AP BIO INSTA-REVIEW

TOPIC 3.4

Cellular Energy

ENE-1.H.1

All living systems require constant input of energy.

ENE-1.H.2

Life requires a highly ordered system and does not violate the second law of thermodynamics—

a. Energy input must exceed energy loss to maintain order and to power cellular processes.

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Cellular Energy

ENE-1.H.2

Life requires a highly ordered system and does not violate the second law of thermodynamics–

b. Cellular processes that release energy may be coupled with cellular processes that require energy.

c. Loss of order or energy flow results in death.

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Cellular Energy

ENE-1.H.3

Energy-related pathways in biological systems are sequential to allow for a more controlled and efficient transfer of energy. A product of a reaction in a metabolic pathway is generally the reactant for the subsequent step in the pathway

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Which describes an endergonic reaction?

A. Positive ΔG, nonspontaneous

B. Negative ΔG, nonspontaneous

C. Positive ΔG, spontaneous

D. Negative ΔG, spontaneous

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TOPIC 3.4

Which describes an endergonic reaction?

A. Positive ΔG, nonspontaneous

Endergonic reactions will ABSORB energy. EN- makes you think of something ENtering, so the energy is ENtering the reaction. Due to the products having a higher amount of free energy, the ΔG is positive.

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TOPIC 3.4

Which describes an exergonic reaction?

A. Positive ΔG, nonspontaneous

B. Negative ΔG, nonspontaneous

C. Positive ΔG, spontaneous

D. Negative ΔG, spontaneous

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TOPIC 3.4

Which describes an exergonic reaction?

D. Negative ΔG, spontaneous

Exergonic reactions will RELEASE energy. EX- makes think of something EXiting. So, the energy is EXiting the reaction. Since the products have less free energy than the reactions, the ΔG will be negative.

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What is energy coupling?

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What is energy coupling?

Energy coupling is pairing an exergonic reaction with an endergonic reaction. The exergonic reaction releases the energy that is used to fuel the endergonic reaction.

Example:
Hydrolysis of ATP (exergonic) & move Na against concentration gradient (endergonic)

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What is the first law of thermodynamics?

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TOPIC 3.4

What is the first law of thermodynamics?

Energy cannot be created or destroyed but can be transformed or transferred.

All of the energy on Earth comes from the solar radiation that was released that was released by reactions on sun from its creation. That energy was transformed from stored potential chemical energy to solar energy to heat energy, chemical energy, etc.

Then all of the energy leaves Earth in the form of heat.

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TOPIC 3.4

What does the second law of thermodynamics state about disorder?

A. Every reaction increases the entropy

B. Every reaction decreases the entropy

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TOPIC 3.4

What does the second law of thermodynamics state about disorder?

A. Every reaction increases the entropy

In the second law of thermodynamics, every reaction will increase the entropy of the universe.

Think about it like a puzzle. You are assembling a puzzle, you will release more CO_2 and H_2O creating more disorder than the unassembled puzzle pieces originally.

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TOPIC 3.4

Loss of energy results in...

A. Death

B. Eating

C. Hibernation

D. Metabolism

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TOPIC 3.4

Loss of energy results in...

A. Death

If there is no energy, the cells will be unable to perform many functions which will result in death of the cell.

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What is the function of B in the metabolic pathway?

A → B → C

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TOPIC 3.4

What is the function of B in the metabolic pathway?

A → B → C

B is an intermediate. It is the product of the A → reaction AND the reactant for the B → C reaction

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TOPIC 3.4

A → B → C → D

Enzyme B is inhibited. What happens to the concentration of C?

A. C increases

B. C decreases

C. C stays the same

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TOPIC 3.4

A → B → C → D

Enzyme B is inhibited. What happens to the concentration of C?

B. C decreases

Enzymes will speed up reactions. Enzyme B is responsible to catalyzing the conversion of B to C. If the enzyme is inhibited, the conversion of B to C will be inhibited. There will be less C produced.

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TOPIC 3.4

Every reaction increases the entropy of the universe...

A. First law of thermodynamics
B. Second law of thermodynamics
C. Third law of thermodynamics

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TOPIC 3.4

Every reaction increases the entropy of the universe...

B. Second law of thermodynamics

This is the definition of the second law of thermodynamics. Every reaction will increase the entropy of the universe.

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What is entropy?

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TOPIC 3.4

What is entropy?

Entropy is the disorder or chaos.

For example, 1 glucose is broken down to 6 carbon dioxide and 6 water molecules. Think about how organized glucose is, but how much disorder is in those gas molecules.

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TOPIC 3.4

Energy cannot be created or destroyed, but transferred or transformed...

A. First law of thermodynamics
B. Second law of thermodynamics
C. Third law of thermodynamics

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TOPIC 3.4

Energy cannot be created or destroyed, but transferred or transformed...

A. First law of thermodynamics

This is the definition of the first law of thermodynamics. Energy cannot be created or destroyed, but it can be transferred or transformed.

