

مراجعة نهائية وحدة Bases and Acids وحدة الأحماض والقواعد المسار 101-M



تم تحميل هذا الملف من موقع المناهج الإماراتية

موقع المناهج ← المناهج الإماراتية ← الصف الحادي عشر العام ← كيمياء ← الفصل الثالث ← ملفات متنوعة ← الملف

تاريخ إضافة الملف على موقع المناهج: 21:01:25 2025-06-04

ملفات اكتب للمعلم اكتب للطالب | اختبارات الكترونية | اختبارات | حلول | عروض بوربوينت | أوراق عمل
منهج انجليزي | ملخصات وتقارير | مذكرات وبنوك | الامتحان النهائي | للمدرس

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التواصل الاجتماعي بحسب الصف الحادي عشر العام



صفحة المناهج
الإماراتية على
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التربية الاسلامية

المواد على تلغرام

المزيد من الملفات بحسب الصف الحادي عشر العام والمادة كيمياء في الفصل الثالث

الهيكل الوزاري الجديد 2025 منهج بريدج الخطة A-101-M

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ACID


A substance that donates H^+ ions in water.

BASES

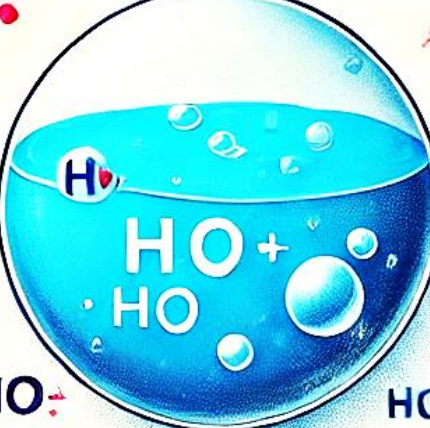
A substance that accepts H^+ ions in water.



ACID




Turns litmus paper red.

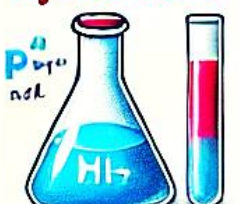


BASES

Turns litmus paper blue.




A substance that donates H^+ ions and produces hydronium ions.

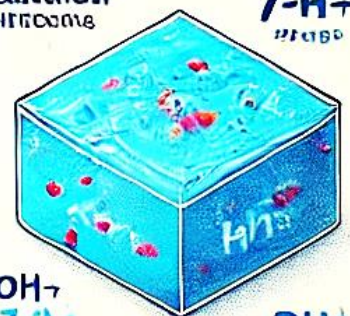


BASES

A substance that accepts H^+ ions and produces hydroxide ions.



Calcium hydroxide



ACIDS AND BASES

Physical Science

Chemistry Teacher : Aysha Aljaberi

Acids

Properties of acids

An **acid** is a substance that produces hydrogen ions H^+ in a water solution.

As acids dissolve in water, ions interact with water molecules to produce **hydronium ions H_3O^+** .

- ✓ Acids cause the sour taste of many foods.
- ✓ Some acids can damage tissue by causing painful burns. Acids are corrosive.
- ✓ Some acids react strongly with certain metals, like zinc, and seem to eat away the metals as metallic compounds and hydrogen gas form.
- ✓ Acids also react with indicators.



Vinegar
(Acetic Acid)



Apple
(Malic Acid)



Milk
(Lactic Acid)



Ant
(Formic Acid)



Grapes
(Tartaric Acid)



Tomato
(Oxalic Acid)



Lemon
(Citric Acid)

An **indicator** is an organic compound that changes colour in the presence of acids and bases. For example, blue litmus paper is an indicator that turns red in acid.



Blue litmus turns red



Red litmus turns blue

Common acids

- ✓ citric acid in citrus fruits,
- ✓ lactic acid found in yogurt and buttermilk. It is also produced in your muscles during high levels of exercise when your muscles need oxygen.
- ✓ Any pickled food contains vinegar, also known as acetic acid.
- ✓ Your stomach uses hydrochloric acid to help digest your food.

