

1. (a).

$$K_o = \frac{[HB]_{\text{org}}}{[HB]_{\text{aq}}}$$



$$K_a = \frac{[H^+][B^-]}{[HB]} \quad \Rightarrow \quad [B^-] = K_a \frac{[HB]}{[H^+]}$$



$$K_d = \frac{[HB \cdot HB]}{[HB]^2} \quad \Rightarrow \quad [HB \cdot HB] = K_d [HB]^2$$

Sebelum kita tahu bahwa

$$D = \frac{\text{Total konsentrasi as. benzoat pada fase organik}}{\text{Total konsentrasi as. benzoat pada fase cair.}}$$

$$D = \frac{[HB]_{org} + 2[HB \cdot HB]_{org}}{[HB]_{aq} + [B^-]_{aq}}$$

$$\boxed{[B^-] = K_a \frac{[HB]}{[H^+]}} \quad \boxed{[HB \cdot HB] = K_d [HB]^2}$$

Lathe disubstitusikan kedalam persamaan D

$$D = \frac{[HB]_{org} + 2[HB \cdot HB]_{org}}{[HB]_{aq} + K_a \frac{[HB]_{aq}}{[H^+]_{aq}}} = \frac{[HB]_{org} (1 + 2K_d [HB])}{[HB]_{aq} (1 + K_a/[H^+])}$$

$$= \frac{K_d (1 + 2K_d [HB])}{1 + K_a/[H^+]}$$