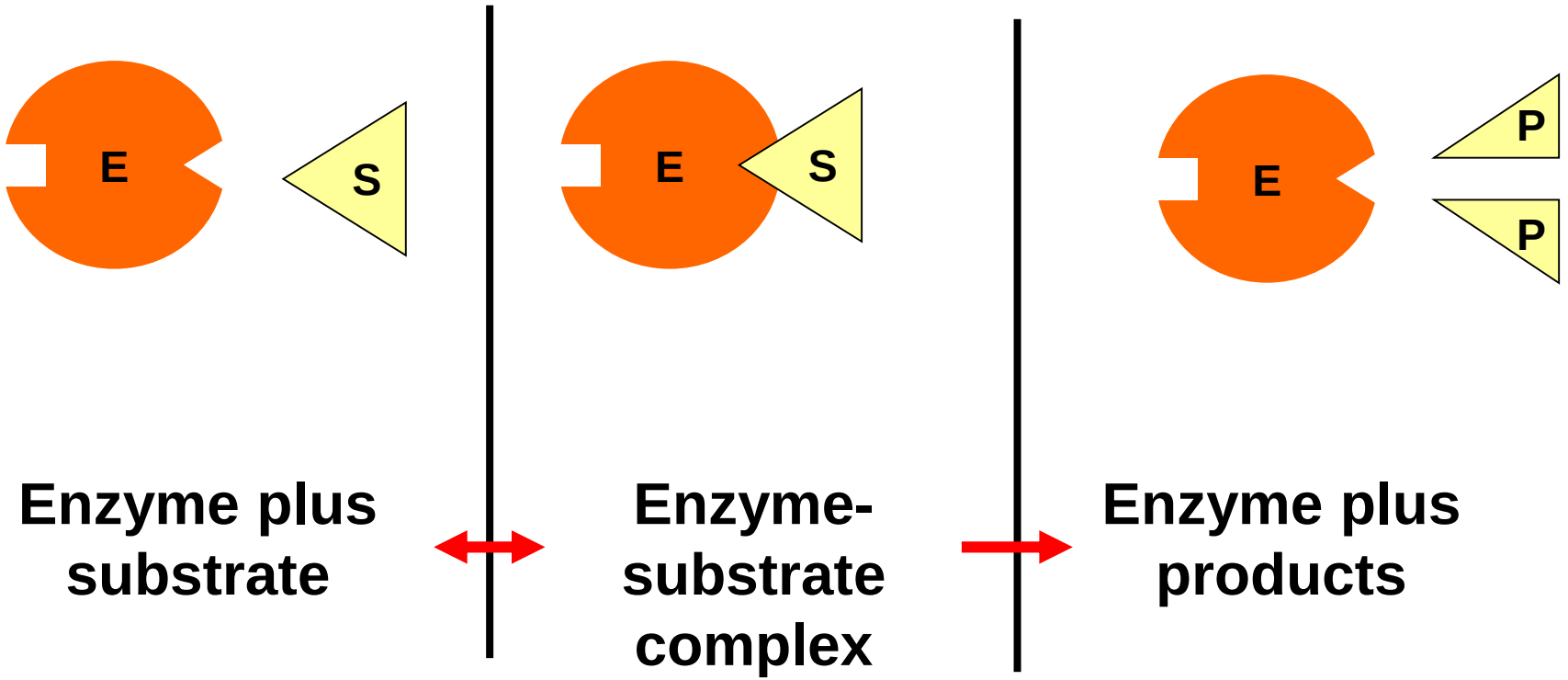
Further Factors Affecting Enzyme Activity