Common Acids and Their Uses

Name, Formula	Use	Other Information
Acetic acid (CH ₃ COOH)	food preservation, commercial organic syntheses	vinegar (about 5% acetic acid)
Acetylsalicylic acid (HOOC-C ₆ H ₄ -OOCCH ₃)	pain relief, fever relief; to reduce inflammation	main component of aspirin
Ascorbic acid (H ₂ C ₆ H ₆ O ₆)	antioxidant, vitamin	Vitamin C occurs naturally in some foods and is added to others.
Carbonic acid (H ₂ CO ₃)	carbonated drinks	involved in cave formation and acid rain
Hydrochloric acid (HCl)	cleans steel in a process called pickling	Gastric juice in the stomach is a solution of HCl and water.
Nitric acid (HNO ₃)	to make fertilizers	colourless, yet yellows when it is exposed to light
Phosphoric acid (H ₃ PO ₄)	to make soft drinks, fertilizers, and detergents	slightly sour but pleasant taste; detergents containing phosphates cause water pollution
Sulfuric acid (H ₂ SO ₄)	car batteries; to manufacture fertilizers and other chemicals	dehydrating agent that extracts water from air

Many acids can cause a chemical burn. For example, sulfuric acid reacts with skin cells and removes water as easily as it takes water from sugar,

Acids – Question Set

I. True or False

1. ___ Acids produce hydroxide ions (OH^-) in a water solution.
2. ___ Acids taste sour and are corrosive to tissues.
3. ___ Blue litmus paper turns red when exposed to an acid.
4. ___ Hydrochloric acid (HCl) is found in the stomach and aids digestion.
5. ___ Sulfuric acid is commonly used in car batteries.
6. ___ Acids react with certain metals, releasing oxygen gas.
7. ___ Acetic acid is the main component of vinegar.
8. ___ Phosphoric acid is used in soft drinks and fertilizers.
9. ___ Lactic acid is found only in yogurt and not in the human body.
10. ___ Nitric acid turns yellow when exposed to light.

II. Matching Questions

Match the acid to its common use:

Acid	Use
Hydrochloric acid (HCl)	1. Main component of aspirin
Sulfuric acid (H_2SO_4)	2. Used in carbonated drinks
Carbonic acid (H_2CO_3)	3. Cleaning steel (pickling)
Acetic acid (CH_3COOH)	4. Car batteries, manufacturing fertilizers
Ascorbic acid (Vitamin C)	5. Found in vinegar, used for food preservation
Phosphoric acid (H_3PO_4)	6. Used in fertilizers and soft drinks
Acetylsalicylic acid	7. Antioxidant, vitamin found in foods

III. Multiple Choice Questions

1. Which ion is produced when an acid dissolves in water?
 - a) OH^-
 - b) H_3O^+
 - c) Na^+
 - d) Cl^-
2. What is the common property of acids?
 - a) They taste bitter
 - b) They are slippery
 - c) They produce hydrogen ions (H^+) in solution
 - d) They turn red litmus paper blue
3. What happens when an acid reacts with certain metals like zinc?
 - a) The metal dissolves, forming a metallic compound and hydrogen gas
 - b) Oxygen gas is released
 - c) The metal becomes stronger
 - d) No reaction occurs
4. Which acid is found in citrus fruits?
 - a) Acetic acid
 - b) Carbonic acid
 - c) Hydrochloric acid
 - d) Citric acid
5. What is the main component of aspirin?
 - a) Sulfuric acid
 - b) Acetic acid
 - c) Acetylsalicylic acid
 - d) Ascorbic acid

6. Which acid is used in car batteries?
- a) Hydrochloric acid
 - b) Nitric acid
 - c) Sulfuric acid
 - d) Phosphoric acid
7. What does an indicator do in the presence of an acid?
- a) Turns blue litmus paper red
 - b) Turns red litmus paper blue
 - c) Forms bubbles
 - d) Becomes colorless
8. Which acid is used to clean steel in a process called pickling?
- a) Carbonic acid
 - b) Hydrochloric acid
 - c) Phosphoric acid
 - d) Nitric acid
9. Why were phosphates removed from some detergents?
- a) They were too expensive to produce
 - b) They were ineffective
 - c) They reacted with soap
 - d) They caused water pollution
10. What happens when sulfuric acid comes into contact with human skin?
- a) It removes water and causes chemical burns
 - b) It cools the skin
 - c) It turns the skin blue
 - d) It forms bubbles without harming the skin

Bases

Most bases contain an OH^- , called a **hydroxide ion**, in their chemical formula.

A **base** is a substance that produces hydroxide **ions** OH^- when it is dissolved in water.

In addition, a base is any substance that **accepts** H^+ from acids.

An acid is any substance that **donates** H^+ to a base.

Describe how hydrogen ions H^+ are associated with both acids and bases.

- ✓ Some foods, such as egg whites, are slightly basic.
- ✓ Other examples of basic materials are baking powder and amines, organic compounds with OH^- a group, found in some foods.
- ✓ Some medicines, such as milk of magnesia and antacids, are also basic.
- ✓ soap, base. Bases remove dirt and grime.
- ✓ Bases also are important in many types of cleaning products,
- ✓ Bases are important in industry. For example, sodium hydroxide is used in the paper industry to separate fibers of cellulose from wood pulp.



