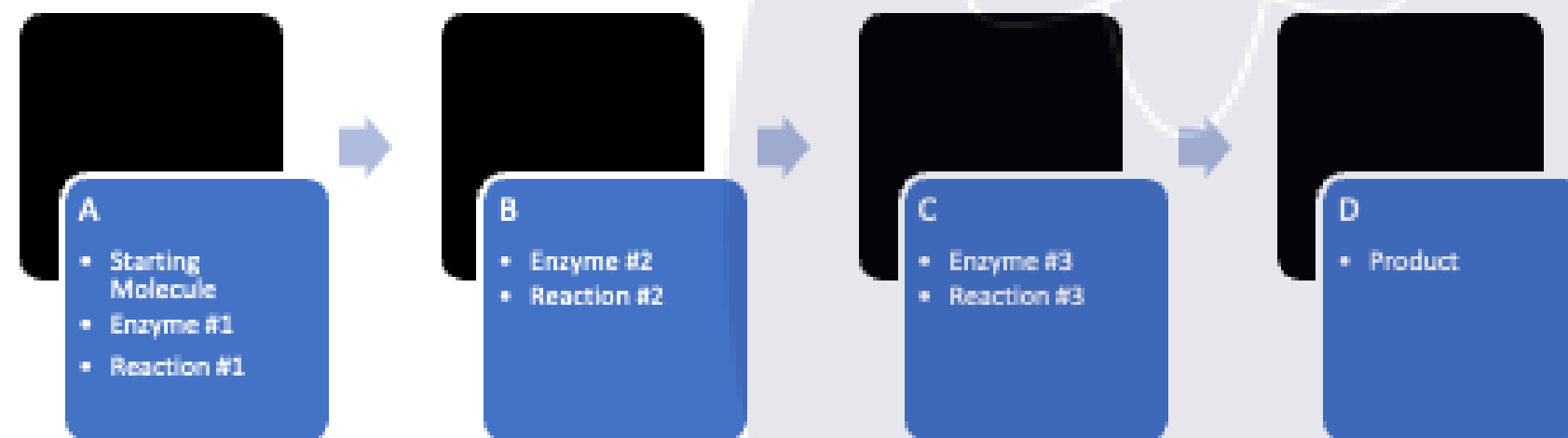


# Ch. 6: Metabolism

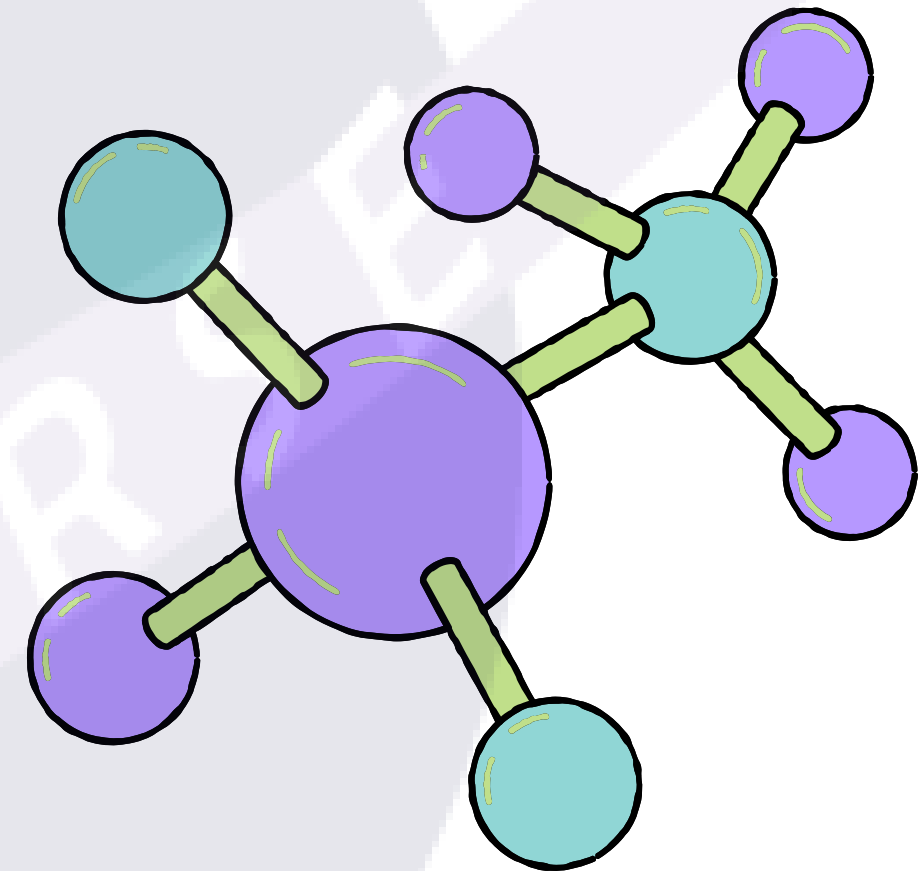


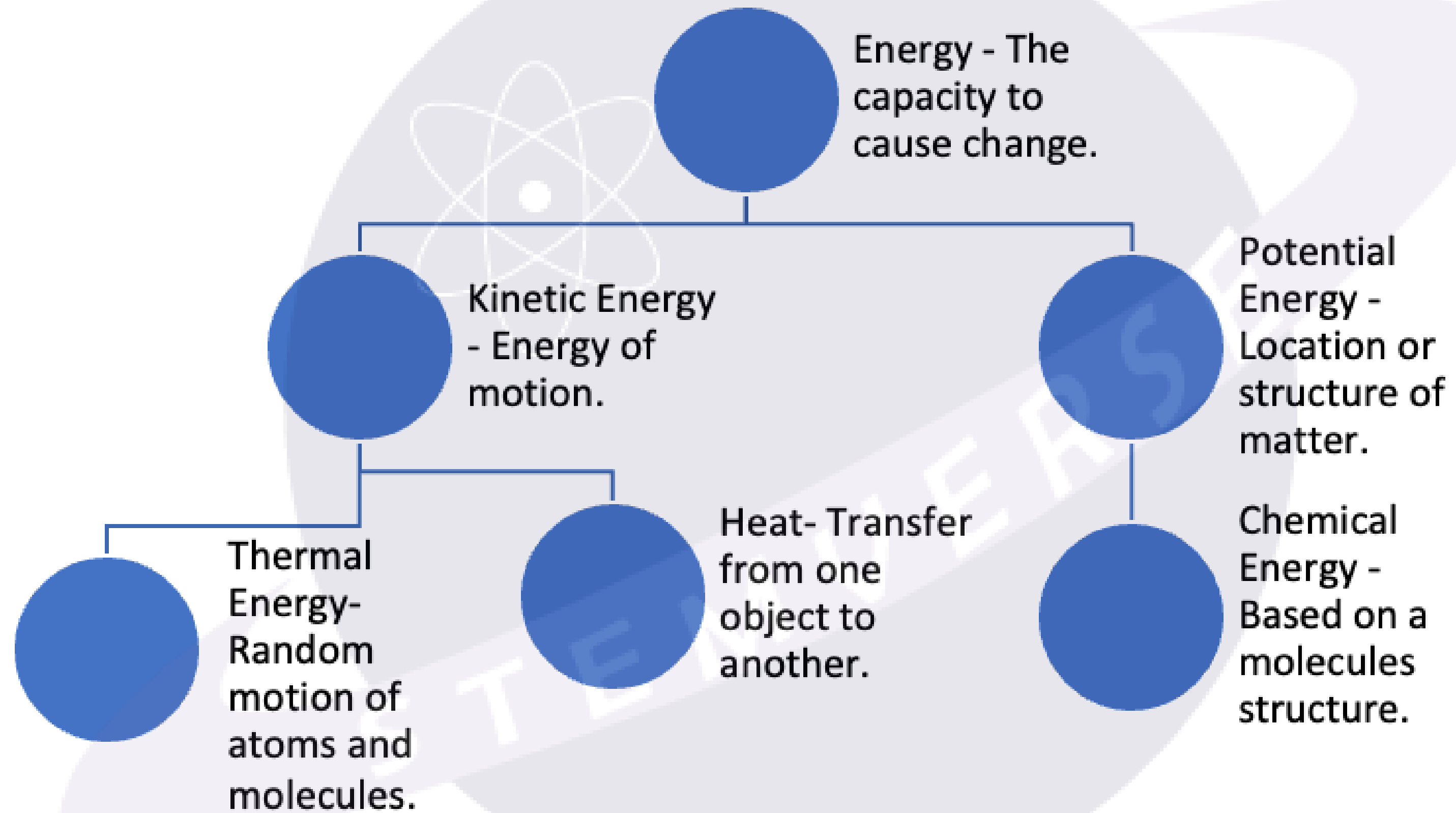
Metabolism - The totality of an organisms chemical reactions.

Metabolic Pathways: A specific molecule is altered in a series of defined steps, resulting in a product.

**Enzymes catalyze reactions in intersecting metabolic pathways, which may be catabolic (breaking down molecules, releasing energy) or anabolic (building molecules, consuming energy).**

Bioenergetics - Study of how energy flows through living organisms.





