

(7) Today

Section 2.1 and 2.2: The Multiple Roles of Water

Sections 2.3 - 2.4.9: Buffers and Solubility In the Aqueous World

We will refer back to 2.4.10 and 11 when looking at proteins

Next Class (8)

Sections 2.4.9 - 2.5: Solubility In the Aqueous World

(9) Second Class from Today

Chap 3: Amino Acids, Peptides, and Proteins

Third Class from Today (10)

Chap 3: Amino Acids, Peptides, and Proteins

Biochem Test 1 is being rescheduled to Wed. Feb 26

Redox rxns are characterized by a movement of e^-

Water as a Reactant: Oxidizing/Reducing Agent

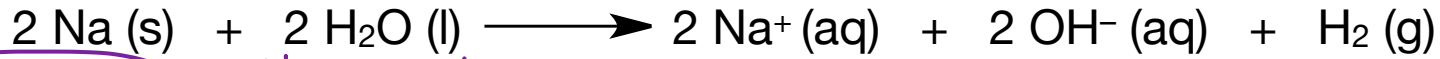
Section 2.1.4

Reduction is gaining e^-

Oxidation is losing e^-

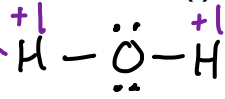
Water as Oxidizing Agent

e^- 's are transferred from Na to the H of H_2O



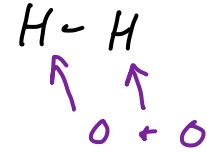
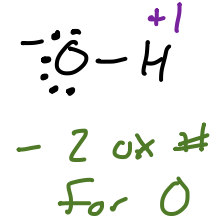
If the e^- 's in the bond are assigned to O, what charge will the H get? +1

↑
O charge



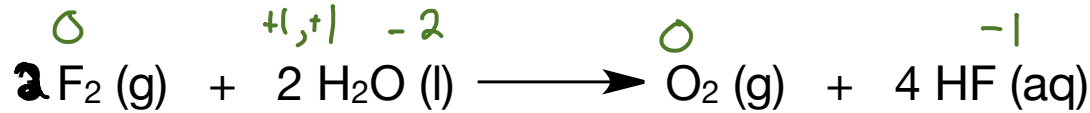
↑
each Na is losing 1 e^-

↑
+1 charge

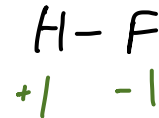


O in H_2O	-1	O in OH^-	-1
	-1		-1
	<hr/>		<hr/>
	-2		-2

Water as Reducing Agent



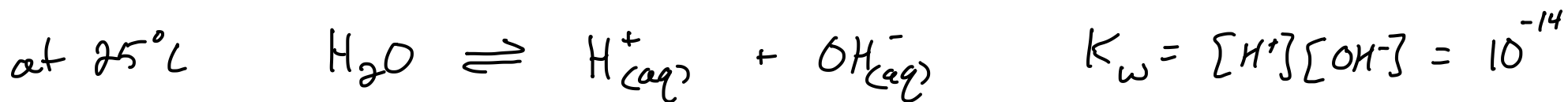
O atom of water is transferring e^- 's to F



- when determining oxidation #'s we assume all the e^- 's in the bond belong to the more eneg atom.
- add up all bond contributions to determine oxidation #

OIL RIG

LEO says GER



a neutral aqueous soln has the same concentration of $[\text{H}^+]$ and $[\text{OH}^-]$

$$[\text{H}^+] = [\text{OH}^-] \quad [\text{H}^+] = [\text{OH}^-] = 10^{-7}$$

$$\text{pH} = -\log[\text{H}^+]$$

at 25°C $-\log[10^{-7}] = 7$ K_w changes with changing temp

$$\text{p}K_a = -\log K_a$$

K_a is an acid ionization constant a measure of acid strength



$$K_a = \frac{[\text{CH}_3\text{CO}_2^-][\text{H}_3\text{O}^+]}{[\text{CH}_3\text{CO}_2\text{H}]} = 1.8 \times 10^{-5} \quad \leftarrow \text{weak acids}$$

$$K_a = \frac{[H^+][A^-]}{[HA]}$$

large K_a lots of products

larger the K_a the stronger the acid

$$pK_a = -\log K_a$$

$$pK_a = -\log 10^6$$

K_a of HCl $\sim 10^7$

$$pK_a = -6$$

$$pK_a = -\log(1.8 \times 10^{-5})$$

K_a of acetic acid

$$pK_a = 4.74$$

The larger the pK_a is the weaker the acid is

$$K_a = \frac{[H^+][A^-]}{[HA]}$$

$$-\log K_a = -\log \left(\frac{[H^+][A^-]}{[HA]} \right)$$

$$pK_a = -\log [H^+] - \log \frac{[A^-]}{[HA]}$$

$$pK_a = pH - \log \frac{[A^-]}{[HA]}$$

$$pH = pK_a + \log \frac{[A^-]}{[HA]}$$

$$\text{pH} = \text{pK}_a + \log \frac{[\text{A}^-]}{[\text{HA}]}$$

$$\text{pH} - \text{pK}_a = \log \frac{[\text{A}^-]}{[\text{HA}]}$$

pH is	pH - pK _a	log (A ⁻ /HA)	$\frac{\text{A}^-}{\text{HA}}$	state
2 units less than pK _a	-2	-2	$10^{-2} = 0.01 = \frac{1}{100}$	~ 99% protonated
pH = pK _a	0	0	$10^0 = 1 = \frac{1}{1}$	50%
2 units more than pK _a	2	2	$10^2 = 100 = \frac{100}{1}$	~ 99% deprotonated