Properties of bases

- ✓ In the pure, undissolved state, many bases are crystalline solids.
- ✓ In solution, bases feel slippery and have a bitter taste.
- ✓ Strong bases are corrosive and contact with skin can result in severe chemical burns.
- ✓ Bases react with indicators to produce changes in colour. Red litmus paper turns blue in bases.

Common bases

Name, Formula	Use	Other Information
Aluminium hydroxide ($\text{Al}(\text{OH})_3$)	colour-fast fabrics, antacid, water purification	sticky gel that collects suspended clay and dirt particles on its surface
Calcium hydroxide ($\text{Ca}(\text{OH})_2$)	to make leather, mortar and plaster; lessen acidity of soil	slaked lime
Magnesium hydroxide ($\text{Mg}(\text{OH})_2$)	laxative, antacid	called milk of magnesia when it is mixed with water
Sodium hydroxide (NaOH)	to make soap, oven cleaner, drain cleaner, textiles, and paper	called lye and caustic soda; generates heat when it is combined with water; reacts with metals to form hydrogen (exothermic reaction)
Ammonia (NH_3)	cleaners, fertilizer; to make rayon and nylon	irritating odor that is damaging to nasal passages and lungs

True or False:

- () A base produces hydrogen ions (H^+) when dissolved in water.
- () Some foods, such as egg whites, are slightly acidic.
- () Bases are important in many types of cleaning products.
- () Bases have a sour taste when dissolved in water.
- () Ammonia is used in cleaning products and fertilizers.
- () Sodium hydroxide is also known as caustic soda.
- () Bases have a slippery texture and bitter taste when dissolved in water.
- () Red litmus paper turns blue in the presence of an acid.
- () Milk of magnesia is a common base used as a laxative.
- () Bases react with acids to form hydroxide ions.

Matching:

Match the base with its use:

Base		Use
	Aluminum hydroxide	1. Used as an antacid and in water purification
	Calcium hydroxide	2. Used to make soap, drain cleaner, and paper
	Magnesium hydroxide	3. Used in the textile industry and for making nylon
	Sodium hydroxide	4. Used in the leather industry and to lessen soil acidity
	Ammonia	5. Used as a laxative and antacid

Multiple Choice Questions:

- Which of the following is the definition of a base?
 - a) A substance that produces hydroxide ions (OH^-) when dissolved in water
 - b) A substance that donates H^+ ions to a base
 - c) A substance that accepts OH^- ions from acids
 - d) A substance that produces hydrogen ions (H^+) when dissolved in water
- What is the common name for sodium hydroxide?
 - a) Lime
 - b) Milk of magnesia
 - c) Lye
 - d) Baking soda
- What color does red litmus paper turn when exposed to a base?
 - a) Blue
 - b) Red
 - c) Green
 - d) Yellow

4. What is a property of bases in solution?
- a) They taste sweet and feel sticky
 - b) They feel slippery and have a bitter taste
 - c) They are highly acidic
 - d) They turn blue litmus paper red
5. What is magnesium hydroxide commonly used for?
- a) Making leather and mortar
 - b) Removing dirt and grime
 - c) Water purification
 - d) As a laxative and antacid
6. Which of the following is an example of a basic material?
- a) Egg whites
 - b) Vinegar
 - c) Lemon juice
 - d) Acetone
7. What is a major use of sodium hydroxide in industry?
- a) Water purification
 - b) To lessen soil acidity
 - c) To make soap and clean drains
 - d) As a laxative
8. What is the result of combining a strong base like sodium hydroxide with water?
- a) It generates heat
 - b) It becomes neutral
 - c) It produces hydrogen gas
 - d) It turns acidic

9. What substance is used in the paper industry to separate fibers from wood pulp?

- a) Ammonia
- b) Calcium hydroxide
- c) Sodium hydroxide
- d) Aluminium hydroxide

10. What characteristic of ammonia makes it dangerous?

- a) It has a sour taste
- b) It is colorless
- c) It reacts with metals to form hydrogen
- d) It has an irritating odor that can damage nasal passages and lungs

