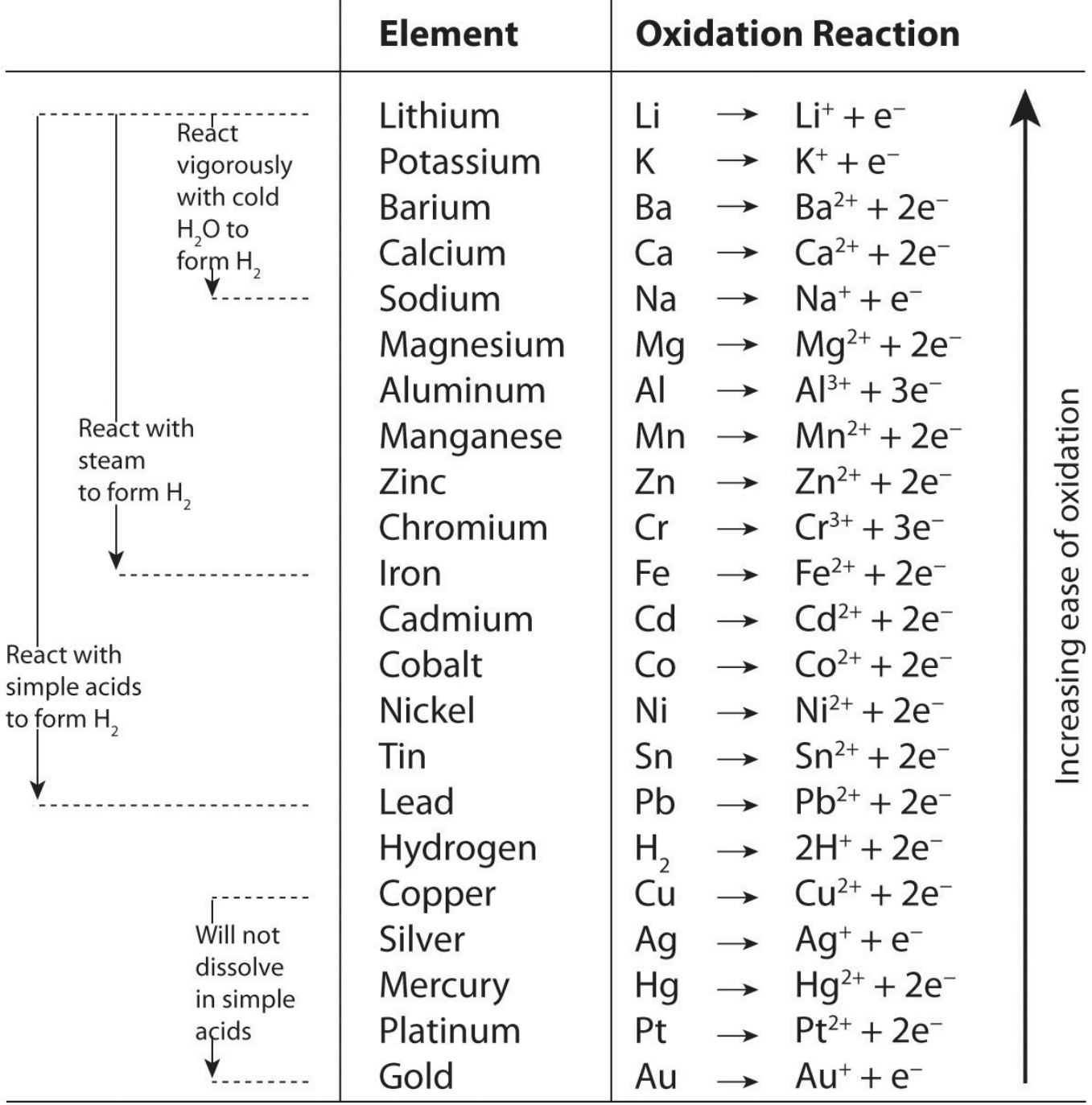
$2K^0 + 2H^{-1}{}_2O \rightarrow 2K^{+1}OH + H^0{}_2$

