

Ionic and Molecular Dissolution

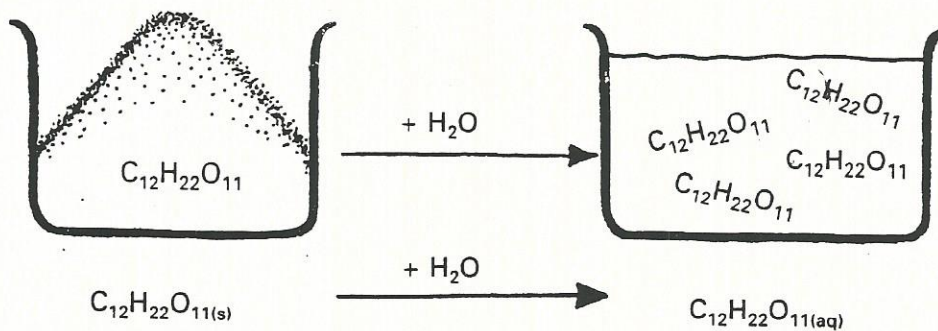
Dissolution: is the phenomenon by which the constituent parts of a substance (e.g. sugar) separate and merge with the constituent parts of the substance with which they come into contact (e.g. water) to form a mixture of perfectly uniform composition (e.g. sugar water). ("dissolving" is the same thing as "dissolution")

2 types of dissolution: 1) molecular dissolution
 2) ionic dissolution

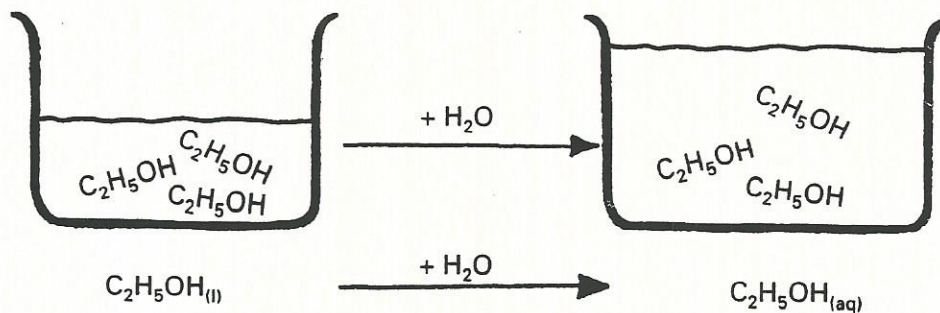
Molecular Dissolution

- This is what it is called when a covalent compound (nonmetals only; e.g. sugar, alcohol, etc.) is dissolved in water.
- The molecules remain intact (they do not break apart).
- The molecules spread out and become distributed among the H_2O molecules.
- This solution will not conduct electricity because there are no ions present.

Molecular dissolution



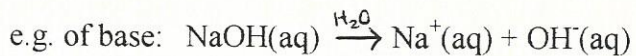
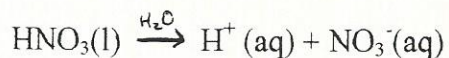
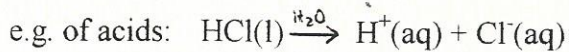
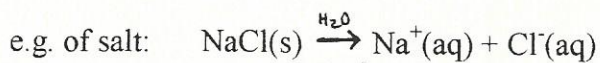
a) In a water and sugar solution, the sugar molecules ($C_{12}H_{22}O_{11}$) disperse in the water but remain intact.



b) In a solution of water and ethyl alcohol, the alcohol molecules (C_2H_5OH) disperse in the water but remain intact.