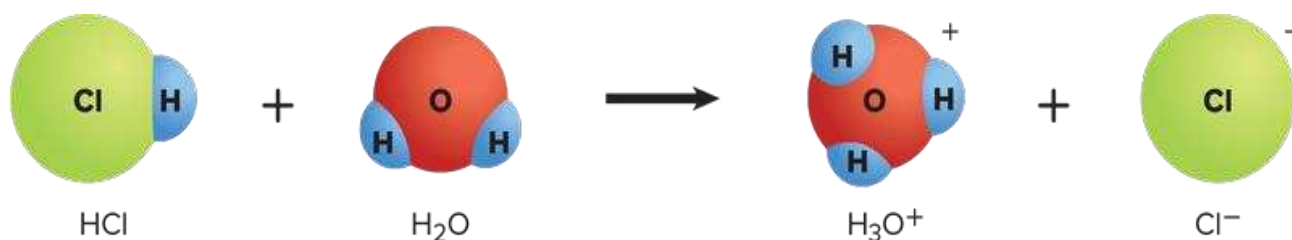
Solutions of Acids and Bases

Because of its polarity, water is the main solvent in these products. Solutions of acids and bases produce ions that can conduct an electric current. Thus, they are said to be electrolytes.



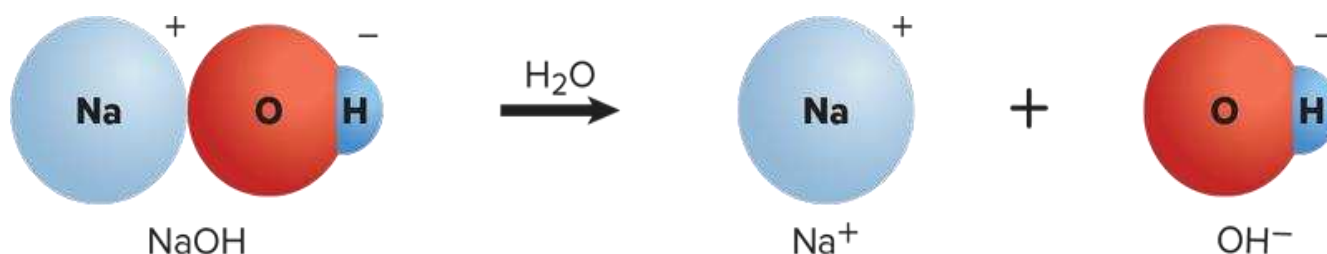
Ionization of acids

You have learned that substances such as HCl , HNO_3 , and H_2SO_4 are acids because of their abilities to produce hydrogen ions H^+ in water. When an acid dissolves in water, the water molecules surround the neutral molecules of the acid, pulling them apart into ions. The positive hydrogen ions H^+ are attracted to the negative ends of the water molecules to form hydronium ions H_3O^+ . Therefore, an acid can be described more accurately as a compound that produces hydronium ions H_3O^+ when dissolved in water.



Dissociation of bases

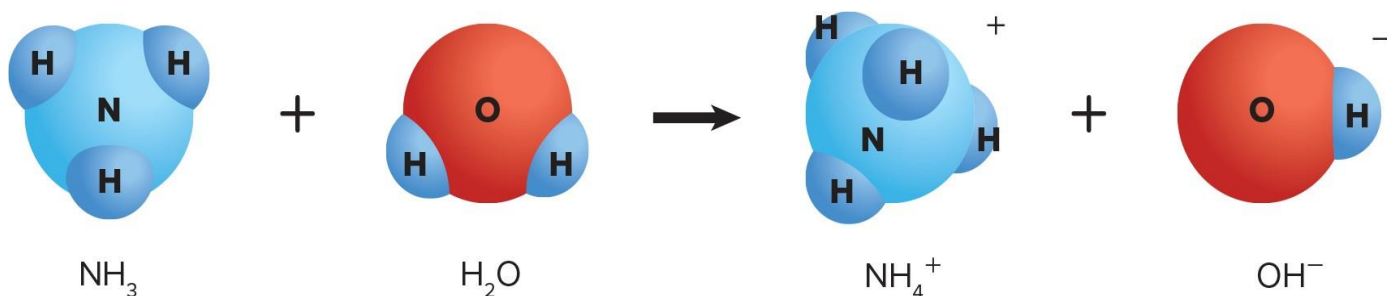
Many bases are ionic compounds. When bases dissolve in water, the negative areas of nearby water molecules attract the positive ion in the base. The positive areas of nearby water molecules attract the OH^- of the base.



Ionization of bases

A base is also any substance that accepts an H^+ from acids.

Ammonia (NH_3) is a base, even though it does not contain the letters OH in its chemical formula. Ammonia is a base because it accepts a hydrogen ion (H^+) from water. In a water solution, ionization takes place when the ammonia molecule attracts a hydrogen ion from a water molecule, forming an ammonium ion. This produces a hydroxide ion.



