

Unit One: Chemistry in Biology - Lesson 3: Water and Solutions



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

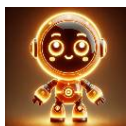
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المزيد من مادة
علوم:

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 علوم في الفصل الأول

Unit One: Chemistry in Biology - Lesson 2 Chemical Reactions

1

مراجعة عامة لاختبار نهاية الفصل منهج انسابير مع الإجابات

2

حل مراجعة اختيار من متعدد منهج انسابير

3

حل كراسة تدريبية مراجعة وفق الهيكل الوزاري الجديد منهج بريدج

4

حل مراجعة نهائية وفق الهيكل الوزاري الجديد منهج انسابير

5

{ يَرْفَعُ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ }

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قناة المُستوصف على جميع وسائل التواصل الإجتماعي

Mr. Ahmed Elhddad

U1L3: Water
and Solutions

Biology

Learning
Outcomes:

✓ Explain how
the structure of
water

✓ Compare and
contrast
solutions and
suspension

✓ Differentiate
between acids
and bases

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 3 :Water and Solutions

Session: 1

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Biology
Life
Discover
Explore
Learn
Grow

Cells
Genes
Ecosystems
Life

أ. أحمد الحداد
Mr. Ahmed Elhddad
أستاذ الأحياء الأول
The 1st Biology Teacher

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

اضمن تفوقك من بداية العام

Science
Today
A Brighter
Tomorrow

BIOLOGY
LIFE
SCIENCE

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

U1L3: Water and Solutions

BiologyLearning Outcomes:

- ✓ Explain how the structure of water
- ✓ Compare and contrast solutions and suspension
- ✓ Differentiate between acids and bases

Main Idea:

The unique structure of water — its polarity and hydrogen bonding — gives it the properties that make it essential to dissolving substances, forming solutions, and sustaining life.

Learning Outcomes:

- ✓ *Students will be able to explain how the structure of water enables it to function as an effective solvent.*
- ✓ *Students will be able to compare and contrast solutions and suspensions in terms of particle size, appearance, settling behavior, and filterability.*
- ✓ *Students will be able to differentiate between acids and bases based on the ions they release, their pH values, and their physical/chemical properties.*

Unit One: Chemistry in Biology

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Quick Check: Lesson Goals

1. What is one main goal of this lesson?

A. To explain water structure 

B. To study only animals

C. To draw plants

D. To memorize planets

2. Water is important because it helps form...

A. solutions 

B. metals only

C. rocks only

D. light only

3. Acids and bases can be compared using...

A. pH 

B. mass only

C. shape only

D. sound

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Essential Questions



1. How does the structure of water make it a good solvent?



2. What are the similarities and differences between solutions and suspensions?



3. What are the differences between acids and bases?

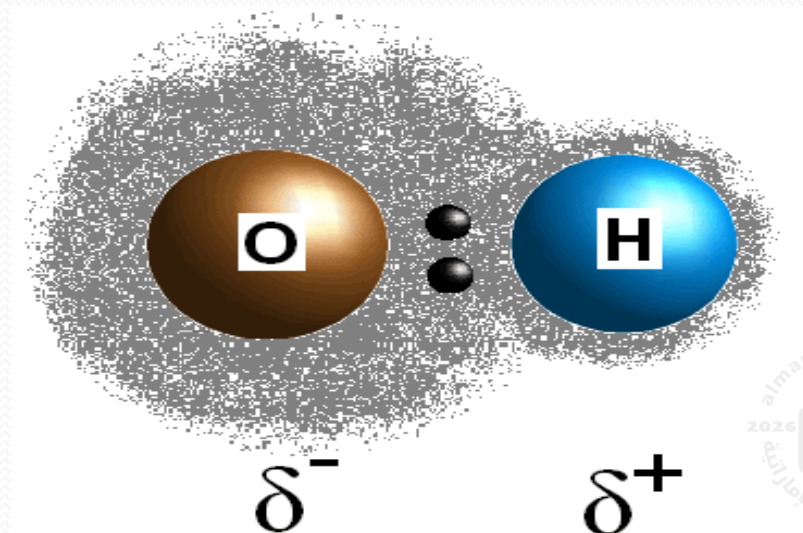
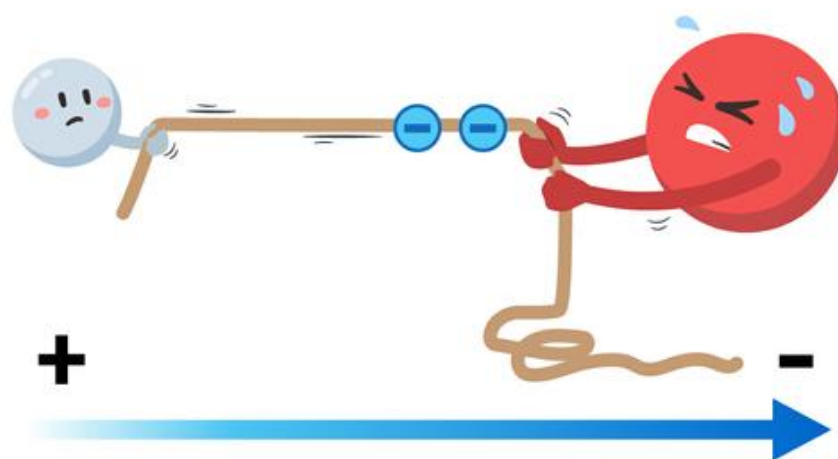
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Lesson 3 Water and Solutions

Session1: Intermolecular Forces

Intermolecular Forces

- We learned in ionic bonds that positive and negative ions can form, based on the nucleus's attraction for electrons
- Similarly, electrons in a covalent bond, do not attract electrons equally
- Some compounds contain atoms that hold onto electrons more tightly than other atoms, this results in polarity



U1L3: Water and Solutions

BiologyLearning Outcomes:✓ Explain how the structure of water✓ Compare and contrast solutions and suspension✓ Differentiate between acids and bases

Quick Check: Intermolecular Forces

1. Polarity happens when electrons are shared...

- A. only in metals
- B. equally always
- C. not at all
- D. unequally 

2. Atoms that attract electrons more strongly can create...

- A. Darkness
- B. polarity 
- C. mass loss
- D. no bonds

3. Intermolecular forces act mainly...

- A. between molecules 
- B. inside the nucleus
- C. only in solids
- D. only in animals

U1L3: Water
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Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

U1L3: Water and Solutions

BiologyLearningOutcomes:

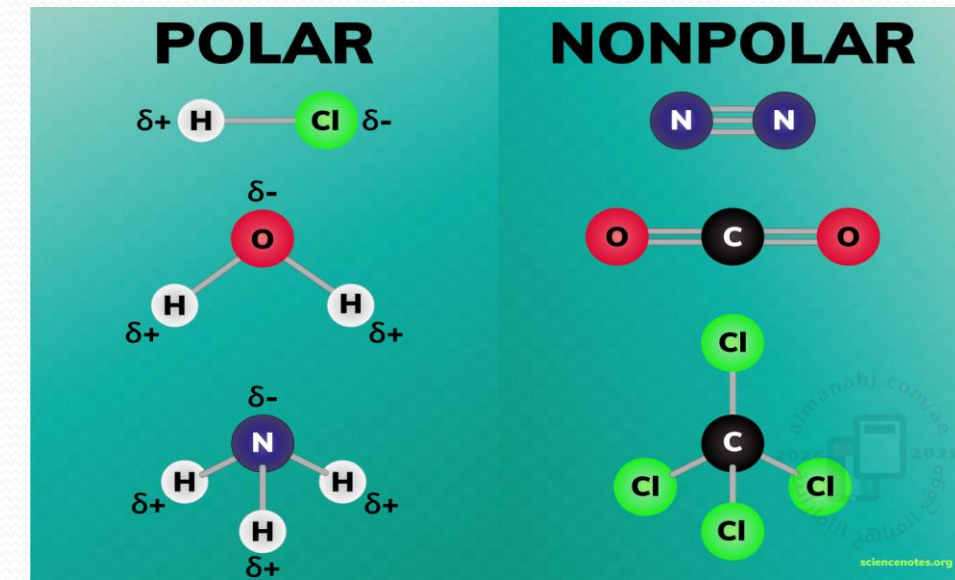
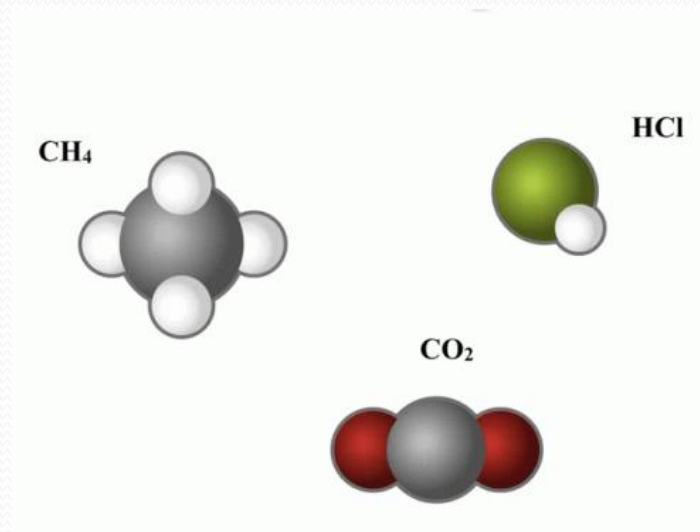
✓ Explain how the structure of water

