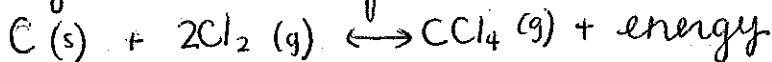


The following reaction is at equilibrium:



EXOTHERMIC

The reaction will shift **NO WHERE** when I add $C(s)$ b/c solid doesn't affect equilibrium.

The reaction will shift **LEFT** when I increase the temperature

- Add $Cl_2 \rightarrow$ right
- Remove $CCl_4 \rightarrow$ right
- decrease Volume \rightarrow right
- decrease pressure \leftarrow left (same as $\uparrow V$)

Add inert gas (doesn't act in rxn)

↓
constant
volume

[Container is same size; more gas doesn't change partial pressure]

↓
constant
pressure

[must allow increase in volume; shift to side w/ more gas molecules]

WORKSHEET

PART ONE

① $K = \frac{[CH_3COO^-][H_3O^+]}{[CH_3COOH]}$

$H_2O(l)$ has mass action expression of one

$K_A = \text{acid}$ $K_{sp} = \text{sparingly soluble salt}$

② $K = 1.8 \times 10^{-5}$

$K > 1$: products

$K < 1$: reactants

Favors Reactants

④ 0.2M concentration of CH_3COO^-

expect to have a higher concentration of CH_3COOH at equilibrium b/c it's reactant favored

③ $\Delta G = -RT \ln K$

↑ always

+ $\ln K$

- - - = +

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

⑤ $K = \frac{[X][X]}{.2} = 1.85 \times 10^{-5} = \frac{X^2}{.2}$

$X = .00189$
concentration of product

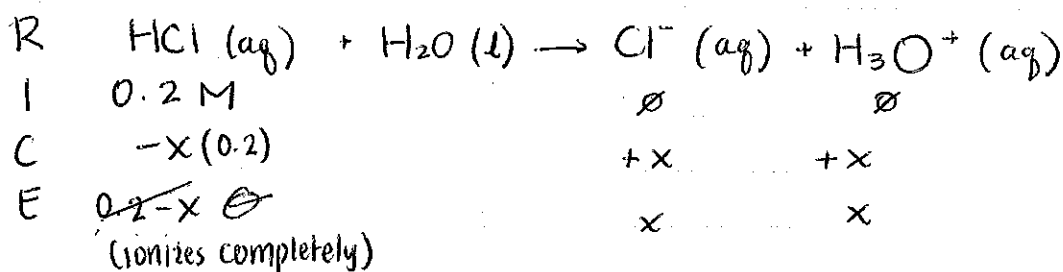
* safe to ignore x and approximate answer when $K \leq 1 \times 10^{-3}$ (part 1)

Continuation of part one

- Increase H_3O^+ , the concentration of CH_3COOH will INCREASE
- Increase CH_3COO^- , it will DECREASE

2T
0

- strong bases disassociate to form a cation and the Hydroxide ion (capable of accepting a proton)
- weak acids do not completely disassociate



Q What is the assumed concentration of HCl in a 0.2 M aq solution of HCl at equilibrium? $\rightarrow HCl$ ionizes completely to H^+ , Cl^- and has a 0.2 M concentration
 \downarrow switch answers

Hydronium ion concentration? assumed concentration is 0; $K \sim \infty$ assumes 100% products

- whenever you have a strong acid or base, we assume it ionizes 100%

Brain Dumb: Acids & Bases

- acids have pH from 1-7
- bases have pH from 8-14
- acids = H^+ ; proton donor
- base = OH^- ; proton acceptor
- bases are bitter; acids are sour
- mix together to form water + salt (neutralization)

According to Brønsted Lowry

- acid is PROTON DONOR
- base is a PROTON ACCEPTOR