$K^0 \rightarrow K^{+1} + e$ oxidation

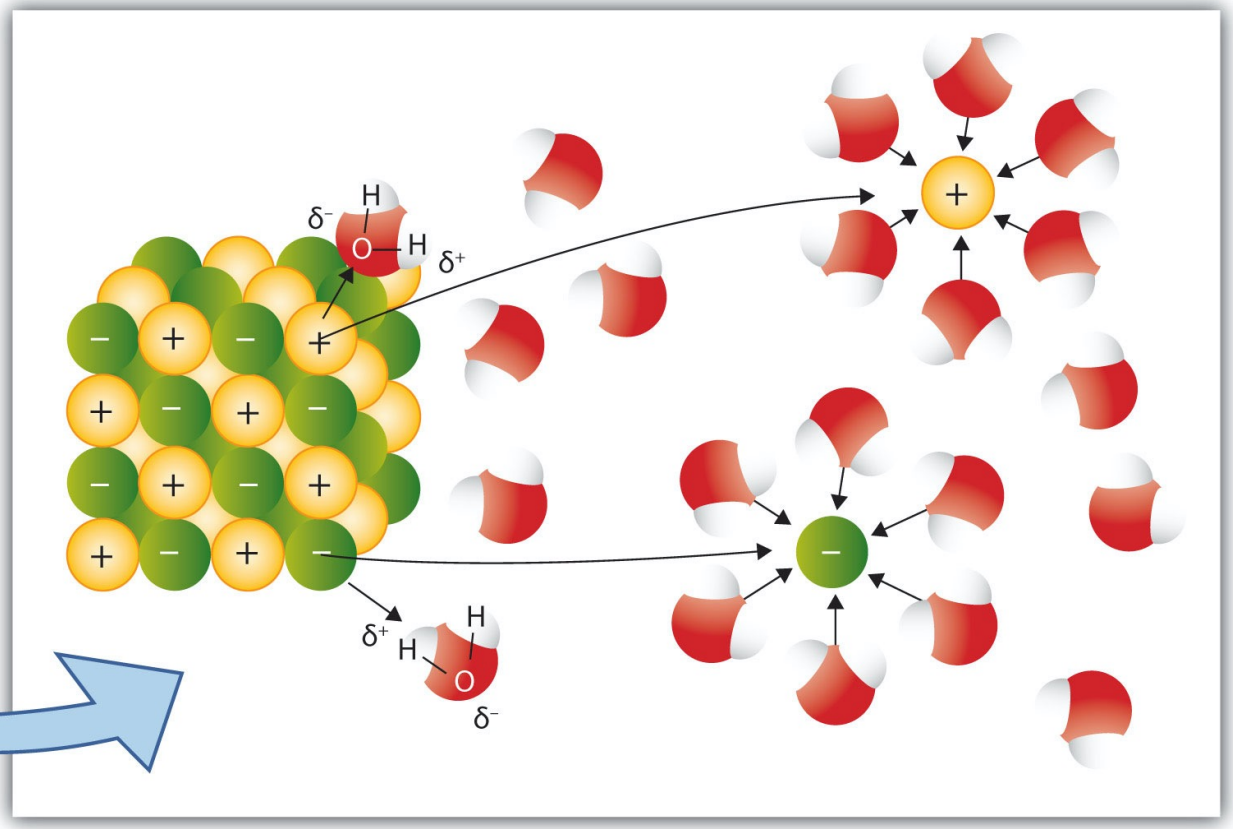
$H^{-1} + 2e \rightarrow H^0{}_2$ reduction

