

Chem 111

Lecture 10

Announcements

- Oct 4th is your first exam. 1 week.
→ Bring a calculator (battery) and pencils (erasers)
- Practice Exams:
<http://courses.umass.edu/chem111-bbotch/ExamInfo.html>
- Friday Review



Help Sessions

Sunday, October 3rd Review Sessions

4:00-6:00 PM, ISB 135	Beatrice Botch (Instructor)
6:45-8:00 PM, ISB 221	Steven McPartland (SI)
7:00-9:00 PM, ISB 135	Breanne Holmes (TA)
8:15-9:30 PM, ISB 221	Nathaniel Kornet (SI)



SI sessions

Sunday

6:45 - 8:00 Steve McPartland - Library 1085

8:15 - 9:30 Nathaniel Kornet - Library 1049

Monday

5:45 - 7:00 Ankur Sheel - Library 1049

8:45 - 10:00 Kate Leidell - ISB 321

Tuesday

4:15 - 5:30 Nathaniel Kornet - Library 1049

5:45 - 7:00 Chris Gunderson - Library 1049

Wednesday

5:45 - 7:00 Ankur Sheel - Library 1049

7:15 - 8:30 Steve McPartland - ISB 329

Thursday

7:15 - 8:30 Chris Gunderson - Library 1085

8:45 - 10:00 Kate Leidell - ISB 321



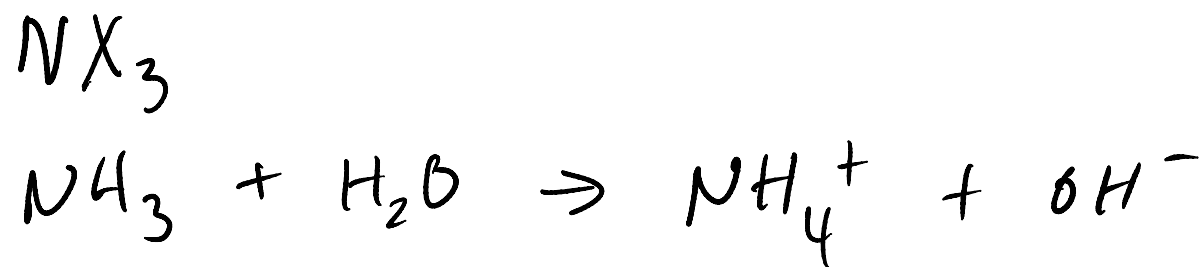
Homework

- Read Chapter 4
- OWL online homework.



Recap

- Complete Ionic Equation
- Net Ionic Equation
- Acids
- Bases



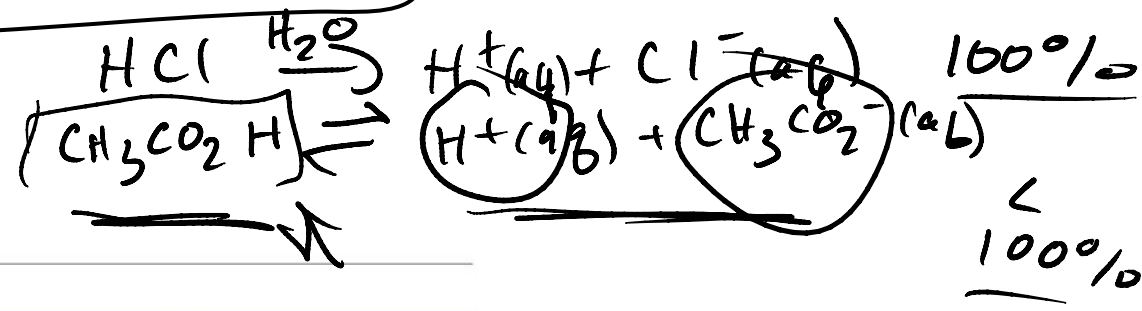
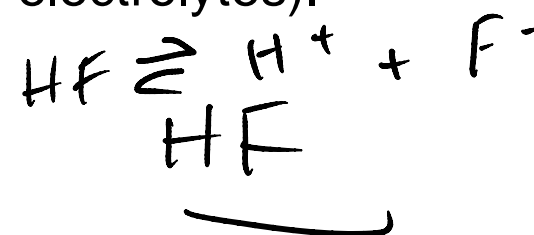
Strong/Weak Acids and Bases *Memorize*

Strong acids or bases – completely ionize in solution (considered a good electrolyte)