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Polar Molecules

- Polarity is the property of having two opposite poles or ends (think magnet)
- These ends have different charges, either + or -
- Molecules that have an unequal distribution of charges are called polar molecules



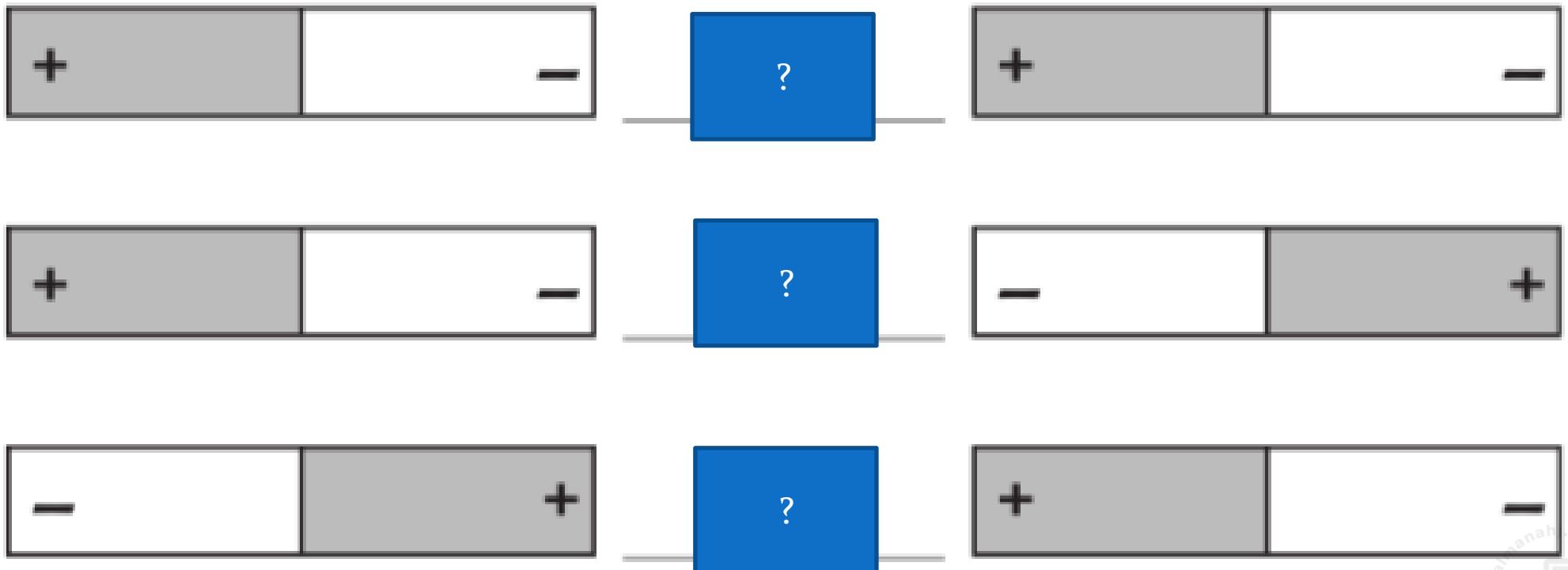
Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

U1L3: Water
and SolutionsBiologyLearning
Outcomes:✓ Explain how
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Activity 1

*Will the magnets below **repel** or **attract**?*

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

Quick Check: Polar Molecules

1. A polar molecule has...

- A. two charged ends 
- B. no electrons
- C. no shape
- D. only one atom

2. A magnet is a useful model because it has...

- A. only heat
- B. no poles
- C. opposite poles 
- D. no attraction

3. Unequal charge distribution makes a molecule...

- A. polar 
- B. neutral only
- C. a gas only
- D. a metal

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U1L3: Water and Solutions

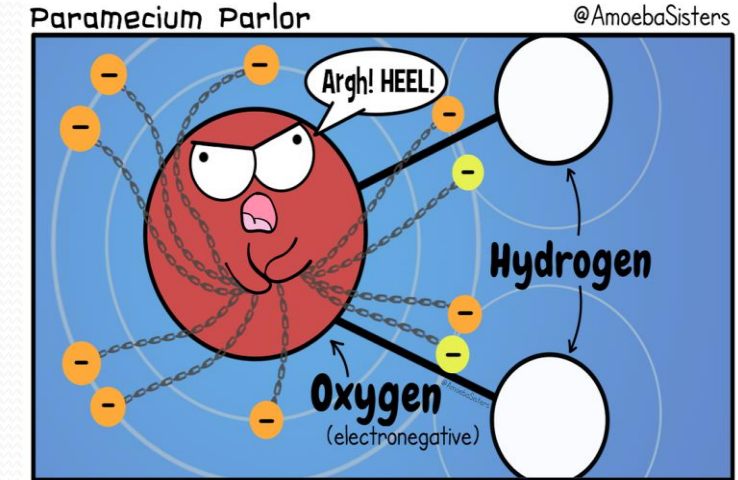
Biology

Learning Outcomes:

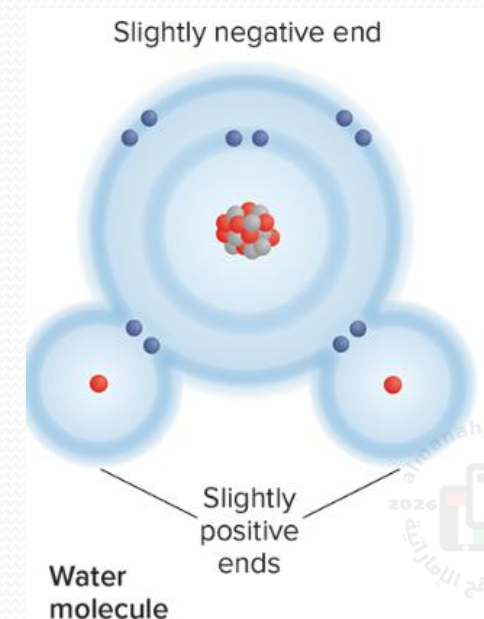
- ✓ **Explain** how the structure of water
- ✓ **Compare** and contrast solutions and suspension
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Water is a Polar Molecule

- The electrons spend more time near the oxygen end than the hydrogen end
- This causes a slightly - charge on the oxygen end and a slightly + charge on the hydrogen end
- Molecules that have unequal charges are called polar molecules



Water: the polar molecule



Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

U1L3: Water and Solutions

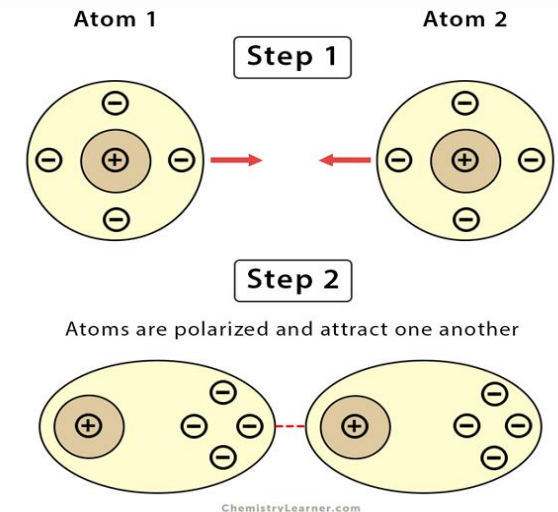
BiologyLearning Outcomes:

