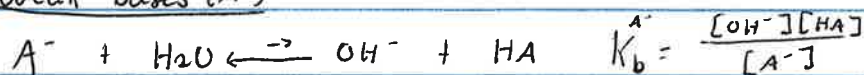


Today 2/23 Sections 16.1 - 16.4

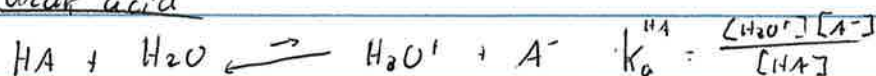
This weekend:

- look over exam
- do worksheet & homework problems
- download Prelab for experiment 7
- Ali's problem club

weak bases (A^-)



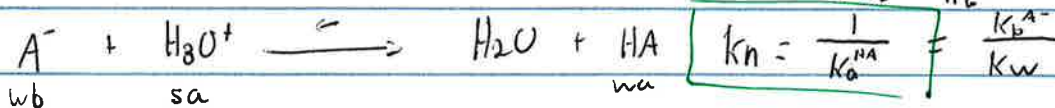
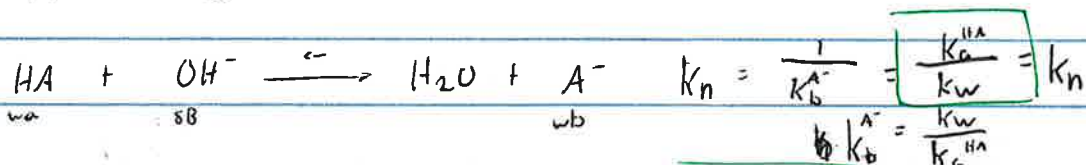
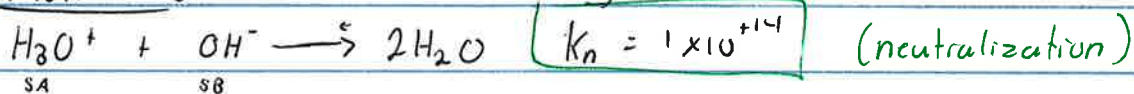
weak acid



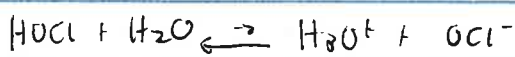
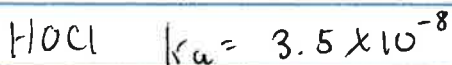
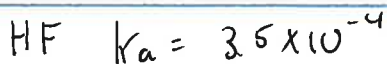
water dissociation



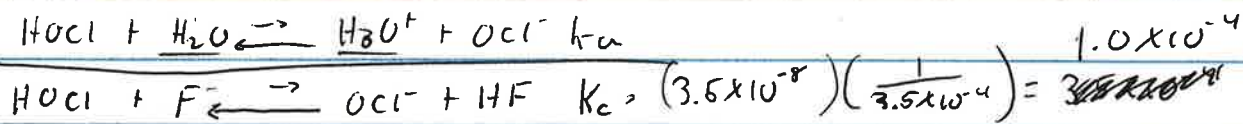
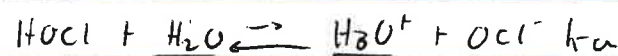
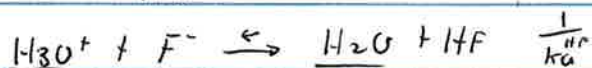
Titration (neutralization reactions)



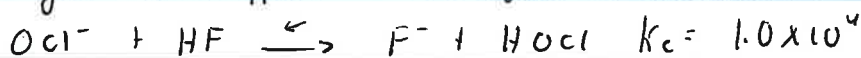
* big arrow goes away from the strong acid or base