Explain how ammonia reacts in a water solution.

Ammonia is a common household cleaner. However, products containing ammonia should never be mixed with other chlorine-based cleaners (sodium hypochlorite), such as some bathroom bowl cleaners and bleach. A reaction between sodium hypochlorite and ammonia produces the toxic gases hydrazine and chloramine. Breathing these gases can severely damage lung tissues and cause death.

True or False:

- () Water is the main solvent in solutions of acids and bases.
- () Acids produce hydrogen ions (H^+) when dissolved in water.
- () When ammonia dissolves in water, it produces hydroxide ions (OH^-).
- () Ammonia is a base because it donates a hydrogen ion (H^+) to water.
- () The reaction between ammonia and chlorine-based cleaners produces non-toxic gases.
- () Ionization of acids in water produces hydronium ions (H_3O^+).
- () A base is any substance that accepts hydroxide ions (OH^-) from acids.
- () Bases dissociate in water to form hydroxide ions (OH^-) and positive ions.
- () Ammonia contains the letters OH in its chemical formula.
- () A solution of an acid can conduct electricity because it contains ions.

Matching:

Match the acid/base with its characteristic or reaction:

	Ammonia	1. Dissolves to produce hydronium ions (H_3O^+)
	Hydrochloric acid (HCl)	2. The main solvent for acids and bases, allows ionization
	Sulfuric acid (H_2SO_4)	3. Reacts with water to form ammonium ions (NH_4^+)
	Sodium hydroxide (NaOH)	4. Common household cleaner that can form toxic gases with chlorine-based cleaners
	Water	5. Dissolves to form hydroxide ions (OH^-)

Multiple Choice Questions:

- What is the main solvent in solutions of acids and bases?
 - a) Alcohol
 - b) Oil
 - c) Ether
 - d) Water
- When an acid dissolves in water, what does it produce?
 - a) Hydronium ions (H_3O^+)
 - b) Hydroxide ions (OH^-)
 - c) Ammonium ions (NH_4^+)
 - d) Sodium ions (Na^+)
- Which of the following describes how ammonia behaves in water?
 - a) It produces hydronium ions (H_3O^+)
 - b) It reacts to form ammonia hydroxide (NH_4OH)
 - c) It accepts hydrogen ions (H^+) to form ammonium ions (NH_4^+)
 - d) It produces sodium hydroxide (NaOH)

4. What is a common use of ammonia in households?
- a) As a cleaner
 - b) As a bleach substitute
 - c) As a food additive
 - d) As a pesticide
5. What dangerous gases are produced when ammonia is mixed with chlorine-based cleaners?
- a) Oxygen and hydrogen
 - b) Nitrogen and chlorine
 - c) Methane and carbon dioxide
 - d) Hydrazine and chloramine
6. What ions are produced when an acid like HCl is dissolved in water?
- a) Hydroxide ions (OH^-) and sodium ions (Na^+)
 - b) Hydronium ions (H_3O^+) and chloride ions (Cl^-)
 - c) Hydronium ions (H_3O^+) and hydroxide ions (OH^-)
 - d) Sodium ions (Na^+) and chloride ions (Cl^-)
7. Why are solutions of acids and bases considered electrolytes?
- a) They do not conduct electricity
 - b) They only contain non-metallic ions
 - c) They contain ions that can conduct electricity
 - d) They are always neutral
8. What happens when ammonia reacts with water?
- a) Ammonia produces sulfuric acid
 - b) Ammonia accepts a hydrogen ion (H^+) and forms ammonium (NH_4^+)
 - c) Ammonia dissociates into nitrogen and hydrogen
 - d) Ammonia produces hydronium ions (H_3O^+)

9. Which of the following is true about bases in water?

- a) Bases always produce hydronium ions (H_3O^+)
- b) Bases are typically acids in disguise
- c) Bases do not affect pH levels
- d) Bases produce hydroxide ions (OH^-) when dissolved in water

10. What should you avoid when using ammonia-based cleaners?

- a) Mixing with chlorine-based cleaners
- b) Mixing with vinegar
- c) Mixing with baking soda
- d) Mixing with water

Strong and Weak Acids and Bases

Some acids are stronger than others.

The strength of an acid or a base depends on the degree to which acid or base particles form into ions in water.

In a **strong acid**, all the acid ionizes upon dissolving in water.

- ✓ Hydrochloric acid, nitric acid, and sulfuric acid are examples of strong acids.

In a **weak acid**, only a small fraction of the molecules ionize upon dissolving in water.