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Van der Waals Forces

- When polar molecules come close together, the attractive forces between the positive and negative regions, pull on the molecules, causing a weak electrostatic attraction that pulls them together.
- These attractions between the molecules are called **van der waals forces**.
- A compounds physical properties such as boiling point or melting point are determined by these intermolecular forces
- The strength of the attraction depends on:
 - Size of molecule
 - Shape of molecule
 - Ability of molecule to attract electrons

Van der Waals Forces



Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

Quick Check: Water Polarity

1. In water, electrons spend more time near...

- A. oxygen ←
- B. hydrogen
- C. carbon
- D. sodium

2. The oxygen end of water is slightly...

- A. Positive
- B. negative ←
- C. neutral always
- D. absent

3. The hydrogen ends of water are slightly...

- A. positive ←
- B. negative
- C. zero charge
- D. metallic

U1L3: Water
and Solutions

Biology

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Unit One: Chemistry in Biology

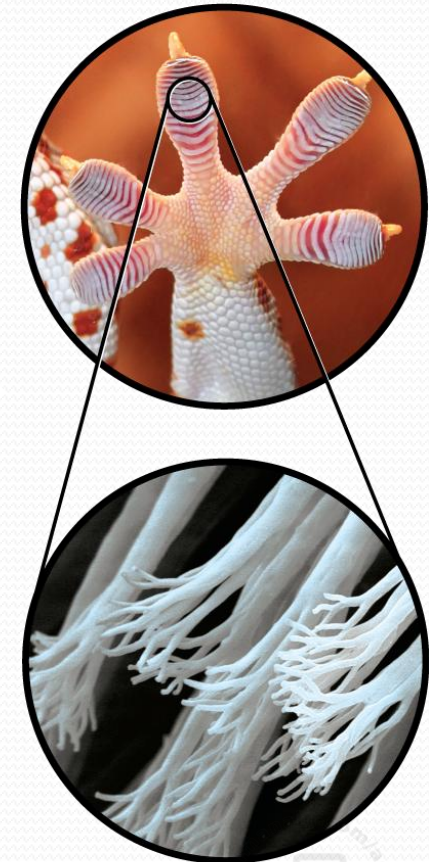
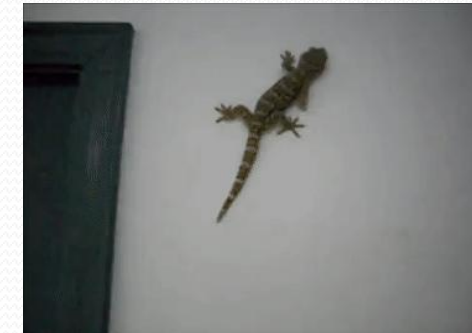
Lesson 3 Water and Solutions

Session1: Intermolecular Forces

U1L3: Water
and Solutions**Biology****Learning
Outcomes:**✓ **Explain** how
the structure of
water✓ **Compare** and
contrast
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between acids
and bases**Van Der Waals are Important for Life**

- These forces are not as strong as Covalent or ionic bonds. BUT, they play a key role in biological processes.
- They are easy to break apart, acting like molecular 'Velcro', whereas a covalent bond is like a molecular 'knot'

Geckos can climb walls and ceilings because of Van der Waals forces acting in-between tiny hairs and the surface, just like Velcro 'sticking' to flat surfaces



SEM Magnification: 11,000 X

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

U1L3: Water and Solutions

BiologyLearning Outcomes:

✓ Explain how the structure of water

✓ Compare and contrast solutions and suspension

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Van der Waals Forces in Water

- The areas of slight negative and positive charges around the water molecule are attracted to the opposite charge of other nearby water molecules, this holds water together
- Without Van der Waals forces, water would not form droplets and droplets would not form a surface
- Important to remember is that Van der Waals forces are the attractive forces between different water molecules, not the atoms that make up those molecules

The water strider takes advantage of Van der Waals to walk on water, as it is light enough that it does not break the forces



Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session1: Intermolecular Forces

Quick Check: Van der Waals Forces

1. Van der Waals forces are...

- A. weak attractions between molecules ←
- B. strong nuclear forces
- C. chemical reactions
- D. changes in mass

2. These forces can affect a substance's...

- A. boiling and melting points ←
- B. color only
- C. name only
- D. age

3. Opposite charged regions tend to...

- A. attract ←
- B. repel
- C. disappear
- D. freeze

U1L3: Water
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Quick Check: Forces in Life

1. Van der Waals forces are weaker than...

A. covalent or ionic bonds



B. shadows

C. pictures

D. magnets only

2. Geckos climb walls partly because of forces between tiny hairs and...

A. surfaces



B. clouds

C. food

D. water only

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Biology

Life
Discover
Explore
Learn
Grow



Cells



Genes



Ecosystems



Life

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وللتواصل



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المستوصف

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اضمن تفوقك من بداية العام

Science
Today
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Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session2: Mixtures

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 3 :Water and Solutions
Session 2: Mixtures

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session2: Mixtures

U1L3: Water
and SolutionsBiologyLearning
Outcomes:

- ✓ Explain how the structure of water
- ✓ Compare and contrast solutions and suspension
- ✓ Differentiate between acids and bases

Main Idea:

The unique structure of water — its polarity and hydrogen bonding — gives it the properties that make it essential to dissolving substances, forming solutions, and sustaining life.

Learning
Outcomes:

- ✓ *Students will be able to differentiate between mixtures types.*
- ✓ *Students will be able to give examples for each water property.*

**Learning
Outcomes:**✓ **Explain** how
the structure of
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contrast
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Quick Check: Water Surface

1. Attractions between water molecules help water form...

A. droplets ←

B. rocks

C. salt

D. oxygen gas

2. Surface tension helps some insects...

A. dissolve metals

B. breathe fire

C. become plants

D. walk on water ←

3. Van der Waals forces in water act between...

A. atoms inside one water molecule

B. different water molecules ←

C. only fish

D. only ice



Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

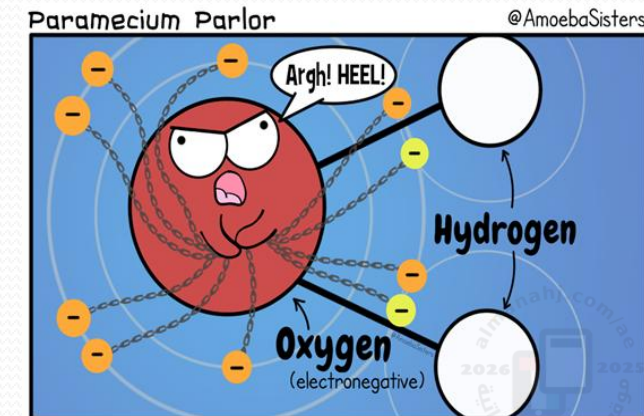
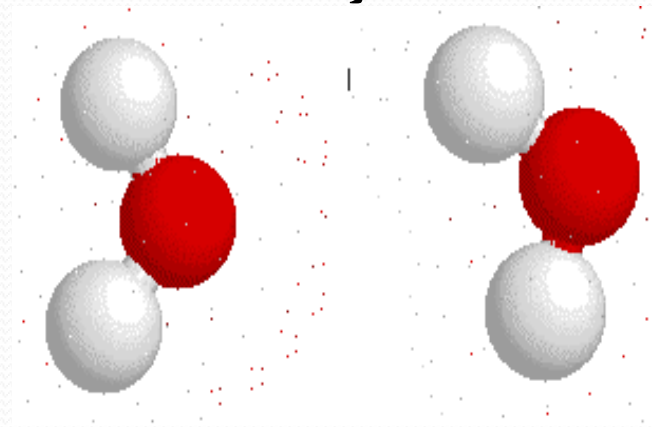
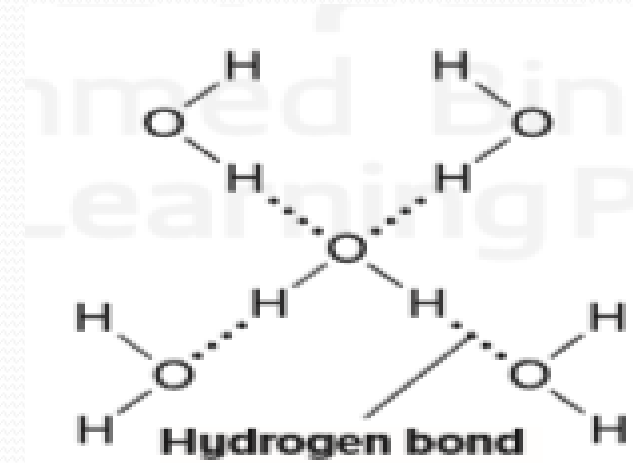
Session2: Mixtures