AP BIO INSTA-REVIEW

TOPIC 3.4

What molecule is responsible for powering cellular processes?

A. ATP

B. Glucose

C. Membrane Potential

D. Sucrose

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TOPIC 3.4

What molecule is responsible for powering cellular processes?

A. ATP

ATP has an higher free energy than ADP. The third phosphate will be added to power cellular processes, because when things are phosphorylated, they are primed to do work.

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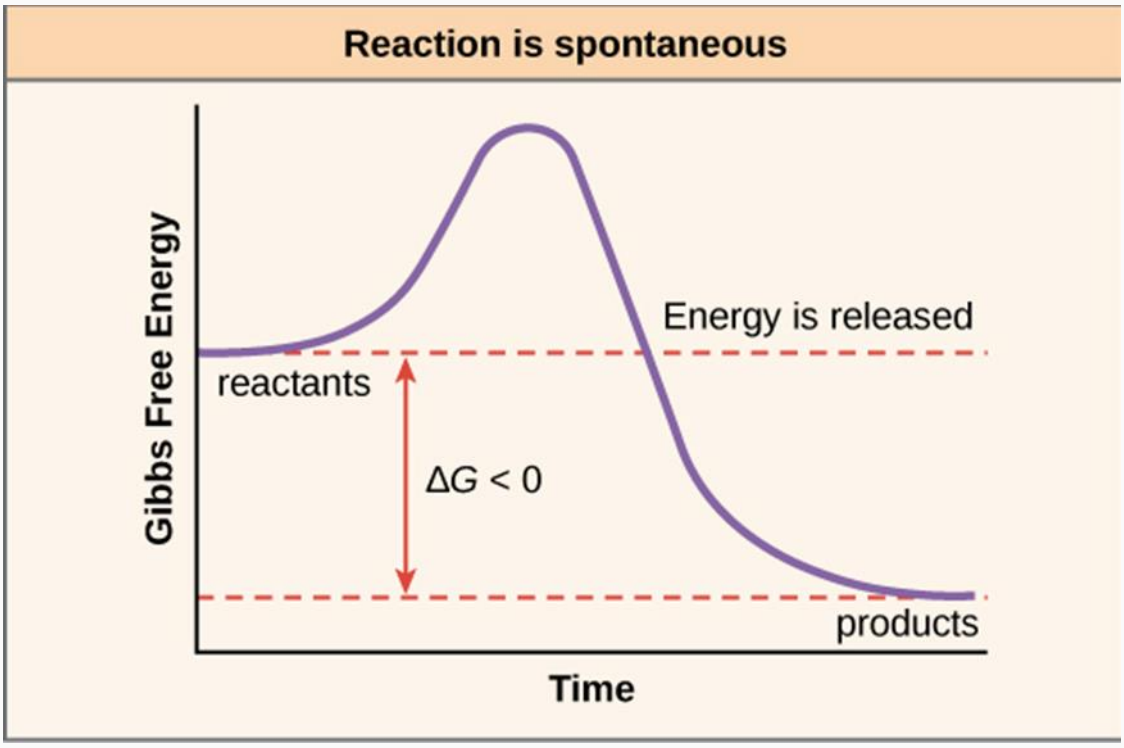
TOPIC 3.4

This reaction is...



A. Endergonic

B. Exergonic

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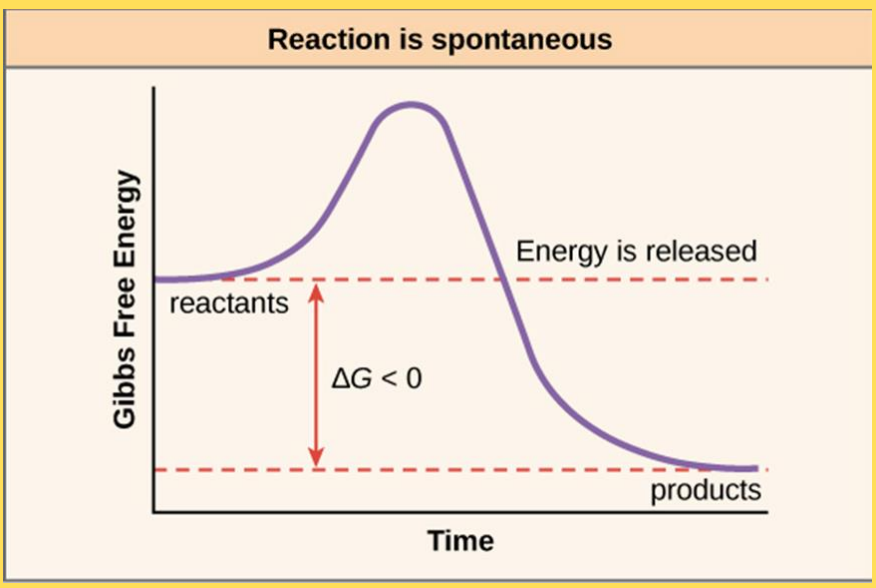
This reaction is...