Only active metals can participate in redox reactions with water

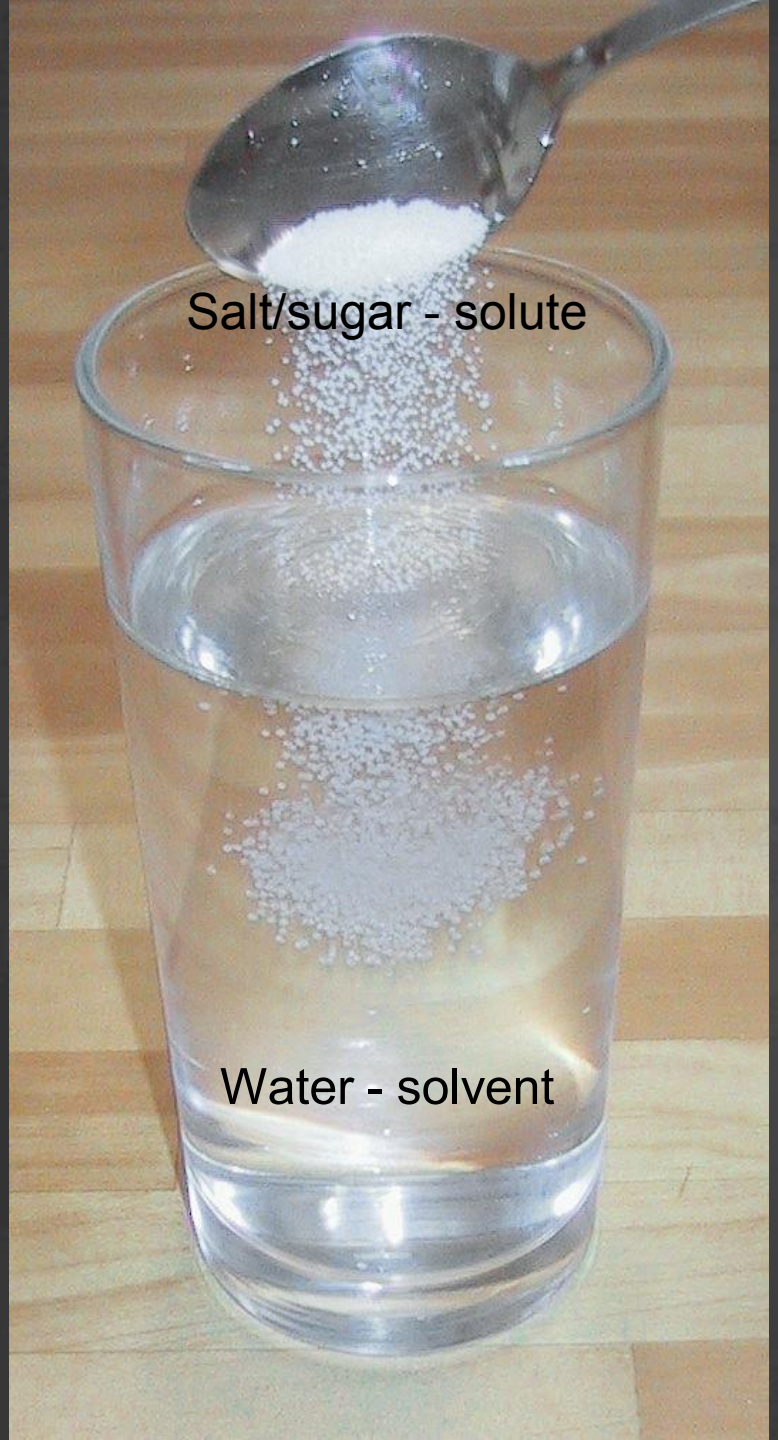


Element	Oxidation Reaction
Lithium	$Li \rightarrow Li^+ + e^-$
Potassium	$K \rightarrow K^+ + e^-$
Barium	$Ba \rightarrow Ba^{2+} + 2e^-$
Calcium	$Ca \rightarrow Ca^{2+} + 2e^-$
Sodium	$Na \rightarrow Na^+ + e^-$
Magnesium	$Mg \rightarrow Mg^{2+} + 2e^-$
Aluminum	$Al \rightarrow Al^{3+} + 3e^-$
Manganese	$Mn \rightarrow Mn^{2+} + 2e^-$
Zinc	$Zn \rightarrow Zn^{2+} + 2e^-$
Chromium	$Cr \rightarrow Cr^{3+} + 3e^-$
Iron	$Fe \rightarrow Fe^{2+} + 2e^-$
Cadmium	$Cd \rightarrow Cd^{2+} + 2e^-$
Cobalt	$Co \rightarrow Co^{2+} + 2e^-$
Nickel	$Ni \rightarrow Ni^{2+} + 2e^-$
Tin	$Sn \rightarrow Sn^{2+} + 2e^-$
