

Unit One: Chemistry in Biology - Lesson 2 Chemical Reactions



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ← المناهج الإماراتية ← الصف التاسع المتقدم ← أحياء ← الفصل الأول ← ملفات متنوعة ← الملف

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المزيد من مادة
أحياء:

إعداد: Elhddad Ahmed

التواصل الاجتماعي بحسب الصف التاسع المتقدم



صفحة المناهج
الإماراتية على
فيسبوك

الرياضيات

اللغة الانجليزية

اللغة العربية

التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف التاسع المتقدم والمادة أحياء في الفصل الأول

أسئلة على درس الذرات والعناصر والمركبات _ بريدج

1

"يرفع الله الذين آمنوا منكم والذين أوتوا العلم درجات"

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قناة المُستوصف على جميع وسائل التواصل الاجتماعي

Mr. Ahmed Elhddad

U1L2: Chemical
Reactions

Biology

Learning
Outcomes:

- ✓The student identifies the parts of a chemical reaction
- ✓The student learns how energy changes relate to chemical reactions
- ✓The student concludes the importance of enzymes in living organisms

Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 1 : Reactants and Products

Biology for Advanced Grade 9

Biology is the science concerned with studying the life of living organisms. Have you ever reflected on the creation of God??

Welcome to a new Biology class

Unit One: Chemistry in Biology
Lesson Two: Chemical Reactions

Session One: Reactants and Products

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Biology

Life
Discover
Explore
Learn
Grow



Cells



Genes



Ecosystems



Life

أ. أحمد الحداد

Mr. Ahmed Elhddad

أستاذ الأحياء الأول
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اضمن تفوقك من بداية العام

Science
Today
A Brighter
Tomorrow



Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 1 : Reactants and Products

U1L2: Chemical Reactions

BiologyLearning Outcomes:

- ✓The student identifies the parts of a chemical reaction
- ✓The student learns how energy changes relate to chemical reactions
- ✓The student concludes the importance of enzymes in living organisms

Main Idea:
Chemical reactions allow living organisms to grow, develop, reproduce, and adapt

**Learning Outcomes:**

- ✓The student identifies the parts of a chemical reaction
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Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

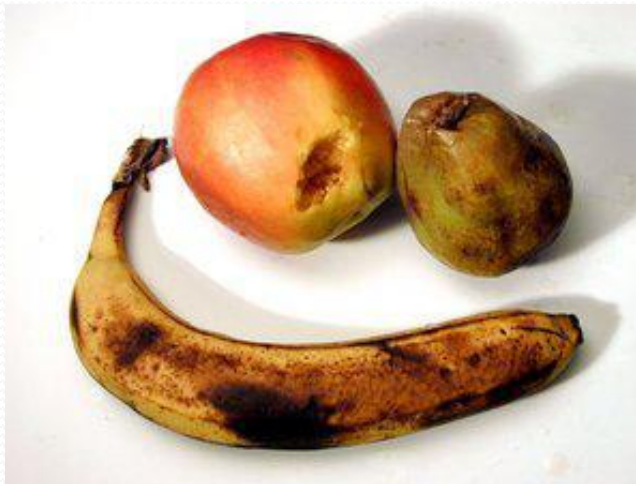
Session 1 : Reactants and Products

U1L2: Chemical Reactions

Biology

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What causes fruit to change color?

What causes rust to form on iron?



Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 2 : Reactions Energy

U1L2: Chemical
ReactionsBiologyLearning
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Boiling water — is it a chemical or a physical change? And why?

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Chemical Reaction -:

A process in which atoms or groups of atoms in substances take on a new arrangement, causing these substances to change into different substances

What happens in a chemical reaction?

Chemical bonds break and new bonds form in chemical reactions.

Example:- The rust covering the chain in the picture is a compound called iron oxide (Fe_2O_3), (formed when oxygen in the air O_2 reacts with iron Fe

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Quick Check: What Happens in a Chemical Reaction?