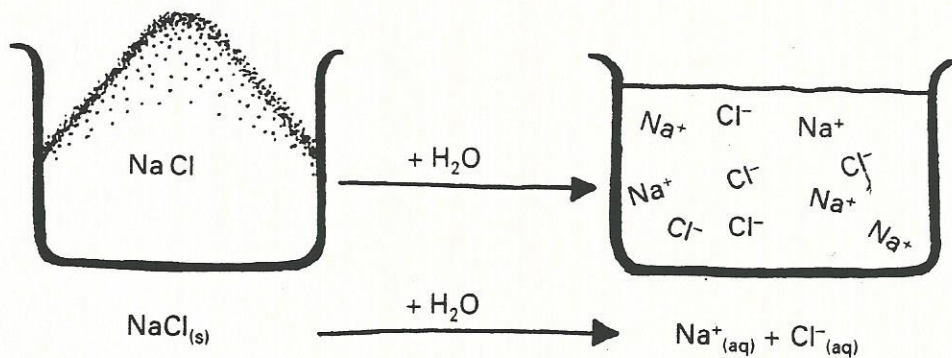
Ionic Dissolution

- This is what it is called when an ionic compound (acid, base, or salt) is dissolved in water.
- The ionic compound breaks apart (dissociates) into its constituent ions.

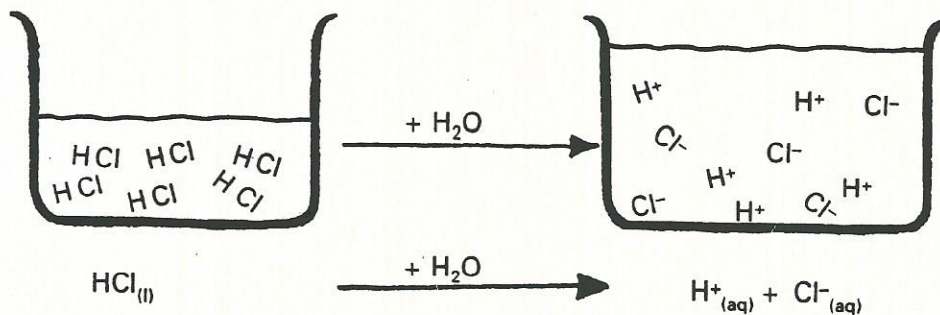


(the above are called dissociation equations)

Ionic dissolution



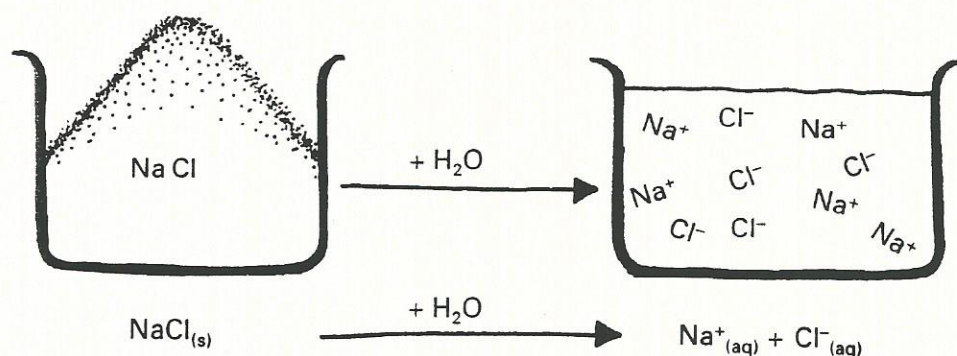
- a) In a solution of salt water, the salt dissociates into positive ions (Na⁺) and negative ions (Cl⁻) which are dispersed in the water.



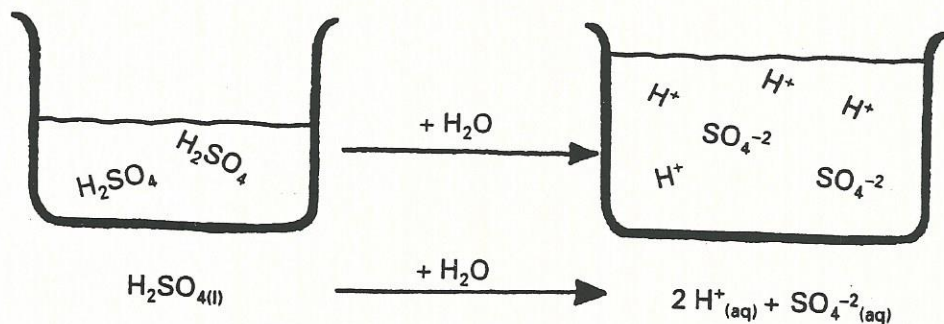
- b) In a solution of hydrochloric acid, the acid dissociates into positive ions (H⁺) and negative ions (Cl⁻) which are dispersed in the water.