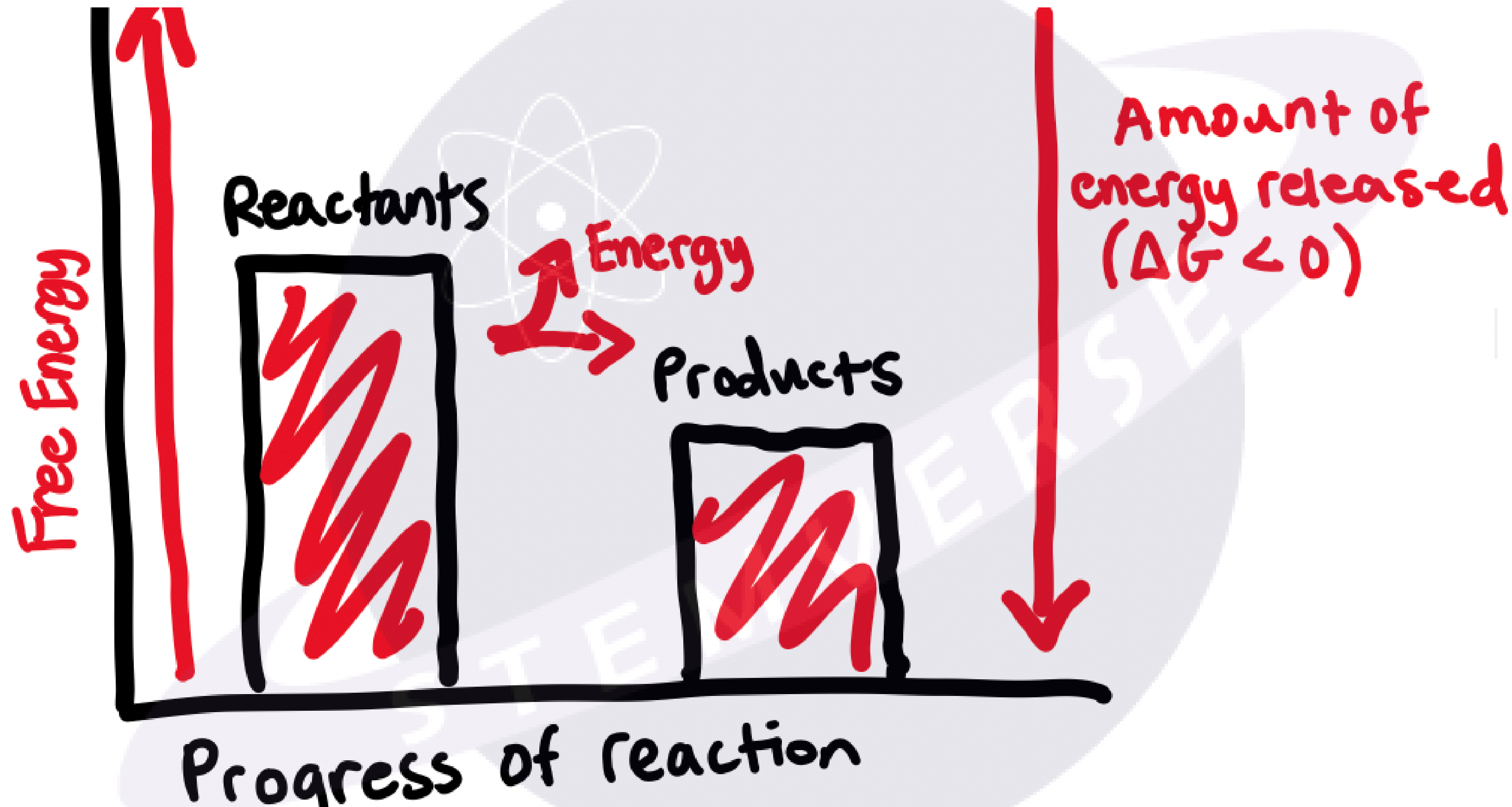


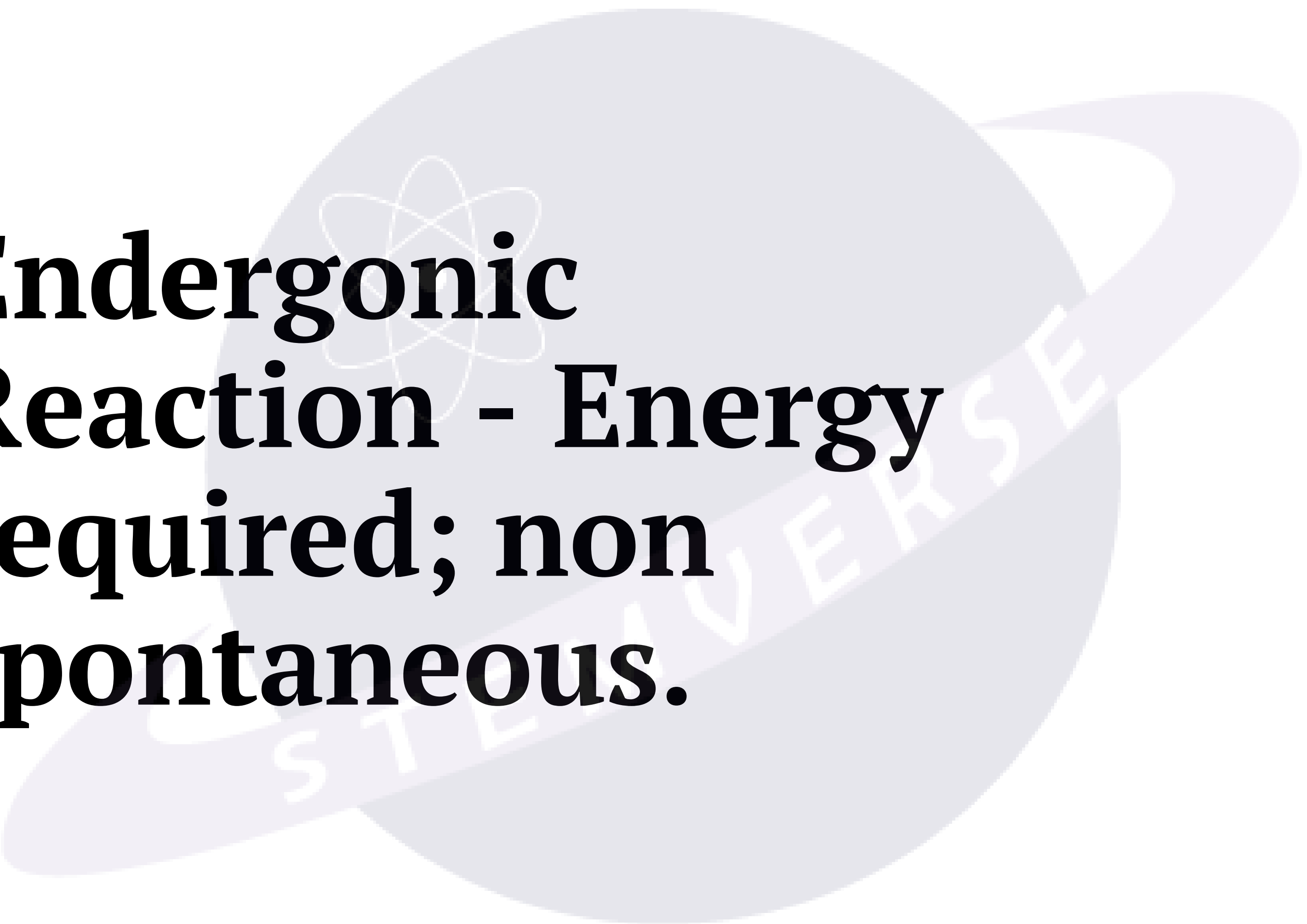
**First Law of Thermodynamics - Conservation of energy, states that energy cannot be created or destroyed, only transformed or transferred.**