3 MCQs

1 Which statement best defines a chemical reaction?

☐ A. A change in shape only☒ B. A rearrangement of atoms that forms different substances☐ C. A change of state only☐ D. A process that never changes bonds

2 What happens to chemical bonds during a chemical reaction?

☐ A. Only old bonds remain☐ B. Bonds disappear permanently☒ C. Bonds break and new bonds form☐ D. No bonds are involved

3 In the rust example, iron reacts with which substance from the air?

☒ A. Oxygen☐ B. Nitrogen☐ C. Water vapor only☐ D. Carbon dioxide

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Types of changes in matter:-Chemical change:- produces new substancesPhysical change:- changes the form of the substance, not its chemical composition

What are the signs that a chemical reaction has occurred ?

Color change



Production of heat or light

Formation of a new gas, liquid, or solid

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Quick Check: Signs and Types of Change

3 MCQs

1 Which observation can be evidence that a chemical reaction occurred?

- ☒ Color change
- ☐ Only a change in size
- ☐ Only a change in shape
- ☐ Moving the substance

2 A chemical change is different from a physical change because it...

- ☐ always changes temperature
- ☒ produces new substances
- ☐ only changes the form
- ☐ never involves energy

3 Which description matches a physical change?

- ☐ New substances are produced
- ☒ The form changes but the chemical composition does not
- ☐ The chemical composition changes
- ☐ New bonds always form

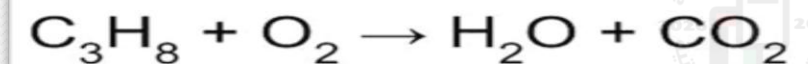
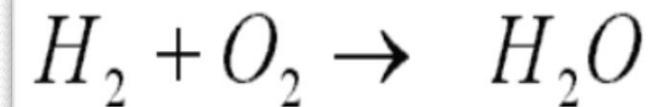
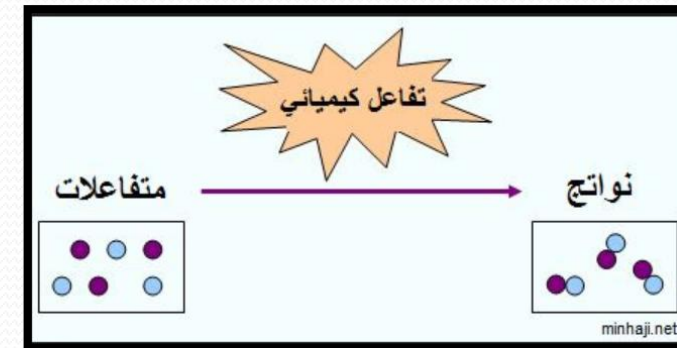
Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 1 : Reactants and Products

Chemical Equations

A description of the chemical formulas of the reactants and products, with arrows showing the direction of the change.



Identify the reactants and products in each reaction shown below?

U1L2: Chemical Reactions

Biology

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Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 1 : Reactants and Products

Balanced Equations

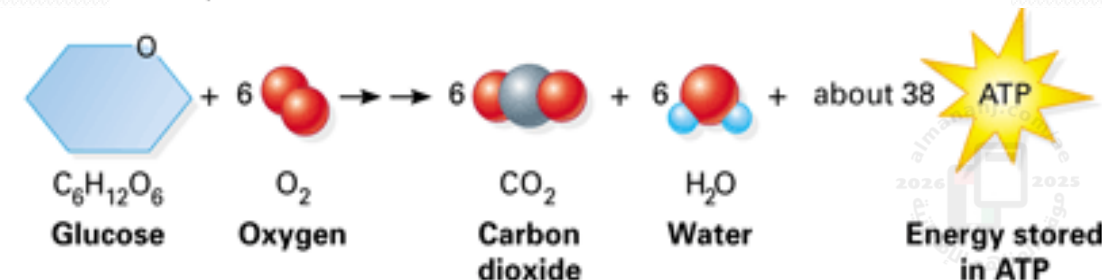
Equations in which the number of atoms of each element in the reactants equals the number of atoms of each element in the products of a chemical reaction, according to the law of conservation of mass .

