Chem 12   Name: _____

Unit 1 Review Questions... so far...   Date: _____
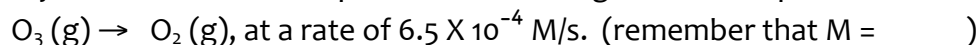

PLEASE NOTE! The chemical reactions given throughout this worksheet ARE NOT BALANCED!

1. Ozone is an important component of the atmosphere that protects us from the ultraviolet rays of the Sun. Certain pollutants encourage the decomposition of Ozone:

O_3 (g) → O_2 (g), at a rate of 6.5×10^{-4} M/s. (remember that M =   )

How many molecules of O_2 gas are formed in each litre of atmosphere every day by this process?

2. Propane gas combusts in camp stoves to produce energy to heat your dinner. Assume that the gas is combusted at a rate of 1.10 g of C_3H_8 /min. How long would it take to produce 6.75 L of CO_2 gas measured at STP?

3. A 2.65 g sample of calcium metal is placed into water. The metal is completely consumed in 25.0 s. Assuming the density of water is 1.00 g/ml at the reaction temperature, how long would it take to consume 5.00 mL of water as it converts into products?

4. Consider the following reaction:

Cu (s) + HNO_3 (aq) → $CuNO_3$ (aq) + H_2O (l) + NO_2 (g)

a) if 5.00 g of copper solid is completely reacted in 250.0 mL of excess nitric acid in 7.00 min. at STP, calculate the rate of the reaction in:
i) g Cu/min.
ii) mol HNO_3/min.
iii) g NO_2/min

b) Assume the reaction continues at this average rate for 10.0 min total time. Determine the final:
i) mL NO_2 formed at STP
ii) molarity of $CuNO_3$

c) Describe SIX ways you might measure the reaction rate. Include the equipment required, measurements made, and units for the rate. You may use a labeled diagram.

5. Consider the graph for this reaction:

$$CaCO_3 \, (s) + \, HCl \, (aq) \rightarrow \, CaCl_2 \, (aq) + \, H_2O \, (l) + \, CO_2 \, (g)$$

a) Determine the instantaneous rate at the following times:
i) the instant after 0 min. ("initial rate")
ii) 1 min.
iii) 4 min.

b) How do these rates compare? What do you suppose causes this pattern?

6. Given the following reactants, complete this reaction:

$$Sr \, (s) + \, HCl \, (aq) \rightarrow$$
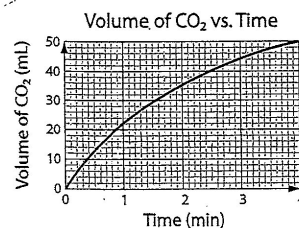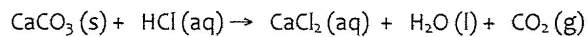
Given the following data:

a) Calculate the average rate of reaction in moles of HCl consumed per second over the first 50.0 s.

b) Calculate the mass of strontium consumed in this 50.0s period.

c) Why did the volume of gas collected decrease in each increment until 50.0 s?

d) Why did the volume of gas remain unchanged from 50.0 s to 60.0 s?

5. Consider the graph for this reaction:

$CaCO_3 (s) + HCl (aq) \rightarrow CaCl_2 (aq) + H_2O (l) + CO_2 (g)$

Volume of CO_2 vs. Time

a) Determine the instantaneous rate at the following times:
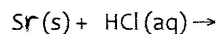i) the instant after 0 min. ("initial rate")
ii) 1 min.
iii) 4 min.

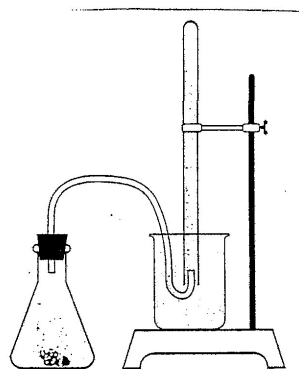b) How do these rates compare? What do you suppose causes this pattern?

6. Given the following reactants, complete this reaction:

$Sr (s) + HCl (aq) \rightarrow$

Given the following data:

Time (seconds)	Volume of Hydrogen at STP (mL)
0	0
10.0	22.0
20.0	40.0
30.0	55.0
40.0	65.0
50.0	72.0
60.0	72.0

a) Calculate the average rate of reaction in moles of HCl consumed per second over the first 50.0 s.

b) Calculate the mass of strontium consumed in this 50.0s period.

c) Why did the volume of gas collected decrease in each increment until 50.0 s?

d) Why did the volume of gas remain unchanged from 50.0 s to 60.0 s?