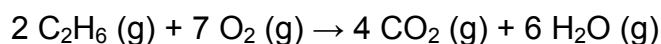
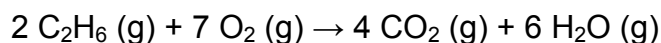


- 1) Does reaction with a decrease in enthalpy ( $\Delta H < 0$ ) always proceed spontaneously?
- 2) When a substance converts from gas  $\rightarrow$  liquid, what is the change in entropy?
- 3) If a reaction is third-order with respect to reactant A, what effect will doubling the concentration of A do to the reaction rate?
- 4) Is the molar entropy of water vapor (g) greater or less than that of hydrogen gas?
- 5) Which combinations of  $\Delta H$  and  $\Delta S$  lead to  $\Delta G$  values which are NOT dependent on temperature?
- 6) List several examples of changes which INCREASE entropy, we went over 4 cases at the start of Ch 18.
- 7) What is MOLAR ENTROPY and how do we know if one molecule has a greater molar entropy than another?
- 8) What is the SECOND law of thermodynamics and what does it tell us about spontaneity?
- 9) Predict the signs of  $\Delta H$ ,  $\Delta S$ , and  $\Delta G$  for the condensation of water vapor on your bathroom mirror at 32 °C.
- 10) For a reaction,  $\Delta H^\circ = 80.9 \text{ kJ}$  and  $\Delta S^\circ = -80.7 \text{ J/K}$ , calculate  $\Delta G^\circ$ . Is this reaction spontaneous at 25 °C?
- 11) If a reaction is non-spontaneous at a given temperature, how would you determine when the reaction becomes spontaneous?
- 12) Write the rate expressions for all reactants and products:



- 13) A reaction has the following rate law:  $\text{Rate} = k[\text{A}]^2[\text{B}]^3$ . If the concentration of **A is doubled** and the concentration of **B is tripled**, by what factor will the rate increase?
- 14) For a second-order reaction, how can you graphically determine the rate constant (k)?
- 15) For the following reaction, the rate of  $\text{O}_2$  loss was measured to be 0.352 M/s.



Determine the rate of  $\text{CO}_2$  production over the same period of time.

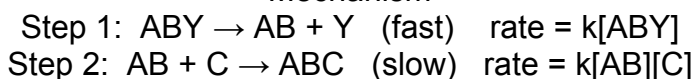
16) A given reaction is determined to be first-order with a rate constant of  $0.025 \text{ min}^{-1}$ . If the reaction is started with an initial concentration of reactant A of  $0.500 \text{ M}$ , what will be the concentration of A after 7.5 minutes?

17) A certain first-order reaction starts with an initial concentration of  $0.50 \text{ M}$ . 75% of this reactant is used up in 10 minutes. What is the half-life ( $t_{1/2}$ ) of the reaction?

18) Explain why all collisions between reactant molecules do not lead to product formation.

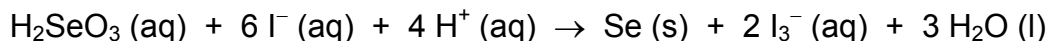
19) The following reaction has the mechanism shown below.  $\text{ABY} + \text{C} \rightarrow \text{ABC} + \text{Y}$

Mechanism



Write the rate law for this reaction.

20) Determine the order of each reactant and write the RATE LAW for this reaction.



$[\text{H}_2\text{SeO}_3]$	$[\text{H}^+]$	$[\text{I}^-]$	Initial Rate (M/s)
$1.0 \times 10^{-4} \text{ M}$	$1.0 \times 10^{-2} \text{ M}$	$1.0 \times 10^{-2} \text{ M}$	$1.66 \times 10^{-7}$
$3.0 \times 10^{-4} \text{ M}$	$1.0 \times 10^{-2} \text{ M}$	$1.0 \times 10^{-2} \text{ M}$	$4.98 \times 10^{-7}$
$1.0 \times 10^{-4} \text{ M}$	$3.0 \times 10^{-2} \text{ M}$	$1.0 \times 10^{-2} \text{ M}$	$14.94 \times 10^{-7}$
$1.0 \times 10^{-4} \text{ M}$	$1.0 \times 10^{-2} \text{ M}$	$2.0 \times 10^{-2} \text{ M}$	$6.64 \times 10^{-7}$