Identify the following chemicals as Arrhenius acids or bases and give their names: NaOH and  $H_2CO_3$ .

Show work to get full credit

#### 2. ♥ STUDY CHECK

Indicate whether the following chemicals are lewis acid or lewis bases: (a)  $AlH_3$  and (b)  $OH^-$ . Show work to get full credit

## 3. ♥ STUDY CHECK

Identify the acid, the base, the conjugate acid and the conjugate base in the reaction:

$$CO_3^{2-}{}_{(aq)} + H_2O_{(1)} \Longrightarrow HCO_3^{-}{}_{(aq)} + H_3O_{(aq)}^{+}$$

Show work to get full credit

## **4. ♥ STUDY CHECK**

Identify the acid, the base, the conjugate acid and the conjugate base in the reaction:

Show work to get full credit

Indicate the strongest of the following acids:

$$H_2PH_4^-_{(aq)} + H_2O_{(l)} \Longrightarrow H_{(aq)}^+ + HPH_4^{2-}_{(aq)}$$
  $K_a = 6.2 \cdot 10^{-8}$   
 $H_{(aq)}^+ + HCO_3^{2-}_{(aq)} \Longrightarrow H_2CO_{3(aq)} + H_2O_{(l)}$   $K_b = 2.3 \cdot 10^{-8}$ 

Show work to get full credit

## 6. ♥ STUDY CHECK

Write down the dissociation reaction using double arrows for the following chemicals:  $HI_{(g)}$  and  $HClO_{2(l)}$ .

Show work to get full credit

## 7. ♥ STUDY CHECK

Calculate the PH for: (a) an acid solution with proton concentration of  $3.0 \cdot 10^{-8} M$  (b) a basic solution with a hydroxyl concentration of  $2.0 \cdot 10^{-9} M$ .

Show work to get full credit

### 8. ♥ STUDY CHECK

The PH of a solution is 9.5. Calculate the proton concentration of that solution. Show work to get full credit

Name:

# 9. ♥ STUDY CHECK

Calculate the PH of a 0.002M aniline solution.  $K_b = 7.4 \times 10^{-10}$  Show work to get full credit

### **10.** ♥ STUDY CHECK

Calculate the percent dissociation of a 0.05M methylamine CH<sub>3</sub>NH<sub>2</sub> solution.  $K_b = 4.4 \times 10^{-4}$  Show work to get full credit

## 11. ♥ STUDY CHECK

Calculate the PH of a 0.2M HF/0.3M KF ( $K_a = 6.30 \times 10^{-4}$ ). Show work to get full credit

### 12. ♥ STUDY CHECK

A 15mL sample of an unknown acid is neutralized with 45 mL of a NaOH 1M solution. Calculate the molarity of the unknown acid. Show work to get full credit

## 13. ♥ STUDY CHECK

A 1mL sample of 2M NH $_3$  (1.80  $\times$  10 $^{-5}$ ) is titrated with with 2 mL of a NaOH 1M solution. (a) indicate whether you are before, after or at the endpoint (b) indicate whether the titrate is an acid or a base, and a weak or a strong electrolyte (c) indicate the formula that would need to be used to calculate the PH (d) calculate the PH

Show work to get full credit

Write down the solubility equilibrium for: Copper(II) phosphate, and CuCN.

Show work to get full credit

## 15. ♥ STUDY CHECK

Write down the expression of  $K_{sp}$  in terms of the ion concentration for the following compounds: PbCl<sub>2</sub>, and manganese(II) sulfide.

Show work to get full credit

## **16. ♥ STUDY CHECK**

How many mL of solution contains 1ng of solute in a saturated ScF<sub>3</sub> solution, given s=2.41  $\times$  10<sup>-12</sup>M. The molar mass of is ScF<sub>3</sub> 101.9g/mol. Show work to get full credit

## 17. ♥ STUDY CHECK

Write down the relationship between  $K_{sp}$  and s for the following salts: ceAg2CO3 and Fe(OH)<sub>3</sub>.

Show work to get full credit

The solubility product of Nickel(II) phosphate Ni<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub> is  $4.74 \times 10^{-32}$ . Calculate the molar solubility of the salt.

Show work to get full credit

# 19. ♥ STUDY CHECK

Predict if a precipitate will form in a mixtures of  $[Li^+]=10^{-1}M$  and  $[CO_3^{2-}]=10^{-1}M$  given that  $K_{sp}(Li_2CO_3)=8.15\times 10^{-4}M$  Show work to get full credit

# 20. ♥ STUDY CHECK

Predict if a FeCO<sub>3</sub> precipitate will form after mixing 4mL of a  $10^{-6}$ M FeSO<sub>4</sub> with 5mL of a  $10^{-6}$ M Na<sub>2</sub>CO<sub>3</sub>, given that  $K_{sp}$ (FeCO<sub>3</sub>)=3 ×  $10^{-11}$ . Show work to get full credit