

LEC (11)

CHEM 30A

Oct 25th

(1)

- ① CIS/TRANS DIASTEREISOMERS
- ② CONSEQUENCES OF CHIRALITY

CHAPTER 4 - ACIDS & BASES

- ③ INTRO
- ④ ACID STRENGTH

HMK: MIDTERM ON WEDNESDAY...

MIDTERM

EXTRA OFFICE HRS: TUES 1-2, 4-5pm

ROOMS: A-J BUNCHE 1209B K-Z CS50

BOOKS:

NO CALCULATORS

①/② Start Page ⑧ Lecture ⑩

③ CHAPTER ④

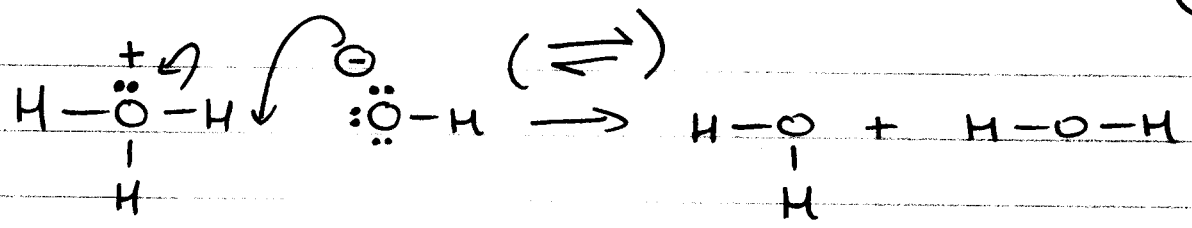
ACIDS & BASES

BRONSTED-LOWRY

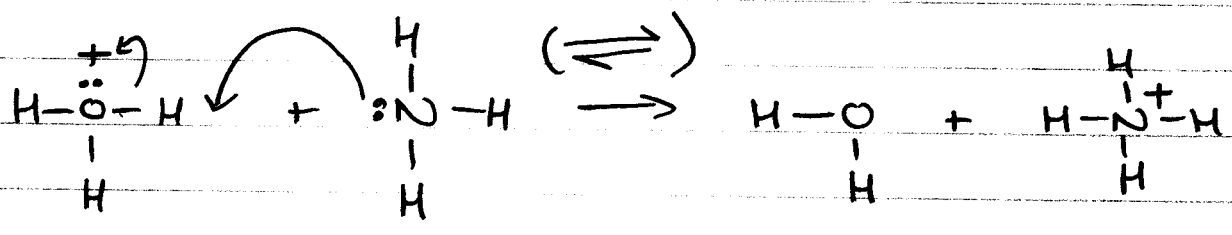
ACID H^+ DONOR

BASE H^+ ACCEPTOR

(2)



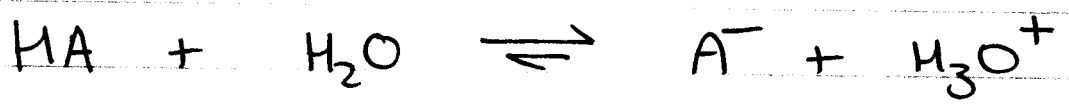
ACID (H⁺ DONOR) BASE (H⁺ ACCEPTOR)
 Hydronium Ion Hydroxide Ion



ACID BASE CONJUGATE BASE CONJUGATE ACID

② ACID DISSOCIATION CONSTANTS

- Quantify acid strength



$$K_{eq} = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}][\text{H}_2\text{O}]}$$

← changes very little - huge xs

$$K_a = K_{eq}[\text{H}_2\text{O}] = \frac{[\text{H}_3\text{O}^+][\text{A}^-]}{[\text{HA}]}$$

3

e.g. for acetic acid $\text{CH}_3\overset{\text{O}}{\parallel}\text{C}-\text{OH}$

$$K_a = 1.74 \times 10^{-5}$$

most organic acids have K_a values with -ve exponents, so we often compare pK_a values

$$pK_a = -\log_{10} K_a$$

$$pK_a (\text{CH}_3\text{COOH}) = 4.76$$

LARGER pK_a VALUE \rightarrow WEAKER ACID

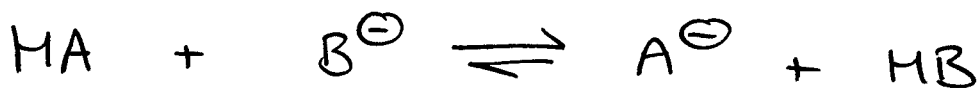
ALSO:

STRONG ACID \equiv WEAK CONJUGATE BASE

WEAK ACID \equiv STRONG CONJUGATE BASE

Scan through table Page 141

— Position of acid/base equilibrium



Competition between B^- and A^- for the H^+

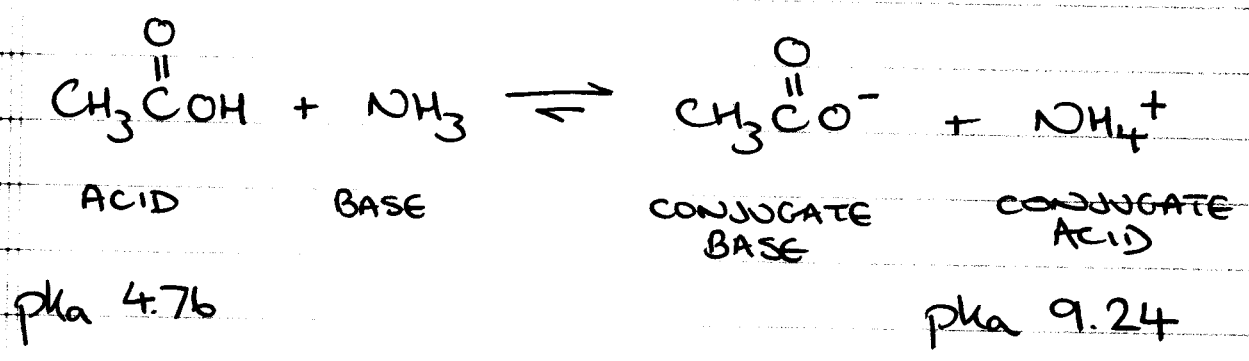
(4)

$$K_{eq} = \frac{[A^-][BH]}{[HA][B^-]}$$

$$\times \frac{[H_3O^+]}{[H_3O^+]}$$

$$K_{eq} = \frac{[A^-][H_3O^+]}{[HA]} \times \frac{[BH]}{[B^-][H_3O^+]}$$

$$K_{eq} = \frac{K_{AH} \text{ (ACID)}}{K_{BH} \text{ (CONJUGATE ACID)}} \left[pK_{eq} = pK_{HA} - pK_{BH} \right]$$



$$pK_{eq} = 4.76 - 9.24 = -4.48$$

$$K_{eq} = 10^{-pK_{eq}}$$

$$= 3 \times 10^4$$

PUT STRONGER ACID ON LEFT, $K_{eq} > 1$
 STRONGER ACID + STRONGER BASE \Rightarrow WEAKER ACID/BASE