

(IV.13) + F4, F5

Hydrolysis Ions react with water.

Chemistry 12

Unit IV - Acids, Bases, and Salts

Problem Set # 5 Hydrolysis of Salts and Reactions of Acids and Bases

Describe each substance below as an acid, base, neutral salt, acidic salt, or basic salt.

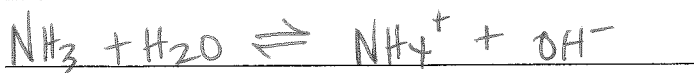
Then,

- (i) For each acidic or basic salt, write the dissociation equation *and* the hydrolysis equation.
- (ii) For each neutral salt, write the dissociation equation.
- (iii) For acids and bases, write an equation to show how the species ionizes in aqueous solution.

Weak
1. Base

NH₃

Weak Base



Bronsted Lowry Rxn.
(EQM)

Neutral
2. Salt

KCl



Both ions are spectators, no hydrolysis = Neutral

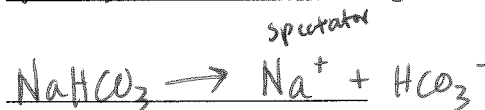
Strong
3. Acid

HNO₃

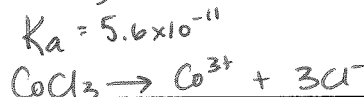


Basic
4. Salt

NaHCO₃



BASIC SALT



$$K_b = \frac{K_w}{K_a} = \frac{1.0 \times 10^{-14}}{4.3 \times 10^{-7}} = 2.3 \times 10^{-8}$$

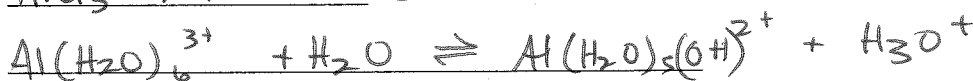
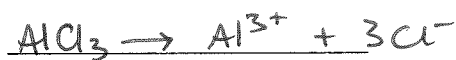
Acidic
5. Salt

CoCl₃



Acidic
6. Salt

AlCl₃



Weak
7. Acid

H₂C₂O₄



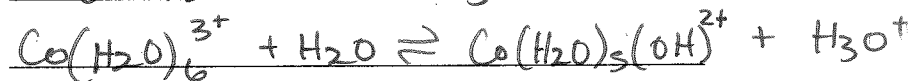
Basic
8. Salt

NaC₆H₅O

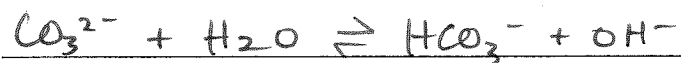


Acidic
9. Salt

Co(NO₃)₃



10. *Basic salt* Na_2CO_3



11. *Neutral salt* NaCl



no hydrolysis

12. *Strong Acid* HCl



13. *Basic salt* NaCN



14. *Strong Base* KOH



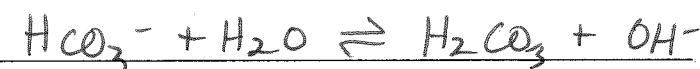
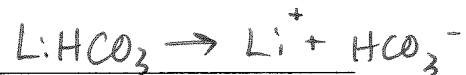
15. *Acidic salt* FeCl_3



16. *Weak acid* HF

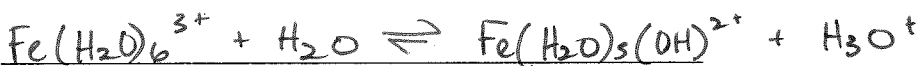


17. *Basic salt* LiHCO_3

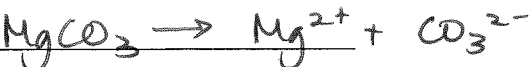


HCO_3^- HCO_3^-
 $K_a = 5.6 \times 10^{-11}$ $K_b =$

18. *Acidic salt* $\text{Fe}(\text{NO}_3)_3$



19. *Basic salt* MgCO_3



20. ^{weak acid}
H₂S



21. ^{strong acid}
HBr

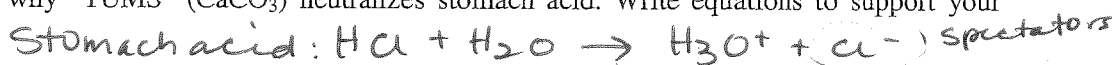


22. ^{neutral salt}
CaI₂



no hydrolysis

23. Describe why "TUMS" (CaCO₃) neutralizes stomach acid. Write equations to support your answer.



Carbonate ion reacts with the acid to form bicarbonate. then bicarbonate also reacts with acid

then decomposes into water and carbon dioxide

24. Describe why Mg(OH)₂ is used in Milk of Magnesia as an antacid instead of NaOH.

NaOH is too strong a base, as it dissociates almost completely. Swallowing NaOH would cause chemical burns to the mouth and throat.

Mg(OH)₂ has low solubility, small amount will dissolve and dissociate, as the hydroxide ions that are produced are neutralized more Mg(OH)₂ will dissolve. (think LeChatelier's Principle)