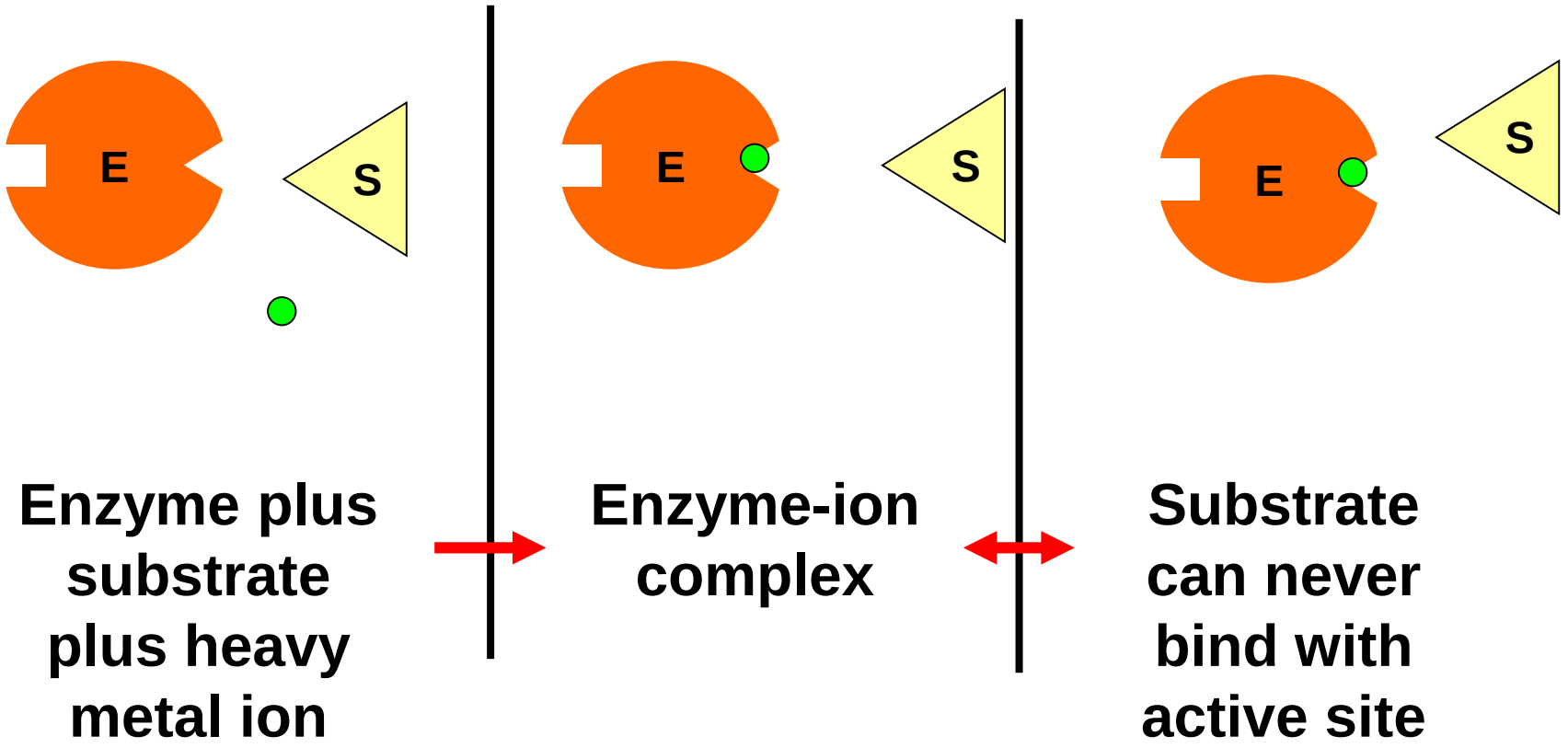
Enzyme Activity Revision



Enzyme Inhibition

- Inhibitors reduce the activity of enzymes.
- Some inhibitors can permanently interfere with enzyme activity.
- Some (Eg. Heavy metal ions) can permanently bind to the active site, making the enzyme inactive.