Law of Conservation of Mass:- Matter can neither be created nor destroyed

Balance the photosynthesis equation shown



Balance the cellular respiration equation shown



U1L2: Chemical Reactions

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Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 1 : Reactants and Products

U1L2: Chemical Reactions

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Quick Check: Chemical Equations

3 MCQs

1 What does a chemical equation describe?

A. Only the color of substances

☒ The formulas of reactants and products

C. Only the temperature

D. Only the mass of products

2 What does the arrow in a chemical equation show?

☒ The direction of the change

B. The reaction temperature

C. The mass of atoms

D. The color change

3 Which two major parts are represented in a chemical equation?

A. Elements and mixtures

B. Solids and liquids

☒ Reactants and products

D. Atoms and cells

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Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

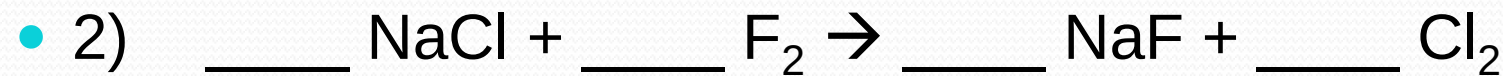
Session 1 : Reactants and Products

U1L2: Chemical Reactions

BiologyLearningOutcomes:

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- Balance the following equations:



Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 2 : Reactions Energy

U1L2: Chemical Reactions

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Allah raises those among you who believe, and those given knowledge, in ranks

9Biology for Advanced Grade

Biology is the science concerned with studying the life of living organisms.
Have you ever reflected on the creation of God??

Welcome to a new Biology class

Unit One: Chemistry in Biology
Lesson Two: Chemical Reactions
Session Two: Reaction Energy

Unit One: Chemistry in Biology

Lesson 2 Chemical ReactionsSession 2 : Reactions Energy**U1L2: Chemical Reactions****Biology****Learning Outcomes:**

- ✓The student identifies the parts of a chemical reaction
- ✓The student learns how energy changes relate to chemical reactions
- ✓The student concludes the importance of enzymes in living organisms

Main Idea:
Chemical reactions allow living organisms to grow, develop, reproduce, and adapt

**Learning Outcomes:**

- ✓The student learns the concept of activation energy
- ✓The student distinguishes between endothermic and exothermic reactions
- ✓The student identifies the relationship between catalysts, enzymes, and reactions
- ✓The student appreciates scientists' efforts in studying reaction energy

Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 2 : Reactions Energy

U1L2: Chemical Reactions

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1 When is a chemical equation balanced?

- ☐ A. When each side has the same number of molecules
- ☐ B. When each element has the same number of atoms on both sides
- ☐ C. When all coefficients are 1
- ☐ D. When the reaction is fast

2 Which law explains why atoms must be conserved in a balanced equation?

- ☐ A. Law of Conservation of Mass
- ☐ B. Law of Gravity
- ☐ C. Law of Motion
- ☐ D. Law of Energy Loss

3 According to the law of conservation of mass, matter...

- ☐ A. can be created but not destroyed
- ☐ B. can be destroyed but not created
- ☐ C. can neither be created nor destroyed
- ☐ D. always changes into energy

Unit One: Chemistry in Biology

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Reaction Energy

How can these sugar cubes be dissolved???

By heat.

Activation Energy:-

The minimum amount of energy needed for reactants to become products in a chemical reaction, or the energy required to start the chemical reaction

Important note:- No reactions occur in the body of a living organism without a source of energy

Unit One: Chemistry in Biology

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U1L2: Chemical Reactions

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Quick Check: Activation Energy

3 MCQs

1 What is activation energy?

- ☐ A. Energy stored only in products
- ☐ B. The minimum energy needed to start a chemical reaction
- ☐ C. Energy that stops a reaction
- ☐ D. Energy found only in light

2 Chemical reactions in living organisms require...

- ☐ A. a source of energy
- ☐ B. no energy at all
- ☐ C. only oxygen
- ☐ D. only water

