Activity 3

Example 2:

If we have the reaction:

$$\text{Solid} \underset{1/2\ \text{period}^{-1}}{\overset{1/4\ \text{period}^{-1}}{\rightleftharpoons}} \text{Liquid} \underset{1/4\ \text{period}^{-1}}{\overset{1/2\ \text{period}^{-1}}{\rightleftharpoons}} \text{Gas}$$

For the first time point, 40/4 = 10 “Solid” molecules will move to the “Liquid” cup, 0/2 = 0 “Liquid” molecules will move to the “Solid” cup, 0/2 = 0 “Liquid” molecules will move to the “Gas” cup and 0/4 = 0 “Gas” molecules will move to the “Liquid” cup. At time point one you will thus have 30 “Solid” molecules, 10 “Liquid” molecules and 0 “Gas” molecules. At time point two 30/4 = 7 (always round down) “Solid” molecules will to the “Liquid” cup, 10/2 = 5 “Liquid” molecules will move to the “Solid” cup, 10/2 = 5 “Liquid” molecules will move to the “Gas” cup and 0/4 = 0 “Gas” molecules will move to the “Liquid” cup. At time point two you will have 28 “Solid” molecules, 7 “Liquid” molecules, and 5 “Gas” molecules. The data in your chart should look like this:

Time point	A	B	C
0	40	0	0
1	30	10	0
2	28	7	5
3	24	9	7

Example 3:

In an irreversible reaction, molecules that reach a certain state cannot re-enter the equilibrium. You can model this by removing the molecules that would be going into cup “C” from the system. **If these are candy, you may now eat them when they are placed in cup “C”.**

$$A \underset{1/2\ \text{period}^{-1}}{\overset{1/4\ \text{period}^{-1}}{\rightleftharpoons}} B \xrightarrow{1/2\ \text{period}^{-1}} C$$

For the first time point, 40/4 = 10 “A” molecules will move to cup “B”, 0/2 = 0 “B” molecules will move to cup “A”, and 0/2 = 0 “B” molecules will move to cup “C”. At time point one you will thus have 30 “A” molecules, 10 “B” molecules and 0 “C” molecules. At time point two 30/4 = 7 (always round down) “A” molecules will to cup “B”, 10/2 = 5 “B” molecules will move to cup “A”, and 10/2 = 5 “B” molecules will move to cup “C”. At time point two you will have 28 “A” molecules, 7 “B” molecules, and 5 “C” molecules. The data in your chart should look like this:

Time point	A	B	C
0	40	0	0
1	30	10	0
2	28	7	5
3			
4			

Questions:

Did this system reach equilibrium?

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How does the number of molecules in each cup vary from example 2 above?

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