U1L3: Water
and SolutionsBiologyLearning
Outcomes:

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Hydrogen Bonds

- As previously mentioned, when a charged region of a molecule meets an oppositely charged region of another a weak attraction forms
- In water this is called a hydrogen bond, hydrogen bonding is a strong type of Van der Waals force
- Hydrogen can also bond in this way to fluorine and nitrogen



Water: the polar molecule

U1L3: Water
and Solutions**Biology**Learning
Outcomes:✓ Explain how
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Quick Check: Van der Waals Forces

1. Van der Waals forces are...

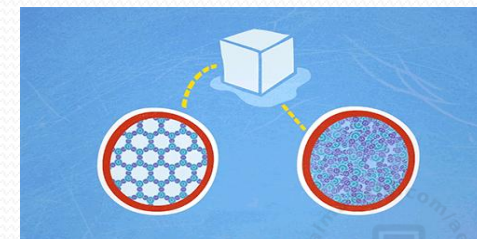
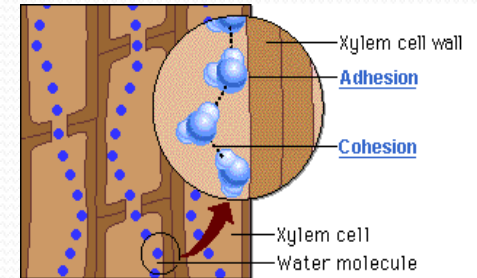
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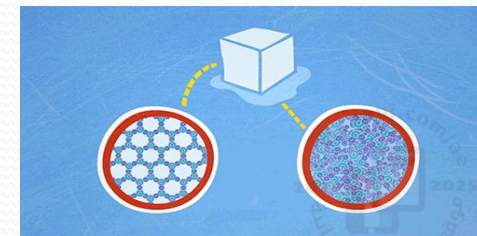
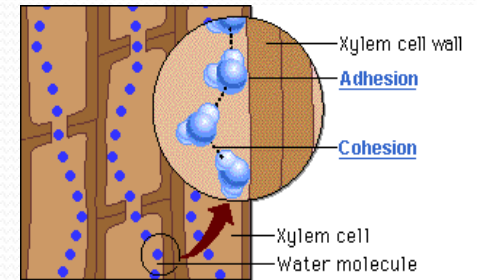
Quick Check: Forces in Life

1. Van der Waals forces are weaker than...

- A. covalent or ionic bonds ←
- B. shadows
- C. pictures
- D. magnets only

2. Geckos climb walls partly because of forces between tiny hairs and...

- A. surfaces ←
- B. clouds
- C. food
- D. water only



Properties Of Water

Directions: Use the textbook figure "Visualizing Hydrogen Bonding". Work as a group and complete the table using short, clear sentences.

Water Property	What does it mean?	Example / Evidence from the book	Why is it important?
Hydrogen Bonding	_____ _____	_____ _____	_____ _____
Adhesion	_____ _____	_____ _____	_____ _____
Cohesion	_____ _____	_____ _____	_____ _____
Ice Floats	_____ _____	_____ _____	_____ _____
Universal Solvent	_____ _____	_____ _____	_____ _____

Group Challenge - Match the example to the correct property:

1. Water moves up a plant stem:

2. A water strider stays on the surface:

3. Ice stays on top of liquid water:

4. Many substances dissolve in water:

U1L3: Water and Solutions

Biology

Learning Outcomes:

✓ **Explain** how the structure of water

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✓ **Differentiate** between acids and bases

Unit One: Chemistry in Biology

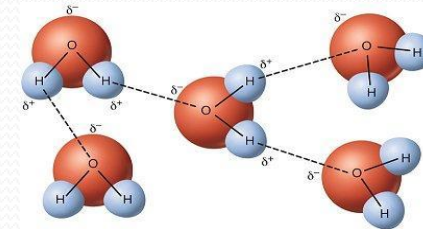
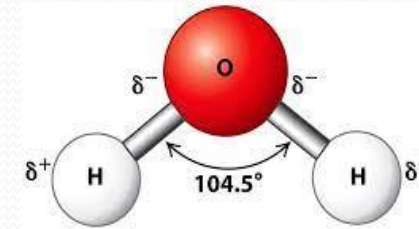
Lesson 3 Water and Solutions

Session2: Mixtures

Properties Of Water Summary

1. SHAPE

- Bent, 104, angular

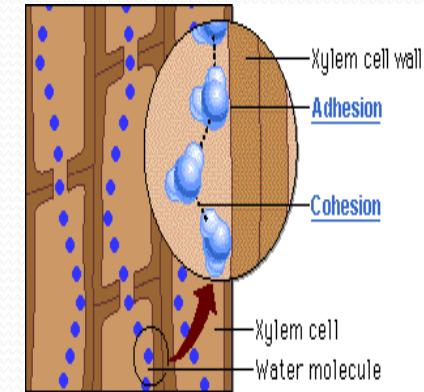
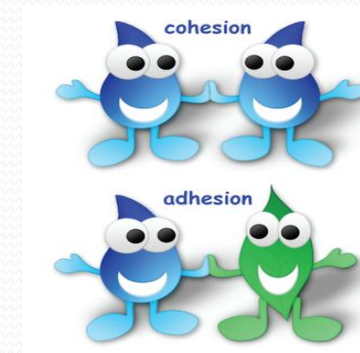


2. POLARITY

- Slightly negative oxygen, positive hydrogen

3. VAN DER WAALS FORCE

- Make the water liquid, rather than a gas
- O- and H+ get attracted and stick together



4. COHESION ADHESION (hydrogen bonds)

- Cohesion=water sticks to water (SURFACE TENSION)
- Adhesion=water sticks to other surfaces (CAPILLARITY)



U1L3: Water and Solutions

BiologyLearning Outcomes:

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Hydrogen Bonds

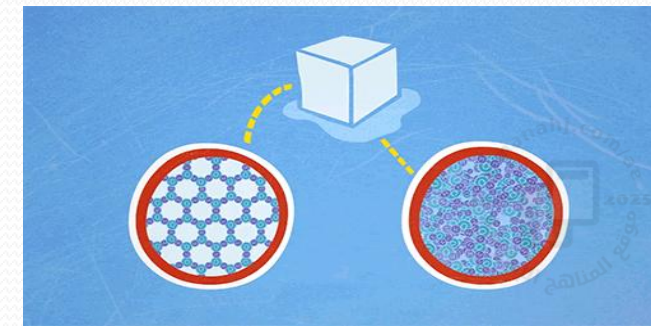
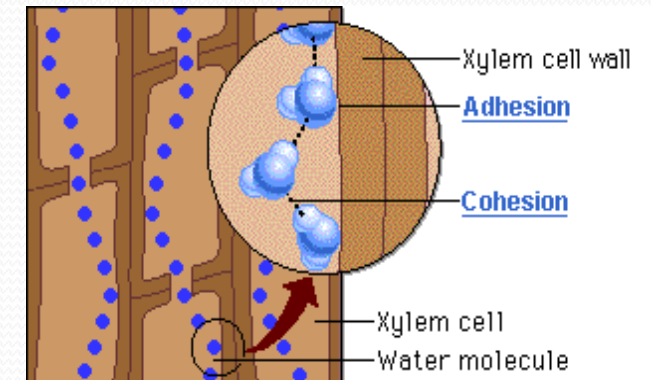
- Most unique properties of water arise from its ability to form hydrogen bonds:

The Universal Solvent: many substances dissolve in water

Adhesion: water is 'sticky' it forms hydrogen bonds with molecules on other surfaces, this is how water travels in plants

Cohesion: water is cohesive, the attraction between water molecules creates surface tension forming droplets

Ice Floats: Water is more dense than ice, which causes ice to float, this allows fish to stay alive underneath



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قناة **المستوصف** على جميع وسائل التواصل الاجتماعي

Mr. Ahmed Elhddad

U1L3: Water
and Solutions

Biology

**Learning
Outcomes:**

✓ **Explain** how
the structure of
water

✓ **Compare** and
contrast
solutions and
suspension

✓ **Differentiate**
between acids
and bases

Biology

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Life

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U1L3: Water
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Learning Outcomes:

