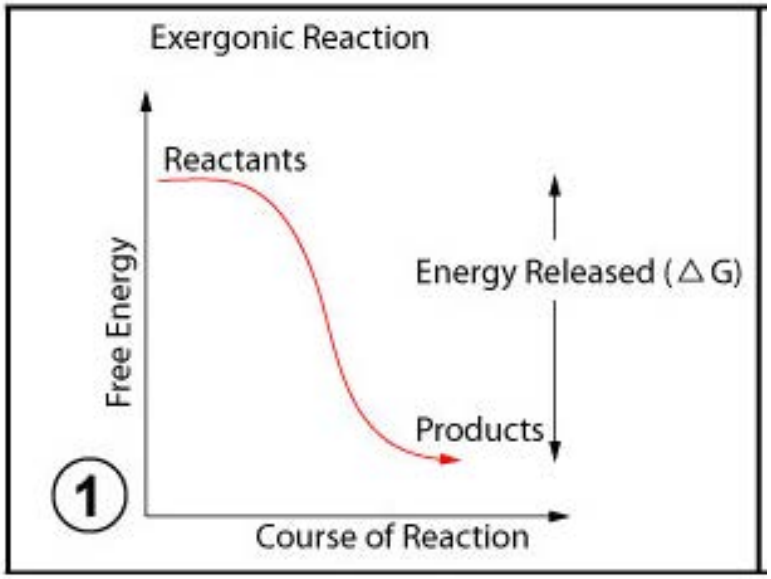
Summary: Free energy and reaction kinetics

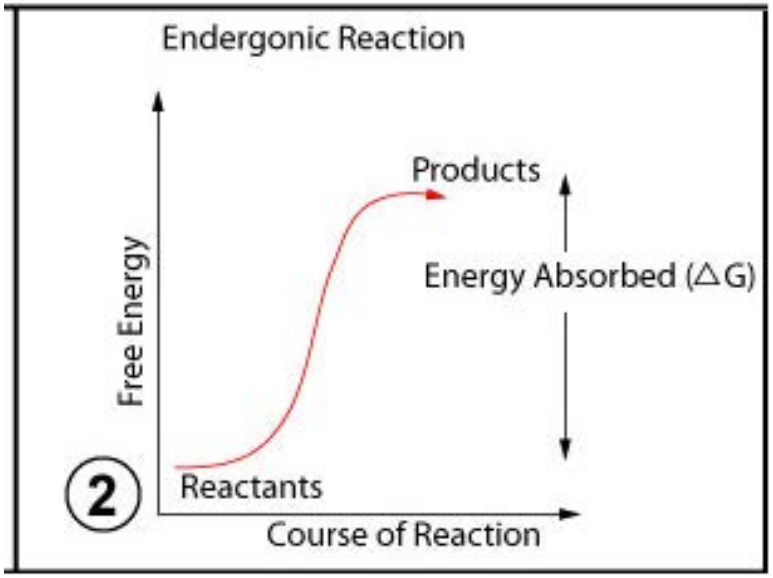


Free energy (ΔG)

ΔG= ΔH-TΔS

H: enthalpy, S: entropy, T: temperature.

Exergonic reactions release energy (ΔG<0), spontaneous.



Endergonic reactions require energy to proceed (ΔG>0).

If ΔG= 0, the reaction is at equilibrium (forward = back rate)

Reactions:

1: G 6 P $\rightleftharpoons$ F 6 P ($\Delta G=0$)

2: F 6 P + ATP $\longrightarrow$ F 1,6 P ($\Delta G<0$)