3 In the sugar-cube example, the heat energy needed is identified as...

- ☐ A. chemical mass
- ☐ B. activation energy
- ☐ C. product energy
- ☐ D. conservation energy

Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 2 : Reactions Energy

U1L2: Chemical Reactions

Biology

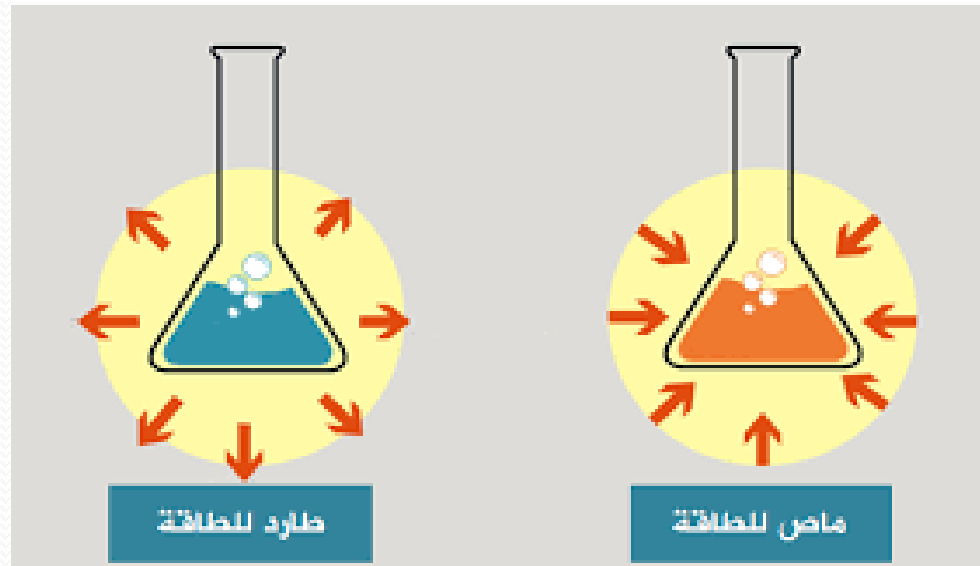
Learning Outcomes:

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- For any chemical reaction to begin, energy must be available .
- Most compounds found in living organisms cannot be converted through chemical reactions without energy.
- **What is activation energy ?**
- The minimum amount of energy needed to start the reaction .
- Reactions that require an extremely large amount of activation energy rarely occur.

Exothermic reactions

Endothermic reactions



Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

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U1L2: Chemical Reactions

BiologyLearning Outcomes:

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1 What is the minimum amount of energy needed to start a reaction called?

A. Product energy

C. Bond mass

☒ Activation energy

D. Reaction speed

2 In an exothermic reaction, the products have...

A. more energy than the reactants

B. the same energy as the reactants

☒ less energy than the reactants

D. no energy

3 In an endothermic reaction, the products have...

☒ more energy than the reactants

B. less energy than the reactants

C. no energy

D. exactly zero activation energy

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Lesson 2 Chemical Reactions

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U1L2: Chemical
ReactionsBiologyLearning
Outcomes:

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Let's go to the guided reading on
exothermic and endothermic reactions

Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 2 : Reactions Energy

Types of Chemical Reactions in Terms of Energy

U1L2: Chemical Reactions

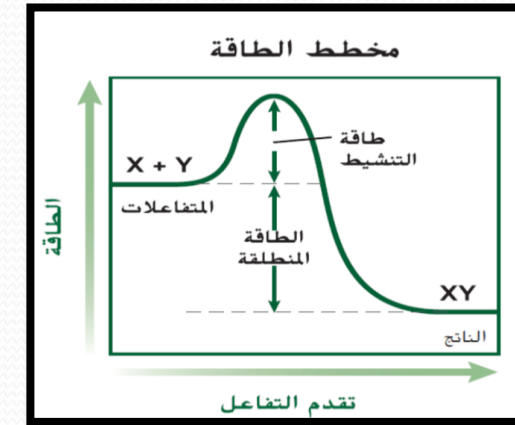
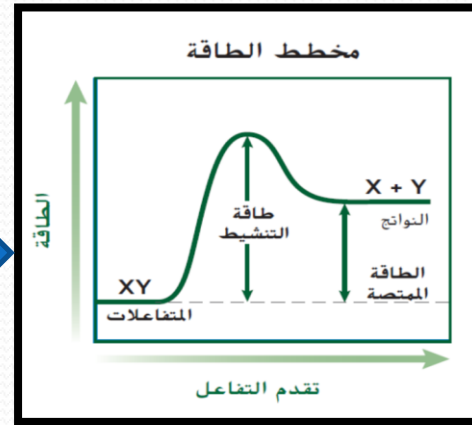
Biology