- ✓ Acetic acid and carbonic acid are examples of weak acids.

Ions in solution can conduct an electric current.
The more ions that a solution contains, the more current it can conduct.

The strong acid solution conducts more current, and the lightbulb burns brightly

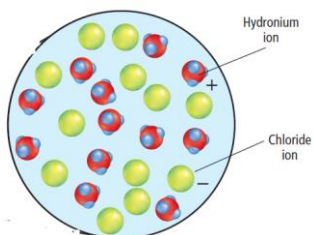


The lamp glows brightly

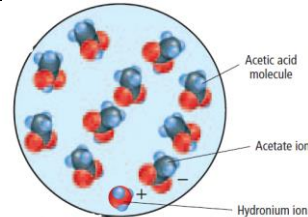
The weak acid solution does not conduct as much current as a strong acid solution, and the bulb burns less brightly.



The lamp shines a dull light



Hydrochloric acid is completely ionized, where the whole acid turns into ions.



Acetic acid ionizes in water partially ionizes, where part of the acid is ionized, and part remains without ionization.

Acid strength

In strong acids, such as hydrochloric acid HCl nearly all the acid ionizes to form hydronium ions H_3O^+ and chloride ions and leaves almost no molecules present.



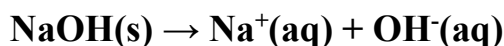
Equations describing the ionization of weak acids, such as acetic acid are written using double arrows pointing in opposite directions. This means that the reaction does not go to completion.



Base strength

Many bases are ionic compounds that dissociate to produce ions when they dissolve.

A **strong base** dissociates completely upon dissolving in water.



When ammonia is dissolved in water, an ammonium ion and a hydroxide ion form. using double arrows indicates that not all of the molecules ionize.

A **weak base** is one that does not ionize completely.

Ammonia produces only a few ions in water, and most of the ammonia remains in the form of NH_3



True or False:

1. () Strong acids ionize completely in water.
2. () Weak acids only partially ionize in water.
3. () Ammonia is a strong base because it ionizes completely in water.
4. () Hydrochloric acid is an example of a weak acid.
5. () The more ions in a solution, the more current it can conduct.
6. () In a solution of a weak acid, the lamp will glow brightly.
7. () Acetic acid ionizes completely in water.
8. () Strong bases like sodium hydroxide dissociate completely in water.
9. () The ionization of weak acids is represented by a single arrow in chemical equations.
10. () A strong acid solution will cause the lightbulb to burn more brightly than a weak acid solution.

Matching:

Match the type of acid/base to its description:

	Strong acid	1. Forms ammonium and hydroxide ions when dissolved in water
	Weak acid	2. Ionizes completely in water
	Strong base	3. Forms fewer ions in solution, resulting in less conductivity
	Weak base	4. Conducts more electricity due to complete ionization
	Ammonia	5. Only partially ionizes in water

Multiple Choice Questions:

- What happens when a strong acid dissolves in water?
 - a) Only a small fraction of the molecules ionize
 - b) The acid does not ionize
 - c) The acid ionizes completely, producing hydronium ions (H_3O^+)
 - d) The acid becomes neutral
- Which of the following is an example of a strong acid?
 - a) Acetic acid
 - b) Carbonic acid
 - c) Ammonia
 - d) Hydrochloric acid
- How is the ionization of weak acids represented in chemical equations?
 - a) With a double arrow pointing in opposite directions
 - b) With a single arrow pointing to the right
 - c) With a double arrow pointing to the left
 - d) With no arrows

4. What is a characteristic of a weak base like ammonia in water?
- a) It produces only a few ions, and most remains undissolved
 - b) It dissociates completely into ions
 - c) It forms hydronium ions in water
 - d) It does not affect the pH of the solution
5. Which of the following bases dissociates completely in water?
- a) Ammonia
 - b) Sodium hydroxide (NaOH)
 - c) Calcium hydroxide
 - d) Potassium carbonate
6. What occurs when a strong acid like HCl is dissolved in water?
- a) Only a few molecules ionize, and the rest remain intact
 - b) The acid dissociates completely, producing hydronium ions and chloride ions
 - c) The acid forms a weak acid and water
 - d) The solution remains neutral
7. Why does a solution of a strong acid conduct more electricity than a solution of a weak acid?
- a) Strong acids produce fewer ions
 - b) Weak acids ionize completely
 - c) Weak acids do not produce ions
 - d) Strong acids dissociate completely, creating more ions in solution
8. What is the correct equation for the ionization of acetic acid (a weak acid) in water?
- a) $\text{CH}_3\text{COOH} + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{COO}^- + \text{H}_3\text{O}^+$
 - b) $\text{CH}_3\text{COOH} \rightleftharpoons \text{CH}_3\text{COO}^- + \text{H}_3\text{O}^+$
 - c) $\text{CH}_3\text{COOH} \rightarrow \text{CH}_3\text{COO}^- + \text{H}_2\text{O}$
 - d) $\text{CH}_3\text{COOH} + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{COOH}_2^+$