**Second Law of Thermodynamics - States that spontaneous processes (requiring no outside energy), increase the entropy (disorder of the universe).**

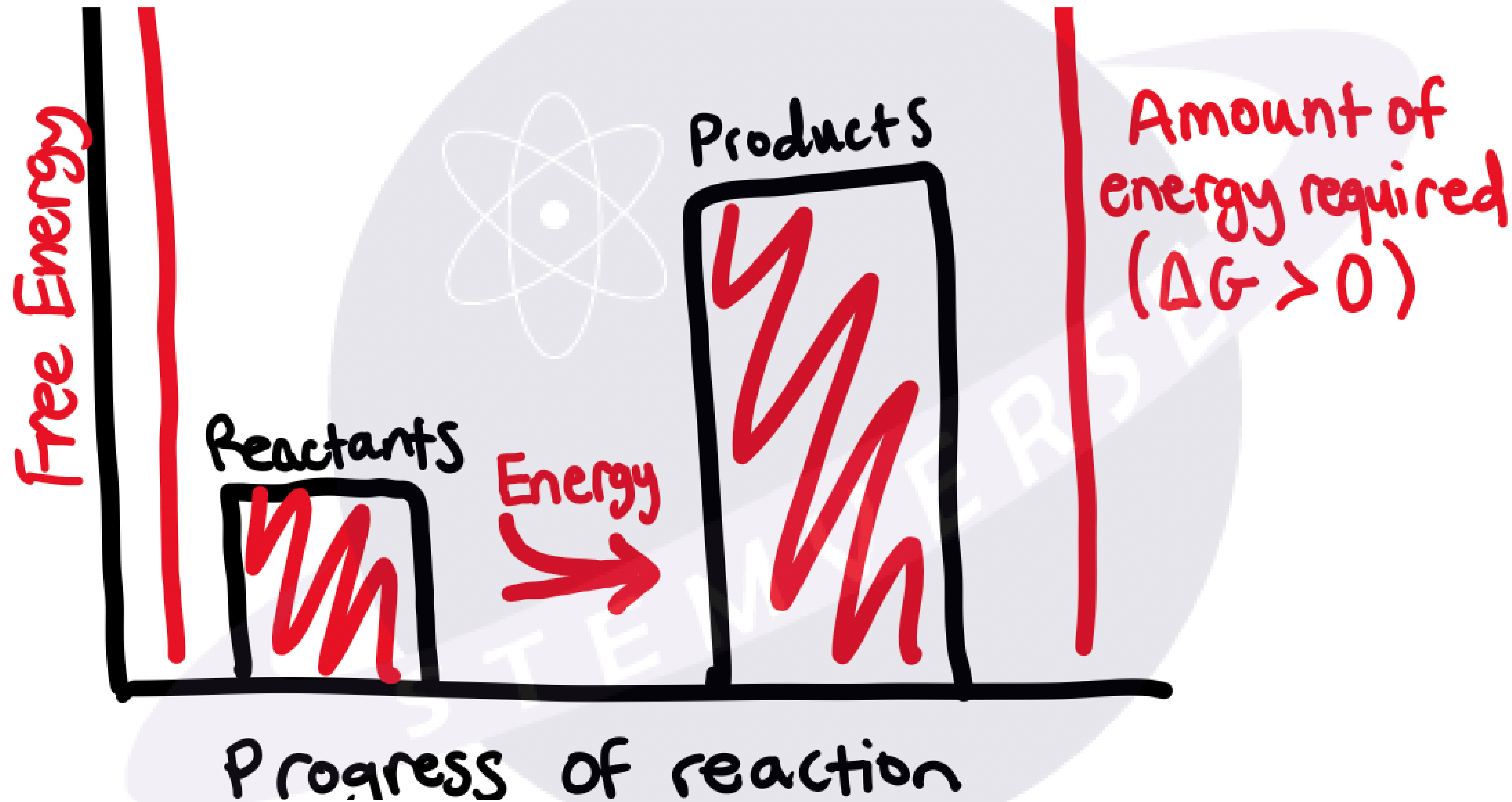
**Free Energy - Energy that can do work under cellular conditions.**

