1. Name 3 strong acids and write their formulas. What makes an acid strong?

2. Name 4 weak acids and write their formulas. What makes an acid weak?

3. Name 2 strong bases and write their formulas. What makes a base strong?

4. Name 1 weak base and write its formula. What makes a base weak?

5. Identify the Arrhenius acid and base in the following reactions:
   a. HNO$_3$(aq) + KOH(aq) $\rightarrow$ H$_2$O(l) + LiNO$_3$(aq)
   b. 2 HBr(aq) + Ca(OH)$_2$(aq) $\rightarrow$ 2 H$_2$O(l) + CaBr$_2$(aq)
   c. HC$_2$H$_3$O$_2$(aq) + LiOH(aq) $\rightarrow$ H$_2$O(l) + LiC$_2$H$_3$O$_2$(aq)

6. What is the pH for these solutions? Is the solution acidic, basic, or neutral?
   a. [H$^+$] = 10$^{-9}$ pH = ________
   b. [H$^+$] = 10$^{-4}$ pH = ________
   c. [H$^+$] = 0.0001 pH = ________
   d. [H$^+$] = 0.0000000001 pH = ________

7. What is the definition of a buffer solution?

8. Identify the Bronsted Lowry acid and base in the following reactions:
   a. NH$_3$(aq) + HClO$_4$(aq) $\rightarrow$ NH$_4^+$ (aq) + ClO$_4^-$ (aq)
   b. HCl(aq) + CH$_3$NH$_2$(aq) $\rightarrow$ Cl$^-$ (aq) + CH$_3$NH$_3^+$ (aq)

9. Draw a picture of the following in beakers of water: NaBr, Mg(OH)$_2$, K$_2$S, HNO$_3$, and HC$_2$H$_3$O$_2$.

10. Are the following strong, weak, or non-electrolytes?
    a. PbSO$_4$  f. CH$_3$OH
    b. Al$_2$(SO$_4$)$_3$ g. K$_2$CrO$_4$
    c. C$_6$H$_{12}$O$_6$ h. Ni(NO$_3$)$_3$
    d. SrI$_2$ i. Ba(C$_2$H$_3$O$_2$)$_2$
    e. Cu(OH)$_2$ j. Ca$_3$(PO$_4$)$_2$
Answers:

1. Name 3 strong acids and write their formulas. What makes an acid strong?
   Hydrochloric acid HCl, nitric acid HNO₃, sulfuric acid H₂SO₄. Strong means 100% ionized, all the H⁺ ions have broken off the acid molecule in water. It exists as all ions.

2. Name 4 weak acids and write their formulas. What makes an acid weak?
   Hydrofluoric acid HF, phosphoric acid H₃PO₄, carbonic acid H₂CO₃, acetic acid HC₂H₃O₂. Weak means very little ionized like 1-5%. Few H⁺ ions have come off the acid molecule in water. Few ions.

3. Name 2 strong bases and write their formulas. What makes a base strong?
   Potassium hydroxide KOH, sodium hydroxide NaOH. Strong means 100% dissociated, all the OH⁻ ions have broken off the base in water. It exists as all ions.

4. Name 1 weak base and write its formula. What makes a base weak?
   Magnesium hydroxide Mg(OH)₂. Weak means 1-5% dissociated. Few ions. Most stays together.

5. Identify the Arrhenius acid and base in the following reactions:
   a. HNO₃(aq) + KOH(aq) → H₂O(l) + LiNO₃(aq)  
      Acid          Base
   b. 2 HBr(aq) + Ca(OH)₂(aq) → 2 H₂O(l) + CaBr₂(aq)  
      Acid          Base
   c. HC₂H₃O₂(aq) + LiOH(aq) → H₂O(l) + LiC₂H₃O₂(aq)  
      Acid          Base

6. What is the pH for these solutions? Is the solution acidic, basic, or neutral?
   a. [H⁺] = 10⁻⁹ ⊕ pH = 9 basic
   b. [H⁺] = 10⁻⁴ ⊕ pH = 4 acidic
   c. [H⁺] = 0.0001 ⊕ pH = 4 acidic
   d. [H⁺] = 0.0000000001 ⊕ pH = 10 basic

7. What is the definition of a buffer solution?
   A solution that keeps pH constant, resists a change in pH.

8. Identify the Bronsted Lowry acid and base in the following reactions:
   a. NH₃(aq) + HClO₄(aq) → NH₄⁺(aq) + ClO₄⁻(aq)  
      Base          Acid
   b. HCl(aq) + CH₃NH₂(aq) → Cl⁻(aq) + CH₃NH₃⁺(aq)  
      Acid          Base

9. Draw a picture of the following in beakers of water: NaBr, Mg(OH)₂, K₂S, HNO₃, and HC₂H₃O₂.

10. Are the following strong, weak, or non-electrolytes?
    a. PbSO₄ weak  
    f. CH₃OH non
    b. Al₂(SO₄)₃ strong  
    g. K₂CrO₄ strong
    c. C₆H₁₂O₆ non  
    h. Ni(NO₃)₃ strong
    d. SrI₂ strong  
    i. Ba(C₂H₃O₂)₂ strong
    e. Cu(OH)₂ weak  
    j. Ca₃(PO₄)₂ weak