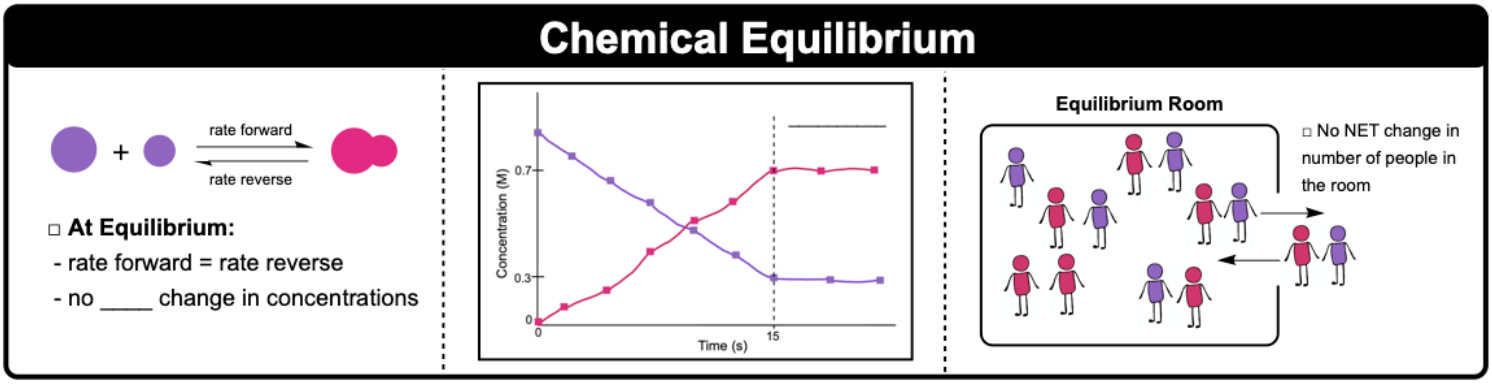
CONCEPT: INTRO TO CHEMICAL EQUILIBRIUM

- Most chemical reactions never go to _____, instead reach a *chemical equilibrium*.
  - □ **Chemical Equilibrium**: *dynamic* process where rate of forward and reverse reactions are _____.
    - Dynamic process: reaction does not simply stop but keeps going in both directions
    - These reactions are _____ and use a double arrow (_____).



- *Chemical equilibrium* can be _____genous or _____genous
  - □ **Homogenous equilibrium:** reactants and products are present in _____ state of matter (phase)
  - □ **Heterogenous equilibrium:** reactants and products are present in _____ phases

EXAMPLE: Describe what happens when reaction reaches chemical equilibrium.

a) reaction stops

b) reactants form products as fast as products form reactants

c) the collision frequencies of products and reactants are identical

d) rates of forward and reverse reactions are equal to zero

PRACTICE: Which of the following does not represent a heterogenous equilibrium?

I) $CH_4\ (g) + 2\ O_2\ (g) \rightleftharpoons CO_2\ (g) + 2\ H_2O\ (g)$

II) $CO_2\ (g) + C\ (s) \rightleftharpoons 2\ CO\ (g)$

III) $2\ H_2O\ (l) \rightleftharpoons 2\ H_2\ (g) + O_2\ (g)$

IV) $CH_3COOH\ (aq) + H_2O\ (l) \rightleftharpoons CH_3COO^-\ (aq) + H_3O^+\ (aq)$

a) Only I) b) Only II) c) Only III) d) Only IV) e) Both I) & IV) f) Both II) & III)