

Chm 116 (Sp 2004) - Review of Chm 115

Conversions within the SI system

Examples (with Answers):

- Convert $1.29 \times 10^{+5}$ mg into the following units: kilograms, grams, micrograms, and nanograms.

In order from the smallest unit to the largest unit, the answers are:

$$1.29 \times 10^{+11} \text{ ng} = 1.29 \times 10^{+8} \text{ microg} = 1.29 \times 10^{+5} \text{ mg} = 1.29 \times 10^{+2} \text{ g} = 1.29 \times 10^{-1} \text{ kg}$$

- Convert 7.44×10^{-6} m into the following units: angstroms (Å), nanometers, millimeters, and centimeters.

In order from the smallest unit to the largest unit, the answers are:

$$7.44 \times 10^{+4} \text{ Å} = 7.44 \times 10^{+3} \text{ nm} = 7.44 \times 10^{-3} \text{ mm} = 7.44 \times 10^{-4} \text{ cm} = 7.44 \times 10^{-6} \text{ m}$$

Note: An Angstrom (Å) is 1×10^{-10} meter. Angstrom is not a prefix for other units (like grams or liters). It refers only to length and is not an SI unit (However, it is a convenient and common unit of length for the atomic scale).

Solubility Rules and list of strong acids and strong bases

Review from Chapter 4 and know the following:

Solubility Rules						
	NO ₃ ⁻ C ₂ H ₃ O ₂ ⁻ NO ₃ ⁻	Cl ⁻ Br ⁻ I ⁻	SO ₄ ²⁻	CO ₃ ²⁻	OH ⁻	S ²⁻
Na ⁺ , K ⁺ , Rb ⁺ , Cs ⁺ , NH ₄ ⁺	s	S	s	s	s	s
Mg ²⁺	s	S	s	i	i	d
Ca ²⁺	s	S	sl s	i	i	d
Ba ²⁺	s	S	i	i	sl s	d
Al ³⁺	s	S	s	*	i	d
Pb ²⁺	s	I	i	i	i	i
Ag ⁺	s	I	sl s	i	i	i
Hg ₂ ²⁺	s	I	sl s	i	*	*
Hg ²⁺	s	sl s	sl s	i	i	i

s = soluble, sl s = slightly soluble, i = insoluble,
d = decomposes in or reacts with water, * = compound does not exist

Classification of Acids and Bases

Strong Acids and Strong Bases

an acid or base that is virtually 100 percent dissociated into ions in aqueous solution (note that this means that strong acids and bases are also strong electrolytes)

Weak Acids and Weak Bases

an acid or base that partly dissociates into ions in aqueous solution (note that this means that weak acids and bases are also weak electrolytes)

Common Strong Acids and Bases			
Acid	Name of Acid	Base	Name of Base
HCl	hydrochloric acid	LiOH	lithium hydroxide
HBr	hydrobromic acid	NaOH	sodium hydroxide
HI	hydroiodic acid	KOH	potassium hydroxide
HNO ₃	nitric acid	RbOH	rubidium hydroxide
H ₂ SO ₄	sulfuric acid	CsOH	cesium hydroxide
HClO ₄	perchloric acid	Ca(OH) ₂	calcium hydroxide
		Sr(OH) ₂	strontium hydroxide
		Ba(OH) ₂	barium hydroxide

Reactions: writing and balancing

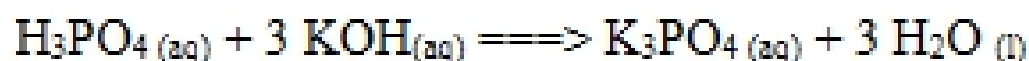
Examples (with Answers):

1. Write the balanced chemical equation for the combustion of C₄H₆O₄ (assume the only products are carbon dioxide and water).

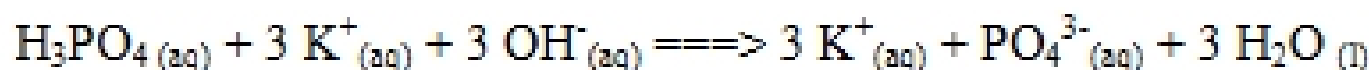


2. Write balanced full molecular, full ionic, and net ionic equations for the following aqueous reactions:
 - o **phosphoric acid reacts with potassium hydroxide (Weak Acid - Strong Base)**

Molecular Representation



Full Ionic Representation (only strong electrolytes are shown dissociated into ions)



Net Ionic Representation

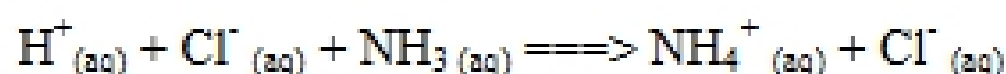


- **hydrochloric acid reacts with ammonia (Strong Acid - Weak Base)**

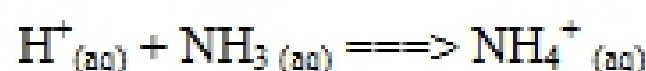
Molecular Representation



Full Ionic Representation (only strong electrolytes are shown dissociated into ions)

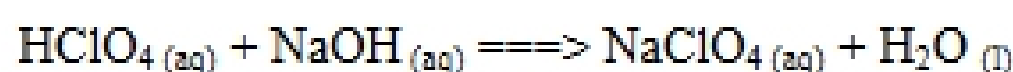


Net Ionic Representation



- **perchloric acid reacts with sodium hydroxide (Strong Acid - Strong Base)**

Molecular Representation



Full Ionic Representation (only strong electrolytes are shown dissociated into ions)



Net Ionic Representation



- **copper (II) chloride reacts with sodium carbonate**

Molecular Representation



Full Ionic Representation



Net Ionic Representation

