CHM152 Name:_____

Write Equilibrium expressions for each of the following acids, bases or salts in water, then decide if the resulting solution is acidic, basic, or neutral (A, B, or N).

1. $C_6H_5NH_2$ + H_2O ⇆ $C_6H_5NH_3^+ + OH^-$ A, B, or N ? B K_b

2. C_5H_5N + H_2O ⇆ $C_5H_5NH^+ + OH^-$ A, B, or N ? B K_b

3. $(CH_3)_3N$ + H_2O ⇆ $(CH_3)_3NH^+ + OH^-$ A, B, or N ? B K_b

4. HIO_2 + H_2O ⇆ $H_3O^+ + IO_2^-$ A, B, or N ? A K_a

5. CH_3COOH + H_2O ⇆ $CH_3COO^- + H_3O^+$ A, B, or N ? A K_a

6. $HCOOH$ + H_2O ⇆ $HCOO^- + H_3O^+$ A, B, or N ? A K_a

7. $O{=}CHCOOH$ + H_2O ⇆ $O{=}CHCOO^- + H_3O^+$ A, B, or N ? A K_a

8. $CH_3(OH)COOH$ + H_2O ⇆ $CH_3(OH)COO^- + H_3O^+$ A, B, or N ? A K_a

9. $(CH_3CH_2)_3N$ + H_2O ⇆ $(CH_3CH_2)_3NH^+ + OH^-$ A, B, or N ? B K_b

10. HNO_3 + H_2O → $H_3O^+ + NO_3^-$ strong Acid A, B, or N ? A K_a

11. $HClO_4$ + H_2O → $H_3O^+ + ClO_4^-$ strong acid A, B, or N ? A

12. KOH $\xrightarrow{(H_2O)}$ $K^+ + OH^-$ strong base A, B, or N ? B

13. $Ba(OH)_2$ $\xrightarrow{(H_2O)}$ $Ba^{2+} + 2OH^-$ A, B, or N ? B

Dissociate the following salts in water. Then look at (and write out) the hydrolysis of the ions **after dissolving (i.e. dissociating)** the salts and state if the resulting solution is acidic, basic or neutral (A, B, or N).

Number 14 is done for you as an example.

14. NH_4NO_3 $\xrightarrow{(H_2O)}$ NH_4^+ + NO_3^- (W, S)

then: NH_4^+ + H_2O ⇆ $NH_4OH + H^+$ A, B, or N ? A K_a

or ⇌ $NH_3 + H_3O^+$

15. $C_6H_5NH_3Cl \xrightarrow{(H_2O)}$ $C_6H_5NH_3^+ + Cl^-$ (wk. / st. — HCl)

then: $C_6H_5NH_3^+$ + H_2O $\leftrightarrows$ $C_6H_5NH_2 + H_3O^+$

A, B, or N ? A Ka

16. $C_5H_5NHCl \xrightarrow{(H_2O)}$ $C_5H_5NH^+ + Cl^-$

then: $C_5H_5NH^+ + H_2O \leftrightarrows C_5H_5N + H_3O^+$

A, B, or N ? A Ka

17. $(CH_3)_3NHBr \xrightarrow{(H_2O)}$ $(CH_3)_3NH^+ + Br^-$

then: $(CH_3)_3NH^+ + H_2O \leftrightarrows (CH_3)_3N + H_3O^+$

A, B, or N ? A Ka

18. $CH_3COONa \xrightarrow{(H_2O)}$ $CH_3COO^- + Na^+$

then: $CH_3COO^- + H_2O \leftrightarrows CH_3COOH + OH^-$

A, B, or N ? B K_b

19. $CH_3(OH)COONa \xrightarrow{(H_2O)}$

then: $\leftrightarrows$

A, B, or N ?

20. HCOOK $\xrightarrow{(H_2O)}$

then: $\leftrightarrows$

A, B, or N ?

21. $NaNO_3 \xrightarrow{(H_2O)}$ $Na^+ + NO_3^-$ (NaOH, HNO_3 — both strong)

then??: No hydrolysis $\leftrightarrows$

A, B, or N ? N

22. $Ni(NO_3)_2 \xrightarrow{(H_2O)}$ $Ni^{2+} + 2NO_3^-$

then: $Ni^{2+} + H_2O \leftrightarrows NiOH^+ + H^+$

A, B, or N ? A Ka

23. $Fe(NO_3)_2 \xrightarrow{(H_2O)}$ $Fe^{2+} + 2NO_3^-$

then: $Fe^{2+} + H_2O \leftrightarrows Fe(OH)^+ + H^+$

A, B, or N ? A Ka

24. KCl $\xrightarrow{(H_2O)}$ Both from strong

A, B, or N ? N