TABLE 3.2 Common Acids and Bases

Strong Acids (Strong Electrolytes)		Soluble Strong Bases	
HCl (aq)	Hydrochloric acid ✓	LiOH	Lithium hydroxide ✓
HBr (aq)	Hydrobromic acid ✓	NaOH	Sodium hydroxide ✓
HI (aq)	Hydroiodic acid ✓	KOH	Potassium hydroxide ✓
HNO ₃	Nitric acid ✓	Ba(OH) ₂	Barium hydroxide ✓
HClO ₄	Perchloric acid ✓		
H ₂ SO ₄	Sulfuric acid ✓		
Weak Acids (Weak Electrolytes) *		Weak Base (Weak Electrolyte)	
H ₃ PO ₄	Phosphoric acid	NH ₃	Ammonia ✓
H ₂ CO ₃	Carbonic acid		
CH ₃ CO ₂ H	Acetic acid ←		
H ₂ C ₂ O ₄	Oxalic acid		
H ₂ C ₄ H ₄ O ₆	Tartaric acid		
H ₃ C ₆ H ₅ O ₇	Citric acid		
HC ₉ H ₈ O ₄	Aspirin		

Weak acids or bases – partially ionize in solutions (weak electrolytes).



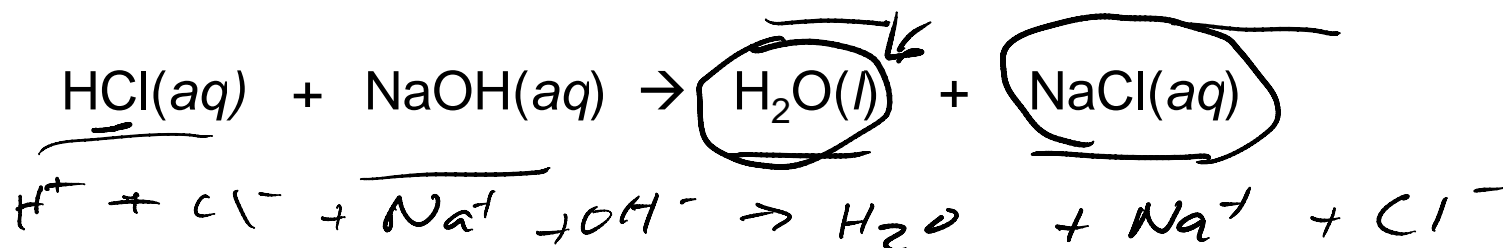
CHO weak acids

* These are representative of hundreds of weak acids.



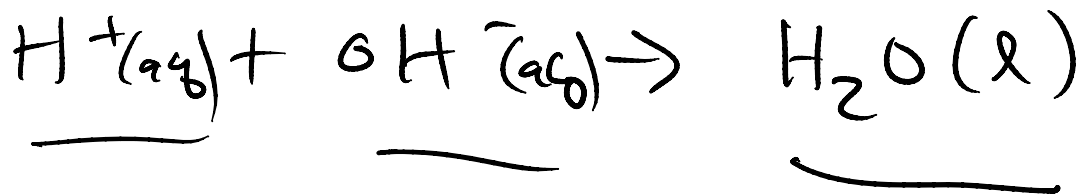
Neutralization Reactions

Happen when a solution of an acid and that of a base are mixed.

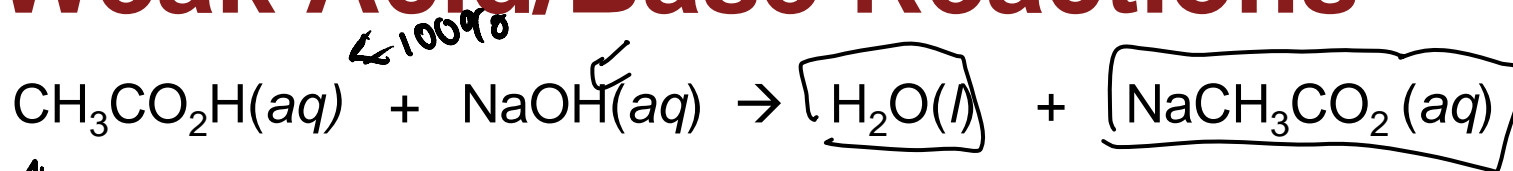


Neutralization reactions between an acid and a metal hydroxide produces water and a salt (an ionic compound).

