

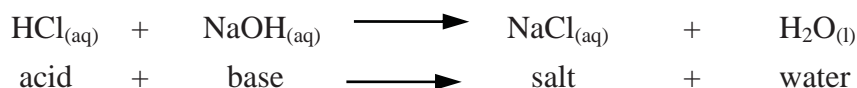
Chemistry 12

Unit IV – Acids, Bases and Salts

Notes

IV.1 – The Arrhenius Theory Of Acids and Bases

- **Acid:** any substance which releases $\text{H}^+_{(\text{aq})}$ in water.
- **Base:** any substance which releases $\text{OH}^-_{(\text{aq})}$ in water.
- **Salt:** is the neutralization product which results when an acid and a base react:



In more general terms, a salt is any *ionic* compound which is neither an acid nor a base.

- The following is a more simple way to think of Arrhenius acids, bases and salts. (There are some exceptions)

An **ACID** is any *ionic* species whose formula starts with an “H”.

Examples: HCl, HNO₃, H₂SO₄

A **BASE** is any *ionic* species whose formula ends with an “OH”

Examples: NaOH, KOH, Ca(OH)₂, Zn(OH)₂

A **SALT** is any *ionic* species which does not start with an “H” or end with an “OH”.

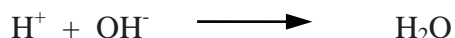
Examples: KBr, FePO₄, Li₂CO₃

How to write and balance acid-base neutralization reactions.

- Since we know that: ACID + BASE \longrightarrow SALT + WATER, we can use the following procedure.

All neutralization reactions are based on the fact that acids produce H^+ and bases produce OH^- .

Therefore, the main reaction which occurs in every instance is just:



Example: Write the neutralization reaction that occurs between HCl and Ca(OH)₂.

- General Properties of Acids and Bases

The presence of H^+ accounts for these properties of **acids**:

- a) acids react with bases.
- b) acids are electrolytes.
- c) acids react with some metals to produce $\text{H}_{2(\text{g})}$.
- d) acids turn litmus paper RED.
- e) acids taste SOUR. (e.g. lemon juice, vinegar)

The presence of OH⁻ accounts for these properties of **bases**:

- a) bases react with acids.
- b) bases are electrolytes.
- c) bases feel slippery. (React with your fat to make soap.)
- d) bases turn litmus paper **BLUE**.
- e) bases taste **BITTER**. (e.g. baking soda)

A mnemonic for remembering the litmus colours:

Litmus paper is: **RED** in **ACID**
BLUE in **BASE**

Examples:

1. August 2003

Which of the following is a property of **all** acidic solutions at 25°C?

- A. They have a pH less than 7.0.
- B. They have a pH greater than 7.0.
- C. They cause phenolphthalein to turn pink.
- D. They release hydrogen when placed on copper metal.

2. June 2004

Which of the following best describes an acidic solution?

	Litmus Colour	Reaction with Zn
A.	red	reaction
B.	red	no reaction
C.	blue	no reaction
D.	blue	reaction

3. August 1998

Both acidic and basic solutions

- A. taste sour.
- B. feel slippery.
- C. conduct electricity.
- D. turn blue litmus red.

4. August 2001

Which of the following reactions is not a neutralization reaction?

- A. $\text{KOH} + \text{HF} \rightarrow \text{KF} + \text{H}_2\text{O}$
- B. $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
- C. $\text{Ca}(\text{OH})_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$
- D. $\text{Na}_2\text{CO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{CO}_2 + \text{H}_2\text{O}$

*****Do Hebden Questions #1 - 4, pgs 110 - 112*****