- ✓ Explain how the structure of water
- ✓ Compare and contrast solutions and suspension
- ✓ Differentiate between acids and bases

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session2: Mixtures

U1L3: Water
and Solutions

Biology

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Session2: Mixtures

Quick Check: Water Summary

1. Water's polarity means oxygen is slightly...

A. negative



B. positive

C. absent

D. neutral only

2. Capillarity is linked to...

A. adhesion and cohesion



B. burning

C. freezing only

D. magnetism only

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

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U1L3: Water and Solutions

BiologyLearningOutcomes:✓ Explain how the structure of water✓ Compare and contrast solutions and suspension✓ Differentiate between acids and bases

Intermolecular Forces Summary

1. VAN DER WAALS FORCES

Opposite charges attract, same charges repel

Weaker than covalent or ionic, easier to break

Determines boiling, melting point, state (solid, liquid, gas)

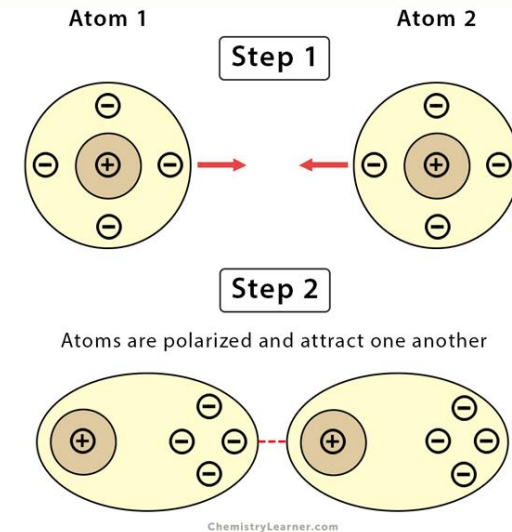
2. HYDROGEN BOND

A special type of van der Waals force

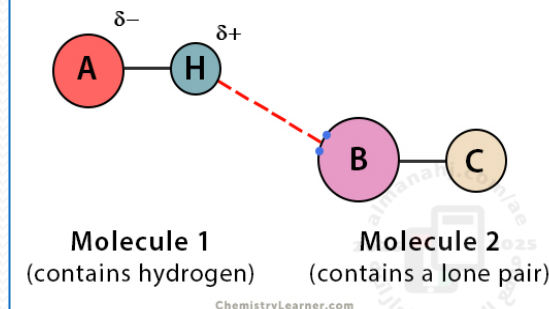
Only between a hydrogen atom and Oxygen, Nitrogen or Fluorine

(HF, HO, HN)

Van der Waals Forces



Hydrogen Bond



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Session2: Mixtures

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Use the textbook to complete the table. Write key words, not full sentences.

Feature	Homogeneous Mixture (Solution)	Heterogeneous Mixture (Suspension)	Heterogeneous Mixture (Colloid)
Definition / appearance	_____	_____	_____
Are the parts easy to see?	_____	_____	_____
Do particles settle over time?	_____	_____	_____
Main parts / components	Solvent: _____ Solute: _____	_____	_____
Example from the book	_____	_____	_____
My own example	_____	_____	_____

Quick Check: Salt water is a _____ mixture because _____.

Sand and water is a _____ because _____.

Blood is a _____ because _____.

{ يَرْفَعُ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ }

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U1L3: Water
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Learning
Outcomes:

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- ✓ Differentiate between acids and bases

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session3: Mixtures and Acids

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 3 :Water and Solutions
Session 2: Mixtures

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session3: Mixtures and Acids

U1L3: Water
and SolutionsBiologyLearning
Outcomes:

- ✓ Explain how the structure of water
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Main Idea:

The unique structure of water gives it the properties that make it essential to dissolving substances, forming solutions, and sustaining life.

Learning
Outcomes:

- ✓ *Students will be able to differentiate between mixtures types.*
- ✓ *Students will be able to give examples for each water property.*

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session3: Mixtures and Acids

Thursday 17 – 09 – 2026

06 ربيع الآخر هـ

U1L3: Water
and Solutions**Biology**Learning
Outcomes:✓ Explain how
the structure of
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Mixtures

- When you add a powdered substance to water, it does not react with water to form a new product, instead you create a mixture
- A mixture is a combination of two or more substances, but each substance keeps its characteristics and properties



Think about adding salt to water, when both substances mix, both water and salt are still there, just taste it to find out!

Can you think of any other common mixtures that you might have regularly?



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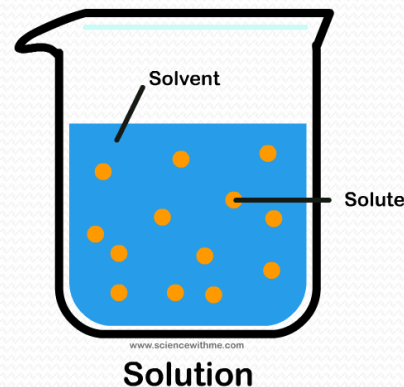
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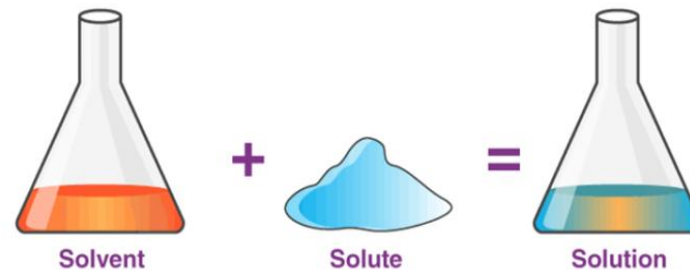
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Homogenous Mixtures

- A mixture with a uniform composition (looks the same throughout) is called a homogenous mixture
- A **solution** is another name for a homogenous mixture, solutions have two parts:
- **Solvent**: substance in which the other substance is dissolved.
- **Solute**: the substance that is dissolved in the solvent.
- Examples of homogenous mixtures include black coffee, salt and water, saliva and air (a gaseous mixture)



TYPES OF SOLUTIONS



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Lesson 3 Water and Solutions

Session3: Mixtures and Acids

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Outcomes:✓ Explain how
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Heterogeneous Mixture

- All the parts stay distinct – you can tell what they are individually.
- There are two main types of heterogenous mixture:
- **Suspension**: Over time the particles settle to the bottom, an example is sand and water
- **Colloid**: A special type, where particles do not settle out, examples include blood, milk, paint and even smoke



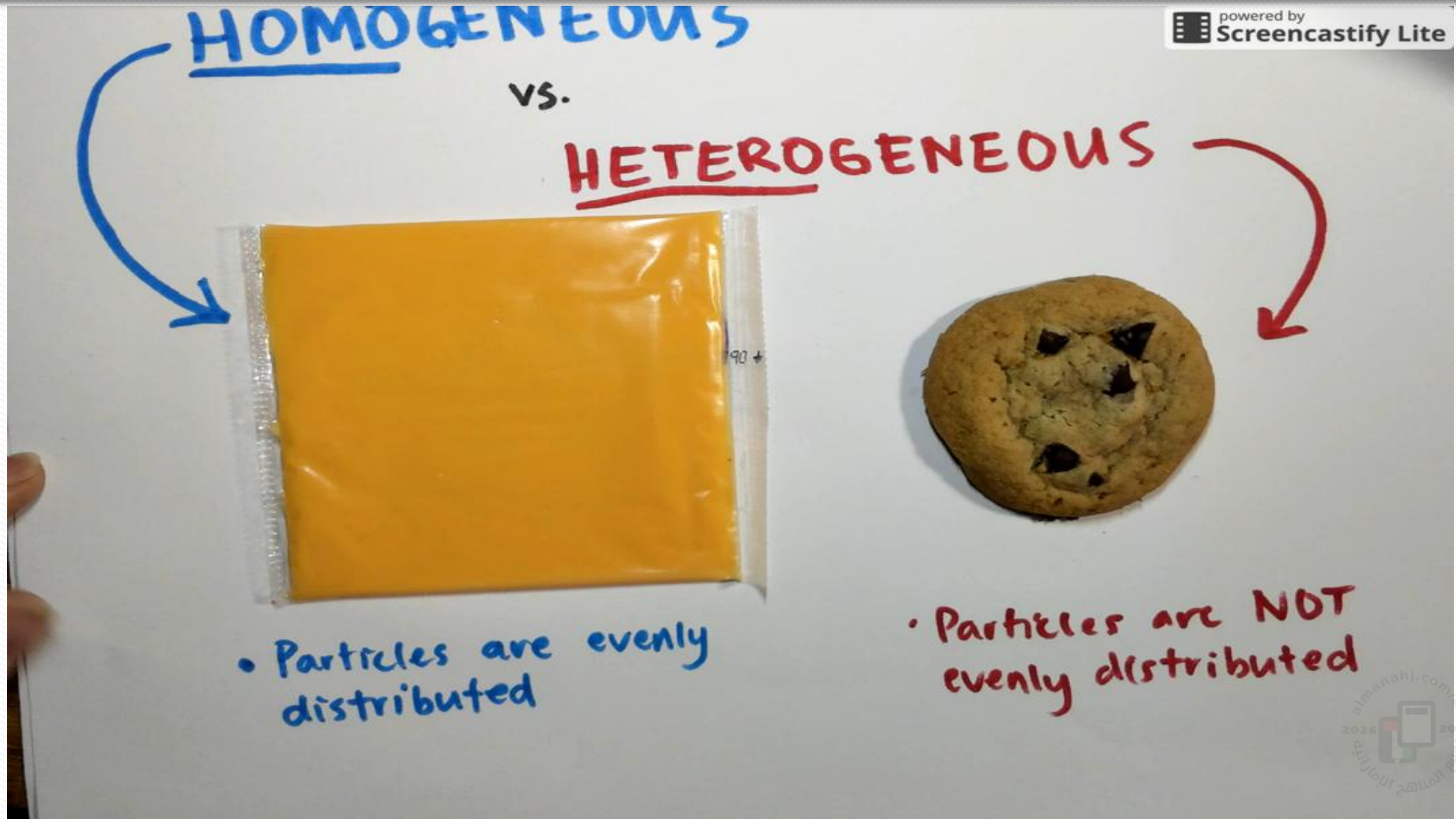
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Lesson 3 Water and Solutions