Lead	$Pb \rightarrow Pb^{2+} + 2e^-$
Hydrogen	$H_2 \rightarrow 2H^+ + 2e^-$
Copper	$Cu \rightarrow Cu^{2+} + 2e^-$
Silver	$Ag \rightarrow Ag^+ + e^-$
Mercury	$Hg \rightarrow Hg^{2+} + 2e^-$
Platinum	$Pt \rightarrow Pt^{2+} + 2e^-$
Gold	$Au \rightarrow Au^+ + e^-$

Dissolving salt in water



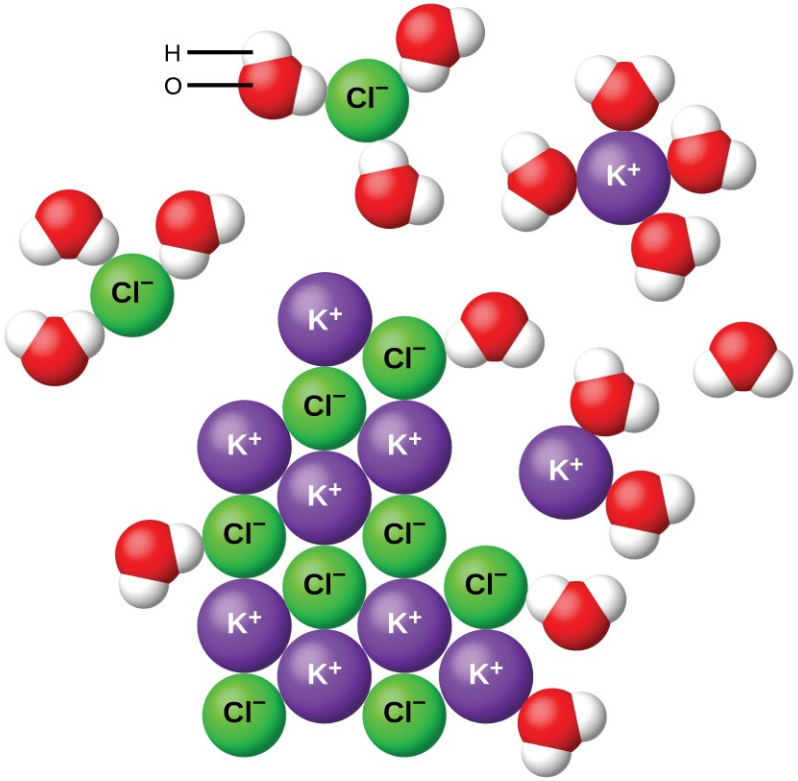
When a substance dissolves in a liquid , we call it solution. Any homogeneous mixture of two or more substances is considered a solution: metal alloys, ceramics, some people consider air as a solution. A solution has a solute and a solvent. The solute – the substance dissolved in the solution; the solvent - the substance that dissolves the solute.

