Experiment 17
Ions in Solution

Name KEY
Drawer Number _____

Observations and Conclusions

Part I. Ionic and Covalent Compounds in Aqueous Solution

	Substance	Conductivity	Electrolyte Type	Major Species in Solution	Minor Species in Solution (if appropriate)
1.	distilled H_2O	NONE	NON	N/A	H^+, OH^- VERY MINOR
2.	tap H_2O	MEDIUM	DILUTE STRONG	UNKNOWN IONS (Ca^{2+}, Cl^-, etc)	UNKNOWN
3.	NaCl(s)	NONE	NON	Na^+, Cl^- (NOT MOBILE)	NONE
4.	NaCl(aq)	HIGH	STRONG	$Na^+_{(aq)}$, $Cl^-_{(aq)}$	NONE
5.	$KClO_3$(s)	NONE	NONE	K^+, ClO_3^- (NOT MOBILE)	NONE
6.	$KClO_3(\ell)$	HIGH	STRONG	K^+, ClO_3^- (MOBILE)	NONE
7.	$KClO_3$(aq)	HIGH	STRONG	$K^+_{(aq)}$, $ClO_2^-{}_{(aq)}$	NONE
8.	$CuSO_4$(aq)	HIGH	STRONG	$Cu^{2+}_{(aq)}$, $SO_4^{2-}{}_{(aq)}$	$HSO_4^-{}_{(aq)}$, $OH^-_{(aq)}$
9.	$CH_3CH_2OH(\ell)$	NONE	NON	N/A	$CH_3CH_2O^-$ VERY MINOR; $CH_3CH_2OH_2^+$
10.	CH_3CH_2OH(aq)	NONE	NON	CH_3CH_2OH	NONE
11.	$C_{12}H_{22}O_{11}$(s)	NONE	NON	N/A	N/A
12.	$C_{12}H_{22}O_{11}$(aq)	NONE	NON	$C_{12}H_{22}O_{11(aq)}$	NONE

← IN ALL AQ. SOLUTIONS

← JUST ILLUSTRATING AUTOIONIZATION

Part II. Acids and Bases in Aqueous Solution

	Sample	Conductivity	Electrolyte Type	Major Species in Solution	Minor Species in Solution (if applicable)
1.	$HC_2H_3O_2(aq)$	MED/LOW	WEAK	$HC_2H_3O_{2(aq)}$	$C_2H_3O_{2(aq)}^-$, $H^+_{(aq)}$
2.	HCl(aq)	HIGH	STRONG	$H^+_{(aq)}$, $Cl^-_{(aq)}$	NONE
3.	NaOH(aq)	HIGH	STRONG	$Na^+_{(aq)}$, $OH^-_{(aq)}$	NONE
4.	$NH_3(aq)$	MED/LOW	WEAK	$NH_{3(aq)}$	$NH_4^+{}_{(aq)}$, $OH^-_{(aq)}$
5.	$HC_2H_3O_2(aq) + NH_3(aq)$	MED/HIGH	FAIRLY STRONG	$C_2H_3O_{2(aq)}^-$ $NH_4^+{}_{(aq)}$	$HC_2H_3O_{2(aq)}$ $NH_{3(aq)}$

↖ WEAK ACID + WEAK BASE

Part III. Reactions in Aqueous Solution

$HC_2H_3O_2 + NH_3 \rightleftharpoons C_2H_3O_2^- + NH_4^+$ EQUILIBRIUM LIES ON THIS SIDE

Reactants	$Na_2CO_3(aq)$	$H_2SO_4(aq)$	NaOH(aq)	$NH_3(aq)$
$Pb(C_2H_3O_2)_2(aq)$	1.	2.	3.	4.
$Fe(NO_3)_3(aq)$	5	6.	7.	8.
$NH_4C_2H_3O_2(aq)$		9.	10.	11.
$H_2SO_4(aq)$	12.		13.	14.
$HNO_3(aq)$ to ppt from #1	15.			

1) $Pb(CH_3COO)_{2(aq)} + Na_2CO_{3(aq)} \longrightarrow PbCO_{3(s)} + 2NaCH_3COO_{(aq)}$

$Pb^{2+} + 2CH_3COO^- + 2Na^+ + CO_3^{2-} \longrightarrow PbCO_{3(s)} + 2Na^+ + 2CH_3COO^-$

$Pb^{2+} + CO_3^{2-} \longrightarrow PbCO_{3(s)}$

2) $Pb(CH_3COO)_{2(aq)} + H_2SO_{4(aq)} \longrightarrow PbSO_{4(s)} + 2CH_3COOH_{(aq)}$

$Pb^{2+} + 2CH_3COO^- + 2H^+ + SO_4^{2-} \longrightarrow PbSO_{4(s)} + 2H^+ + 2CH_3COO^-$

$Pb^{2+} + SO_4^{2-} \longrightarrow PbSO_{4(s)}$

3) $Pb(CH_3COO)_{2(aq)} + 2NaOH_{(aq)} \longrightarrow Pb(OH)_{2(s)} + 2NaCH_3COO_{(aq)}$

$Pb^{2+} + 2CH_3COO^- + 2Na^+ + 2OH^- \longrightarrow Pb(OH)_{2(s)} + 2Na^+ + CH_3COO^-$

$Pb^{2+} + 2OH^- \longrightarrow Pb(OH)_{2(s)}$

4) $Pb(CH_3COO)_{(aq)} + 2NH_4^+_{(aq)} + 2OH^-_{(aq)} \longrightarrow Pb(OH)_{2(s)} + 2NH_4^+_{(aq)} + 2CH_3COO^-_{(aq)}$

$Pb^{2+} + 2CH_3COO^- + 2NH_4^+ + 2OH^- \longrightarrow Pb(OH)_{2(s)} + 2NH_4^+_{(aq)} + 2CH_3COO^-_{(aq)}$

$Pb^{2+} + 2OH^- \rightarrow Pb(OH)_{2(s)}$

YOU CAN FIGURE OUT THE REST.

NOTE:

$NH_{3(aq)} \rightleftharpoons NH_4^+ + OH^-$ EQ. LIES IN FAVOR OF $NH_{3(aq)}$

$HSO_4^- \rightleftharpoons H^+ + SO_4^{2-}$

$CH_3COOH \rightleftharpoons H^+ + CH_3COO^-$

} NOT 100% DISSOCIATION

MAKES WRITING IONIC EQUATIONS A LITTLE MISLEADING