**Quiz 1**

# Directions: Answer each of the following questions. Be sure to use complete sentences where appropriate. For full credit be sure to show all of your work. Where appropriate answers should be boxed for clarity, written to the correct number of significant figures, and, include the proper units.

1. What species is reduced in Experiment 2: Oxidation of an Alcohol (2 points)?

Oxidizing agent/substance reduced is dichromate ion, Cr2O72-

Reducing agent/substance oxidized is the alcohol, 2-propanol, C3H8O

1. For the reaction given below, answer the following questions (10 points):

Cl2 (g) + F2 (g) 🡪 2 ClF (g)

1. Based on the stoichiometry of the equation what are the relative rates of disappearance and appearance (Δ[X]/Δt) of the reactants and products, respectively?

$$-\frac{∆Cl\_{2}}{∆t}=-\frac{1}{1}\frac{∆F\_{2}}{∆t}=+\frac{1}{2}\frac{∆ClF}{∆t}$$

1. If the rate of appearance of ClF is 6.33 x 10-4 M/sec, what is the rate of disappearance of Cl2?

$$\frac{∆ClF}{∆t}=6.33×10^{-4}\frac{M}{s}$$

$$-\frac{∆Cl\_{2}}{∆t}=+\frac{1}{2}\frac{∆ClF}{∆t}=\left(\frac{1}{2}\right)\left(6.33×10^{-4}\frac{M}{s}\right)=-3.17×10^{-4}\frac{M}{s}$$

Therefore, the rate of disappearance of chlorine gas is 3.17x 10-4 M/s. Rate is always a positive value.

1. How is the order of a reaction generally determined (3 points)?

The reaction order cannot be determined by stoichiometry of the reaction. It can only be determined by running controlled experiments where the concentrations of the reactants are varied and the reaction rates are measured and analyzed.

1. The reaction between chlorine monoxide and nitrogen dioxide (5 points):

ClO­ ­(g) + NO­2 (g) + M (g) 🡪 ClONO2 (g) + M (g)

Produces chlorine nitrate (ClONO2). A third molecule (M) takes part in the reaction, but is unchanged by it. The reaction is first order in NO2 and ClO.

1. Write the rate law for this reaction. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_rate = k[NO2][ClO]\_\_\_
2. What is the reaction order with respect to M? \_\_\_\_\_\_\_\_zero\_\_\_\_\_\_\_\_
3. What is the overall order of the reaction? \_\_\_\_\_\_\_second order\_\_\_\_\_\_\_\_\_