

# The Properties of Acids and Bases

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## Acids

- ✓ Produce  $H^+$  (as  $H_3O^+$ ) ions in water
- ✓ Produce a negative ion (-) too
- ✓ Taste sour
- ✓ Corrode metals
- ✓ React with bases to form salts and water
- ✓ Electrolytes



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## Bases

- Produce  $OH^-$  ions in water
- Taste bitter, chalky
- Feel soapy, slippery
- React with acids to form salts and water
- Electrolyte



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### Learning Check AB1

Describe the solution in each of the following as: 1) acid 2) base or 3) neutral.

- A. \_\_\_ soda
- B. \_\_\_ soap
- C. \_\_\_ coffee
- D. \_\_\_ wine
- E. \_\_\_ water
- F. \_\_\_ grapefruit

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### Solution AB1

Describe each solution as:

1) acid 2) base or 3) neutral.

- A.   1   soda
- B.   2   soap
- C.   1   coffee
- D.   1   wine
- E.   3   water
- F.   1   grapefruit

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### Learning Check AB2

Identify each as characteristic of an

A) acid or B) base

- \_\_\_ 1. Sour taste
- \_\_\_ 2. Produces  $\text{OH}^-$  in aqueous solutions
- \_\_\_ 3. Chalky taste
- \_\_\_ 4. Is an electrolyte
- \_\_\_ 5. Produces  $\text{H}^+$  in aqueous solutions

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## Solution AB2

Identify each as a characteristic of an

A) acid or B) base

- A 1. Sour taste
- B 2. Produces  $\text{OH}^-$  in aqueous solutions
- B 3. Chalky taste
- A, B 4. Is an electrolyte
- A 5. Produces  $\text{H}^+$  in aqueous solutions

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## In Summary



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## Acids and Bases

The Three Theories

- Arrhenius
- Brønsted-Lowry
- Lewis

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## Arrhenius



- Svante August Arrhenius was a Swedish physical chemist best known for his theory that electrolytes, certain substances that dissolve in water to yield a solution that conducts electricity, are separated, or dissociated, into electrically charged particles, or ions, even when there is no current flowing through the solution. In 1903 he was awarded the Nobel Prize for Chemistry.

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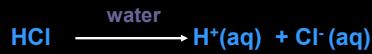
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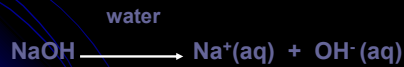
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## Arrhenius Acids and Bases

- Acids produce  $H^+$  in aqueous solutions



- Bases produce  $OH^-$  in aqueous solutions



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## Brønsted-Lowry concept



The Brønsted-Lowry concept focuses on what an acid or base does.

Acids are hydrogen ion ( $H^+$ ) donors  
Bases are hydrogen ion ( $H^+$ ) acceptors

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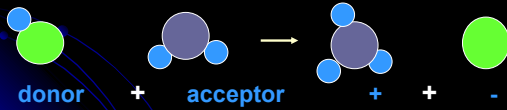
## Brønsted-Lowry Acids

Acids are hydrogen ion (H<sup>+</sup>) donors

PROTON DONORS - ACID

Bases are hydrogen ion (H<sup>+</sup>) acceptor

PROTON ACCEPTORS - BASE



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## Lewis Theory

- A Lewis acid is an electron-pair acceptor.
- A Lewis base is an electron-pair donor.



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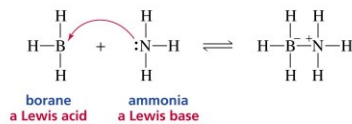
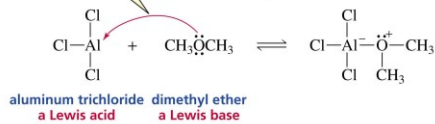
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the curved arrow indicates where the pair of electrons starts from and where it ends up



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