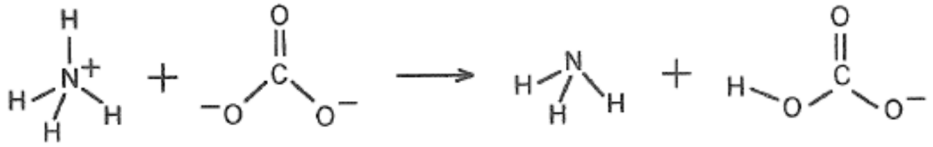
Reaction Kinetics – Part 2

1.) Rank the following three reactions in terms of their expected reaction rates (fastest to slowest) at room temperature.

a.) $2\ H\text{-}O\text{-}O\text{-}H \rightarrow 2\ H\text{-}O\text{-}H + O{=}O$

b.) 

c.) $2\ CH_3\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_2\text{-}CH_3 + 25\ O{=}O \rightarrow 16\ O{=}C{=}O + 18\ H\text{-}O\text{-}H$

(combustion of gasoline)

2.) Experimentally, it is found that at room temperature the reaction between $Li_{(s)}$ and water is much slower than the reaction between $K_{(s)}$ and water. Which of the first four factors taught in class is affecting reaction rates would best explain this (and why)?

3.) Will surface area have an effect on a reaction between two gases? Why? How can this conclusion be generalized to the importance of surface area in homogeneous versus heterogeneous reactions?

4.) In each of the following pairs of reactions, which would have the faster reaction rate?

a.) $H_{2(g)} + I_{2(g)} \rightarrow 2\ HI_{(g)}$ or $Ag^+_{(aq)} + I^-_{(aq)} \rightarrow AgI_{(s)}$

b.) $Fe_{(s)} + 2\ H_2O_{(l)} \rightarrow Fe(OH)_{2(s)} + H_{2(g)}$ or $CH_3COOH_{(aq)} + H_2O_{(l)} \rightarrow CH_3COO^-_{(aq)} + H_3O^+_{(aq)}$

c.) $Cu_{(s)} + S_{(s)} \rightarrow CuS_{(s)}$ or $CaO_{(s)} + H_2O_{(l)} \rightarrow Ca(OH)_{2(s)}$

d.) $C_{(s,\ powder)} + O_{2(g)} \rightarrow CO_{2(g)}$ or $C_{(s,\ chunk)} + O_{2(g)} \rightarrow CO_{2(g)}$

e.) $H^+_{(aq)} + OH^-_{(aq)} \rightarrow H_2O_{(l)}$ or $2\ H_2O_{2(aq)} + 2\ H^+_{(aq)} \rightarrow 2\ H_3O^+_{(aq)} + O_{2(g)}$

5.) Which of the reactions in the previous exercise are HOMOGENEOUS reactions?

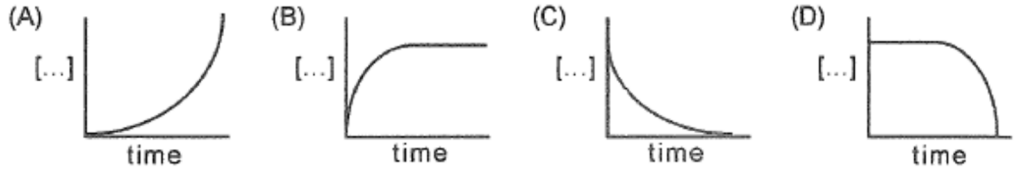
6.) Which of the six factors are important in HOMOGENEOUS reactions? Which are important in HETEROGENEOUS reactions?

7.) State five ways of increasing the rate of the reaction: $2\ Al_{(s)} + 3\ F_{2(g)} \rightarrow 2\ AlF_{3(s)}$. Assume the reaction is occurring in a closed contained whose volume can be changed.

8.) a.) What will happen to the concentration of the reactants as a reaction proceeds?

b.) What will happen to the rate of a reaction as the reaction proceeds?

c.) Which of the following graphs would best represent



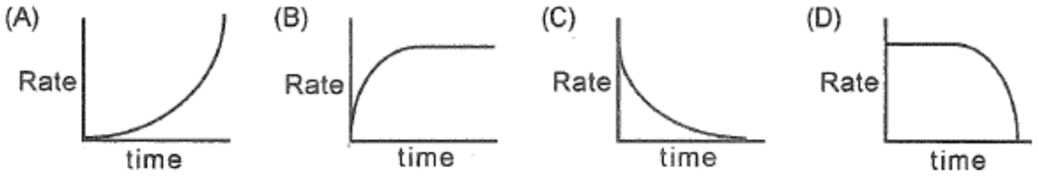
i.) the **product** concentration as time proceeds for a reaction? Explain your choice.

ii.) the **reactant** concentration as time proceeds for a reaction? Explain your selection.

d.) Which of the following graphs would best represent

i.) the rate at which **reactants** are used as time proceeds for the reaction. Explain.

ii.) the rate at which **products** are used as time proceeds for the reaction. Explain.



9.) The following data were collected for the reaction $Zn_{(s)} + 2\ HCl_{(aq)} \rightarrow H_{2(g)} + ZnCl_{2(aq)}$ in which zinc metal was reacted with $0.200\ M$ HCl.

Time (s)	Mass Zn (g)
0	31.0
60	24.6
120	20.2
180	17.4

a.) Calculate the reaction average reaction rate, in $\frac{g}{s}$, from 0-60 s.

b.) Calculate the reaction average reaction rate, in $\frac{g}{s}$, from 120-180 s.

c.) Explain why the average rate in part (b) is less than in part (a).