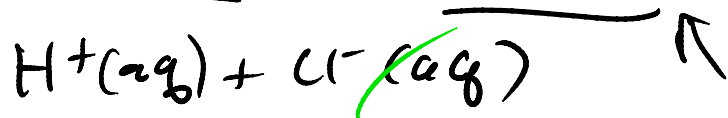
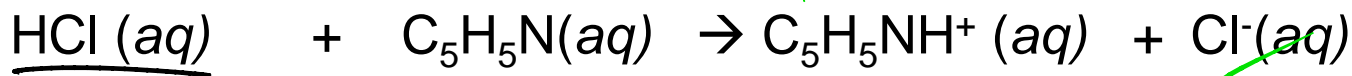
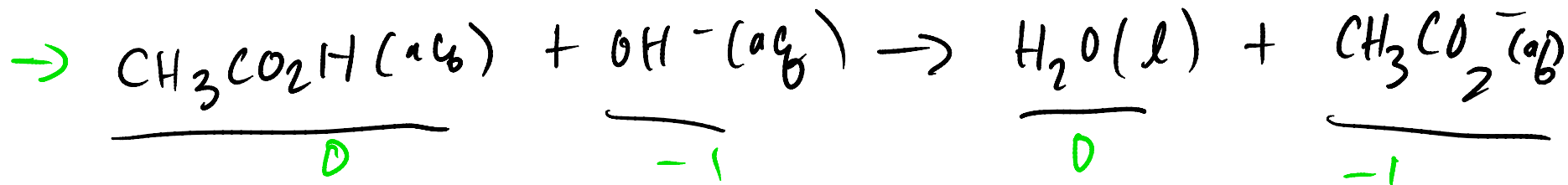
Net Ionic Equation for strong acid + strong base:



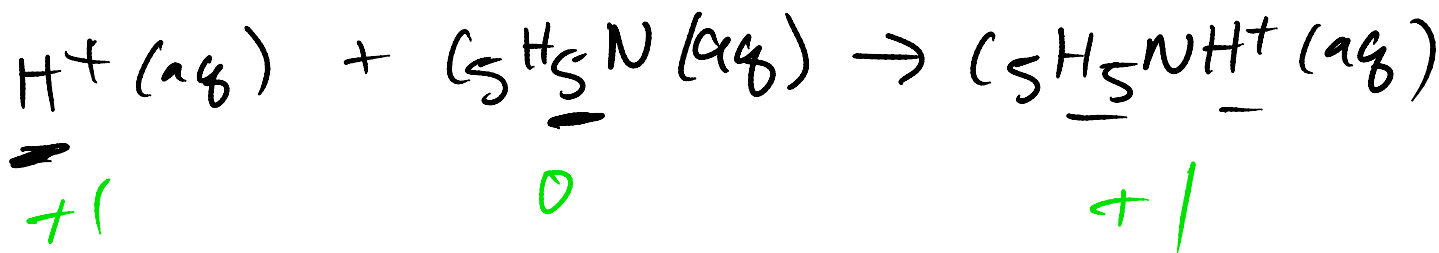
Weak Acid/Base Reactions



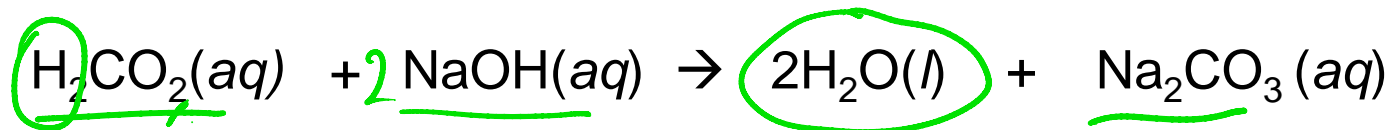
Net Ionic Equation for weak acid + strong base:



