CONCEPT: TRIPROTIC ACIDS AND BASES

Acid Dissociation Constant

- Triprotic Acids (_____) can donate ___ acidic hydrogens and as a result possess three K_a values.
  - □ In terms of Ka magnitude: _____ > _____ > _____
    - K_{a1} deals with donating the ____ acidic proton (H^+).
    - K_{a2} deals with donating the ____ acidic proton (H^+).
    - K_{a3} deals with donating the ____ acidic proton (H^+).
  - □ The relationships between the Ka values and their respective Kb values are shown as:

Polyprotic Acid Equilibria

Dissociation Steps

$H_3A \rightleftharpoons H_2A^- \rightleftharpoons HA^{2-} \rightleftharpoons A^{3-}$

_____ Form _____ Form 1 _____ Form 2 _____ Form

Ka-Kb Equations

____ • ____ = K_w ____ • ____ = K_w ____ • ____ = K_w

Equilibrium Expressions

H_3PO_4 (aq) + _____ ( ) ⇌ _____ (aq) + _____ (aq) $K_{a\_\_}$ = _____

_____ (aq) + _____ ( ) ⇌ _____ (aq) + _____ (aq) $K_{a\_\_}$ = _____

_____ (aq) + _____ ( ) ⇌ _____ (aq) + _____ (aq) $K_{a\_\_}$ = _____

EXAMPLE: Provide the dissociation equation associated with the K_{a2} value for the triprotic acid of pyrophosphoric acid, $H_4P_2O_7$.

PRACTICE: Determine the equilibrium expression for the K_{a3} value of citric acid, $H_3C_6H_5O_7$?