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Endothermic reaction



Exothermic reaction

Study the above graph.. then complete the comparison on table

Endothermic Reaction



Exothermic Reaction



Endothermic Reaction	Exothermic Reaction	
		Concept
		Energy of products
		Activation energy
		Energy released
		Example

Name: _____

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قناة المستوصف على جميع وسائل التواصل الإجتماعي

Mr. Ahmed Elhddad

Investigation: How Does Temperature Affect Reaction Rate?**Inquiry Question**

How does the temperature of water affect the time needed for an effervescent tablet to finish reacting?

Hypothesis

Variables

Independent: water temperature

Dependent: reaction time

Controlled: tablet size, water volume, cup type

Materials & Safety

3 clear cups • equal volumes of cold, room-temperature, and warm water • 3 identical effervescent tablets • stopwatch • thermometer (optional)

Safety: Use warm—not hot—water. Do not taste any materials.

Procedure

1. Add the same volume of water to each cup.
2. Record the temperature/condition of each cup.
3. Add one tablet to the first cup and start the timer immediately.
4. Stop timing when bubbling has essentially stopped. Record the time and observations.
5. Repeat with the other two temperatures, keeping all other variables the same.

Data

Water condition	Temperature (°C)	Reaction time (s)	Observations
Cold			
Room temperature			
Warm			

Analyze & Conclude

1. Which temperature produced the shortest reaction time? _____
2. What pattern do you see between temperature and reaction rate? _____
3. Connect your evidence to activation energy: Why do particles react more effectively at higher temperature? _____

Conclusion: _____

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U1L2: Chemical
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Lesson Two: Chemical Reactions
Session 3 :Enzymes & Catalysts

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Lesson 2 Chemical ReactionsSession 3 : Enzyems & Catalysts**U1L2: Chemical Reactions****Biology****Learning Outcomes:**

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- ✓The student learns how energy changes relate to chemical reactions
- ✓The student concludes the importance of enzymes in living organisms

Main Idea:
Chemical reactions allow living organisms to grow, develop, reproduce, and adapt

**Learning Outcomes:**

- ✓The student learns the importance of a catalyst for a chemical reaction
- ✓The student identifies how enzymes work and the factors affecting them.
- ✓The student appreciates scientists' efforts in studying enzymes in reactions

Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 3 : Enzyems & Catalysts

U1L2: Chemical Reactions

BiologyLearning Outcomes:

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Quick Check: Energy Changes in Reactions

1 Which type of reaction releases energy to the surroundings?

A. Endothermic

C. Physical

☒ Exothermic

D. Balanced

2 Which type of reaction absorbs energy from the surroundings?

A. Exothermic

☒ Endothermic

B. Balanced

D. Catalytic

3 For an exothermic reaction, how does product energy compare with reactant energy?

☒ Products have less energy

C. They must be equal

B. Products have more energy

D. The comparison is impossible

Unit One: Chemistry in Biology

Lesson 2 Chemical ReactionsSession 3 : Enzyems & CatalystsU1L2: Chemical
ReactionsBiologyLearning
Outcomes:

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**Give a
scientific
explanation???**

