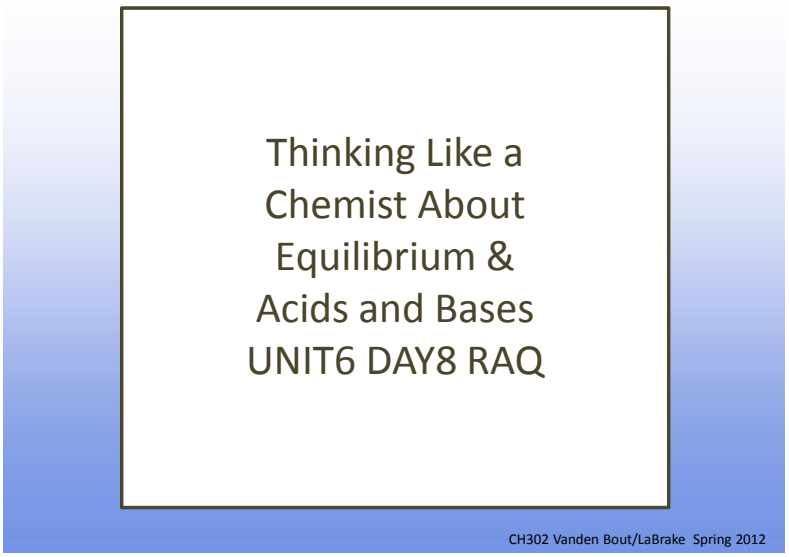
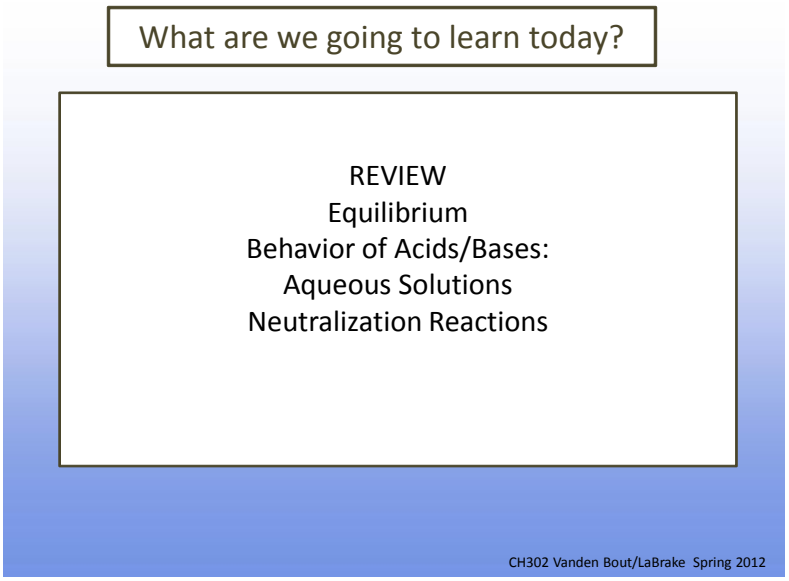
UNIT6-DAY8-LaB1230pm

Monday, March 04, 2013
7:34 PM





IMPORTANT INFORMATION

Class announcement about exam procedures

11am

12:30

-Students MUST take correct exam (professor AND time)

-No bags, no graphing calculators, no extra calculators provided

-Write name 3 places on exam (MC, FR and signature on scantron)

-Students must be prepared to turn the exam in when they get in line: scratch pages stuffed into MC, photo ID out

-For a quieter exam, bring earplugs (not earphones)

IMPORTANT INFORMATION

UNIT 6 EXAM WEDNESDAY EVENING 7PM-9PM

Dr. VandenBout 9:30AM (51540)
WEL 1.316 version # 1- 160
BEL 328 version # 161-330
WEL 2.246 version# 331+

Dr. LaBrake 11 AM (51535)
WCH 1.120 version # 1-175
PAI 3.02 version # 176-325
MEZ 1.306 version # 326+

Dr. LaBrake 12:30 PM (51525)
JGB 2.324 version # 1- 175
WEL 2.122 version # 176+

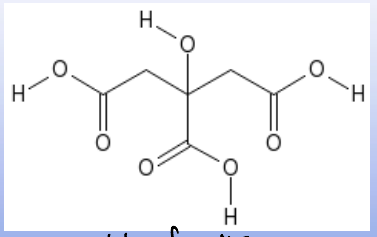
POLL: CLICKER QUESTION 1

Thinking about the UNIT 6 EXAM material, I have a good sense of what I understand and don't understand.