**Exergonic Reaction - Energy released; spontaneous.**

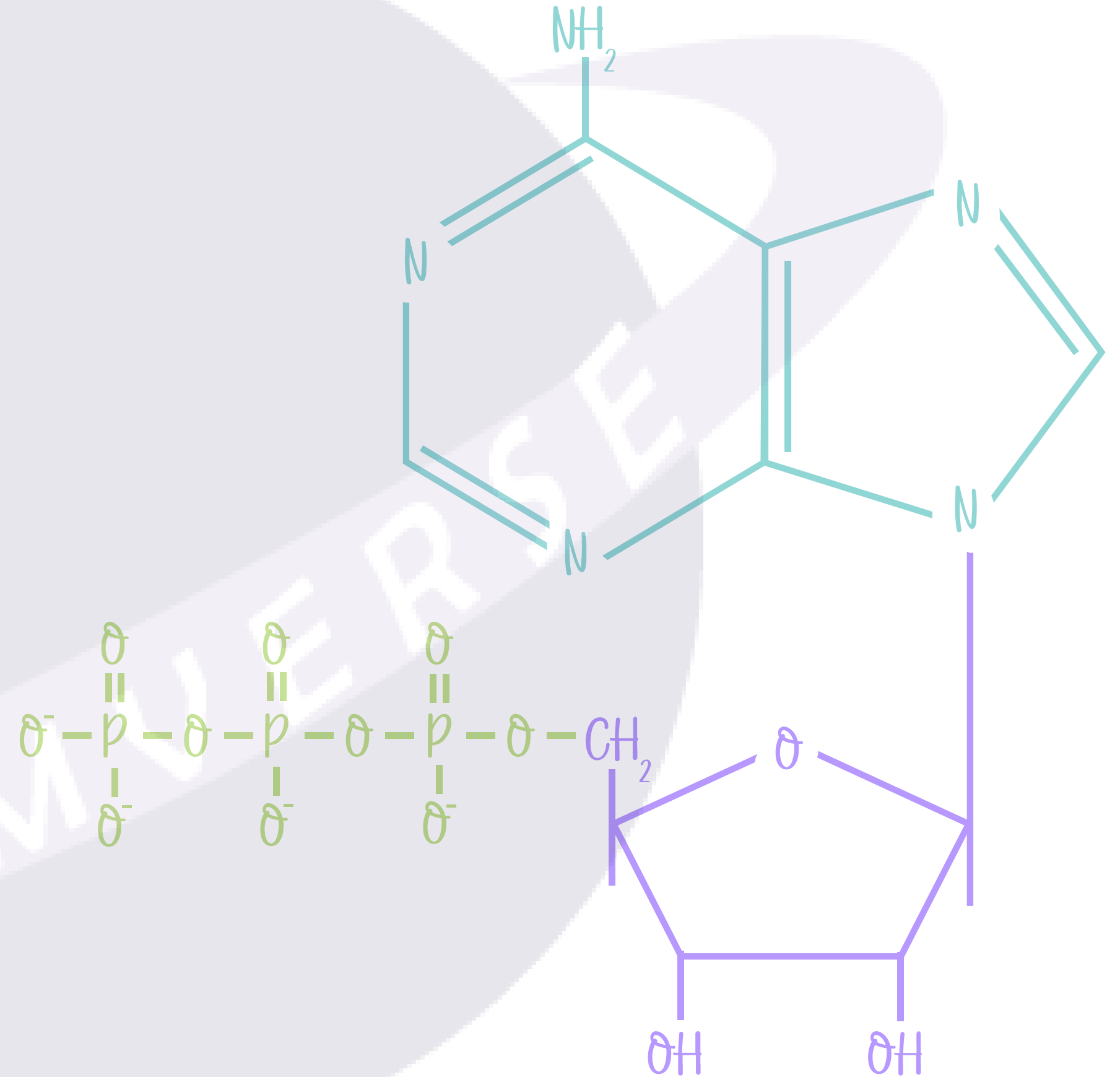




**Endergonic  
Reaction - Energy  
required; non  
spontaneous.**



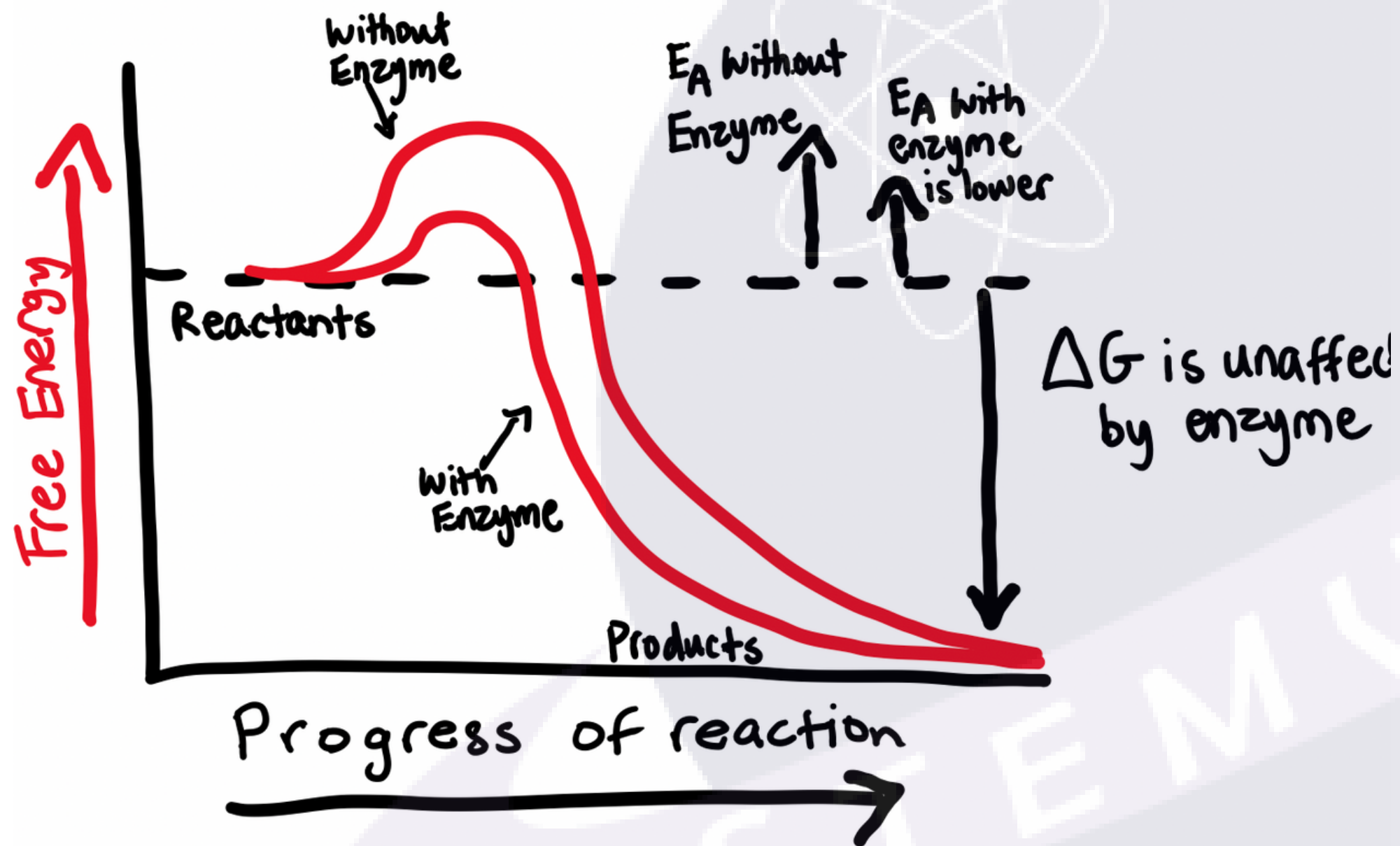
**ATP (Adenosine Triphosphate) - Contains the sugar ribose with the nitrogenous base adenine and a chain of 3 phosphate groups.**





**Energy Coupling -  
The use of an  
exergonic process  
to drive an  
endergonic one.**

# Catabolic pathways drive the regeneration of ATP from ADP + inorganic phosphate



Catalyst - A chemical agent that speeds up a reaction without being consumed by the reaction.

Enzyme - A protein that acts as a catalyst (Lowers the activation energy).

Activation Energy - The energy required to break the bonds of the reactants.

Substrate - The reactant an enzyme acts on.

Active Site - A pocket or groove on the surface of the enzyme where catalysis occurs.

