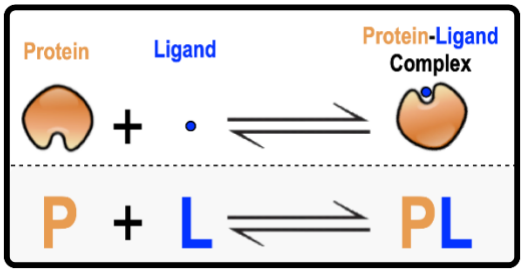
**CONCEPT:** INTRODUCTION TO PROTEIN-LIGAND INTERACTIONS

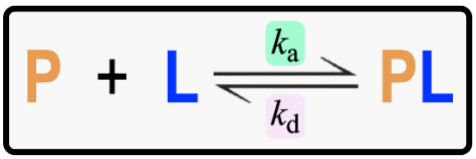
- _____: any small substance that reversibly binds & forms a complex with a larger biomolecule.
  - □ Reversible binding of a protein (____) to a ligand (____) is described by a simple expression: P + L ⇌ PL

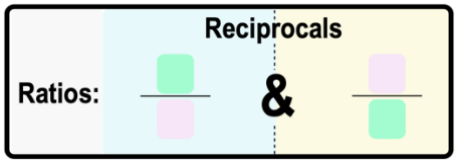



**Protein-Ligand Rate Constants**

- Recall: every reaction has a _____ constant ($k$) indicating reaction rate efficiency/probability under set conditions.
  - □ The *higher* the $k$, the _____ likely the reaction is _____.
- *Association Rate Constant* ($k_a$): rate constant for free protein & ligand (P + L) _____ into a complex (PL).
- *Dissociation Rate Constant* ($k_d$): rate constant for protein-ligand-complex (PL) _____ back into free P + L.
  - □ _____ of $k_a$ and $k_d$ describe the *reversible binding* of a protein & ligand.

**EXAMPLE:** PL Association & Dissociation *Rate Constants*:




**PRACTICE:** Which of the following rate law expressions represents a protein-ligand interaction at equilibrium?

a) $[PL]k_a = [P][L]k_d$.

b) $[PL][P]k_a = [L]k_d$.

c) $[L][PL]k_d = [P]k_a$.

d) $[L][P]k_a = [PL]k_d$.

**PRACTICE:** Calculate the dissociation rate constant ($k_d$) at equilibrium if [P] = 20 mM, [L] = 10 mM, [PL] = 5 mM, and the association rate constant ($k_a$) = 100 $mM^{-1}s^{-1}$.

a) 400.

b) 4,000 $s^{-1}$.

c) 4,000 $mM^{-1}s^{-1}$.