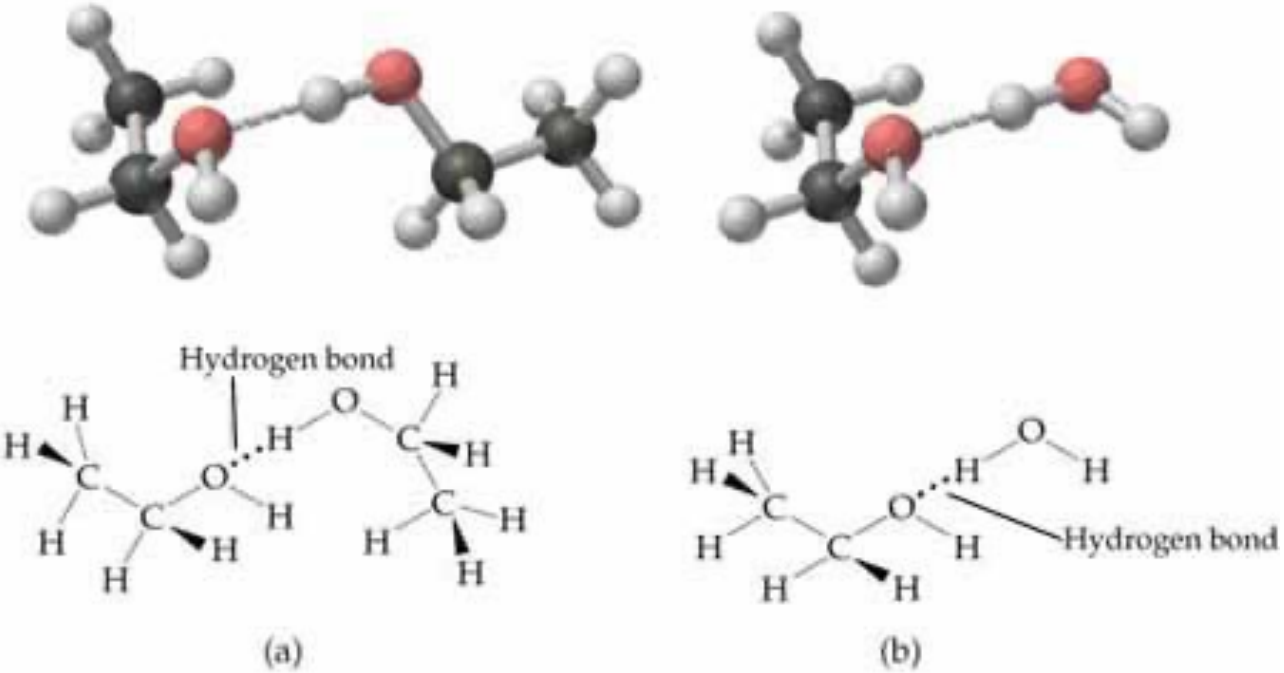


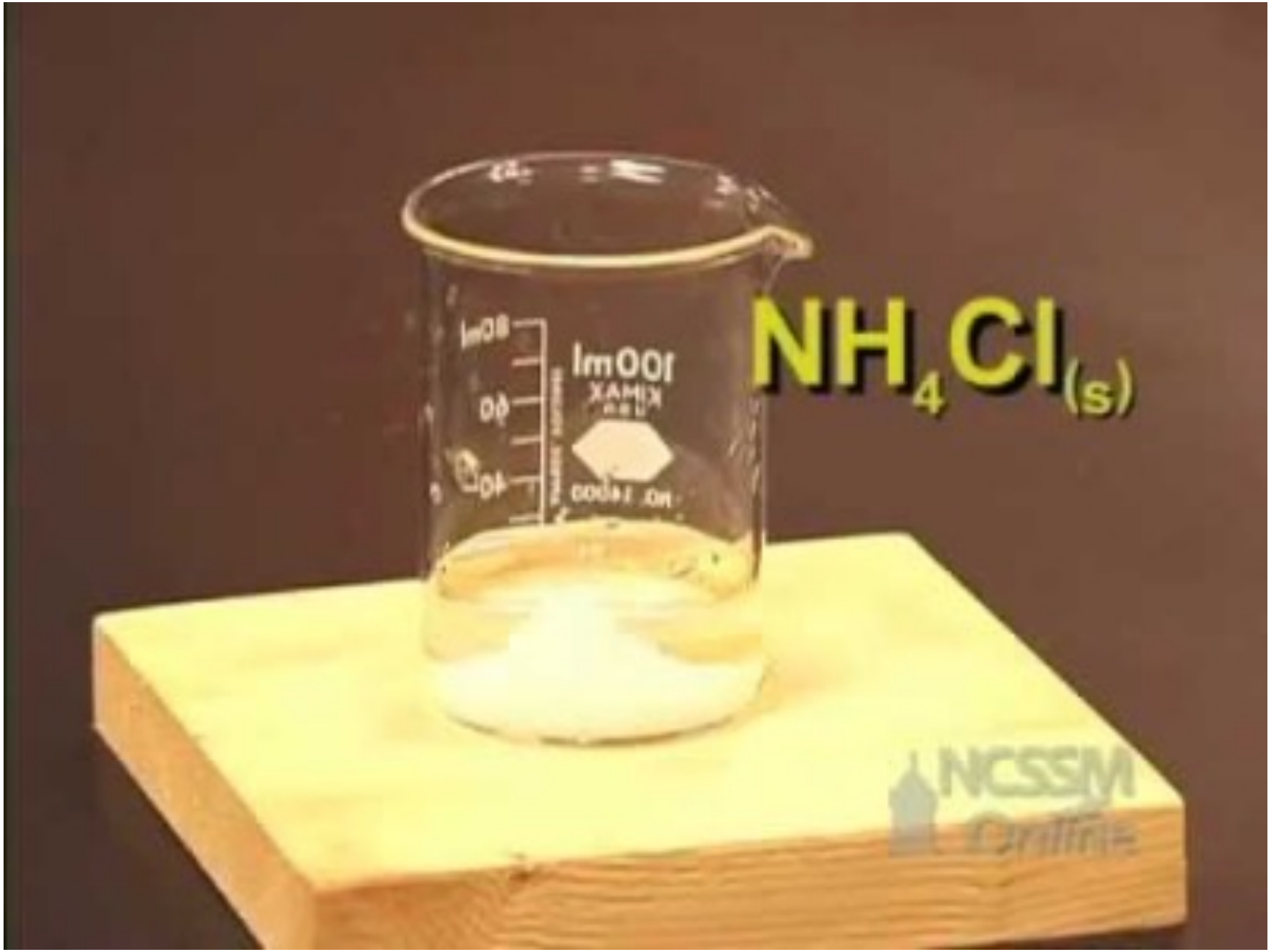
Dissolution, solutions

- Solution is a special type of homogeneous mixture composed of two or more substances. The most common state of solutions is liquid.
- The composition of a solution can change.
- In a solution a solvent is the one that is taken in