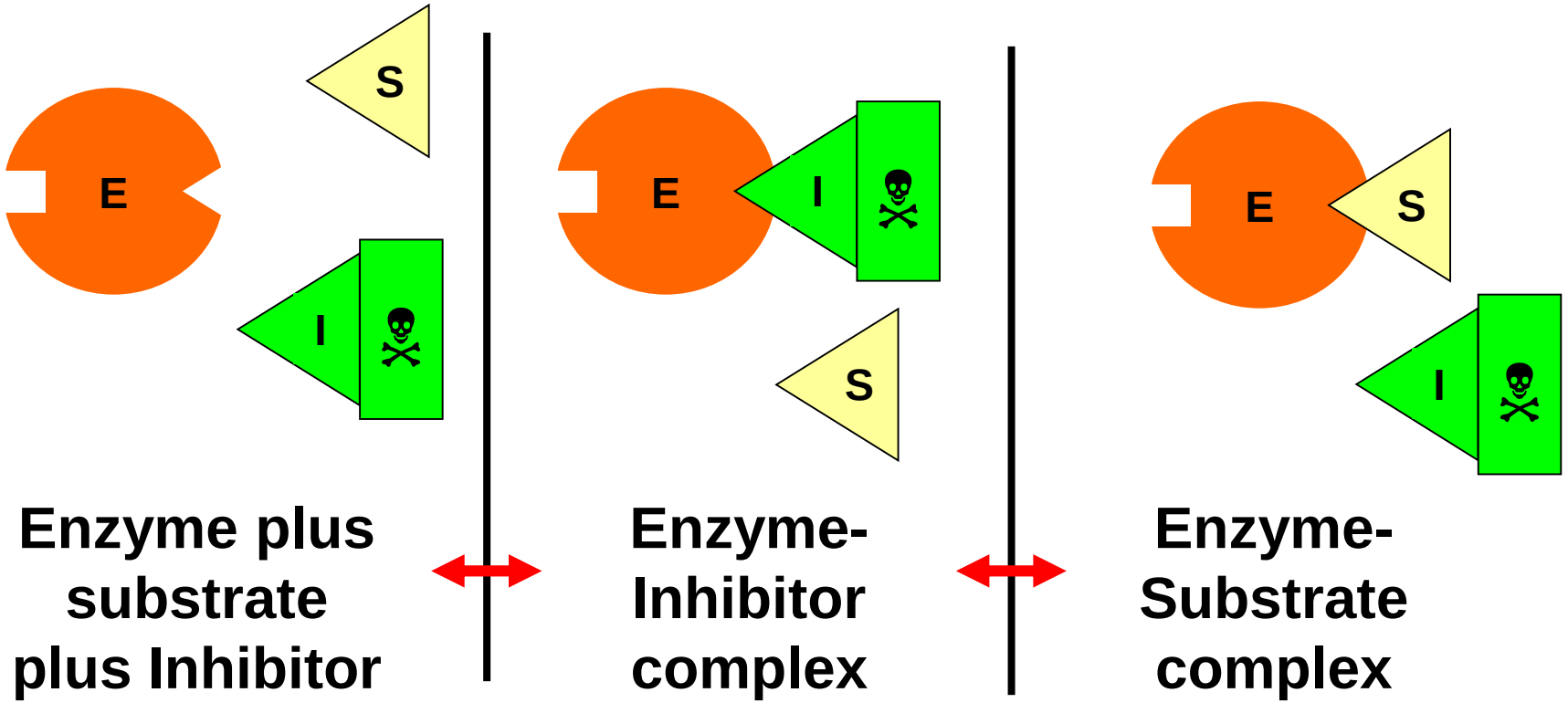
Permanent Enzyme Inhibition



Enzyme Inhibition

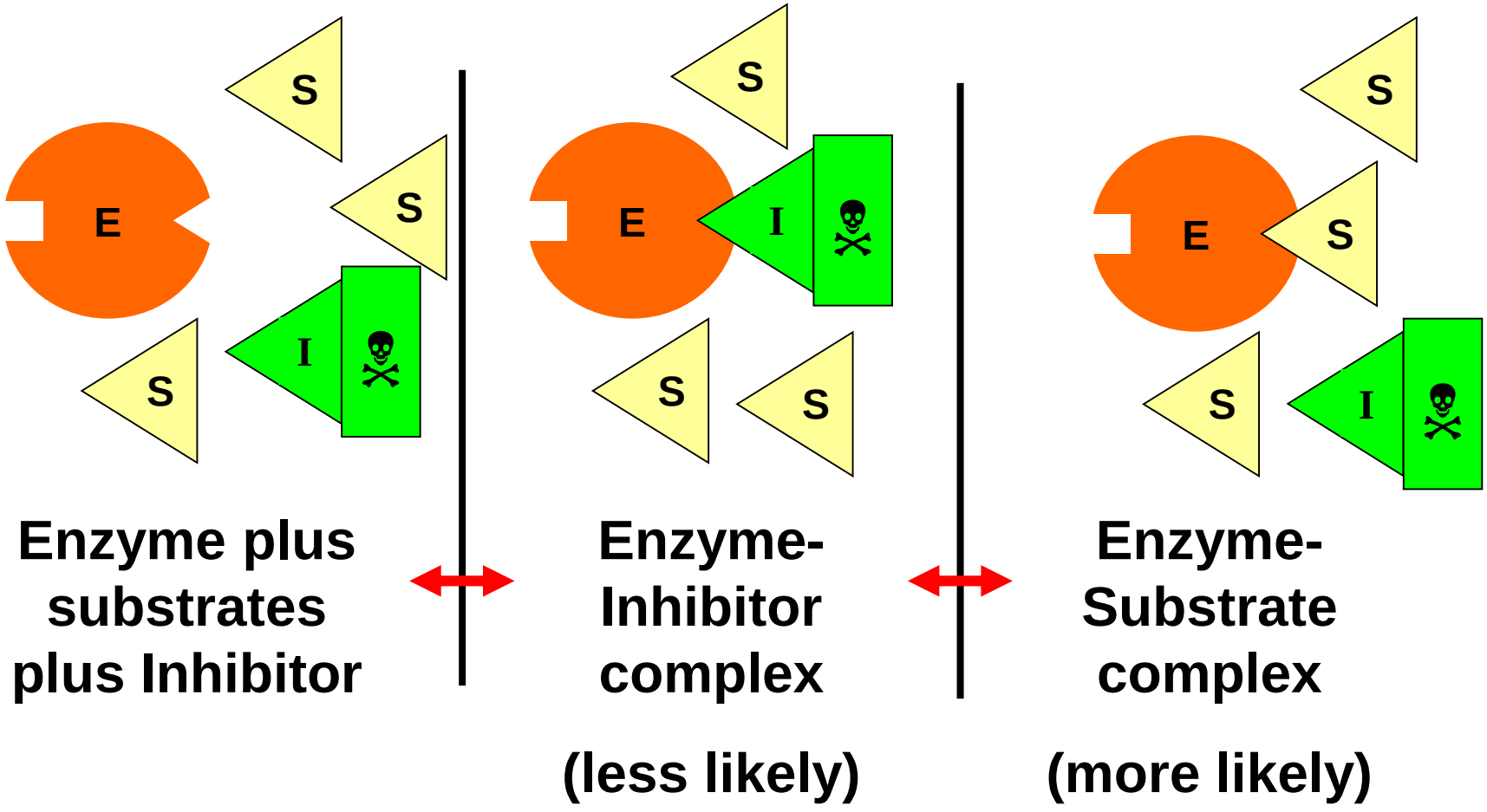
- Some inhibitors can temporarily interfere with enzyme activity by blocking the binding of the substrate.

Temporary Enzyme Inhibition



- Inhibitor temporarily blocks some active sites
  - Enzyme becomes less effective.

