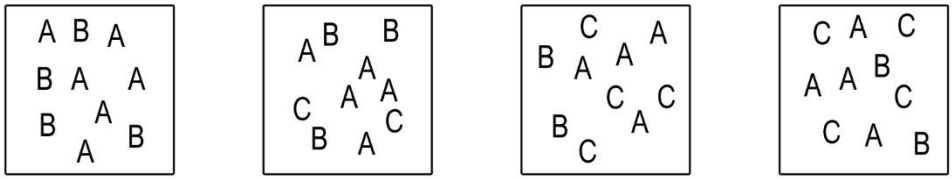
Chemical Equilibrium: Dynamic Equilibrium

1. The reaction A + B ⇌ 2C progresses from I to IV. At what point does the system reach equilibrium?



I II III IV

2. Label each statement as true or false. If false, explain why.
   a. The forward reaction rate is always faster than the reverse rate of a reaction.
   b. The forward reaction stops when the system reaches equilibrium.
   c. A system at equilibrium can have both reactants and products in the reaction vessel.

Chemical Equilibrium: Law of Mass Action

1. Write the law of mass action for each of the following reactions.
   a. A(*aq*) + B(*aq*) ⇌ C(*aq*)
   b. 2A(*aq*) ⇌ D(*s*)
   c. A(*aq*) + B(*aq*) ⇌ 2C(*aq*)
   d. A(*aq*) + B(*l*) ⇌ C(*aq*)
   e. A(*s*) + B(*s*) ⇌ C(*aq*)

Chemical Equilibrium: Law of Mass Action for Combined Reactions

1. What is value of K for each of the following reactions given

   $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$ $\quad K = 32.7$

   a. $2H_2(g) + 2I_2(g) \rightleftharpoons 4HI(g)$ $\quad K_1$
   b. $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$ $\quad K_2$

2. What is the value of K for $A(aq) + 4C(aq) \rightleftharpoons D(aq)$ given the following reactions?

$A(aq) + 2B(aq) \rightleftharpoons D$	$K_1 = 2.5$	(Reaction I)
$B(aq) \rightleftharpoons 2C(aq)$	$K_2 = 0.53$	(Reaction II)

Chemical Equilibrium: Relationship between K_c and K_p

1. For the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$ ($K_p = 0.256$ at 25°C), consider the calculation for the conversion of K_p to K_c.
    a. What is the temperature used in the calculation?
    b. What is the value of R?
    c. What is the value of Δn?
    d. What is the value of K_c?