Session3: Mixtures and Acids

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Activity

- Sand & Sugar
- Salt & Water
- Blood

- **Homogenous or heterogenous??**

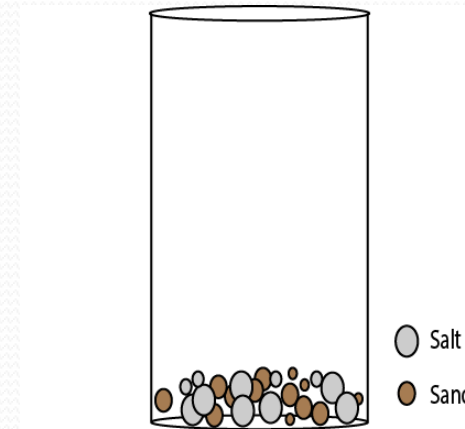


Figure 1: Salt and sand mixture

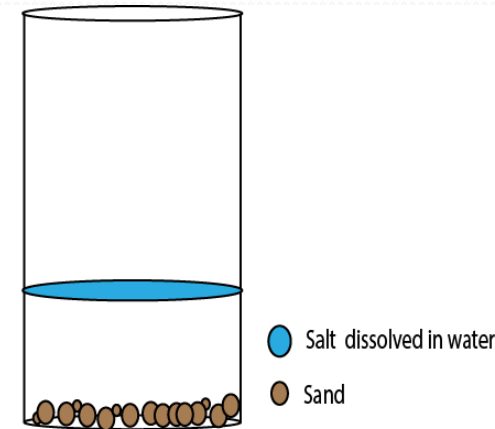
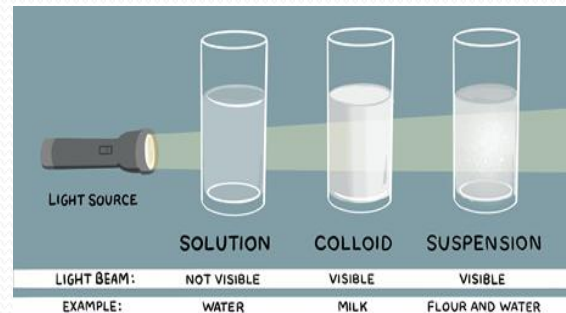
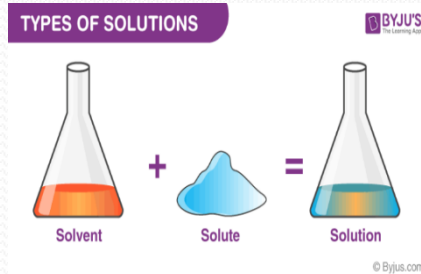
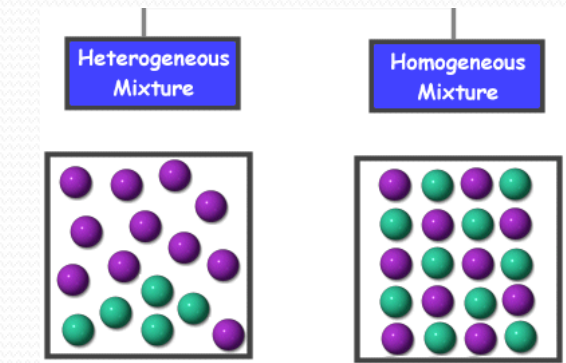


Figure 2: Salt, sand, and water mixture

Unit One: Chemistry in Biology

Lesson 3 Water and Solutions

Session3: Mixtures and Acids

U1L3: Water
and Solutions**Biology****Learning
Outcomes:**✓ **Explain** how
the structure of
water✓ **Compare** and
contrast
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between acids
and bases**Mixtures Summary****MIXTURES****HOMOGENOUS**
Regular order in atomsAlso called
solutionsSolvent +
solute =
solution**HETEROGENOUS**
No order, random arrangement**COLLOID**One substance,
dispersed in
anotherSTABLE-does
not settle downShows Tyndall Effect-
can see path of light**SUSPENSION**One substance,
dispersed in anotherUNSTABLE- it
settle down

U1L3: Water
and Solutions

Biology

**Learning
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Quick Check: Mixtures

1. When salt is added to water, it forms a...

- A. mixture ←
- B. new element
- C. gas only
- D. metal

2. In a mixture, each substance keeps its...

- A. properties ←
- B. atoms only disappear
- C. name only
- D. color always

3. A mixture contains...

- A. two or more substances ←
- B. only one atom
- C. only acids
- D. only bases

U1L3: Water
and Solutions

Biology

Learning Outcomes:

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Quick Check: Solutions

1. A homogeneous mixture looks...

- A. the same throughout ←
- B. different in every part
- C. always cloudy
- D. solid only

2. A solution is made of...

- A. solute and solvent ←
- B. acid and metal only
- C. ice and fire
- D. atoms and no molecules

3. Salt dissolved in water is an example of a...

- A. solution ←
- B. suspension
- C. pure element
- D. gas only

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Quick Check: Heterogeneous Mixtures

1. A heterogeneous mixture has parts that are...

A. distinct or not uniform 

B. always invisible

C. all identical

D. one pure substance

2. In a suspension, particles may...

A. settle to the bottom 

B. disappear forever

C. become ions always

D. form water

3. Milk is an example of a...

A. colloid 

B. pure metal

C. gas only

D. strong acid

U1L3: Water
and Solutions

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Quick Check: Mixture Types

1. Homogeneous mixtures are also called...

- A. solutions ←
- B. suspensions only
- C. acids
- D. bases

2. A suspension is unstable because particles...

- A. settle down ←
- B. never move
- C. become water
- D. turn to light

3. A colloid differs from a suspension because it...

- A. does not settle easily ←
- B. has no particles
- C. is always acidic
- D. is always basic

U1L3: Water
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Scientific Inquiry & Problem Solving: Mystery Mixtures

No materials needed | Work in pairs

Problem: A student finds four cups but the labels are lost. Use the clues to classify each mixture.

Data: Cup A looks clear and does not settle.

Cup B is cloudy and settles after 10 minutes.

Cup C looks cloudy but does not settle.

Cup D looks the same throughout.

Task 1: Classify each cup as solution, suspension, or colloid.

Task 2: Explain one clue that helped you decide.

Task 3: Problem solving: Which cup would be easiest to separate by leaving it still? Why?

Conclusion sentence: I know a mixture is a suspension when _____.



