)_2 = \underline{1}\text{Pb}, \quad \underline{2}\text{N}, \quad \underline{6}\text{O}$
 $(1 * 207.20) + (2 * 14.01) + (6 * 16) = 331.22 \text{ g/mole}$

Pb is lead, atomic # 82

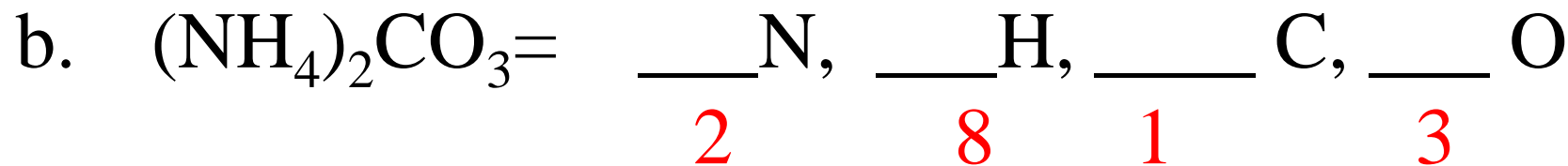
2. Find the molar mass of the following:



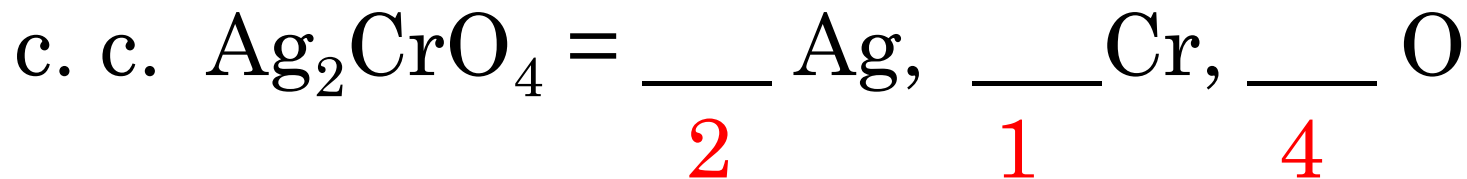
2. Find the molar mass of the following:



101.1 g/mol



96.0 g/mole



331.8 g/mol

Ag is silver, atomic # 47, Cr is chromium, atomic number 24

3. Convert from g \rightarrow moles or from moles \rightarrow g. Show units.

$$\frac{\text{_____}}{\text{(given)}} \times \frac{\text{_____}}{\text{times factor}} = \frac{\text{_____}}{\text{(answer)}}$$

a. 12.0 g Fe

$$\underline{12.0 \text{ g Fe}} \times \frac{1 \text{ mol Fe}}{55.8 \text{ g Fe}} = \underline{? \text{ mol Fe}}$$

mm of Fe = 55.8 g/ mol

55.8 g Fe = 1 mol Fe

$$= 0.215 \text{ mol Fe}$$

b. 0.0280 moles NO₂ \rightarrow grams

mm NO₂ = 46.0 g/mol

$$\underline{0.0280 \text{ mol NO}_2} \times \frac{46.0 \text{ g NO}_2}{1 \text{ mol NO}_2} = \underline{? \text{ g NO}_2}$$

46 g NO₂ = 1 mol NO₂

$$1.29 \text{ g}$$

4. Grams \rightarrow moles \rightarrow # of atoms

A 4.07 g sample of NaI contains how many atoms of Na?

Molar mass of Na = 22.99 grams

1 mole of Na = 22.99 g

1 mole of Na = **6.022×10^{23} atoms of Na**

$22.99 \text{ g Na} = 6.022 \times 10^{23} \text{ atoms of Na}$

5. Grams moles #of atoms

- A 4.07 g sample of NaI contains how many atoms of Na?
- Molar mass of Na = 22.99 grams
- 1 mole of Na = 22.99 g
- 1 mole of Na = **6.022×10^{23} atoms of Na**
- **$22.99 \text{ g Na} = 6.022 \times 10^{23} \text{ atoms of Na}$**

Review

1. In oxides of nitrogen, such as N_2O , NO , NO_2 , and N_2O_3 , atoms combine in small whole-number ratios. This evidence supports the law of

- a. conservation of mass.
- b. multiple proportions.
- c. definite composition.
- d. mass action.

2. Oxygen can combine with carbon to form two compounds, carbon monoxide and carbon dioxide. The ratio of the masses of oxygen that combine with a given mass of carbon is 1:2. This is an example of

- a. the law of conservation of mass.
- b. Dalton's atomic theory.
- c. the law of conservation of energy.
- d. the law of multiple proportions.

3. According to the law of definite proportions, any two samples of KCl have

- a. the same mass.
- b. slightly different molecular structures.
- c. the same melting point.
- d. the same ratio of elements.

Bell Quiz, Thursday, Nov 14, 2013

Copy this data

Hardware	Mass (g)	Mass minus bag & tape
Empty bag & tape	5.8	
Bag/ tape + Washers	73.5	67.7
Bag/ tape + Hex Nuts	133.2	127.4
Bag/ tape + Bolts	215.5	

Go to the Relative Mass Activity sheet, problem #1, and calculate the mass of a box of washers and the mass of a box of hex nuts using the data above.

****Be careful. The masses above include the bag & tape.****

1. A box of hardware contains 100 pieces. Assuming there are 25 pieces in each vial, calculate the mass of a box of each kind of hardware. Express these values in units of g/box.

