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Name: Key
Date: _____
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Chemistry 12
REACTION RATES WORKSHEET

1. If sodium metal is placed in chlorine gas, sodium chloride (salt) is produced. Write the balanced chemical equation.

/1 $2Na(s) + Cl_2(g) \longrightarrow 2NaCl(s)$

2. What is the rate of reaction (in moles of NaCl produced per second) if 5.0 mg of sodium completely reacts with sufficient chlorine gas in 43.0 s?

/1 $5.0\,\text{mg} \times \frac{1\times10^{-3}\,\text{g}}{1\,\text{mg}} \times \frac{1\,\text{mol Na}}{23.0\,\text{g}} \times \frac{2\,\text{mol NaCl}}{2\,\text{mol Na}} = \frac{2.2\times10^{-4}\,\text{mol}}{43.0\,\text{s}}$

$= 5.1\times10^{-6}\,\text{mol NaCl/sec}$

3. What is the rate of reaction in the above question (in litres of chlorine gas used up per second at STP)?

/1 $\frac{5.1\times10^{-6}\,\text{mol NaCl}}{1\,\text{sec}} \times \frac{1\,\text{mol Cl}_2}{2\,\text{mol NaCl}} \times \frac{22.4\,\text{L}}{1\,\text{mol Cl}_2} = 5.7\times10^{-5}\,\text{L Cl}_2/\text{sec}$

4. It takes 1.00 min for 46 grams of oxygen gas to react with sufficient nitrogen gas to produce nitrogen dioxide gas (at STP).

a. Write the balanced equation

/1 $2O_2(g) + N_2(g) \longrightarrow 2NO_2(g)$

b. What is the rate of reaction in grams of oxygen gas per second?

/1 $\frac{46\,\text{grams O}_2}{1.00\,\text{min}} \times \frac{1.00\,\text{min}}{60.0\,\text{sec}} = 0.77\,\text{g/sec}$

c. What is the rate of reaction in moles of oxygen gas per second?

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$$\frac{0.77\ g\ O_2}{1\ sec} \times \frac{1\ mol\ O_2}{32.0\ g\ O_2} = \boxed{2.4 \times 10^{-2}\ mol\ O_2/sec}$$

d. What is the rate of reaction in Litres of nitrogen gas used up per second (at STP)?

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$$\frac{2.4 \times 10^{-2}\ mol\ O_2}{1\ sec} \times \frac{1\ mol\ N_2}{2\ mol\ O_2} \times \frac{22.4\ L\ of\ N_2}{1\ mol\ N_2} =$$

$$\boxed{2.7 \times 10^{-1}\ L\ N_2/sec}$$

5. List the various ways that reaction rates can be measured.

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$\frac{\Delta \text{colour intensity}}{\Delta \text{time}}$, $\frac{\Delta \text{temperature}}{\Delta \text{time}}$,

$\frac{\Delta \text{pressure}}{\Delta \text{time}}$, $\frac{\Delta \text{volume}}{\Delta \text{time}}$,

$\frac{\Delta \text{mass}}{\Delta \text{time}}$, $\frac{\Delta \text{mole}}{\Delta \text{time}}$,

$\frac{\Delta [\ ]}{\Delta \text{time}}$