# 5.2 Salts



- Salts are ionic compounds formed when acids and bases react.
  - Salts are also produced when oxides or carbonates react with acids or when metals react with acids.
- Table salt, NaCl, is found in sea water, salt lakes or rock deposits.
  - Salt was once very valuable as a commodity.
  - Iodine is now added to salt to minimize goiter (a disease of the thyroid).
- NaCl is only one kind of salt.
  - A salt is made up of a positive ion from a base and a negative ion from an acid.
  - Salts are found in many things:
    - In batteries, explosives and fertilizers
    - In multivitamins
    - In many living cells

Salt crystals in Death Valley



See pages 234 - 235

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# Acid-Base Neutralization, and Metal Oxides and Non-Metal Oxides

- Neutralization reactions occur when an acid and a base react to produce a salt and water.
  - $HX(aq) + MOH(aq) \rightarrow MX(aq/s) + HOH(I)$
  - HCI(aq) + NaOH(aq) → NaCI(s) + H<sub>2</sub>O(I)
    acid base salt water
- Metal oxides react with water to form bases.
  - $MO(s) + H_2O(I) \rightarrow MOH(aq)$
  - Examples:
    - $Na_2O(s) + H_2O(I) \rightarrow 2NaOH(aq)$
    - CaO(s) +  $H_2O(I) \rightarrow$
    - MgO(s) +  $H_2O(I) \rightarrow$







The effects of acid rain on a forest



- Non-metal oxides react with water to form acids
  - $CO_2(g) + H_2O(I) \rightarrow H_2CO_3(aq)$
  - $SO_3(g) + H_2O(I) \rightarrow$
  - $NO_2(g) + H_2O(I) \rightarrow$
  - Non-metal oxides are formed from the burning of fossil fuels.
    - Acid added to water in the atmosphere = acid precipitation

### Acids and Metals, and Acids and Carbonates



## Acids and Metals

- The most reactive metals, at the bottom of groups 1 and 2 on the periodic table, react vigorously with water and acids.
- All other metals are less reactive than those in groups 1 and 2.
- When metals do react with acids, H<sub>2</sub> gas is usually released.
- $2HCI(aq) + Mg(s) \rightarrow MgCI_2(s) + H_2(g)$
- HCI(aq) + Zn(s) →
- H<sub>2</sub>SO<sub>4</sub>(aq) + Mg(s) →

See pages 238 - 239



#### Acids and Carbonates

 Carbonates neutralize acids, protecting locations with natural carbonate supplies from acid precipitation.

#### • $H_2SO_4(aq) + CaCO_3(s) \rightarrow CaSO_4(s) + H_2O(I) + CO_2(g)$

sulphuric	calcium	calcium	water	carbon
acid	carbonate	sulphate		dioxide