9. What type of solution will produce the brightest glow in a lightbulb when acid or base is dissolved in water?
- a) Strong acid solution
 - b) Weak acid solution
 - c) Strong base solution
 - d) Weak base solution
10. What happens to ammonia when it dissolves in water?
- a) It ionizes completely to form ammonium ions (NH_4^+) and hydroxide ions (OH^-)
 - b) It forms hydronium ions (H_3O^+)
 - c) It produces sodium hydroxide (NaOH)
 - d) It forms a neutral solution

Strength and concentration

The terms *strong* and *weak* refer to the degree to which an acid or base ionizes or dissociates in solution.

Strong acids ionize completely, and **strong** bases dissociate completely.

Weak acids and bases ionize only partially.

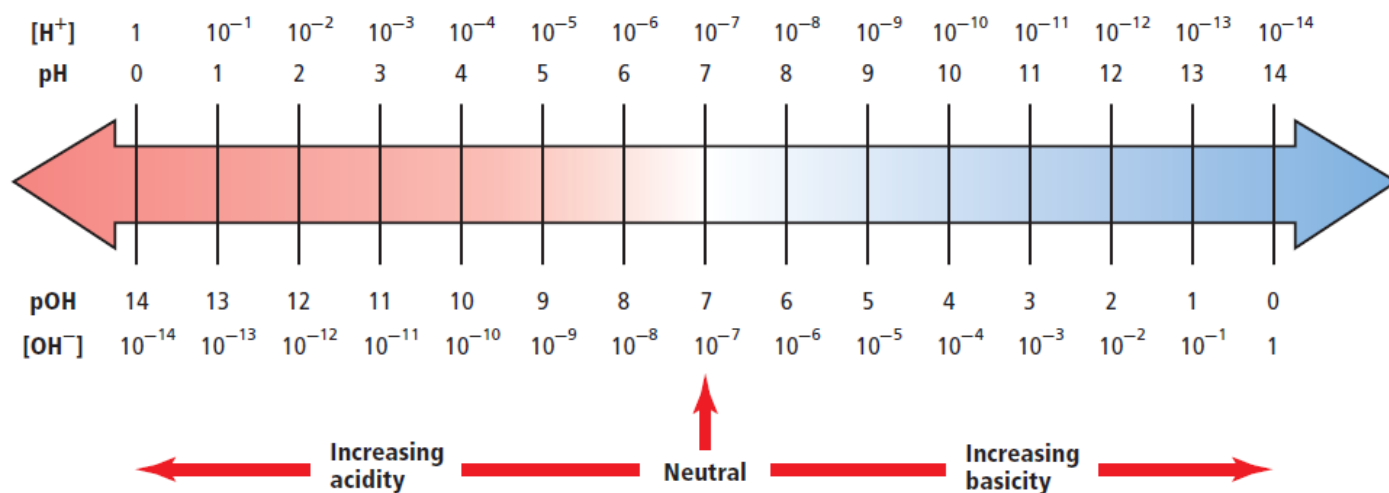
In contrast, the terms *dilute* and *concentrated* indicate the concentration of a solution, which is the amount of acid or base dissolved in the solution.

It is possible to have dilute solutions of strong acids and bases and concentrated solutions of weak acids and bases.

pH of a Solution

pH is a measure of the concentration of H^+ (H_3O^+) ions in solution.

The greater the H_3O^+ concentration is, the lower the pH and the more acidic the solution.



- ✓ The pH scale helps classify solutions as acidic or basic.
- ✓ A solution of **pH = 3** has an **H^+** concentration that is **ten times greater** than a solution of **pH = 4**.
- ✓ Solutions with **pHs lower than 7** are described as **acidic**.
- ✓ The lower the value, the more **acidic** the solution.
- ✓ Solutions with **pHs greater than 7** are **basic**.
- ✓ The higher the **pH** is, the more **basic** the solution.
- ✓ A solution that has a **pH of exactly 7** has **equal concentrations** of **H_3O^+** ions and **OH^-** ions. This solution is **neutral**. **Pure water at 25°C has a pH of 7**

pH Measurement Tools:

- Universal indicator paper detects $\text{H}_3\text{O}^+/\text{OH}^-$ ions via colour changes; pH is identified by comparing the paper's colour to a reference chart.
- pH meters use electrodes immersed in solutions to provide digital readings; portable versions are accurate and practical for outdoor testing (e.g., soil, streams).



