## Aim: How do salts get dissolved by water?

all ionic compounds; NaCl is the most common example
Refer to the diagram in today's handout.

1) A salt water solution consists of hydrated ions. That is, the ions which make up the salt are separated from each other and surrounded by water.

2) We write aqueous ( $\mathbf{a q}$ ) alongside the symbols of the ions to indicate that they are hydrated.
3) The water molecules are attracted to the ions because they are dipoles.

Remember: water is a polar molecule (dipole) due to its polar bonds and asymmetrical shape.


## 2.2

4) The forces of attraction that exist between the water molecules and the ions are called molecule-ion attractions.


Note: the oxygen atom faces the (+) ion, while the hydrogen atoms face the (-) ion, because opposites attract; dashed lines represent the molecule-ion attractions
5) Chemical equations for dissolving in water:
a) ionic compounds (salts)

$$
\begin{array}{ll}
\mathrm{NaCl}_{(\mathrm{s})} & \stackrel{\mathrm{H}_{2} \mathrm{O}}{==}=> \\
& \mathrm{Na}^{+}(\mathrm{aq}) \\
\mathrm{HaF}_{2(\mathrm{~s})} & =\mathrm{Cl}_{(\mathrm{aq})}^{-} \\
==> & \left.\mathrm{Ca}^{+2}{ }_{(\mathrm{aq})}+2 \mathrm{~F}_{(\mathrm{aq})}^{-}\right)
\end{array}
$$

Check to see that the equation balances. That's why the coefficient of $\mathrm{F}^{-}$is 2 .

$$
\mathrm{KNO}_{3(\mathrm{~s})} \stackrel{\mathrm{H}_{2} \mathrm{O}}{==}=>\mathrm{K}_{(\mathrm{aq})}^{+}+\mathrm{NO}_{3}^{-}(\mathrm{aq})
$$

"Polys" stay together. That is, the water doesn't separate the $\mathrm{NO}_{3}^{-}$into $\mathrm{N}^{+5} \& \mathrm{O}^{-2}$ ions. Refer to Table $\mathbf{E}$.
b) covalent (molecular) compounds



When ionic compounds dissolve the water separates ions from each other.


When covalent compounds dissolve the water separates molecules from each other.

Other examples:

$$
\begin{aligned}
& \mathrm{CO}_{2}(\mathrm{~g})===>\mathrm{CO}_{2}(\mathrm{aq}) \\
& \mathrm{NH}_{3}(\mathrm{~g})===>\quad \mathrm{NH}_{3}(\mathrm{aq}) \\
& \\
& \text { ammonia water } \\
& \mathrm{CH}_{3} \mathrm{OH}(\mathrm{l})===>\mathrm{CH}_{3} \mathrm{OH}(\mathrm{aq})
\end{aligned}
$$