a larger quantity and has the same aggregate state as the solution.
- The solute is the substance dissolved in a solvent.
- In the case of water – water is always a solvent.

Dissolving KCl and ethanol (C_2H_5OH) in water.







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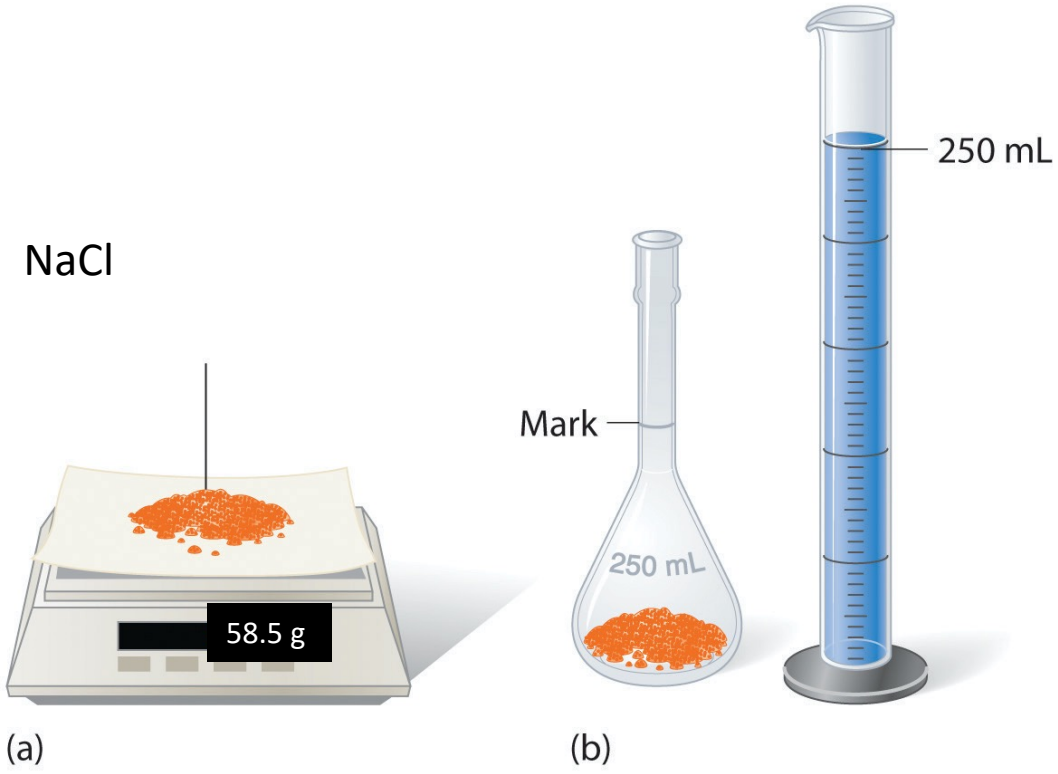
Concentration