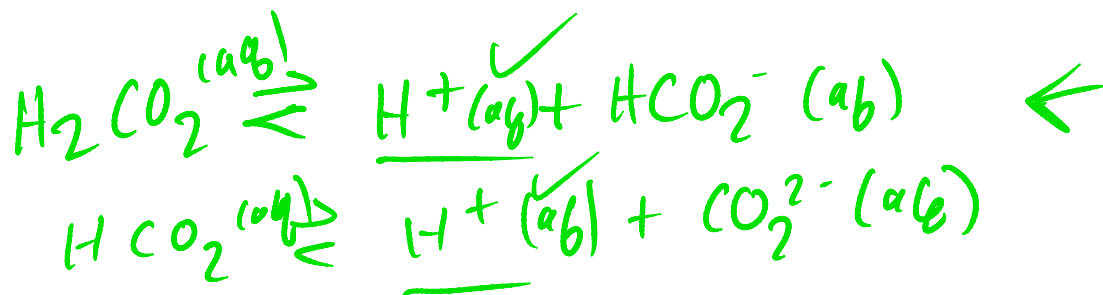
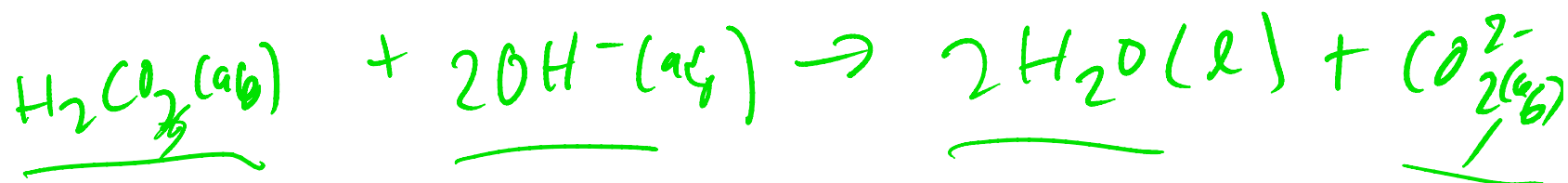
Net Ionic Equation for strong acid + weak base:



Weak Acid/Base Reactions

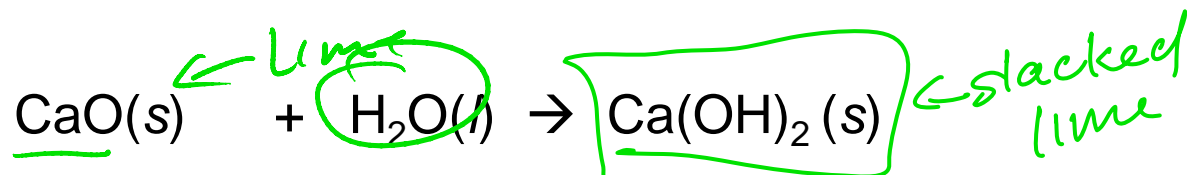
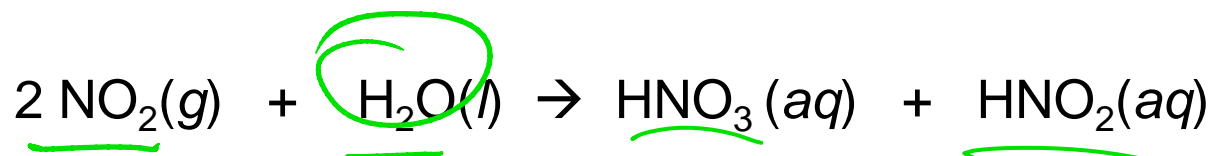
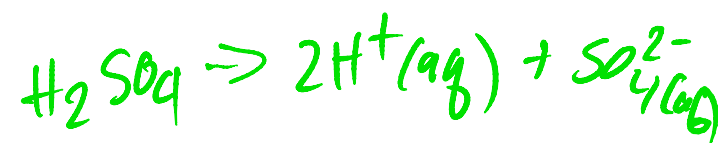
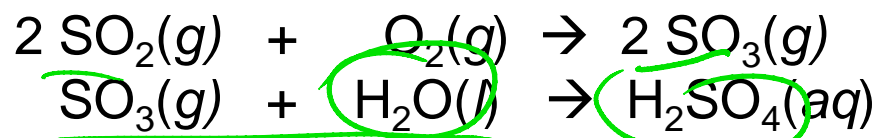
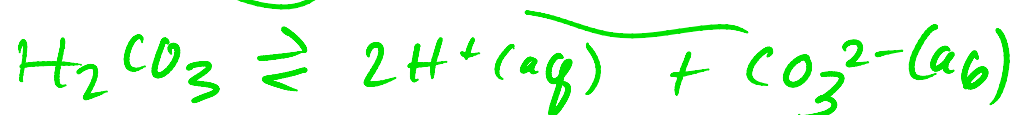
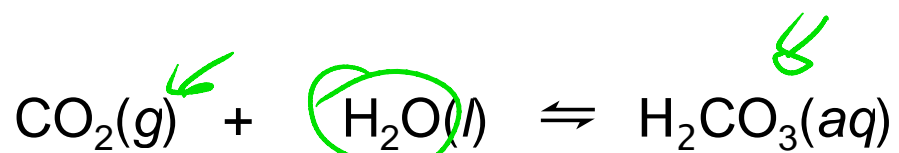


Net Ionic Equation for weak acid + strong base:

