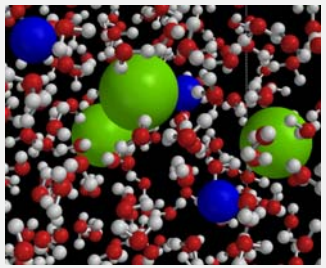


[TP] The molarity of the NaCl(*aq*) solution shown in the image is approximately ...

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



Response Counter 10

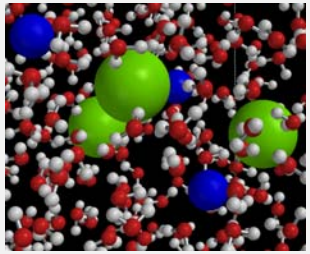
Lecture 18 CH101 A1 (MWF 9 am)

Wednesday, October 19, 2016

- Complete: Dissolving ionic solids
- Solubility rules (memorize solubility guidelines fig 6.28 p 181) Used in Lab 4, Qualitative Analysis
- Precipitation reactions
- Concentrations after precipitation

Next lecture: Ionization of molecular solutes; self-ionization of water; acid-base reactions: Competition for H^+; balancing oxidation-reduction equations; complexation as Lewis acid-base reaction

Estimating molarity



The concentration of water is 55.5 mol/L.

Get molarity from relative numbers of ions and water molecules.

Ions of salt water allow it to conduct electricity

$C_6H_{12}O_6(aq)$ $Na^+(aq) + Cl^-(aq)$

[TP] The molarity of the NaCl aqueous solution shown in the image is approximately ...

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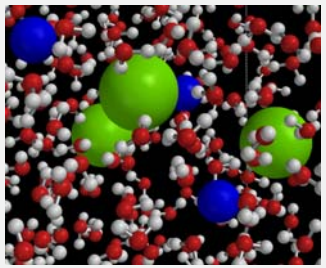
17% 2. 20 M
17% 3. 2 M
17% 4. 0.2 M
17% 5. 0.02 M
17% 6. < 0.02 M



Response Counter 10

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

Precipitation reactions

NaCl and $AgNO_3$ are both soluble in water, but AgCl is not.

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Precipitation reactions

If aqueous solutions of NaCl and $AgNO_3$, are mixed, the $Ag^+(aq)$ and $Cl^-(aq)$ ions can encounter one another.

(b) Initially the Ag^+ ions (silver colour) and Cl^- ions (green) are widely separated.

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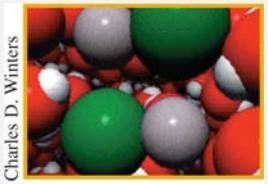
Precipitation reactions

When $Ag^+(aq)$ and $Cl^-(aq)$ ions do encounter one another, they will pair up as a lattice of AgCl(I)



(c) Ag^+ and Cl^- ions approach and form ion pairs.

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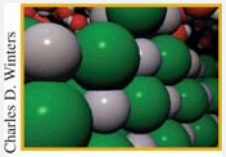
Precipitation reactions

As more pairs form, they will aggregate so much that solid AgCl settles out of the solution., so that no AgCl(aq) remains in solution.

This process is called precipitation.



(d) As more and more Ag^+ and Cl^- ions come together, a precipitate of solid AgCl forms.

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[TP] When aqueous solutions of copper(II) chloride and sodium carbonate are combined, ...

25% 1. no precipitate will form
25% 2. $CuCO_3$ will precipitate
25% 3. NaCl will precipitate
25% 4. both $CuCO_3$ and NaCl will precipitate

[Quiz] Some solid sodium carbonate and solid potassium nitrate are placed together into pure water. After thorough stirring and allowing things to settle, ...

25% 1. $NaNO_3(s)$ will have precipitated
25% 2. $K_2CO_3(s)$ will have precipitated
25% 3. Neither Na_2CO_3 and nor KNO_3 will dissolve, and so will have settled as solids to the bottom of the solution
25% 4. Everything will dissolve, no precipitate will form, and so the solution will be clear

Concentrations before and after precipitation

A comprehensive example

You are given 150 mL of a 0.20 M aqueous solution of ammonium carbonate and 150 mL of 0.40 M aqueous solution of barium iodide.

$$(NH_4)_2CO_3(s) \rightarrow 2\ NH_4^+(aq) + CO_3^{2-}(aq)$$
$$BaI_2(s) \rightarrow Ba^{2+}(aq) + 2\ I^-(aq)$$

A comprehensive example

You are given 150 mL of a 0.20 M aqueous solution of ammonium carbonate and 150 mL of 0.40 M aqueous solution of barium iodide. These solutions are mixed and a precipitate forms.

Write the net-ionic equation for this process.

What are the spectator ions for this process?

[TP] You are given 150 mL of a 0.20 M aqueous solution of ammonium carbonate and 150 mL of 0.40 M aqueous solution of barium iodide. These solutions are mixed and a precipitate forms. The limiting reagent is ….

17% 1. $BaI_2(s)$
17% 2. $(NH_4)_2CO_3(s)$
17% 3. $NH_4^+(aq)$
17% 4. $Ba^{2+}(aq)$
17% 5. $CO_3^{2-}(aq)$
17% 6. $I^-(aq)$