58.5 g of NaCl in 1 L,
We have 1 molar solution of sodium chloride. If we have 0.25 L of the solution, the sodium chloride concentration is 4 mol/L

The concentration of a solution = the amount of solute divided by the amount of solvent.

Favorite measure of concentration - molarity (moles per liters).

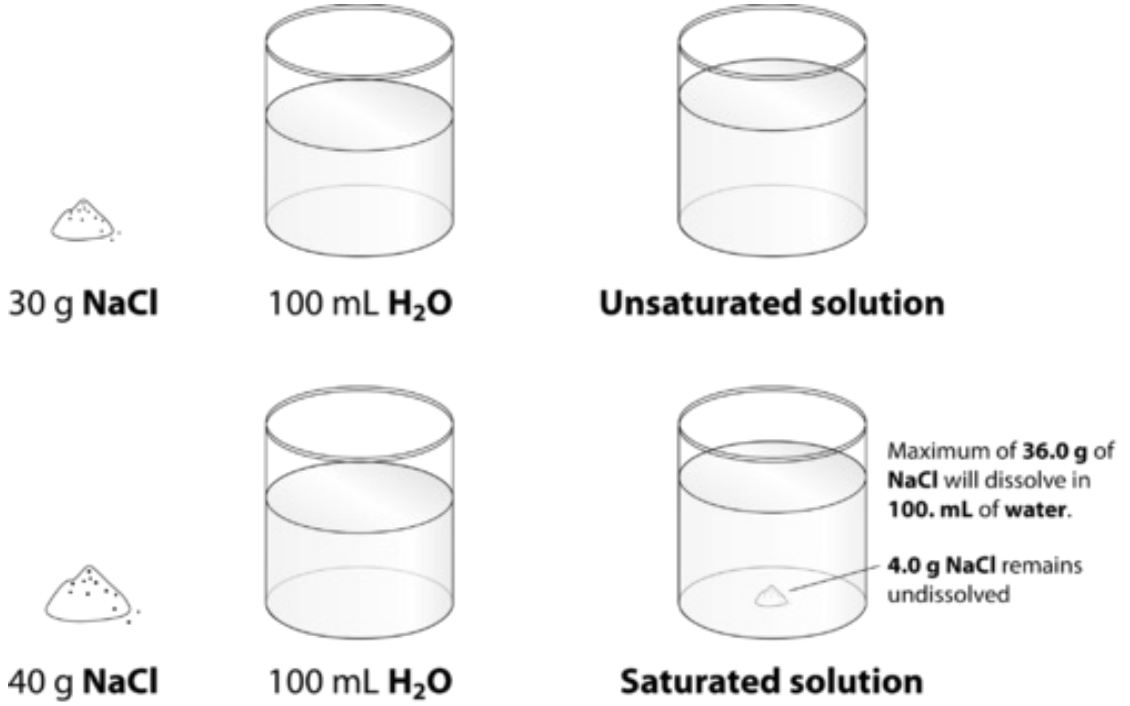
PPM – parts per million, 1ppm = 1 mg/L

SOLUBILITY

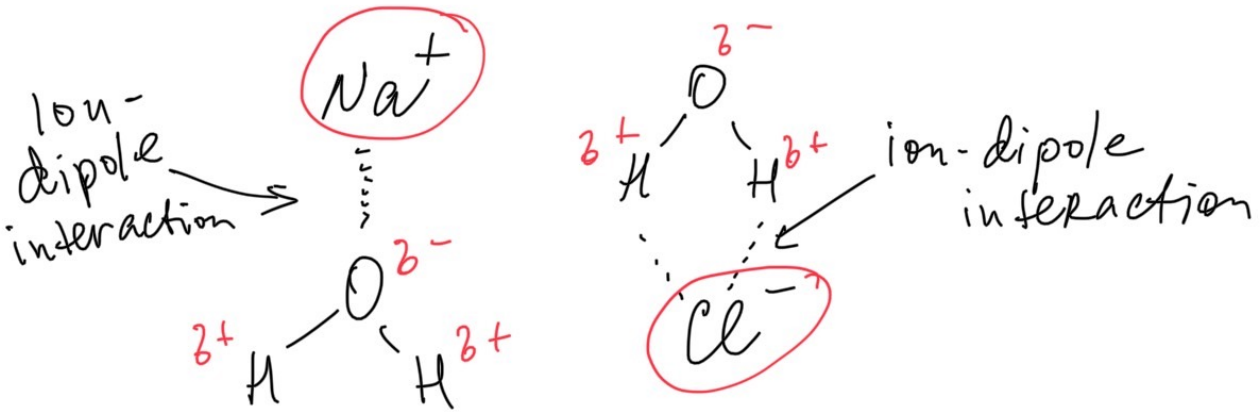
Solubility is the ability of a substance to dissolve in a solution. Solubility always has a limit. This limit, a substance's max possible concentration , is called the substance solubility. A maximally concentrated solution is called saturated.

0.000006 g of Hg will dissolve in a liter of water

"Like dissolves like"



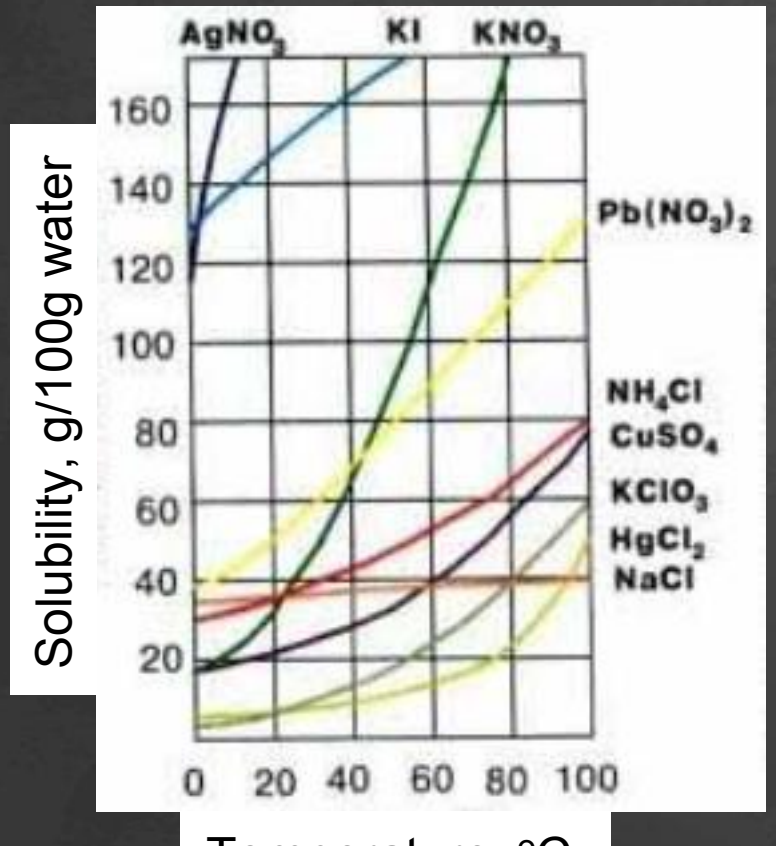
"Like dissolves like"