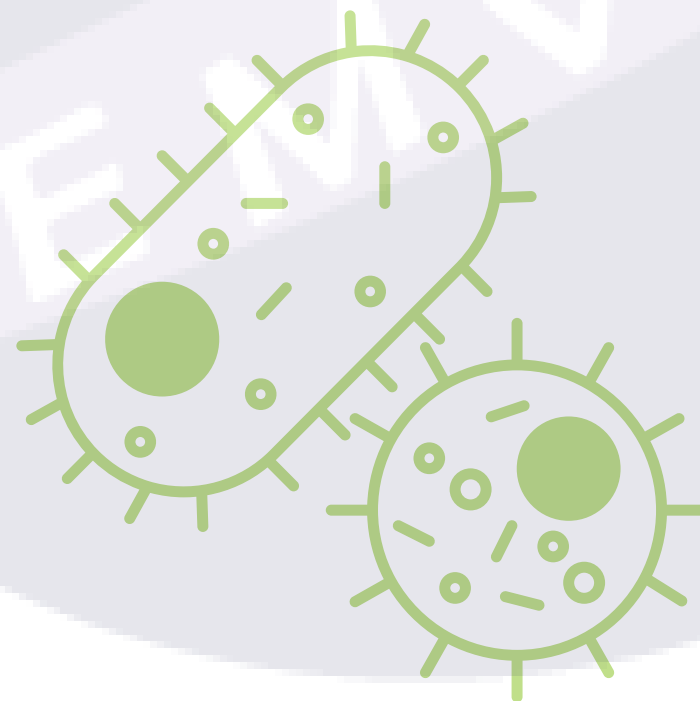


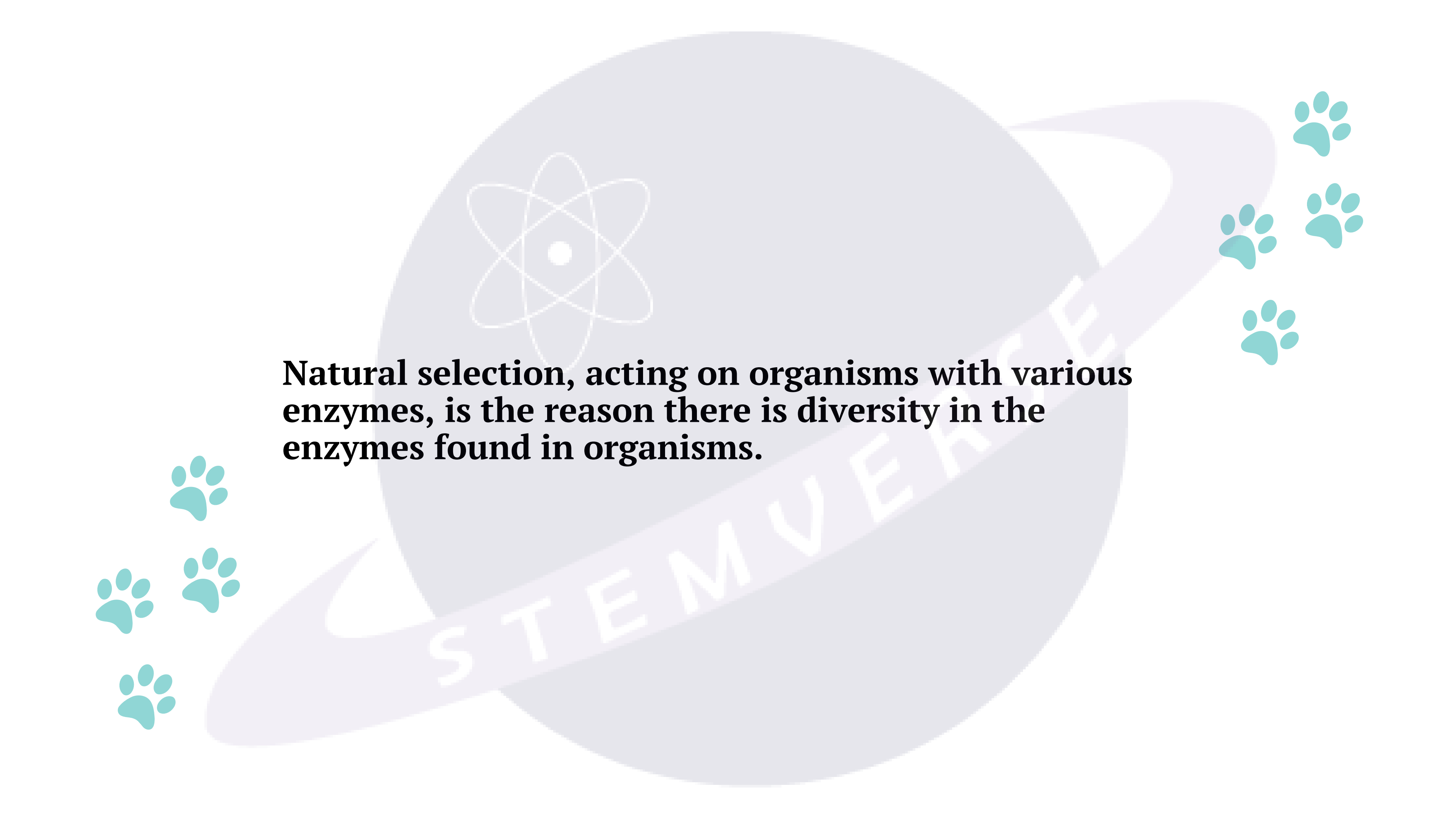
**Each enzyme has  
an optimal  
temperature & pH.**