B. Exergonic



There is a release of free energy that can be used to power an endergonic reaction (requires input of energy)

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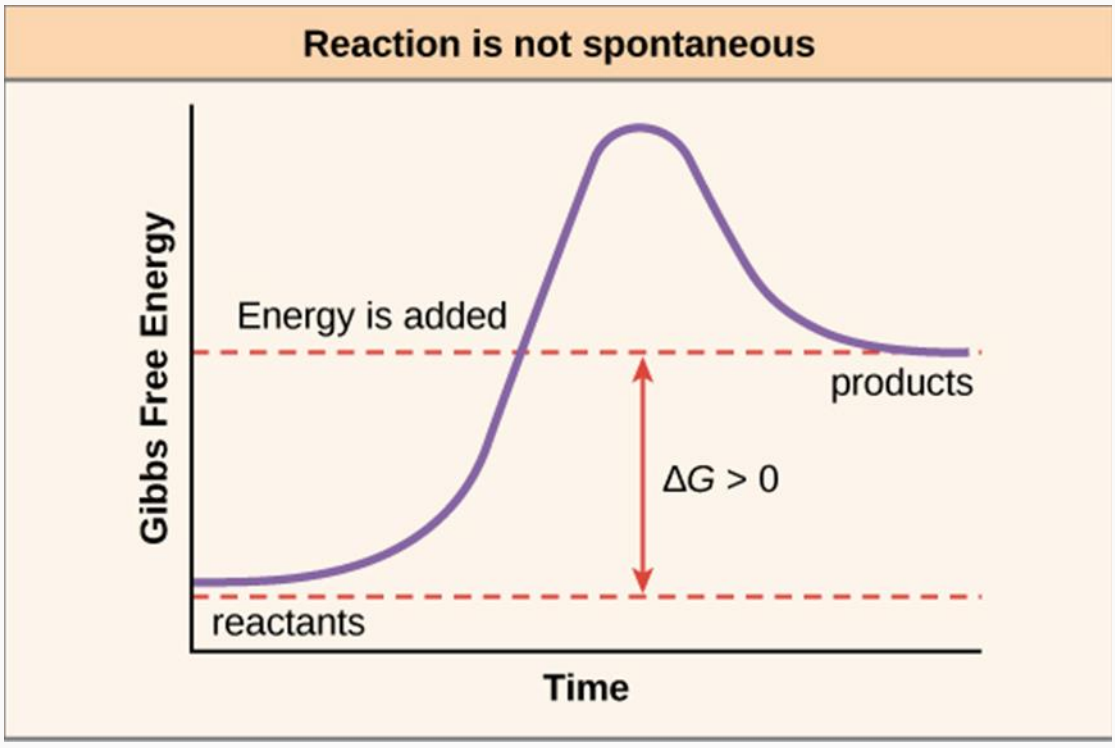
TOPIC 3.4

This reaction is...



A. Endergonic

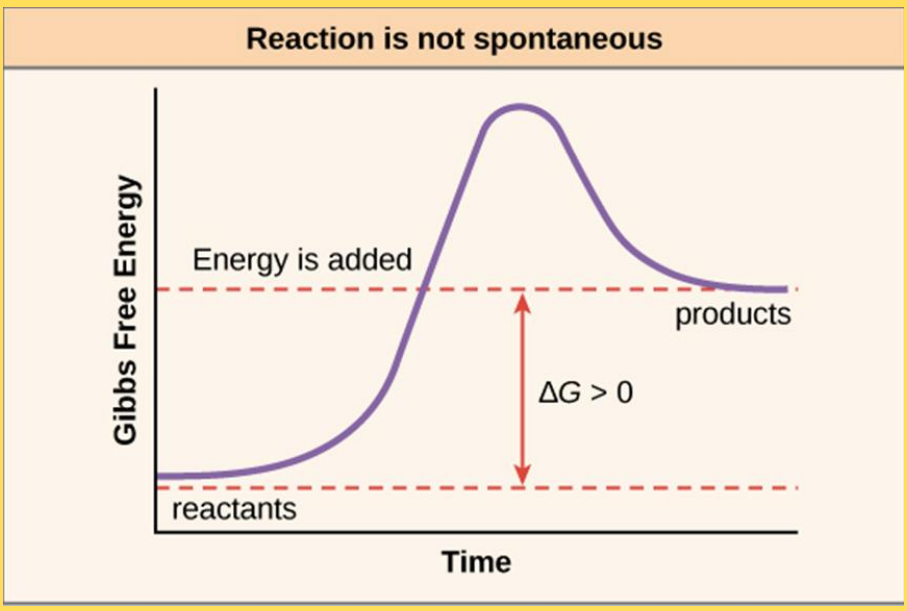
B. Exergonic

AP BIO INSTA-REVIEW

TOPIC 3.4

This reaction is...

A. Endergonic



There is an absorption of free energy that is released by an exergonic reaction (requires input of energy)