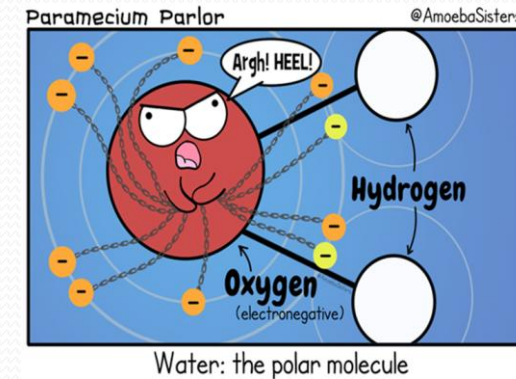
U1L3: Water and Solutions

BiologyLearning Outcomes:

- ✓ Explain how the structure of water
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What Does This Sign Mean?

- Many solutes dissolve readily in water, because of water's polarity (super solvent)
- This means that an organism (made of 70% water) can be a container for many solutions
- Some of these solutions can end up having special properties including corrosiveness (eat away objects, including your hand!), this is why we wear gloves in the lab



U1L3: Water
and Solutions**Biology****Learning
Outcomes:**✓ **Explain** how
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between acids
and bases**Acids**

- When a substance containing hydrogen dissolves in water, a hydrogen ion (H^+) may be released because it is attracted to the negatively charged oxygen end of water
- Substances that release H^+ ions when dissolved in water are known as acids
- The more H^+ released, the more acidic the solution becomes

Can you name anything acidic?

Lemons, Stomach acid, Cola, Orange juice,
Tomatoes and many more



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U1L3: Water
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Biology

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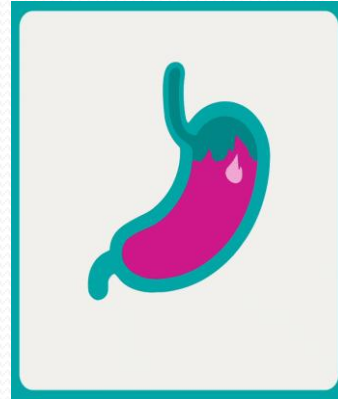
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Bases

- Similarly, when a substance releases hydroxide ions (OH^-) when dissolved in water, it becomes known as a base
- Sodium Hydroxide (NaOH) is a common base that dissolves in water to form sodium ions (Na^+) and OH^-
- The more OH^- released, the more basic the solution becomes

Can you name anything basic?

Seawater, Baking soda, Soapy water, Oven cleaner, Sodium hydroxide



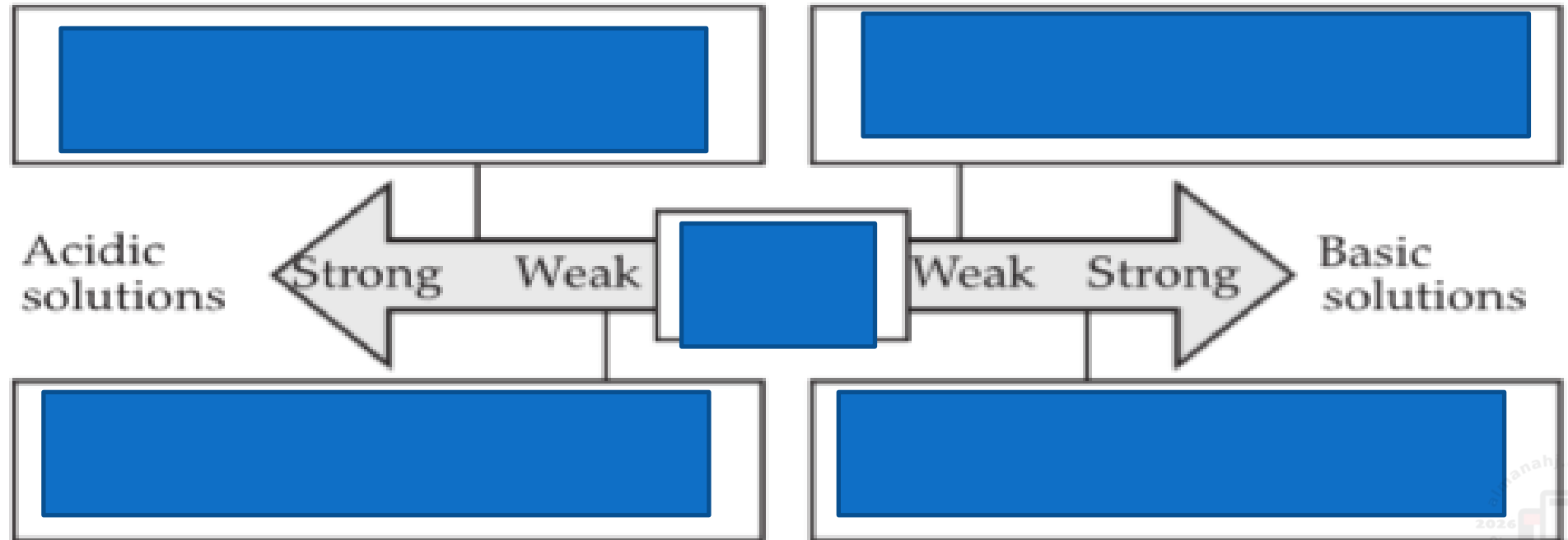
U1L3: Water and Solutions

BiologyLearning Outcomes:

- ✓ Explain how the structure of water
- ✓ Compare and contrast solutions and suspension
- ✓ Differentiate between acids and bases

Construct a model of acidic solutions and basic solutions by placing each of the items below in the correct sequence on the scale.

- releases some hydrogen ions
- releases many hydrogen ions
- water
- releases some hydroxide ions
- releases many hydroxide ions



U1L3: Water
and Solutions**Biology****Learning
Outcomes:**✓ **Explain** how
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Why are they Important?

- Acids and bases are key substances in biology.
- Many of the foods and drinks we consume are acidic and the substances in our stomachs which break down the food, called gastric juices, are highly acidic.
- Our body must compartmentalize areas (make rooms like in a house) and maintain the right level of basic or acidic solution, for us to function properly
- So how do we measure the basic or acidic level of a solution?



U1L3: Water
and Solutions**Biology****Learning
Outcomes:**

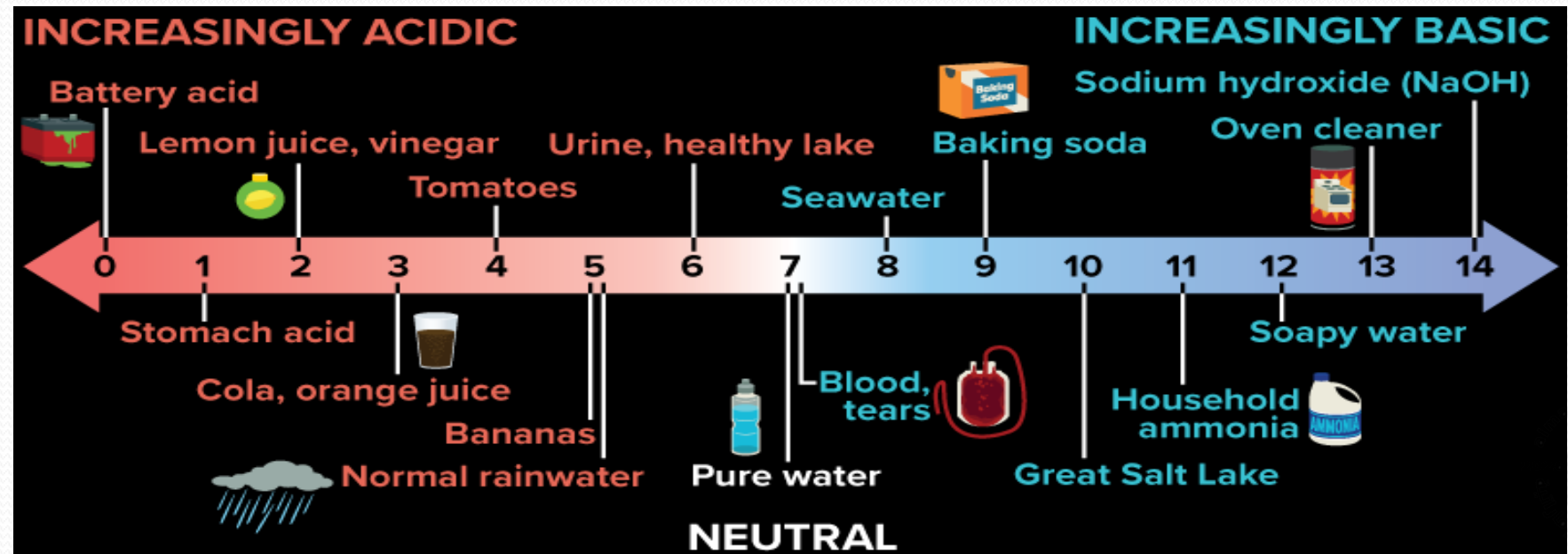
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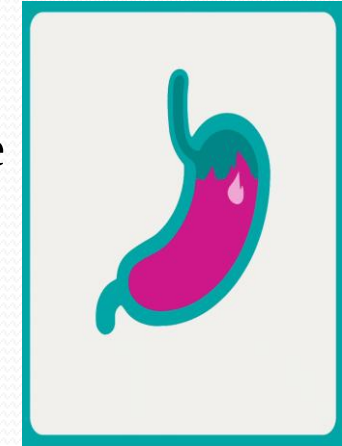
pH