Competitive Enzyme Inhibition

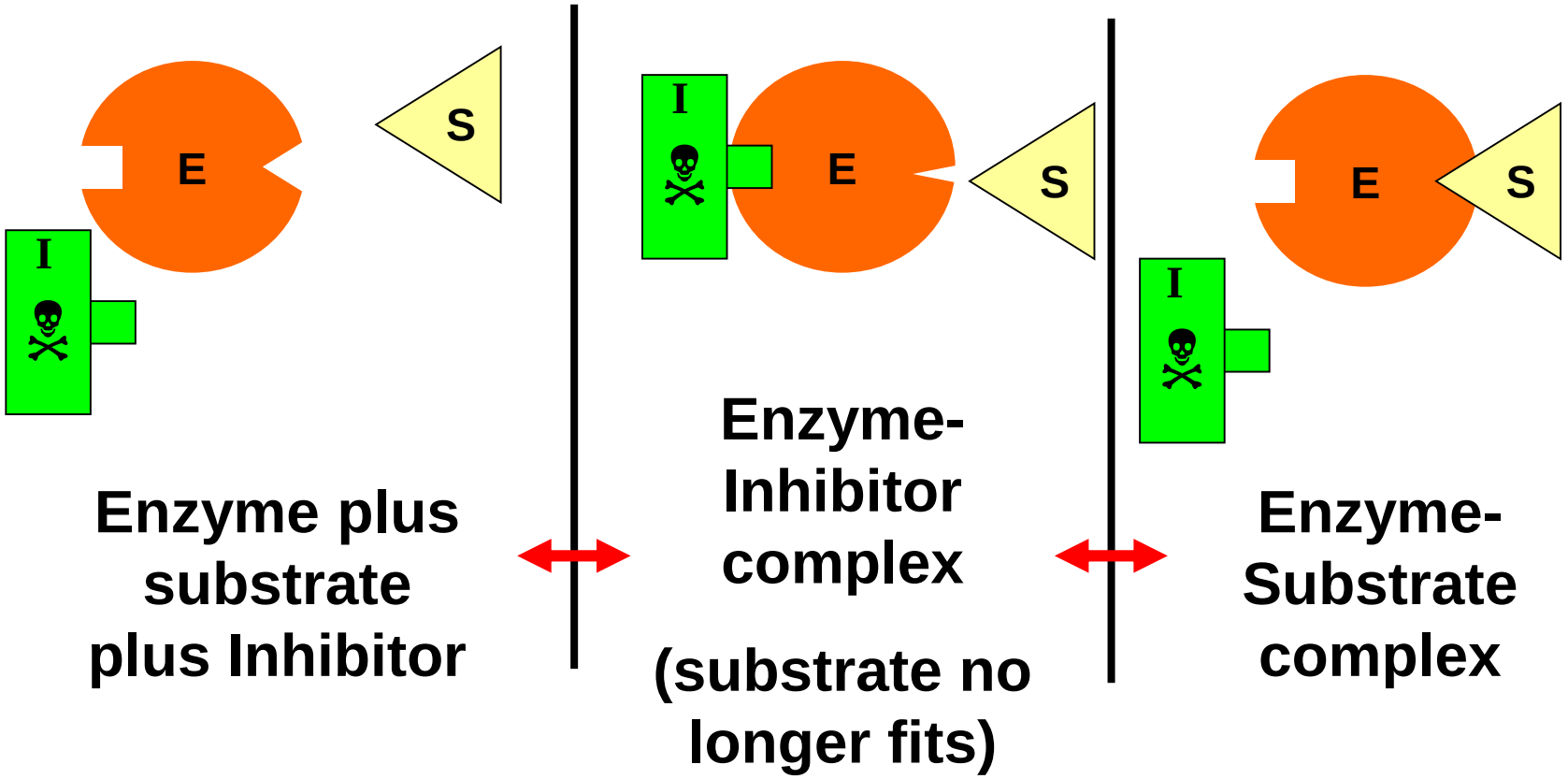


- Increasing substrate reduces inhibition.

