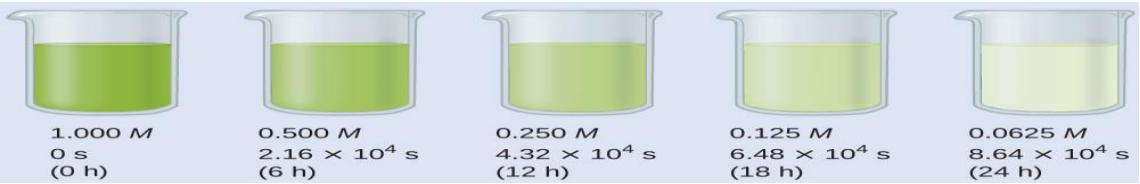
CHM 1220-Dang Chapter 14 – Reading Assignment Name _____

Students must follow the lecture discussion and read the textbook in order to answer the following questions:

1. Rate = change in _____ divided by change in _____. The usual unit for rate is _____. As time progresses, the concentration of the reactants _____ (decreases/increases). As time progresses, the concentration of the products _____ (decreases/increases).
2. Ethanol (C_2H_5OH), the active ingredient in alcoholic beverages and an octane booster in gasoline, is produced by the fermentation of glucose. The balanced equation is
   $C_6H_{12}O_{6(aq)} \rightarrow 2\ C_2H_5OH_{(aq)} + 2\ CO_{2(g)}$
   Write this the mathematical relationship of $\Delta[C_2H_5OH]/\Delta t$ and $\Delta[C_6H_{12}O_6]/\Delta t$

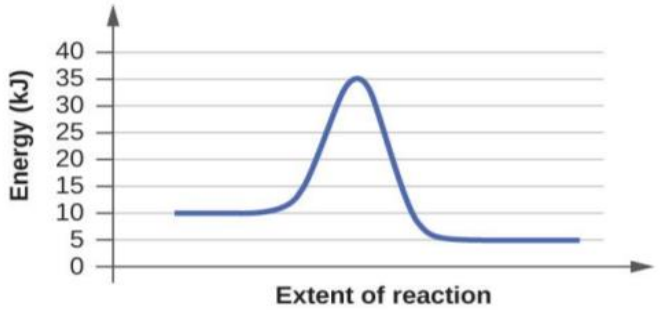
3. The rate law is a relationship between _____.
   Rate = k[A]^n in this expression, **k** is the _____.
   and the exponent **n** is the _____.
   The rate constant and order of the reaction must be determined by _____.
   If n = 1, the reaction is _____ order and the rate is _____ to the concentration of A. If the concentration of A is tripled, the rate will increase by a factor of _____.
   If n = 2, the reaction is _____ order. If the concentration of A is tripled, the rate will increase by a factor of _____.
   If n = 0, the reaction is _____ order and the rate is_____ of the concentration of A. This means that if the concentration of A is tripled, the rate will _____ change.
4. The half-life of a reaction is the time required for _____ and is given the symbol _____
5. The equation for the half-life of a first order reaction is $t_{1/2}$ = _____ and is independent of the concentration.
6. The equation for the half-life of a zero order reaction or a second order reaction is (dependent/independent) on the concentration of reactant.
7. Calculate the rate constant for the first-order decomposition of hydrogen peroxide in water at 40 °C, using the data given in Figure.



8. Determine the half life ($t_{1/2}$) in seconds

9. The diagram below is an example of a reaction coordinate diagram for a single step reaction. Label the following and identify whether the reaction is endothermic or exothermic.

- reactant energy level
- product energy level
- transition state or activated complex energy level
- activation energy (E_a)
- ΔH_{rxn}



10. The Arrhenius equation shows the dependence of the rate constant on temperature and activation energy. Write the Arrhenius equation and define its terms

    k =

    terms:

    A = R =

    T = E_a =

11. An alternative form of the Arrhenius equation is found by taking the natural log of the above equation. Write the **ln k version** of the Arrhenius equation below.

    Note that this equation has the form of a straight line (y = mx + b) if y is taken as ln k and x is taken as 1/T. If the rate constant for a reaction is measured as a function of temperature, a plot of ln k vs. 1/T will give a straight line with slope = _____

In some case, when either data are limited or plotting capabilities are absent, we can calculate the activation energy of a reaction by measuring the rate constant at **two temperatures**:

12. Explain how a chemical reaction occurs according to the collision model.

13. A reaction mechanism is _____.
    Each step in a reaction mechanism is an _____.
    A reaction intermediate is _____ in one elementary step and _____ in another.
    A catalyst is _____.
    In a homogeneous catalysis, the catalysis exists in the _____ phase as reactants.
    In a heterogeneous catalysis, the catalysis exists in a _____ phase than the reactants
14. How does a catalyst speed up a reaction? How can a catalyst be involved in a reaction without being summed by it?