Electrolyte: is any substance that conducts electricity when dissolved in water.
e.g. acid, base, or salt dissolved in water

- strong electrolyte: conducts electricity extremely well.
e.g. HCl, H₂SO₄(strong acid), NaOH(strong acid), NaCl
N.B. the reason that a strong electrolyte conducts electricity well is that all of the ions are freed to float around in the water. (see also picture of strong acid below)

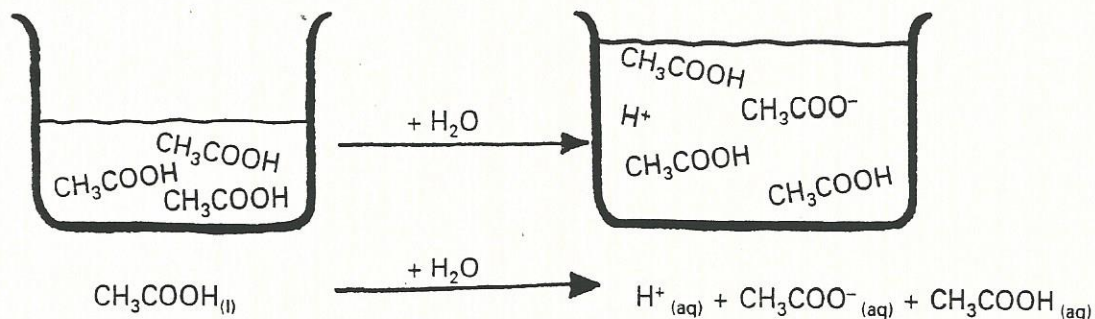


- weak electrolyte: conducts electricity very little e.g. acetic acid (weak acid), ammonia (weak base)
N.B. the reason that a weak electrolyte conducts electricity poorly is that very few ions are freed to float around. (see picture for weak acid below)
- strong acid: is an acid that completely dissociates (all of the ions are freed to float around).
e.g. HCl, H₂SO₄ A strong acid is a strong electrolyte.



H₂SO₄ (sulphuric acid) is one of the acids responsible for acid rain. Upon contact with water, it dissociates into positive ions (H⁺) and negative ions (SO₄⁻²) which disperse into the clouds.

- weak acid: is an acid in which very few of the ions are freed to float around. This is a weak electrolyte.
e.g. CH_3COOH



In a solution of acetic acid (CH_3COOH), only a few of the molecules dissociate into H^+ and CH_3COO^- ions. The rest of the molecules remain intact. Acetic acid is a weak electrolyte.

- strong base: is a base that completely dissociates. This is a strong electrolyte.
e.g. NaOH
- weak base: is a base in which very few of the ions are freed to float around.
e.g. NH_4OH

Problem: The following table shows the results for liquids tested:

Tests	A	B	C	D	E	F	G	H
Conducts current	no	+++	+++	+	+++	+	+	+++
red litmus turns/remains	red	red	blue	blue	blue	red	red	red
blue litmus turns/remains	blue	blue	red	blue	blue	red	blue	red

- Which solution/s is/are:
 - neutral and weak electrolyte?
 - neutral and strong electrolyte?
 - neutral and nonelectrolyte?
 - base and weak electrolyte?
 - base and strong electrolyte?
 - acid and weak electrolyte?
 - acid and strong electrolyte?
- For which liquid are the test results obviously inaccurate?