Harvard Life Sciences Outreach **November 9, 2017**
Drug cocktails and enzyme inhibition

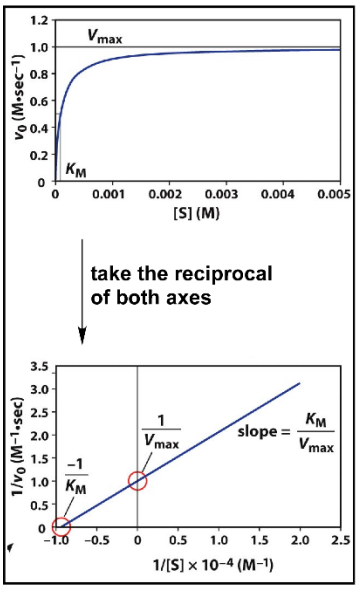
1. What is the root mean square deviation distance between DNA polymerase and Reverse Transcriptase? (Type in a command line: “super DNAP_T7, DNAP_RT”.) How many atoms were used? How many atoms were rejected?

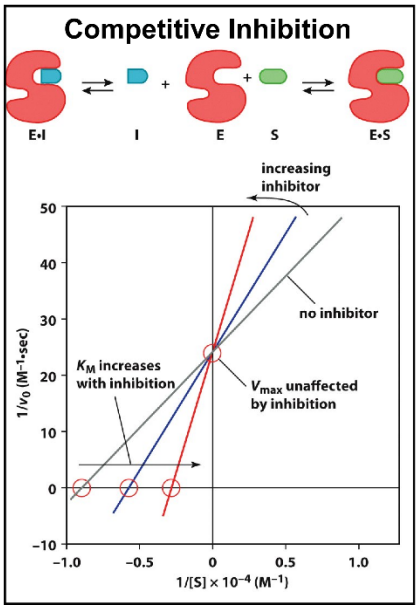
2. Is Drug 1 a competitive inhibitor, a noncompetitive inhibitor, or neither? Why?

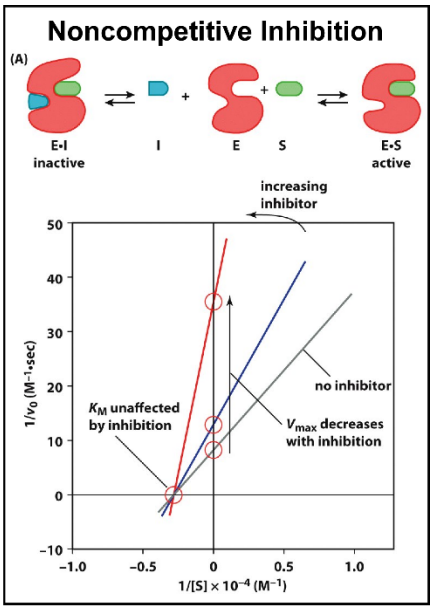
3. Is Drug 2 a competitive inhibitor, a noncompetitive inhibitor, or neither? Why?

4. Is Drug 3 a competitive inhibitor, a noncompetitive inhibitor, or neither? Why?

5. Which combination of drugs would serve as the best drug cocktail? Why?







Using Excel to identify whether an inhibitor is competitive or noncompetitive

For each drug (do one at a time):

1. Convert [S] from the data table to 1/[S] (1/[S] will be on the x-axis).
2. Convert "rate" form the table to 1/rate for any inhibitor concentrations given (1/rate will be on the y-axis).
3. The "1/[S]" column will serve as your x-axis and the "1/rate" column will serve as your y-axis for each inhibitor concentration.
4. Graph each drug table doing the following:
   a. Highlight the 20 cells corresponding to a single drug. (For example, select A11 – D15 for Drug 1.)
   b. From the top toolbar, select **Insert**, then go to the **Charts** section
   c. Chose **Scatter (XY)** and the data will show up in a graph.
   d. You will likely need "Switch Row/Column." Do this by **right clicking on the graph** and choose "**Select Data…**". Next choose "**Switch row/column**."
5. Generate trendlines for each "series" (which corresponds to a different concentration of inhibitor).
   a. Choose a series of data points in the graph and right click. Choose "**Add Trendline…**"
   b. To see the x- and y-intercepts, we will need to get the trendlines to extrapolate backwards. Do this by right clicking on your trendline and choose "Format Trendline…"
   c. Under "Forecast," **increase the value of the Backward Forecast to 0.5**. (You may need to play with this number.)
   d. Repeat for all three trendlines for each drug. (I.e., you want a line for each series (ex. "Series 1" (no inhibitor), "Series 2" (1st inhibitor concentration), etc.)
6. If you choose to label your axes, click on **Chart Design** (or "**Chart Element**"), click **Axis Titles**
   a. Write "1/[S]" for the Value (X) axis label
   b. Write "1/rate" for the Value (Y) axis table
7. Repeat with each drug

Compare your resulting graph(s) with the graphs on the top of the page to determine if the drug is a competitive or noncompetitive inhibitor.