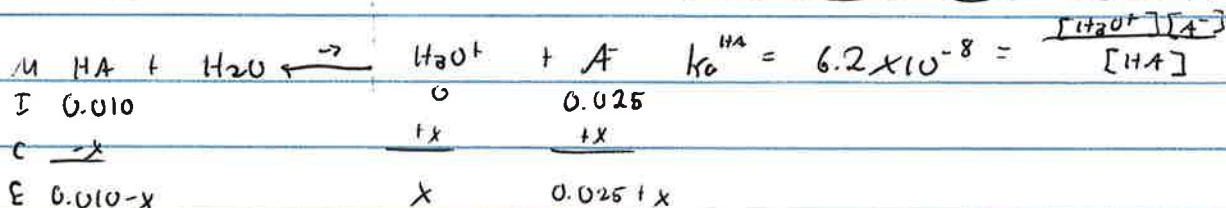
Mix weak acids



if you had flipped the HOCl equation instead...



*you can use these to determine which is stronger, in this case HF was stronger



$$K_a = \frac{(x)(0.025 + x)}{(0.010 - x)}$$

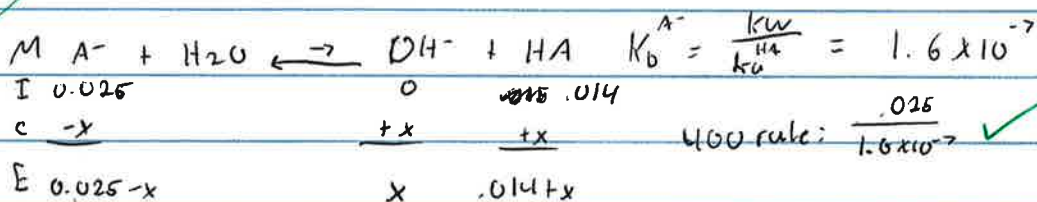
$$\text{400 rule: } \frac{0.010}{6.2 \times 10^{-8}} > 400 \checkmark$$

$$6.2 \times 10^{-8} = \frac{x(0.025)}{0.010}$$

$$x = 2.48 \times 10^{-8} = [\text{H}_3\text{O}^+]$$

$$\text{pH} = -\log(2.48 \times 10^{-8})$$

$$\text{pH} = 7.61$$



$$\text{400 rule: } \frac{0.025}{1.6 \times 10^{-7}} > 400 \checkmark$$

$$K_b = 1.6 \times 10^{-7} = \frac{[\text{OH}^-][\text{HA}]}{[\text{A}^-]}$$

$$1.6 \times 10^{-7} = \frac{(x)(0.014 + x)}{(0.025 - x)}$$

$$1.6 \times 10^{-7} = \frac{x(0.014)}{(0.025)}$$

$$x = 2.9 \times 10^{-7} = [\text{OH}^-]$$

$$\text{pOH} = -\log(2.9 \times 10^{-7})$$

$$\text{pOH} = 6.54$$

$$\text{pH} = 7.46$$

Pretty close to one another (would have been exact if the same concentrations were used)

Buffer: Mixture of wa and wb

$$K_a = \frac{[H_3O^+][A^-]}{[HA]}$$

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

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

*Henderson-Hasselbalch Buffer equation *

$$pH = pK_a + \log \frac{n_A}{n_{HA}} \quad (\text{volumes cancel})$$

$$pK_a = \log(6.2 \times 10^{-8}) = 7.208$$

$$pH = 7.208 + \log \left(\frac{0.025}{0.010} \right)$$

$$pH = 7.61$$

Suppose we add 0.003 mol H_3O^+ to our buffer. What is new pH?

$$pH = 7.208 + \log \left(\frac{n_A - n_{H_3O^+}}{n_{HA} + n_{H_3O^+}} \right)$$

$$pH = 7.208 + \log \left(\frac{0.025 - 0.003}{0.010 + 0.003} \right)$$

$$pH = 7.44 \quad (\text{became slightly more acidic})$$

*If you add strong base (OH^-) the moles of weak base would increase, and decrease moles of weak acid