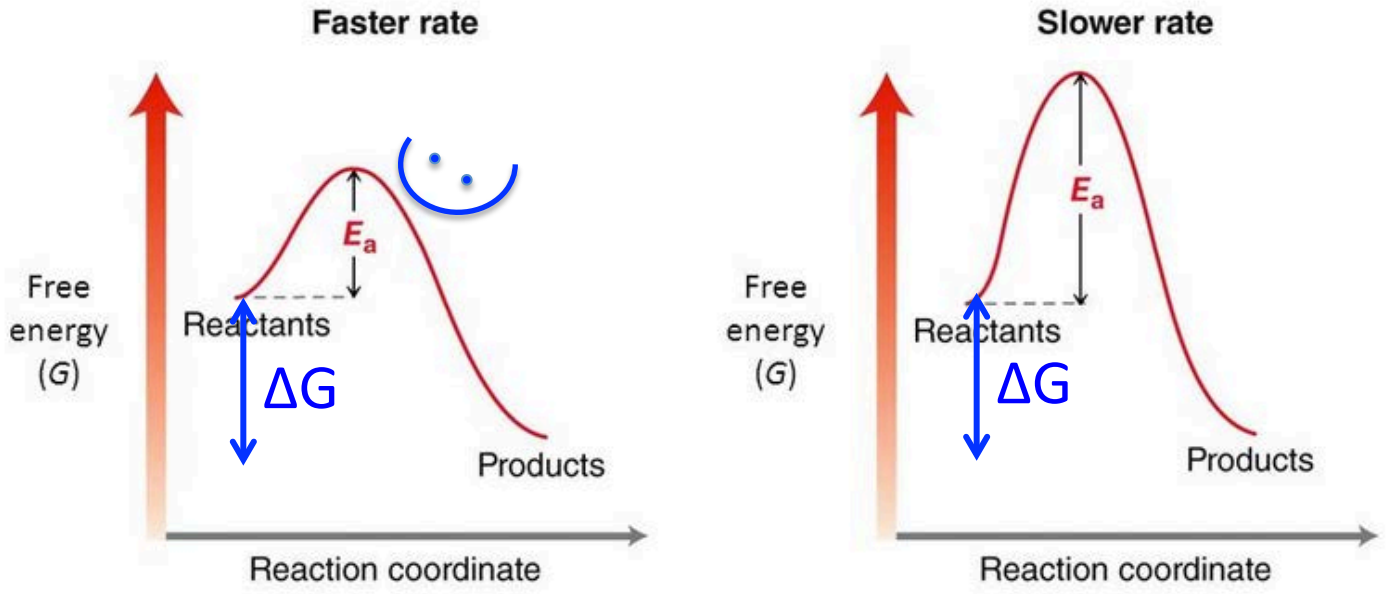
3: Phosphoenolpyruvate +ADP $\longrightarrow$ Pyruvate + ATP ($\Delta G>0$)

Which reaction is endergonic? Circle 1 2 3 (requires energy)

Which reactions proceeds spontaneously? Circle 1 2 3

Which reaction has $\Delta H=T\Delta S$? Circle 1 2 3

Reaction in the presence or absence of enzyme

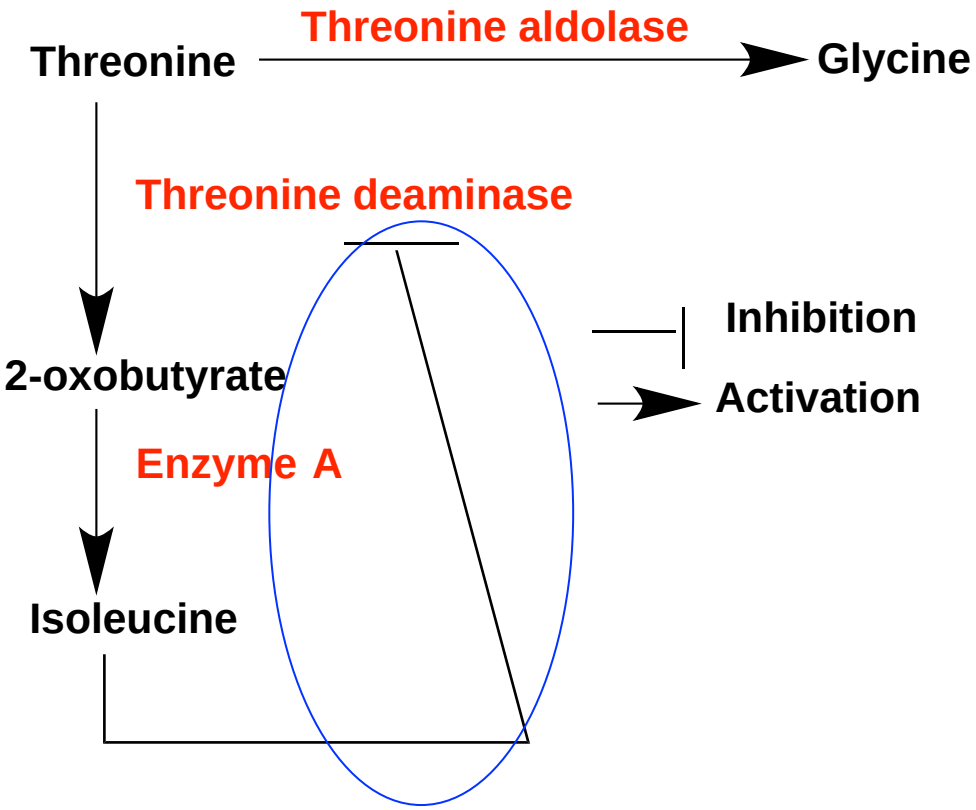


Put a "smile" on the graph that shows the enzyme catalyzed reaction.

Draw ΔG on both graphs. Is ΔG same or different?

Is the reaction exergonic or endergonic?