A) Not True of Me AT ALL
B) Somewhat Not True
C) I'm not sure how I would know if I'm ready for the Exam
D) Moderately True of Me
E) Very True of Me

QUIZ: CLICKER QUESTION 2

Polyprotic Acid



$Ka_1 = 7.4 \times 10^{-4}$ ~4

$Ka_2 = 1.7 \times 10^{-5}$ ~5

$Ka_3 = 4.0 \times 10^{-7}$ ~7

pKa

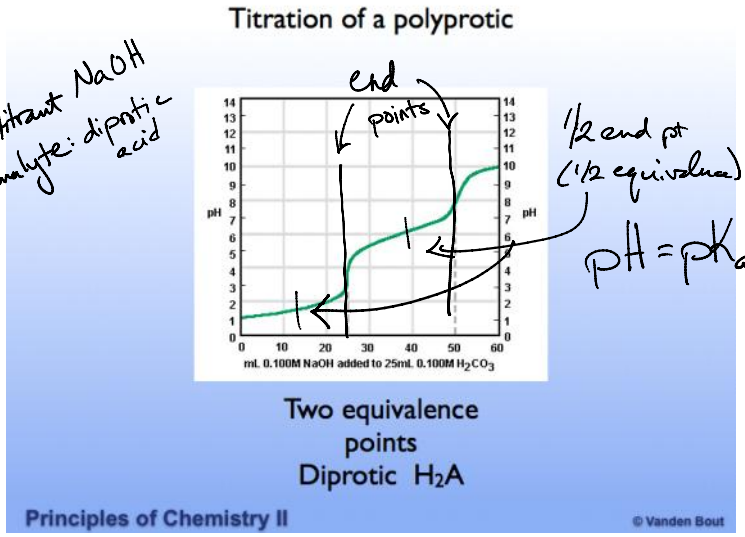
lots of OH^-

At pH = 10 will the acid be fully protonated or fully deprotonated?

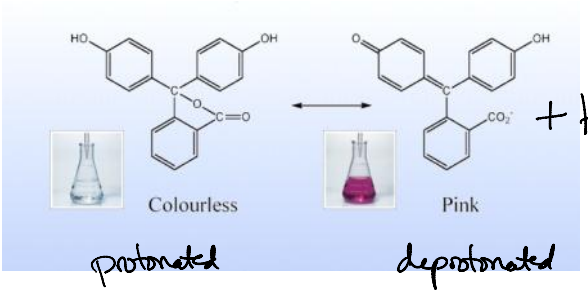
a)Protonated
b)Deprotonated
c)Can't tell

$HA + H_2O \rightleftharpoons A^- + H_3O^+$ equilibrium

shift Right w/ OH^- added



Phenolphthalein: weak acid $K<1$



$+ H_3O^+$

$K_a < 1$

$10^{-14} < 1$

$\Delta G^\circ = -RT \ln K$

$\Delta G^\circ > 0$

nonspontaneous

... But it does happen!

reactant favored

stress by adding OH^-

Add OH^-

H_3O^+ goes down

Shift to products

Explain to a neighbor how, if this is a non-spontaneous change, the indicator ever changes color. Be prepared to share you answer with the rest of your sector.

What happens to a system at equilibrium when you change the environment?