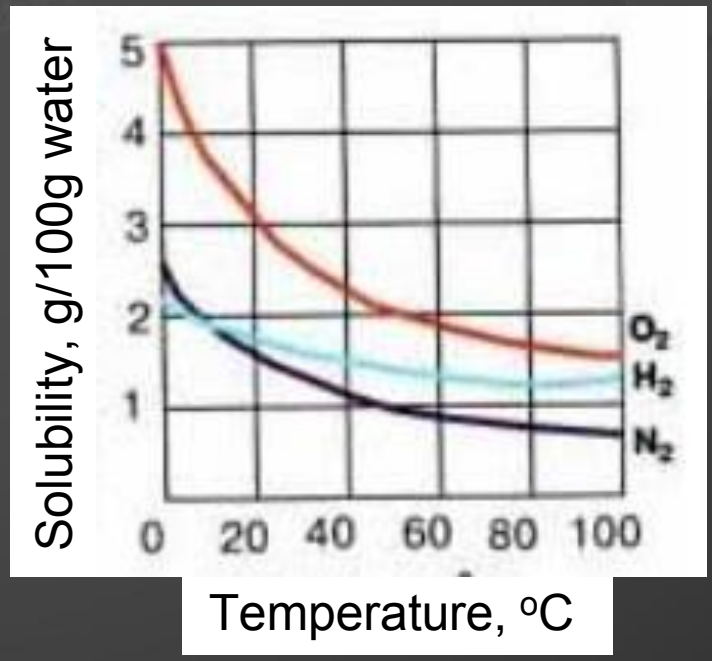


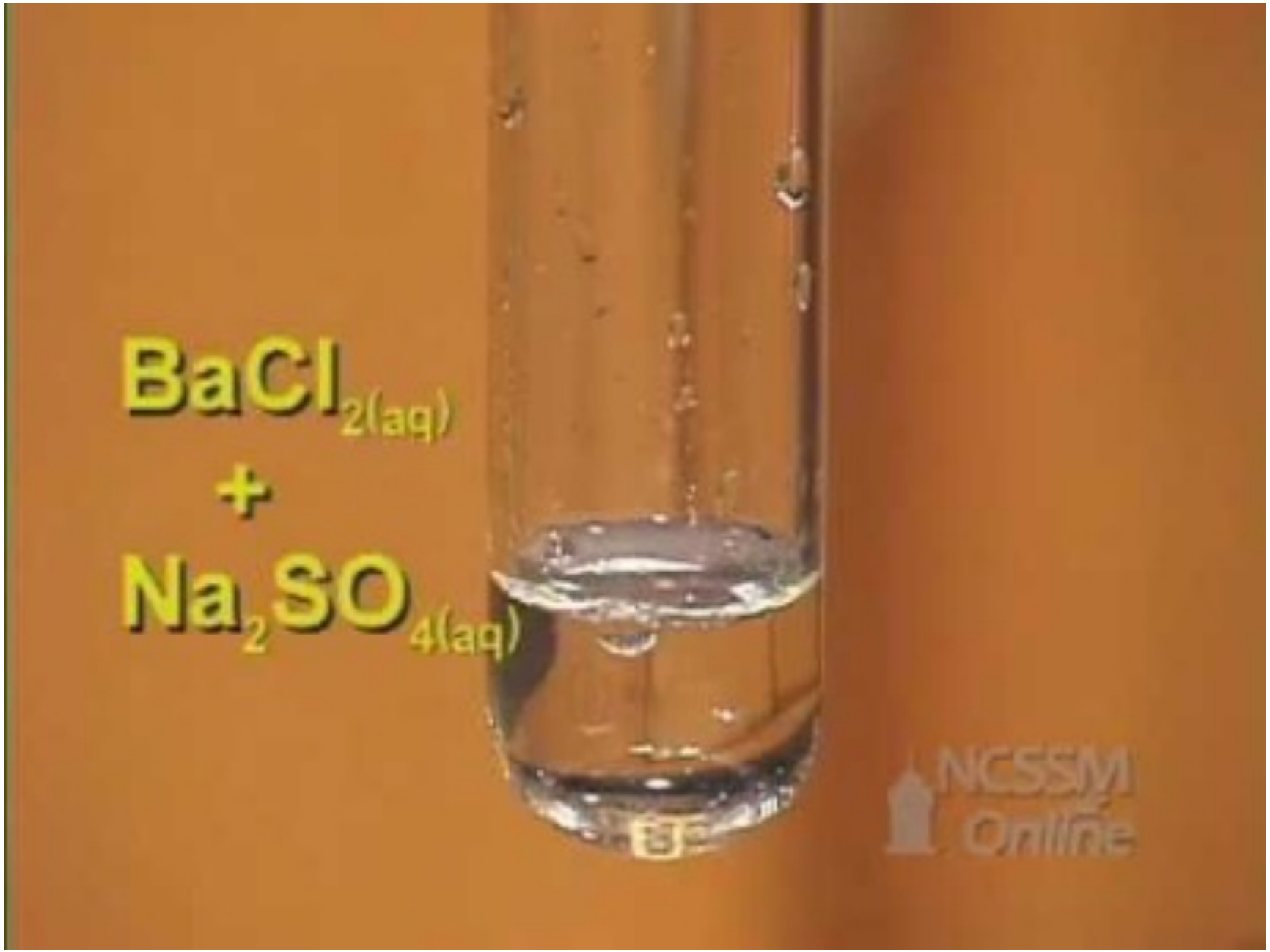
"Energetically favorable"

Solutions

- Solution where a given substance cannot dissolve anymore is called ***saturated*** (under the given conditions)
  - Solubility is an ability of a substance to dissolve in a solution.
  - The measure of solubility is the amount of the substance in its saturated solution







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