Biochemical pathway for glycine and isoleucine biosynthesis

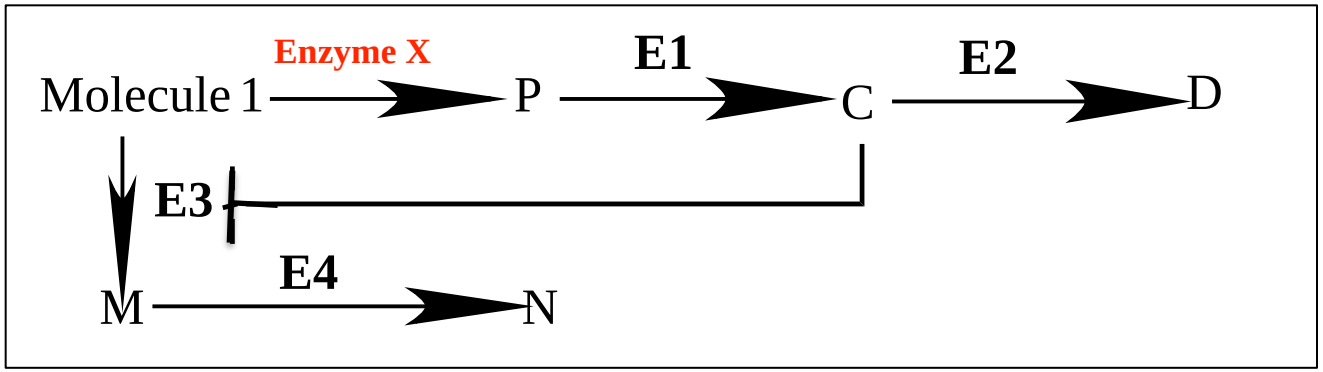


Circle negative feedback loop.

If threonine aldolase is absent will isoleucine be made?
Circle yes no

Increase in isoleucine concentration increases/ decreases/ does not influence levels of glycine. Circle one.

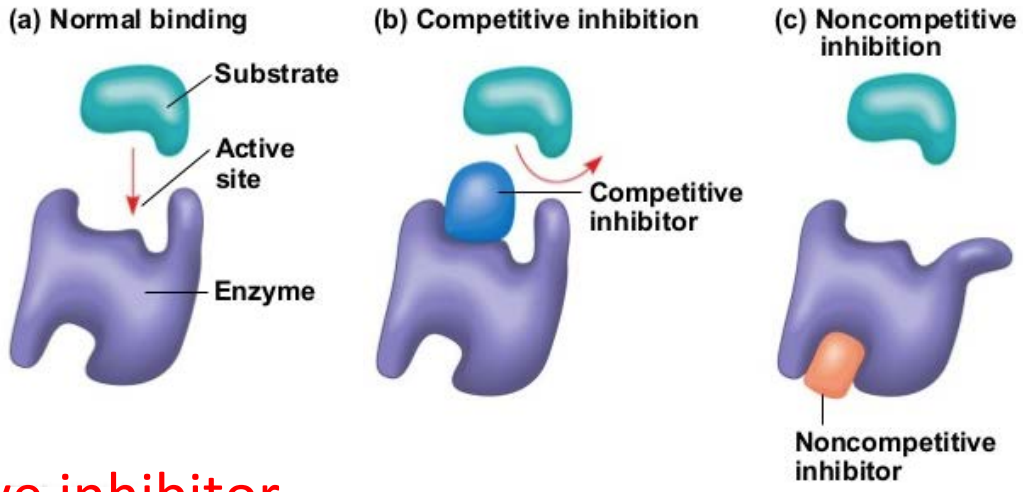
Biochemical pathway showing how molecule 1 is metabolized



Cell lacks both Enzyme X and E3 but produces an overactive version of E1. Would it metabolize Molecule 1?

No, since the cell will lack "P", which serves as the substrate of E1

Summary: Enzyme inhibitors



Competitive inhibitor

- occupies substrate binding site.
- can be reversible (binds non-covalently) or irreversible (binds covalently)

Allosteric / noncompetitive inhibitor

-binds to a different site than substrate binding site.

-changes geometry of substrate binding site.

-can be reversible or irreversible.

Uncompetitive inhibitor

-binds to ES complex instead of the free enzyme and prevents the reaction progress i.e. formation of product.

Enzyme (E1) catalyzed Reaction: **S** $\xrightarrow{E1}$ **P**

Inhibitor A of E1: Competitive
Inhibitor B of E1: Noncompetitive

Where on E1 does Inhibitor A bind?

Substrate binding site or Different site

Incubation with very high [S] concentration cannot remove Inhibitor A bound to E1. So inhibitor A…

-is reversible or *irreversible* inhibitor.

-*covalently* or non-covalently binds to E1.

You incubate E1 with Inhibitor B. Would Inhibitor A bind to E1-Inhibitor B complex? Circle Yes or No and **explain**.
Since Inhibitor B will alter the substrate binding site of E1.