Washers: $25 = 67.7 \text{ g}$

Hex Nuts: $25 = 127.4 \text{ g}$

Bell Quiz, Thursday, Nov 14, 2013

1. (#4 on the activity sheet) Someone at the Home Depot tells you that **a 2" bolt is 6.75 times as heavy as a washer.** What would be the mass of a box of such bolts? Show your work!

Bell Quiz, Thursday, Nov 14, 2013

2. (#5 on the sheet) Suppose that you were given the job of shipping 25,000 hex nuts to a customer.

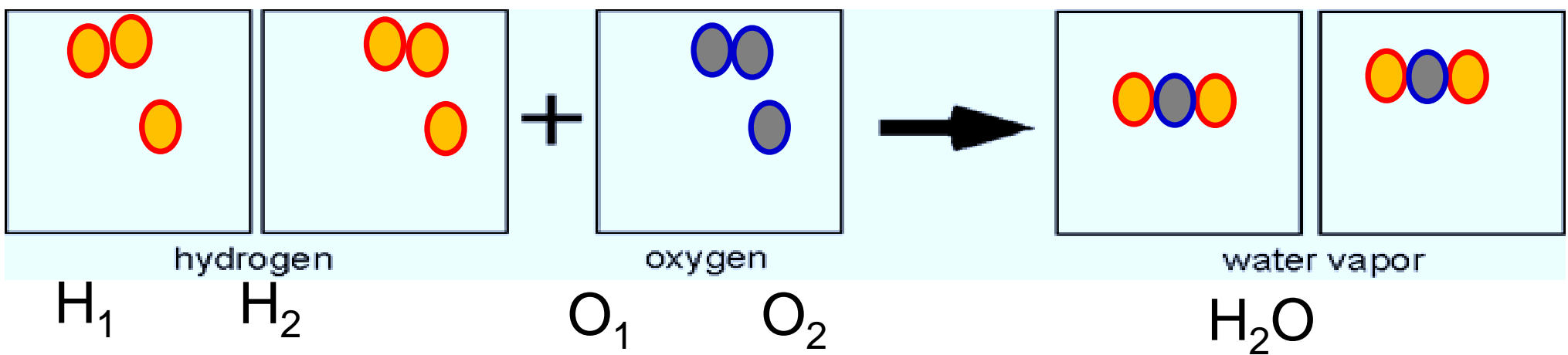
a) How many boxes of hex nuts would be equal to 25000 hex nuts? Use the information from question one on the Relative Mass sheet to answer this question . **Show your work!**

All you have is a hanging scale and a barrel of hex nuts.

b) Describe how you could determine the proper number of pieces without physically counting them out.

Tuesday, Nov 12, 2013

5. Draw how two volumes of hydrogen gas react with one volume of oxygen gas to form two volumes of gaseous water.

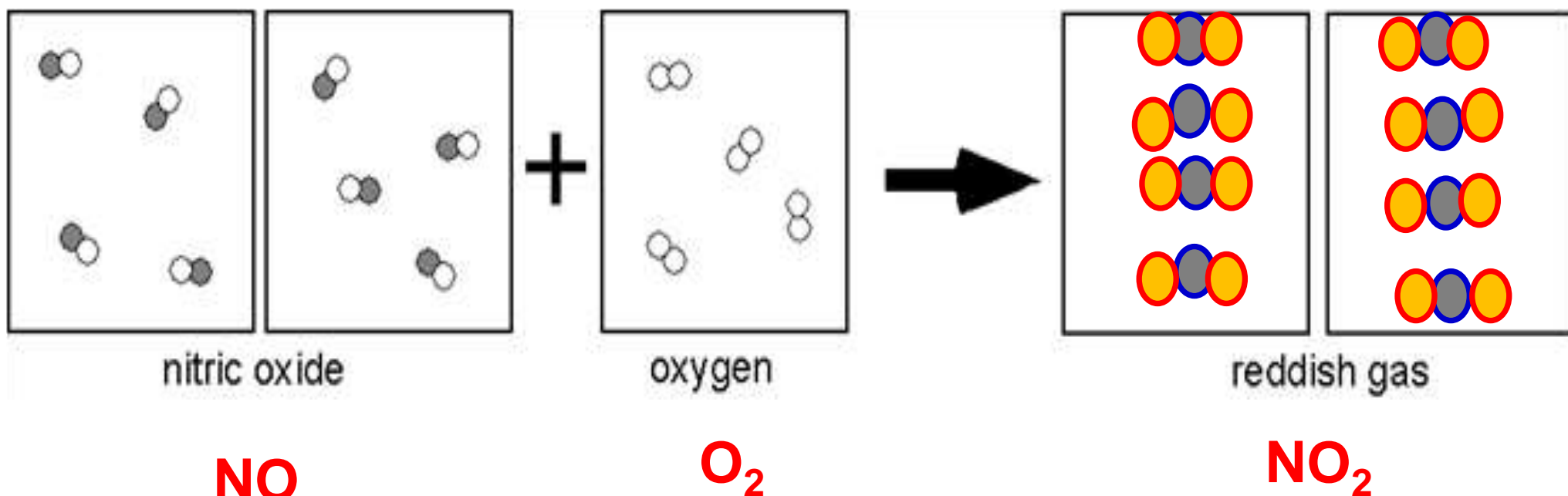


6. Explain why molecules of oxygen must have an even number of atoms.

Oxygen molecules must have an even number of atoms in order for the contents of one container to split evenly into two containers.

Tuesday, Nov 12, 2013

7. Two volumes of nitric oxide react with one volume of oxygen gas to form two volumes of a reddish-brown gas. Deduce the formula of this gas and sketch particle representations of its molecules.



Bell Work, Tuesday, Nov12, 2013