- In every chemical reaction, an energy change occurs as a result of bonds forming or breaking.
- **How is the internal body temperature maintained at 37°C?**
 - Through the energy released by exothermic reactions .
 - Chemical reactions occur in living organisms at body temperature because of catalytic substances (enzymes), which reduce the activation energy needed to start the reactions and allow them to occur quickly .
- **When chemical reactions occur in the laboratory, they are extremely slow... Explain why?**

Because the activation energy they require is large in the absence of catalytic substances

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Quick Check: Energy Changes, Catalysts & Living Organisms

1 What helps maintain internal body temperature?



A. Energy released by exothermic reactions

B. Only endothermic reactions

C. Only physical changes

D. No chemical reactions

2 Why can many reactions occur quickly in living organisms at body temperature?

A. Enzymes increase activation energy



B. Enzymes reduce activation energy

C. Atoms stop moving

D. Products disappear

3 Why may reactions in the laboratory be very slow without catalysts?



A. Activation energy can be large

B. Mass is not conserved

C. Reactants have no atoms

D. Products have no bonds

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Have you ever heard of catalysts and enzymes in your life???



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Unit One: Chemistry in Biology**Lesson 2 Chemical Reactions****Session 3 : Enzyems & Catalysts**

Let's go to the guided reading on
enzymes and catalysts

Name: _____

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Investigation: How Does pH Affect Enzyme Activity in Apple Browning?**Inquiry Question**

How do different pH conditions affect the rate of enzyme-controlled browning in apple tissue?

Hypothesis

Variables

Independent: treatment / pH condition

Dependent: browning score over time

Controlled: apple type, slice size, solution amount, time, room temperature

Materials & Safety

3 similar apple slices • water • lemon juice • teacher-prepared baking-soda solution • 3 labeled cups/plates • spoon/dropper • timer

Safety: The teacher cuts the apple. Do not eat the experimental samples; wash hands after the activity.

Procedure

1. Label three samples: Water, Lemon Juice, Baking-Soda Solution.
2. Apply the same amount of treatment to each apple slice.
3. Start the timer immediately.
4. Score browning at 0, 5, 10, and 15 minutes using: 0 = none, 5 = very dark.
5. Keep slice size, solution amount, and observation time the same for all samples.

Data: Browning Score (0–5)

Treatment	0 min	5 min	10 min	15 min
Water				
Lemon juice				
Baking soda				

Analyze & Conclude

1. Which treatment slowed browning the most? _____
2. Which condition produced the fastest browning? _____
3. What does your evidence suggest about pH as a factor affecting enzyme activity? _____

Conclusion: _____

Unit One: Chemistry in Biology

Lesson 2 Chemical Reactions

Session 3 : Enzyems & Catalysts

U1L2: Chemical Reactions

Biology

Learning Outcomes:

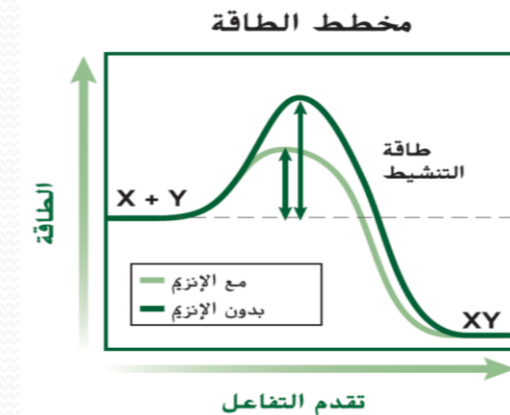
- ✓The student identifies the parts of a chemical reaction
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- How is sugar broken down in the body at a temperature of 37°C ?
This happens by means of catalytic agents called enzymes

Catalyst: a substance that reduces the activation energy needed to start a chemical reaction, such as enzymes, and increases the rate of the chemical reaction.

Enzymes: biological substances found in the body of a living organism that speed up chemical reactions at body temperature

Compare the activation energy of a reaction without an enzyme to its activation energy with an enzyme present?



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Quick Check: Catalysts and Enzymes

1

What is the main effect of a catalyst on a chemical reaction?

☐ A. It raises activation energy☐ C. It becomes the final product

It lowers activation energy and increases reaction rate

☐ D. It stops bond formation

2

What are enzymes?