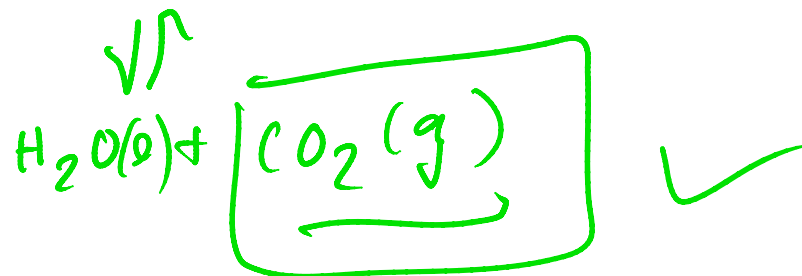
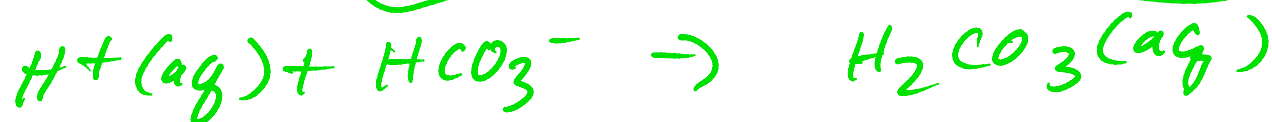
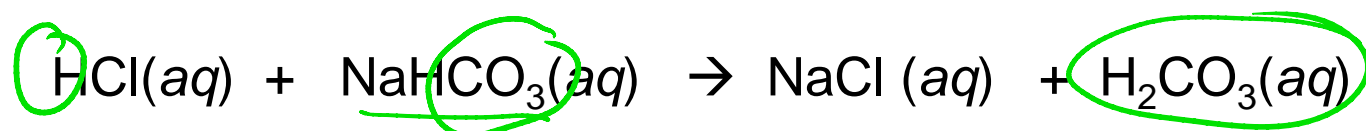
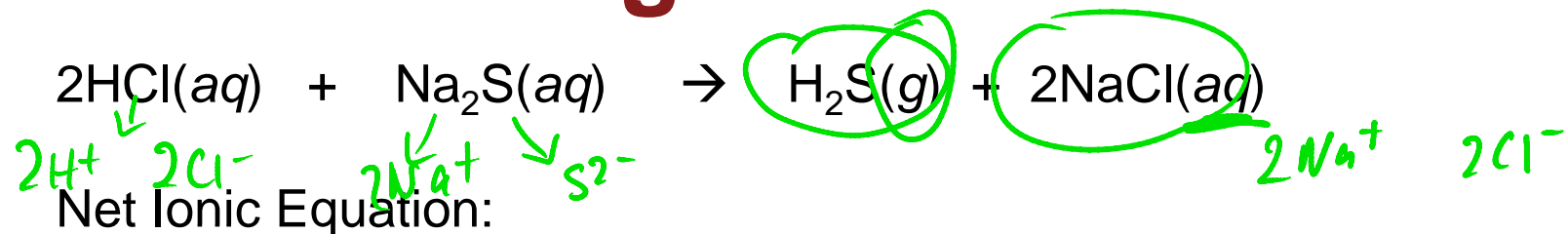


Oxides of Nonmetals and Metals

Sometimes not obvious.



Gas Forming Reactions



Test

Oxidation-Reduction Reactions

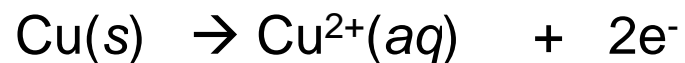


Oxidation – when a substance loses electrons.

Reduction - when a substance gains electrons.



Oxidation-Reduction Reactions



Oxidation Numbers (144-145)

Table 2.2 The determination of oxidation number*

	Oxidation number
1. The sum of the oxidation numbers of all the atoms in the species is equal to its total charge	
2. For atoms in their elemental form	0
3. For atoms of Group 1	+1
For atoms of Group 2	+2
For atoms of Group 13 (except B)	+3(EX ₃), +1(EX)
For atoms of Group 14 (except C, Si)	+4(EX ₄), +2(EX ₂)
4. For hydrogen	+1 in combination with nonmetals -1 in combination with metals
5. For fluorine	-1 in all its compounds
6. For oxygen	-2 unless combined with F -1 in peroxides (O ₂ ²⁻) - $\frac{1}{2}$ in superoxides (O ₂ ⁻) - $\frac{1}{3}$ in ozonides (O ₃ ⁻)
7. Halogens	-1 in most compounds, unless the other elements include oxygen or more electronegative halogens