# Inhibitors reduce enzyme function

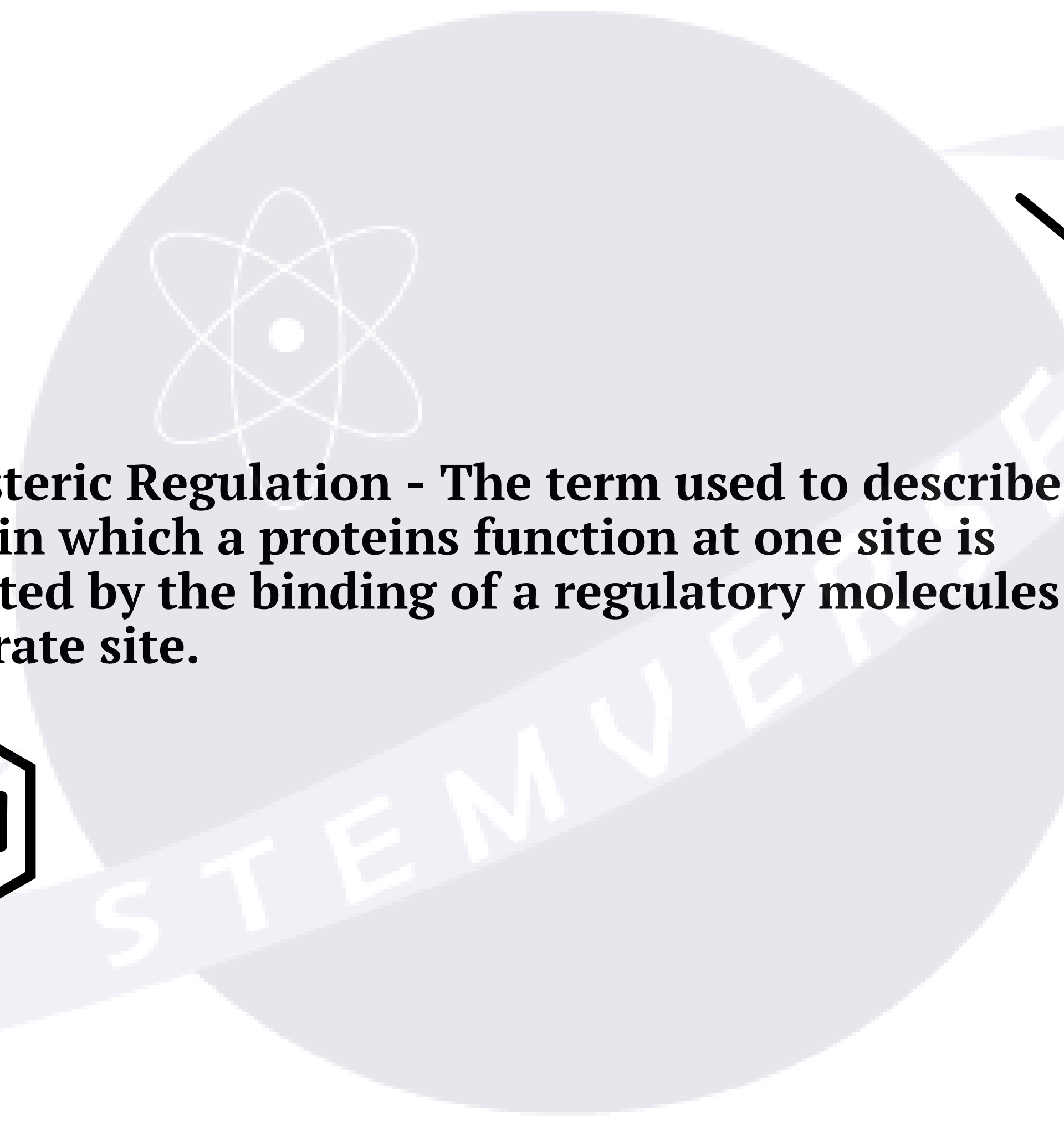
Competitive inhibitor binds to the active site.

