



$K_{a1} = \frac{[H^+][HQ]}{[H_2Q^+]} \rightarrow \frac{[H_2Q^+]}{[HQ]} = \frac{[H^+]}{K_{a1}}$

$K_{a2} = \frac{[H^+][Q^-]}{[HQ]} \rightarrow \frac{[Q^-]}{[HQ]} = \frac{K_{a2}}{[H^+]}$

> 分配比 = 1, H_2Q^+ , HQ , Q^- の割合を求めたい

$pK_{a1} = 4.95 \rightarrow K_{a1} = 10^{-4.95}$

$pK_{a2} = 9.63 \rightarrow K_{a2} = 10^{-9.63}$

分配比 $D = \frac{[HQ]_{org}}{[H_2Q^+] + [HQ] + [Q^-]}$

$= \frac{[HQ]_{org}}{[HQ] \left(\frac{[H_2Q^+]}{[HQ]} + 1 + \frac{[Q^-]}{[HQ]} \right)}$

$= \frac{K_D}{\frac{[H^+]}{K_{a1}} + 1 + \frac{K_{a2}}{[H^+]}}$ (A)

酸性 $\rightarrow [H^+] \uparrow \rightarrow pH = -\log_{10}[H^+] \downarrow \rightarrow$ (A) の分母第 1 項が dominant

(A) $\rightarrow \log_{10} D = \log K_D - \log \frac{[H^+]}{K_{a1}} = \log K_D + \log K_{a1} + (-\log [H^+])$
この段階で消去
 $= \log K_D + pH$

分配比 +1 の直線

弱酸性 $\rightarrow [H^+] \downarrow \rightarrow pH = -\log [H^+] \uparrow \rightarrow$ (A) の分母第 3 項が dominant

(A) $\rightarrow \log_{10} D = \log K_D - \log \frac{K_{a2}}{[H^+]} = \log K_D - (-\log [H^+])$
 $= \log K_D - pH$

分配比 -1 の直線

