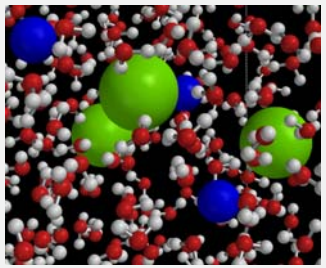


[TP] The molarity of the NaCl(aq) solution shown in the image is approximately ...

17% 1. > 20 M
17% 2. 20 M
17% 3. 2 M
17% 4. 0.2 M
17% 5. 0.02 M
17% 6. < 0.02 M



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Lecture 18 CH101 A1 (MWF 9:05 am)

Wednesday, October 18, 2017

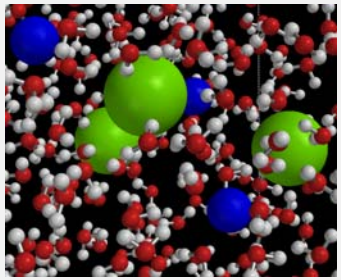
For today ...

- Complete: Dissolving ionic solids
- Solubility rules (memorize solubility guidelines fig 6.28, p 181)

Next lecture: Precipitation reactions; Concentrations after precipitation; ionization of molecular solutes; self-ionization of water; Acid-base reactions: Competition for H^+; Balancing oxidation-reduction equations; Complexation as Lewis acid-base reaction

Dissolving ionic salts

$Na^+(aq)$ and $Cl^-(aq)$ disperse throughout water



About "NaCl(aq)", etc.

Ionic solids dissolve by their ions being surrounded by water.

For example, $NaCl(s) \rightarrow Na^+(aq) + Cl^-(aq)$

The collection of hydrated ions is sometimes represented as "salt(aq)".

For example, $Na^+(aq) + Cl^-(aq)$ is abbreviated as $NaCl(aq)$

However, chemically, salt(aq) does not exist.

It is only an abbreviation for the hydrated ions, e.g., $Na^+(aq) + Cl^-(aq)$

Since salt(aq) does not exist, in this course please do not use it!

Representing an NaCl aqueous solution

If 2 mol of NaCl(s) is dissolved in 1 L of water, ...

How many moles of NaCl(s) are present?

How many moles of NaCl(aq) are present?

How many moles of $Na^+(aq)$ are present?

How many moles of $Cl^-(aq)$ are present?

How many moles of $H_2O(l)$ are present?

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Representing 5 M NaCl solution

Make a sketch of a 5 M NaCl aqueous solution, representing
waters as chevrons (>)
Na^+ ions as +
Cl^- ions as –

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[TP] From your sketch, in a 5 M aqueous solution of NaCl, for every Na^+ ion, there will be about ...

14% 1. 5 waters
14% 2. 10 waters
14% 3. 50 waters
14% 4. 100 waters
14% 5. 500 waters
14% 6. 1000 waters
14% 7. More than 1000 waters

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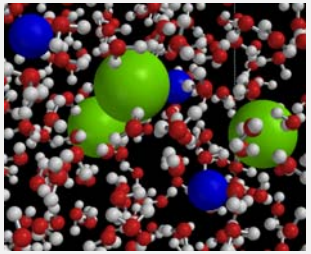
Estimating molarity



The concentration of water is 55.5 mol/L.

Get molarity from relative numbers of ions and water molecules.

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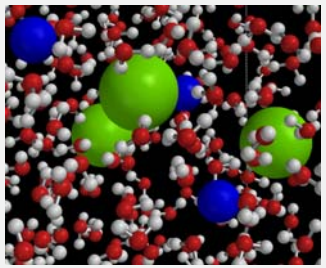

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Solubility guidelines

Soluble ionic compounds, p181 (memorize!)

SOLUBLE COMPOUNDS	EXCEPTIONS
Almost all salts of Na^+, K^+, NH_4^+	
Salts of nitrate, NO_3^- chlorate, ClO_3^- perchlorate, ClO_4^- acetate, $CH_3CO_2^-$	
Almost all salts of Cl^-, Br^-, I^-	Halides of Ag^+, Hg_2^{2+}, Pb^{2+}
Compounds containing F^-	Fluorides of Mg^{2+}, Ca^{2+}, Sr^{2+}, Ba^{2+}, Pb^{2+}
Salts of sulfate, SO_4^{2-}	Sulfates of Ca^{2+}, Sr^{2+}, Ba^{2+}, Pb^{2+}

Insoluble ionic compounds, p 181 (memorize!)

INSOLUBLE COMPOUNDS	EXCEPTIONS
Most salts of carbonate, CO_3^{2-} phosphate, PO_4^{3-} oxalate, $C_2O_4^{2-}$ chromate, CrO_4^{2-}	Salts of NH_4^+ and the alkali metal cations
Most metal sulfides, S^{2-}	
Most metal hydroxides and oxides	$Ba(OH)_2$ is soluble