Enzyme Inhibition

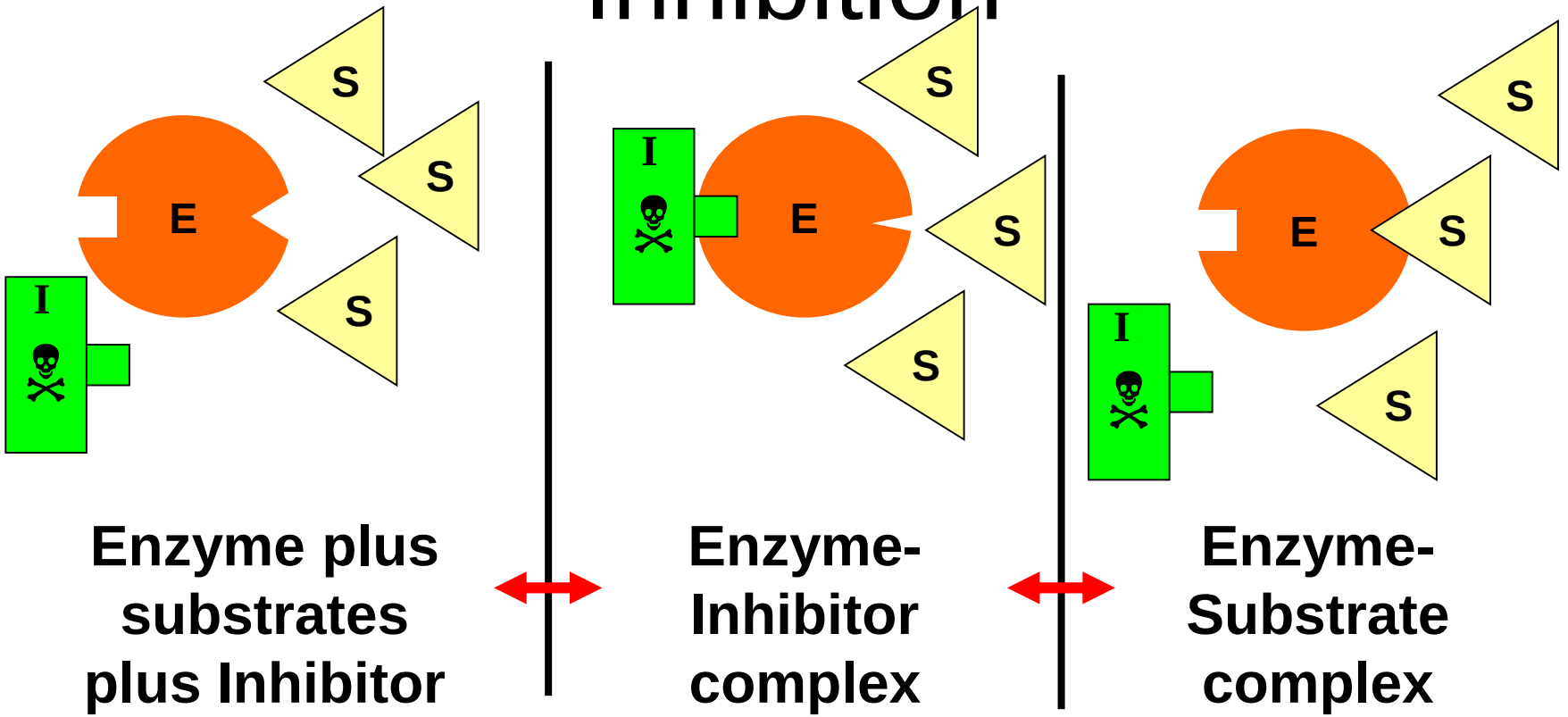
- Some inhibitors can temporarily interfere with enzyme activity by changing the shape of the active site.
  - These substances don’t bind with the active site but with another position on the enzyme.

Temporary Enzyme Inhibition



- Inhibitor temporarily changes some active sites
  - Enzyme becomes less effective.

Non Competitive Enzyme Inhibition



- Increasing substrate has no effect on inhibition.

Technical Terms

- Inhibitor competes with substrate for the active site = COMPETITIVE INHIBITION.

- Inhibitor binds to an area other than the active site = NON COMPETITIVE INHIBITION.
  - The “other site” is called an ALLOSTERIC SITE.

