Edgenuity

Warm-Up | Properties of Acids and Bases

Lesson Question

How do acids and bases differ?

Lesson Goals

Differentiate between acids and bases.

Compare the properties of acids and bases.

Describe common uses for acids and bases.

Words to Know

Fill in this table as you work through the lesson. You may use the glossary to help you.

acid	a substance that tastes sour and reacts with metals and carbonates
base	a substance with a bitter taste and slippery texture that reacts with lipids
carbonate	a chemical made up of molecules that contain a CO_3 ion
hydroxide	a negatively charged ion formed from one atom of hydrogen and one atom of oxygen
lipids	naturally occurring, fatty compounds that make up substances such as oil, grease, and wax

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Ions

- Atoms have no overall charge.
- Ions form when one or more electrons are lost or gained.
  - When electrons are lost, the atom becomes positive.
  - When electrons are gained, the atom becomes negative.

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Acids

An [acid] is a substance that releases [H^+] ions in solution.

- Acetic acid (CH_3COOH) is found in [vinegar].
- Citric acid ($H_3C_6H_5O_7$) is in [lemons], limes, and oranges.
- Formic acid (HCOOH) is found in [ant] venom.

All the formulas contain a hydrogen atom.

Properties of Acids

- Taste [sour]
- [React] with metals
- [Conduct] electricity
- Can [break down] certain substances
  - Strong acids can cause serious burns.

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Uses of Acids

- Hydrochloric acid (HCl) is used to clean masonry and [remove rust] from steel.
- Sulfuric acid (H_2SO_4) is used in industrial chemicals and car [batteries].
- Nitric acid (HNO_3) is used in [fertilizers], dyes, and plastics.

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The Formation of Caves

REAL-WORLD CONNECTION

- Acids react with [carbonates], chemicals that contain a [CO_3^{2-}] ion.
  - Limestone rock (calcium carbonate) is dissolved by [carbonic acid], forming a cave.
  - This [reaction] also forms stalactites and stalagmites.

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Bases

A [base] is a substance that releases [OH^-] ions in solution.

- Ammonium [hydroxide] (NH_4OH) is used in household cleaners.
- [Lye] (sodium hydroxide, NaOH) is used in soap and oven and drain cleaners.
- Slaked [lime] (calcium hydroxide, $Ca(OH)_2$) is used to mark lines on play fields.

All these chemicals contain OH^- ions called hydroxide, which is made up of one oxygen and one hydrogen atom. This is one way to identify a base by its chemical formula.

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Properties of Bases

- Taste [bitter]
- Feel [slippery]
- [React] with nonmetals
- [Conduct] electricity
- Can cause [burns] and damage tissue

Uses of Bases

- Potassium hydroxide is used in [batteries].
- Lithium hydroxide is used in grease, [ceramics], and cement.
- Zinc hydroxide is used in [ointments], lotions, and cosmetics.

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Oil Spill Cleanup

REAL-WORLD CONNECTION

- Bases react with [lipids], naturally occurring fatty compounds that make up oil, grease, and wax.
- In April 2010, the *Deepwater Horizon* oil spill dumped 210 million gallons of [oil] in the Gulf of Mexico.
  - Bases were used to [remove oil] from water and clean affected marine birds.

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Summary | Properties of Acids and Bases

Lesson Question

How do acids and bases differ?

Answer

(Sample answer) Acids and bases differ in their physical properties: taste and texture. They also differ in their chemical properties. Acids release H^+ ions in solution, bases release OH^- ions in solution. Acids react with metals; bases reach with nonmetals.

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Review: Key Concepts

Acids

- Release [H^+] ions in solution
- Taste [sour]
- React with [metals]
- Conduct [electricity]
- Can [break] down certain substances

Bases

- Release [OH^-] ions in solution
- Taste [bitter]
- Feel [slippery]
- React with [nonmetals]
- Conduct [electricity]
- Can cause [burns] and damage tissue

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Summary | Properties of Acids and Bases

Use this space to write any questions or thoughts about this lesson.

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