Noncompetitive inhibitors bind to another site.

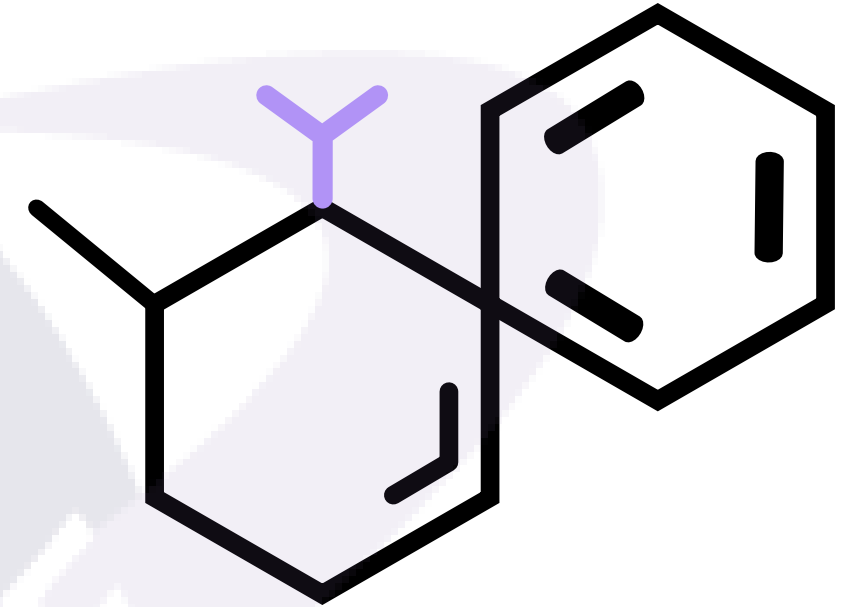
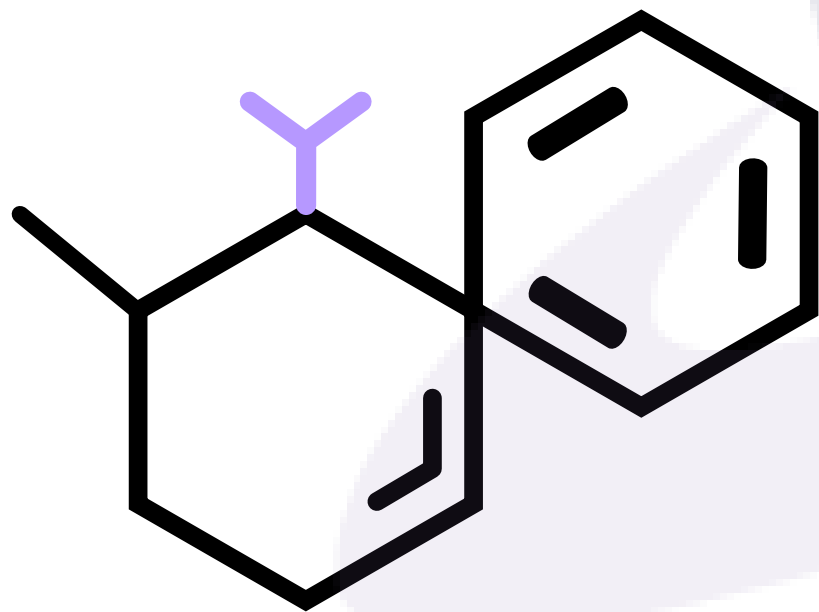




**Natural selection, acting on organisms with various enzymes, is the reason there is diversity in the enzymes found in organisms.**



**Allosteric Regulation - The term used to describe any case in which a proteins function at one site is affected by the binding of a regulatory molecules to a separate site.**



The background features a large, light purple circular graphic. Inside the circle is a stylized white atom with a central dot and three elliptical orbits. A thick, light purple swoosh curves around the right side of the circle. The word "STEM" is written in large, white, sans-serif capital letters across the bottom of the circle.

**Cooperatively - Mechanism  
that amplifies the response  
of enzymes to substrates.**



**Feedback Inhibitor - A metabolic pathway is halted by the inhibitory binding of its end product to an enzyme that acts early in the pathway.**