Biological substances that speed up reactions

☐ C. Only digestive acids☐ B. Products that slow reactions☐ D. Forms of activation energy

3

Compared with a reaction without an enzyme, a reaction with an enzyme has...

☐ A. higher activation energy☐ C. more atoms

lower activation energy

☐ D. less mass

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Examples of Enzymes

Enzyme / Digestive substance	Secreting organ	Site of action	Substance affected	Medium (pH)	Digestion product
Salivary amylase	Salivary glands	Mouth	Cooked starch	Alkaline	Maltose
Pepsin	Stomach	Stomach	Protein	Acidic	Polypeptides
lipase	Pancreas	Duodenum	Fats	Alkaline	Fatty acids and glycerol

U1L2: Chemical Reactions

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Quick Check: Examples of Digestive Enzymes

1

Which enzyme is secreted by the salivary glands and acts on cooked starch?

A. Pepsin

 amylase

C. Pancreatic lipase

D. Sucrase

2

Which enzyme works in the stomach in an acidic medium?

 Pepsin

B. Sucrase

C. Salivary amylase

D. Pancreatic lipase

3

Pancreatic lipase acts mainly on...

A. proteins

B. sucrose

 fats

D. cooked starch

Unit One: Chemistry in Biology

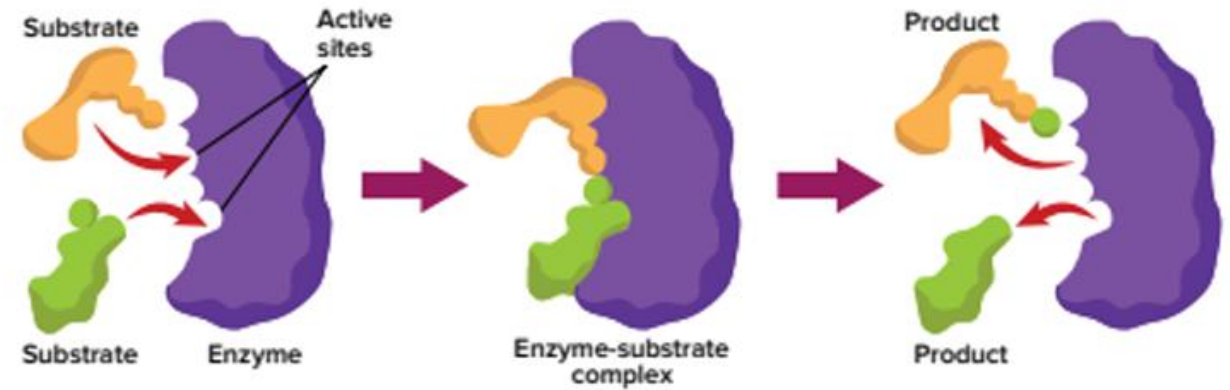
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How an Enzyme WorksSubstrates (Reactants that Bind the Enzyme)

These are the reactants that bind with the enzyme.

Active Site:-

The specific location where the substrate binds with the enzyme

What are the steps of enzyme action in chemical reactions?

- 1The substrate binds to the active site.
- 2The shape of the active site changes, forming the enzyme–substrate complex
- 3This complex helps break the chemical bonds in the reactants and form new bonds in the products.
- 4The enzyme releases the products and then repeats its action again .

Unit One: Chemistry in Biology

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Factors That Affect Enzyme Activity

1- pH

2- Other substances that act like the enzyme

3- Temperature

Each enzyme has a suitable working temperature, which differs from one organism to another

4- Concentration of the reactants and concentration of the enzyme

The importance of enzymes in the vital processes of the living organism.

"Enzymes affect many biological processes. When a viper injects its venom into a human, the enzymes in the venom break down tissues in the red blood cells of the person. Also, a green apple ripens as a result of enzyme activity. Photosynthesis and cellular respiration provide the cell with energy with the help of enzymes. Likewise, the worker bee plays an important role in keeping the beehive alive, just as enzymes are the chemical agent in cells."