- As previously mentioned, the amount of H^+ or OH^- in a solution determines the strength of an acid or a base.
- The measure of concentration of H^+ in a solution is called pH.
- Scientists measure pH on a scale of 0-14 with 7 being neutral



Buffers

- The majority of biological processes carried out by cells are between 6.5 & 7.5.
- Buffers are mixtures that react with acids or bases to keep the pH within a certain range.
- Your blood, for example, contains buffers that keep the pH about 7.4.



What do you think the Goldilocks principle is?

Your body just like goldilocks, needs perfect conditions to run properly, this is called maintaining

Homeostasis!



U1L3: Water and Solutions

Biology

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U1L3: Water
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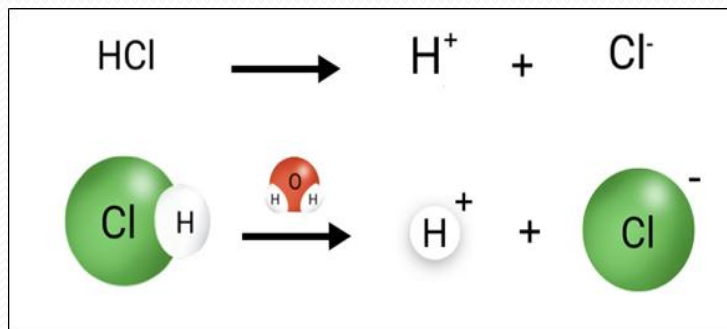
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Acids and Bases Summary

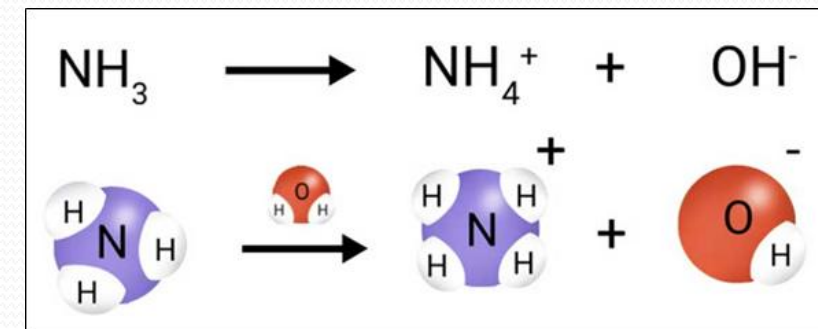
•ACIDS

•Release **hydrogen** ions (H^+)
when dissolved in water

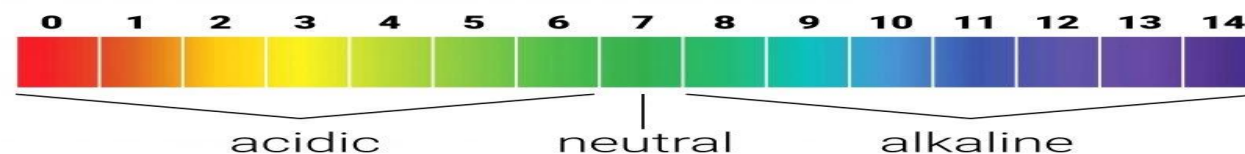


•BASES

•Release **hydroxide** ions (OH^-)
when dissolved in water



The pH scale



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Quick Check: Ions

1. An ion is an atom that has...

A. a charge



B. no electrons ever

C. no protons

D. no mass

2. A positive ion is shown with...

A. +



B. -

C. =

D. ?

3. Ionic bonds form between ions with...

A. opposite charges



B. same color

C. no charge

D. no electrons

U1L3: Water
and Solutions

Biology

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Quick Check: Acids

1. Acids release which ions in water?

- A. H^+ 
- B. OH^-
- C. Na^+ only
- D. O_2

2. More H^+ ions means the solution is more...

- A. acidic 
- B. basic
- C. neutral
- D. solid

3. Lemon juice is an example of something...

- A. acidic 
- B. basic
- C. metallic
- D. neutral always

U1L3: Water
and Solutions

Biology

Learning Outcomes:

✓ Explain how
the structure of
water

✓ Compare and
contrast
solutions and
suspension

✓ Differentiate
between acids
and bases

Quick Check: Bases

1. Bases release which ions in water?

A. OH- 

B. H+

C. Cl₂

D. O₂

2. More OH- ions means the solution is more...

A. basic 

B. acidic

C. neutral

D. polar only

3. Baking soda solution is usually...

A. basic 

B. strongly acidic

C. a pure element

D. a gas

U1L3: Water
and Solutions

Biology

Learning Outcomes:

✓ **Explain** how
the structure of
water

✓ **Compare** and
contrast
solutions and
suspension

✓ **Differentiate**
between acids
and bases

Quick Check: Importance

1. Gastric juices in the stomach are...

- A. acidic 
- B. basic only
- C. neutral always
- D. solid

2. The body must keep correct acid/base levels to...

- A. function properly 
- B. stop all reactions
- C. remove water
- D. make metals

3. Measuring acidity or basicity uses...

- A. pH 
- B. distance
- C. sound
- D. shape

U1L3: Water
and Solutions

Biology

Learning Outcomes:

✓ Explain how
the structure of
water

✓ Compare and
contrast
solutions and
suspension

✓ Differentiate
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and bases

Quick Check: pH

1. pH measures the concentration of...

A. H⁺ ions



B. sand

C. light

D. air

2. The pH scale usually goes from...

A. 0 to 14



B. 1 to 5

C. 10 to 100

D. 50 to 70

3. A pH of 7 is...

A. neutral



B. very acidic

C. very basic

D. corrosive only

U1L3: Water
and Solutions

Biology

Learning Outcomes:

✓ Explain how
the structure of
water

✓ Compare and
contrast
solutions and
suspension

✓ Differentiate
between acids
and bases

Quick Check: Buffers

1. Buffers help keep pH...

- A. within a safe range 
- B. changing quickly
- C. always at zero
- D. above 14

2. Blood pH is kept around...

- A. 7.4 
- B. 2
- C. 14
- D. 0

3. Keeping stable internal conditions is called...

- A. homeostasis 
- B. corrosion
- C. suspension
- D. polarity

U1L3: Water
and Solutions

Biology

Learning
Outcomes:

✓ Explain how
the structure of
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and bases

Scientific Inquiry & Problem Solving: pH Case Study

No materials needed | Work in pairs

Problem: A school nurse has three safe solutions but the labels are missing. Use pH data to identify them.

Data: Solution A pH = 2, Solution B pH = 7, Solution C pH = 10.

Task 1: Classify each solution as acid, base, or neutral.

Task 2: Which solution has the most H⁺ ions? Explain.

Task 3: Problem solving: If blood must stay near pH 7.4, why are buffers important?

Conclusion sentence: Acids release _____ ions, while bases release _____ ions.

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قناة **المستوصف** على جميع وسائل التواصل الإجتماعي

Mr. Ahmed Elhddad

U1L3: Water
and Solutions

Biology

Learning Outcomes:
✓ **Explain** how the structure of water
✓ **Compare** and contrast solutions and suspension
✓ **Differentiate** between acids and bases

Biology

Life
Discover
Explore
Learn
Grow



Cells



Genes



Ecosystems



Life

أ. أحمد الحداد

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أستاذ الأحياء الأول
The 1st Biology Teacher



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يمكنكم الانضمام إلى منصة العلماء التعليمية



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المستوصف

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



اضمن تفوقك من بداية العام

Science
Today
A Brighter
Tomorrow