Chemistry-4311
Novvember 18, 2016

Quiz #9 **Name** Key

$R = 1.987$ cal K^{-1} mol^{-1} = 8.314 J K^{-1} mol^{-1} = 0.08206 L atm K^{-1} mol^{-1}
$K = {}^{o}C + 273.15$, $F = 96{,}500$ C/mole

1. Matching (Use a letter only once)

The rate constant for a first-order reaction has units of h.

An (a) f reaction occurs at the atomistic, molecular level.

Oxidative phosphorylation is the process in which b is formed as a result of electron transfer.

In the expression, rate = $k[A]^n$, n is the reaction e and k is called the d.

a. $time^{-1}molar^{-1}$
b. ATP
c. fundamental
d. rate constant
e. order
f. elementary
g. ADP
h. $time^{-1}$
i. molecularity
j. power

2. Consider the rate expression for a first-order reaction, $-d[A]/dt = k[A]$.
a. Integrate the equation and determine how [A] varies with time.

$$-\frac{d[A]}{[A]} = k\,dt$$

$$-\int_{[A]_o}^{[A]} \frac{d[A]}{[A]} = k\int_0^t dt$$

$$-\int_{[A]_o}^{[A]} \frac{d[A]}{[A]} = kt$$

$$-\{\ln[A] - \ln[A]_o\} = kt$$

$$\ln\left\{\frac{[A]}{[A]_o}\right\} = -kt$$

$$[A] = [A]_o e^{-kt}$$

b. Derive the expression for the half-life.

$$\ln\left\{\frac{[A]}{[A]_o}\right\} = -kt$$

$$\ln\left\{\frac{[A]_o/2}{[A]_o}\right\} = -kt_{1/2}$$

$$\ln 1/2 = -kt_{1/2}$$

$$\ln 2 = kt_{1/2}$$

$$t_{1/2} = \frac{\ln 2}{k}$$

3. Write the rate for each of the following reactions two ways: i.e. in terms of the disappearance of a reactant and in terms of the appearance of a product. Assume the reaction is an elementary reaction.

$$ClO^- + Br^- \rightarrow BrO^- + Cl^-$$

$$\text{Rate} = -\frac{d[ClO^-]}{dt} = -\frac{d[Br^-]}{dt} = \frac{d[BrO^-]}{dt} = \frac{d[Cl^-]}{dt}$$