U1L2: Chemical Reactions

Biology

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Quick Check: Factors That Affect Enzyme Activity

1 Which of the following is listed as a factor that affects enzyme activity?



pH

C. Magnetic poles

B. Planet size

D. Sound volume

2 What does the lesson state about enzyme working temperature?

A. All enzymes work best at exactly the same temperature



Each enzyme has a suitable working temperature

C. Temperature never affects enzymes

D. Enzymes work only below 0°C

3 Which process is described as being helped by enzymes?



Photosynthesis and cellular respiration

C. Only evaporation

B. Only melting ice

D. Only physical cutting

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U1L2: Chemical Reactions

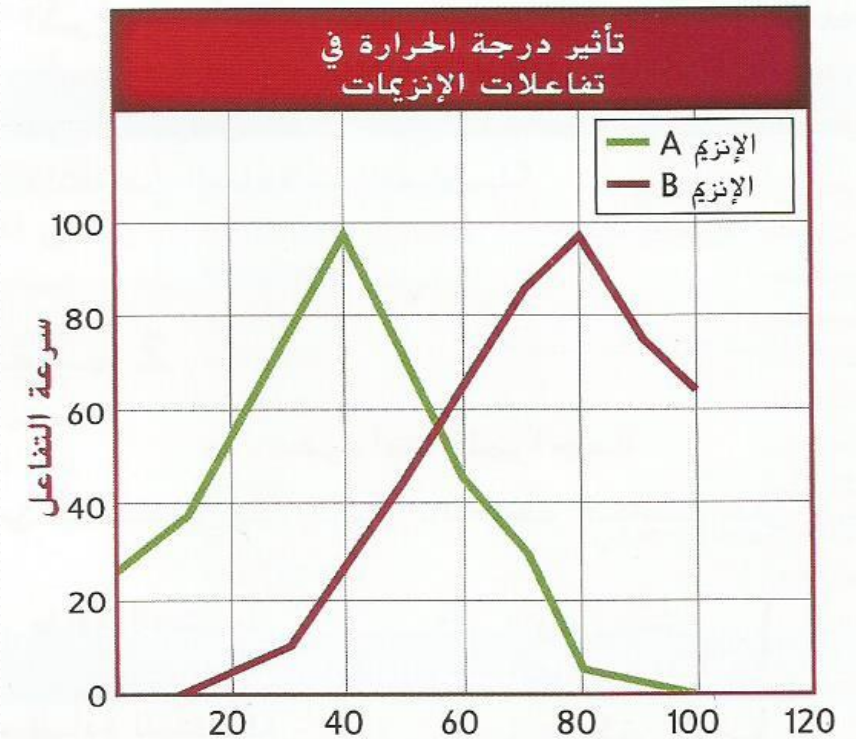
Biology

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1- Describe the effect of temperature on reaction rate using the graph below?

2- Which enzyme is most active in human cells?
And why?



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U1L2: Chemical
ReactionsBiologyLearning
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Quick Check: How an Enzyme Works

1 Where does a substrate bind to an enzyme?

A. At the product site

C. At the nucleus



At the active site

D. At the cell wall

2 What forms when the substrate binds and the active site changes shape?



Enzyme–substrate complex

C. A physical mixture only

B. A new element

D. A cell membrane

3 What happens after the enzyme releases the products?



The enzyme can repeat its action

C. The enzyme is always destroyed

B. The enzyme becomes a product

D. The reaction becomes unbalanced

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قناة **المُستوصف** على جميع وسائل التواصل الإجتماعي

Mr. Ahmed Elhddad

U1L2: Chemical
Reactions

Biology

**Learning
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Biology

Life
Discover
Explore
Learn
Grow



Cells



Genes



Ecosystems



Life

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أستاذ الأحياء الأول
The 1st Biology Teacher



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المُستوصف

كما يمكنك متابعة **قناة المُستوصف** علي جميع وسائل التواصل الإجتماعي



اضمن تفوقك من بداية العام

Science
Today
A Brighter
Tomorrow