Blood pH Maintenance:

- Blood must maintain a pH of 7.0–7.8 to enable enzyme functionality and metabolic processes.
- Buffers (e.g., carbonic acid and bicarbonate ions) neutralize acids/bases, preventing drastic pH shifts despite dietary acid intake.

Buffer Function & Importance:

- Buffers stabilize blood pH by reacting with added acids/bases to minimize their impact.
- Blood pH is tightly regulated near 7.4; deviations can lead to acidosis, a condition linked to severe dehydration or excess acid accumulation.

Consequences of pH Disruption:

- Acidosis arises when blood pH falls below 7.4, disrupting bodily functions and potentially endangering health.
- Buffers ensure blood remains near pH 7.4, safeguarding enzyme activity and overall homeostasis.

True or False:

1. () Strong acids ionize completely, while weak acids ionize only partially.
2. () The concentration of a solution refers to the amount of acid or base dissolved in the solution.
3. () It is impossible to have a dilute solution of a strong acid.
4. () A solution with a pH of 5 is more acidic than a solution with a pH of 7.
5. () A solution with a pH of 7 is neutral.
6. () The pH of a solution increases as the concentration of H_3O^+ ions decreases.
7. () Buffers help maintain the pH of blood by neutralizing acids and bases.
8. () A blood pH outside the range of 7.0–7.8 can be harmful.
9. () Universal indicator paper gives a digital reading of pH.
10. () Acidosis occurs when blood pH exceeds 7.8.

Matching:

Match the term with its definition or description:

Strong acid	1. Solution with a pH of 7
Weak acid	2. Solution with a high amount of acid or base dissolved
Dilute solution	3. Solution where only a small fraction of the acid or base ionizes
Concentrated solution	4. A device that provides digital pH readings
Neutral solution	5. A condition where blood pH is lower than 7.4
Buffer	6. Solution where a large amount of acid or base ionizes
pH meter	7. Solution with a low amount of acid or base dissolved
Acidosis	8. Substances that stabilize pH in the body by neutralizing acids and bases

Multiple Choice Questions:

1. What does the term "concentrated solution" refer to?
 - a) The amount of acid or base that ionizes in solution
 - b) The amount of water in the solution
 - c) The pH level of the solution
 - d) The amount of acid or base dissolved in a solution
2. What is the pH of a neutral solution at 25°C?
 - a) 7
 - b) 3
 - c) 10
 - d) 14
3. How does the pH scale help classify solutions?
 - a) It measures the amount of base in a solution
 - b) It measures the electrical conductivity of a solution
 - c) It indicates whether a solution is acidic or basic based on H_3O^+ concentration
 - d) It determines the strength of an acid or base
4. If a solution has a pH of 4, how does its H_3O^+ concentration compare to a solution with a pH of 5?
 - a) It has 100 times more H_3O^+ ions
 - b) It has 10 times more H_3O^+ ions
 - c) It has the same H_3O^+ concentration
 - d) It has 10 times fewer H_3O^+ ions
5. What is the role of buffers in the body?
 - a) To maintain a stable pH by neutralizing acids and bases
 - b) To lower the pH of blood
 - c) To increase the pH of blood
 - d) To decrease the concentration of H_3O^+ ions

6. What can happen if the blood pH falls below 7.4?
- a) Acidosis, leading to dehydration and acid accumulation
 - b) The body's temperature increases significantly
 - c) The pH stabilizes automatically without consequences
 - d) Alkalosis, leading to enzyme malfunctions
7. Which of the following is used to measure the pH of a solution?
- a) Thermometer
 - b) Titration apparatus
 - c) pH meter
 - d) Refractometer
8. What is the pH of a solution with equal concentrations of H_3O^+ and OH^- ions?
- a) 3
 - b) 7
 - c) 10
 - d) 14
9. A solution with a pH of 6 is:
- a) Basic
 - b) Neutral
 - c) Acidic
 - d) Alkaline
10. How does the pH of a solution relate to the concentration of H_3O^+ ions?
- a) The higher the H_3O^+ concentration, the higher the pH
 - b) The higher the H_3O^+ concentration, the lower the pH
 - c) The concentration of H_3O^+ ions does not affect the pH
 - d) The pH is determined by the concentration of OH^- ions