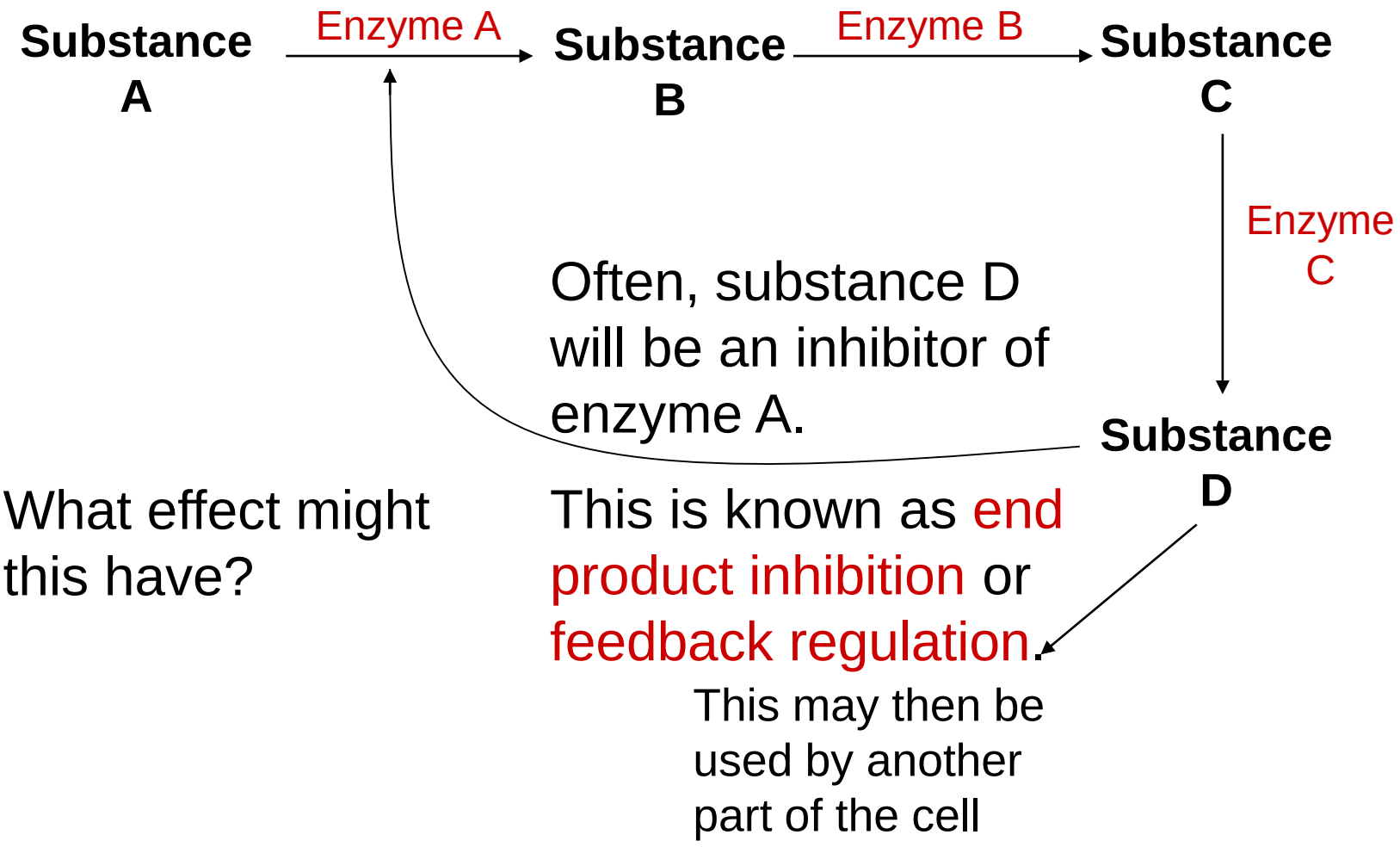
What is a Metabolic Pathway?

- Any ideas?

- Metabolism = All the chemical reactions that take place within a living organism (usually controlled by enzymes).

- A metabolic pathway is a sequence of enzyme controlled reactions.
  - The product of one reaction acts as the substrate for the next.

Example of a Metabolic Pathway.



Often, substance D will be an inhibitor of enzyme A.

What effect might this have?

This is known as end product inhibition or feedback regulation.

This may then be used by another part of the cell

Genetic Enzyme Related Diseases

- Phenylketonuria is a genetic disease.

Normally,

Phenylalanine —(Phenylalanine Hydroxylase)→ Tyrosine

Excess amino acid Phenylalanine is converted into Tyrosine

In Phenylketonuria,

Phenylalanine → Tyrosine

Phenylalanine → Phenyl Pyruvic Acid (PPA)

PPA accumulation causes damage to brain tissue