

Chem 2 AP Homework #4-3: Acids/Bases and Oxidation numbers/half reactions  
Problems pg. 153 #26, 27, 29, 30, 32, 34, 41, 44, 46, 48, 50, 142

4.26 Arrhenius and Bronsted definitions:

a) Give Arrhenius and Brønsted definitions of an acid and a base.

Arrhenius Acid:	Bronsted Acid:
Arrhenius Base:	Bronsted Base:

b) Why are Brønsted definitions more useful than Arrhenius definitions in describing acid-base properties?

4.27 Give an example of a monoprotic acid, a diprotic acid, and a triprotic acid.

Monoprotic acid:	Diprotic acid:	Triprotic acid:
------------------	----------------	-----------------

4.29 Salts:

a) What factors qualify a compound as a salt?

b) Specify which of the following compounds are salts:

CH<sub>4</sub>, NaF, NaOH, CaO, BaSO<sub>4</sub>, HNO<sub>3</sub>, NH<sub>3</sub>, KBr?

Salts:
Not salts:

4.30 Identify the following substances as a weak or strong acid or base:

(a) NH <sub>3</sub> :	(e) H <sub>2</sub> SO <sub>4</sub> :
(b) H <sub>3</sub> PO <sub>4</sub> :	(f) HF:
(c) LiOH:	(g) Ba(OH) <sub>2</sub> :
(d) HCOOH:	(h) CH <sub>3</sub> NH <sub>2</sub> :

4.32 Identify each of the following species as a Brønsted acid, base, or both:

(a) PO <sub>4</sub> <sup>3-</sup>
(b) ClO <sub>2</sub> <sup>-</sup>
(c) NH <sub>4</sub> <sup>+</sup>
(d) HCO <sub>3</sub> <sup>-</sup>

4.34 Determine the products of each of the following acid-base reactions. Balance the resulting molecular equations. Write the corresponding ionic and net ionic equations.

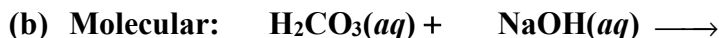
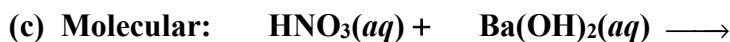
*Note:* All of these rxns involve a strong base; thus, all acidic hydrogens are removed from the acids.

*Remember:* All strong electrolytes (soluble ionics and strong acids) are dissociated into ions in the ionic equations, but weak electrolytes (weak acids and weak bases) are not!!!



*Ionic:*

*Net ionic:*

*Ionic:**Net ionic:**Ionic:**Net ionic:*

4.41 Is it possible to have a reaction in which oxidation occurs and reduction does not? Explain.

4.44 For the complete redox reactions given below, write the **balanced** half-reactions.

(a) $4 \text{Fe} + 3 \text{O}_2 \rightarrow 2 \text{Fe}_2\text{O}_3$ <b>Ox:</b> <b>Red:</b>	(b) $\text{Cl}_2 + 2 \text{NaBr} \rightarrow 2 \text{NaCl} + \text{Br}_2$ <b>Ox:</b> <b>Red:</b>
(c) $\text{Si} + 2 \text{F}_2 \rightarrow \text{SiF}_4$ <i>Assume <math>\text{SiF}_4</math> is made up of <math>\text{Si}^{4+}</math> and <math>\text{F}^-</math>.</i> <b>Ox:</b> <b>Red:</b>	(d) $\text{H}_2 + \text{Cl}_2 \rightarrow 2 \text{HCl}$ <i>Assume <math>\text{HCl}</math> is made up of <math>\text{H}^+</math> and <math>\text{Cl}^-</math>.</i> <b>Ox:</b> <b>Red:</b>

4.46 Indicate the oxidation number of phosphorus in each of the following acids.

(a) $\text{H}\underline{\text{P}}\text{O}_3$ :	(c) $\text{H}_3\underline{\text{P}}\text{O}_3$ :	(e) $\text{H}_4\underline{\text{P}}_2\text{O}_7$ :
(b) $\text{H}_3\underline{\text{P}}\text{O}_2$ :	(d) $\text{H}_3\underline{\text{P}}\text{O}_4$ :	(f) $\text{H}_5\underline{\text{P}}_3\text{O}_{10}$ :

4.47 Give the oxidation number of the underlined atoms in the following molecules and ions.

(a) $\underline{\text{C}}\text{IF}$ :	(f) $\text{K}_2\underline{\text{C}}\text{rO}_4$ :	(k) $\text{Na}\underline{\text{I}}\text{O}_3$ :
(b) $\underline{\text{I}}\text{F}_7$ :	(g) $\text{K}_2\underline{\text{C}}\text{r}_2\underline{\text{O}}_7$ :	(l) $\text{K}\underline{\text{O}}_2$ :
(c) $\underline{\text{C}}\text{H}_4$ :	(h) $\text{K}\underline{\text{Mn}}\text{O}_4$ :	(m) $\underline{\text{P}}\text{F}_6^-$ :
(d) $\underline{\text{C}}_2\underline{\text{H}}_2$ :	(i) $\text{Na}\underline{\text{H}}\underline{\text{C}}\text{O}_3$ :	(n) $\text{K}\underline{\text{Au}}\text{Cl}_4$ :
(e) $\underline{\text{C}}_2\underline{\text{H}}_4$ :	(j) $\underline{\text{Li}}_2$ :	

4.50 Give the oxidation number of the underlined atoms in the following molecules and ions.

(a) $\text{Mg}_3\underline{\text{N}}_2$ :	(c) $\text{Ca}\underline{\text{C}}_2$ :	(f) $\text{Zn}\underline{\text{O}}_2^{2-}$
(b) $\text{Cs}\underline{\text{O}}_2$ :	(d) $\underline{\text{C}}\text{O}_3^{2-}$ :	(g) $\text{Na}\underline{\text{H}}$ :

4.142 What is oxidation number of O in  $\text{HF}\underline{\text{O}}$ ?