Grossmont College Name: \_\_\_\_\_\_\_\_KEY\_\_\_\_\_\_\_\_\_\_\_

Chemistry 142, Spring 2015

Practice

1. For each of the following, write and label the formula for the conjugate acid and the conjugate base.

|  |  |  |  |
| --- | --- | --- | --- |
| compound | OH− | HClO2 | NH3 |
| Conjugate acid | H2O | H2ClO2+ | NH4+ |
| Conjugate base | O2- | ClO2- | NH2- |

1. List the strong acids: \_\_\_\_\_\_\_HCl, HBr, HI, HNO3, H2SO4, HClO3 and HClO4\_\_\_
2. A student measures the pH of a 0.100 M solution of an unknown mono-protic weak acid. The pH is 1.95. What is the Ka of the acid and percent dissociation?

[H3O+] = 10-1.95 = 0.0112 M

HX (aq) + H2O 🡨🡪 H3O+ + X−

I 0.100 M 0 M 0 M

C −x +x +x

E 0..100 M−x x x

1. Calculate the pH of a 0.050 M basic solution of ethylamine (C2H5NH2, Ka=1.56 x10–11)

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | C2H5NH2 (aq) | + | H2O (l) | 🡨🡪 | C2H5NH3+ (aq) | + | OH- (aq) |
| I | 0.050 M |  |  |  | 0 M |  | 0 M |
| C | −x |  |  |  | +x |  | +x |
| E | 0.050 M−x |  |  |  | x |  | x |

1. For the reaction NO(g) + NO2(g) + H2O(g) ⮀ 2 HNO2(g), occurring at 28oC, [NO]*i* = [NO2]*i* = 44.1 torr and [H2O]*i* = 17.5 torr. If the total pressure at equilibrium is 95.6 torr (20 points).

a. What are the equilibrium pressures of all species?

NO(g) + NO2(g) + H2O(g) ⮀ 2 HNO2(g) total pressure

# Initial 44.1 torr 44.1 torr 17.5 torr 0 torr 105.7 torr

Δ −x −x −x +2x −10.1 torr

## Equil 44.1−x 44.1−x 17.5−x 2x 95.6 torr

final pressure = P(NO) + P(NO2) + P(H2O) + P(HNO2)

95.6 torr = (44.1-x)torr + (44.1-x)torr + (17.5-x)torr + (2x)torr

x = 10.1 torr

# Alternate method

pressure change = −10.1 torr = −x + −x + −x + +2x = −x

x = 10.1 torr

P(NO) = 44.1 torr − 10.1 torr = 34.0 torr

P(NO2) = 44.1 torr − 10.1 torr = 34.0 torr

P(H2O) = 17.5 torr − 10.1 torr = 7.4 torr

P(HNO2) = 2(10.1 torr) = 20.2 torr

b. Calculate Kp for the reaction?