$CO_2(g) \rightarrow CO_2(aq)$

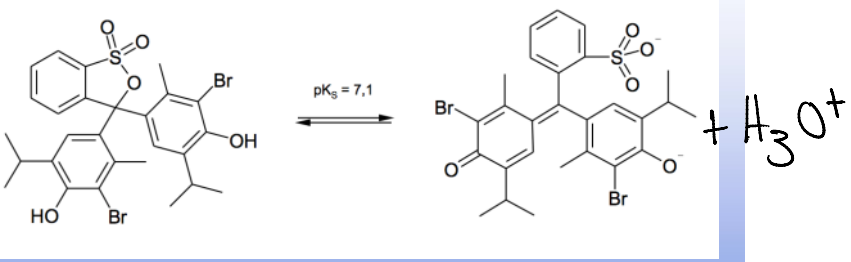
$CO_2(aq) + H_2O \leftrightarrow H_2CO_3(aq)$

$H_2O(l) + H_2CO_3(aq) \leftrightarrow H_3O^+(aq) + HCO_3^-$

TEST

$BTB + H_3O^+ \rightarrow BTBH^+ + H_2O$

Chemical Equilibrium
pH indicator Bromothymol Blue, pKa = 7.1



Protonated form
yellow

Deprotonated form
blue

What is happening to the egg in the acid?

??

lots of OH^-
$pH > pK_a$
de
=
$pH < pK_a$
lots H_3O^+

protein in egg amino acids

cooks egg chemical burn

Egg = proteins + water

We are changing the structure of the proteins

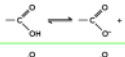
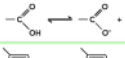
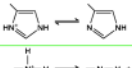
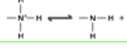
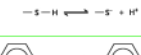
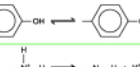
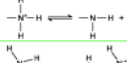
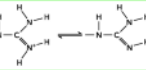
Why? The are all protonating

↳ denatured

If the pH < pKa

an acid/base will be protonated

Proteins = poly-peptides = covalently linked amino acids

Group	Acid ⟷ Base + H^+	pK_a
Terminal carboxyl		3.1
Aspartic acid or glutamic acid		4.4
Histidine		6.5
Terminal amino		8.0
Cysteine		8.5
Tyrosine		10.0
Lysine		10.0
Arginine		12.0

pKa

Which are protonated at pH = 0?

All of them

(plus some more compounds that don't make the chart)

We have buffers in our bodies!

Play a “Know your solution” game

Work with a couple of neighbors.
Clicker questions will come periodically.
Someone will explain what is going on!
If you know this cold, you are in really GREAT shape for the exam.

POLL: CLICKER QUESTION 3

The pH of 1.0 M Aniline is:

A) 11.3
B) 9.3
C) 7.3
D) 4.7
E) 2.7

POLL: CLICKER QUESTION 4

The pH of 0.25 M Anilinium chloride is:

A) 11.4
B) 9.4
C) 7.4
D) 4.6
E) 2.6

POLL: CLICKER QUESTION 4

The pH of a solution with .1 M Aniline and 0.25 M Anilinium chloride is:

A) 11.4
B) 9.6
C) 7.6
D) 4.2
E) 2.4

POLL: CLICKER QUESTION 5

The pH of a solution with 0.5 moles of HCl added to 1 Liter of 1 M Aniline is:

A) 11.6
B) 9.6
C) 7.6
D) 4.6
E) 2.6

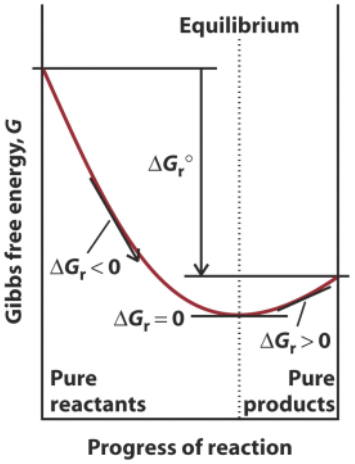
POLL: CLICKER QUESTION 6

The pH of a solution with 0.01 moles of HCl added to 1 Liter of .1 M Aniline and 0.25 M Anilinium chloride is::

A) 11.1
B) 9.9
C) 7.1
D) 4.1
E) 2.1

Interpreting K and $\Delta_r G°$

ΔG_r difference in molar free energy of products and reactants at *any* definite fixed composition of reactants and products



What did we learn today?

REVIEW for EXAM

Chemical Equilibria – Concepts
Acid – Base Chemistry
Determine pH of various solutions
Indicators
pH Curves