Log C- pH Diyagramları

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Log C – pH

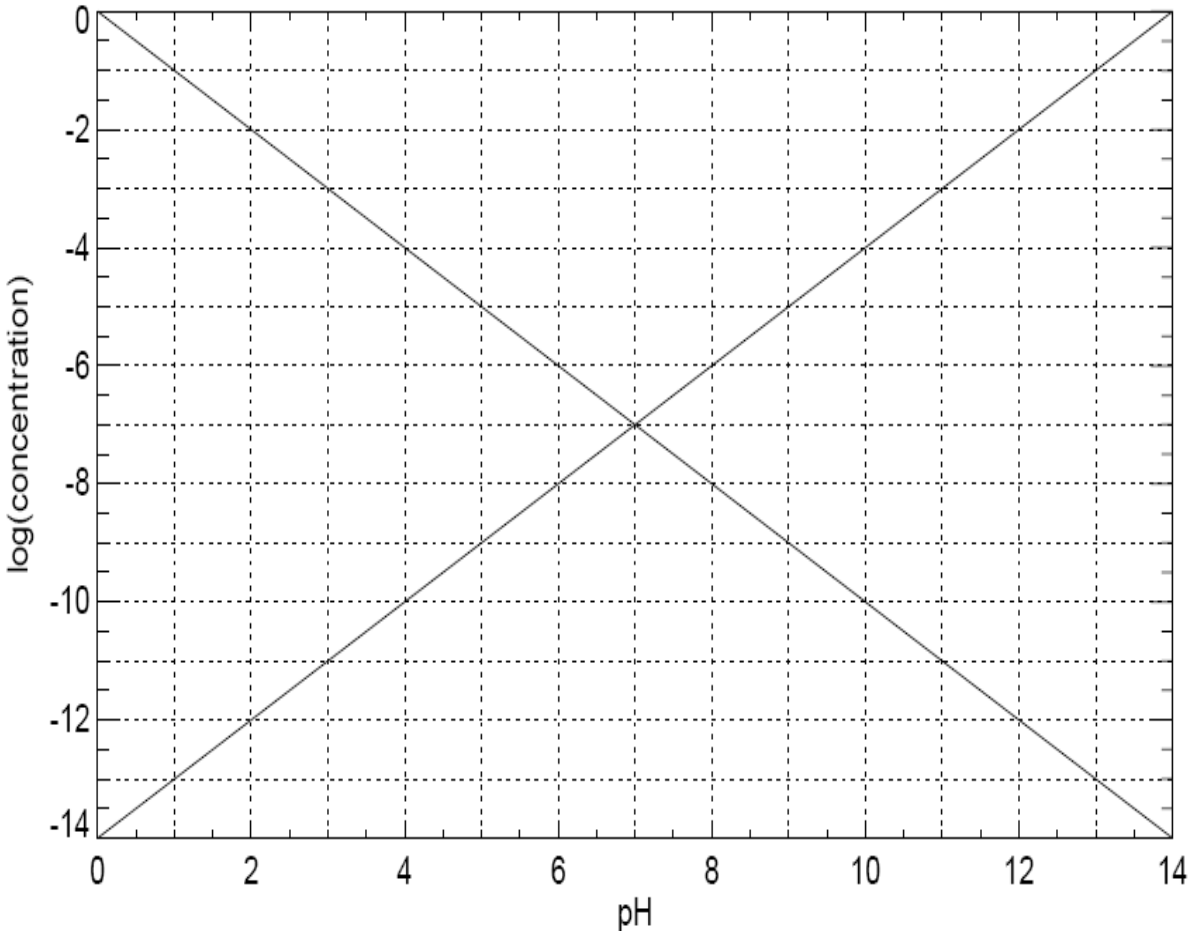
- [ ] = mol/L
- $[H^+]*[OH^-]/ [H_2O] = Kw = 10^{-14}$
- $[H_2O] = 1$
- $[H^+]*[OH^-] = 10^{-14}$
- $-\log[H^+] - \log[OH^-] = -\log 10^{-14} = 14$
- pH + pOH = 14

Log C– pH Diyagramları

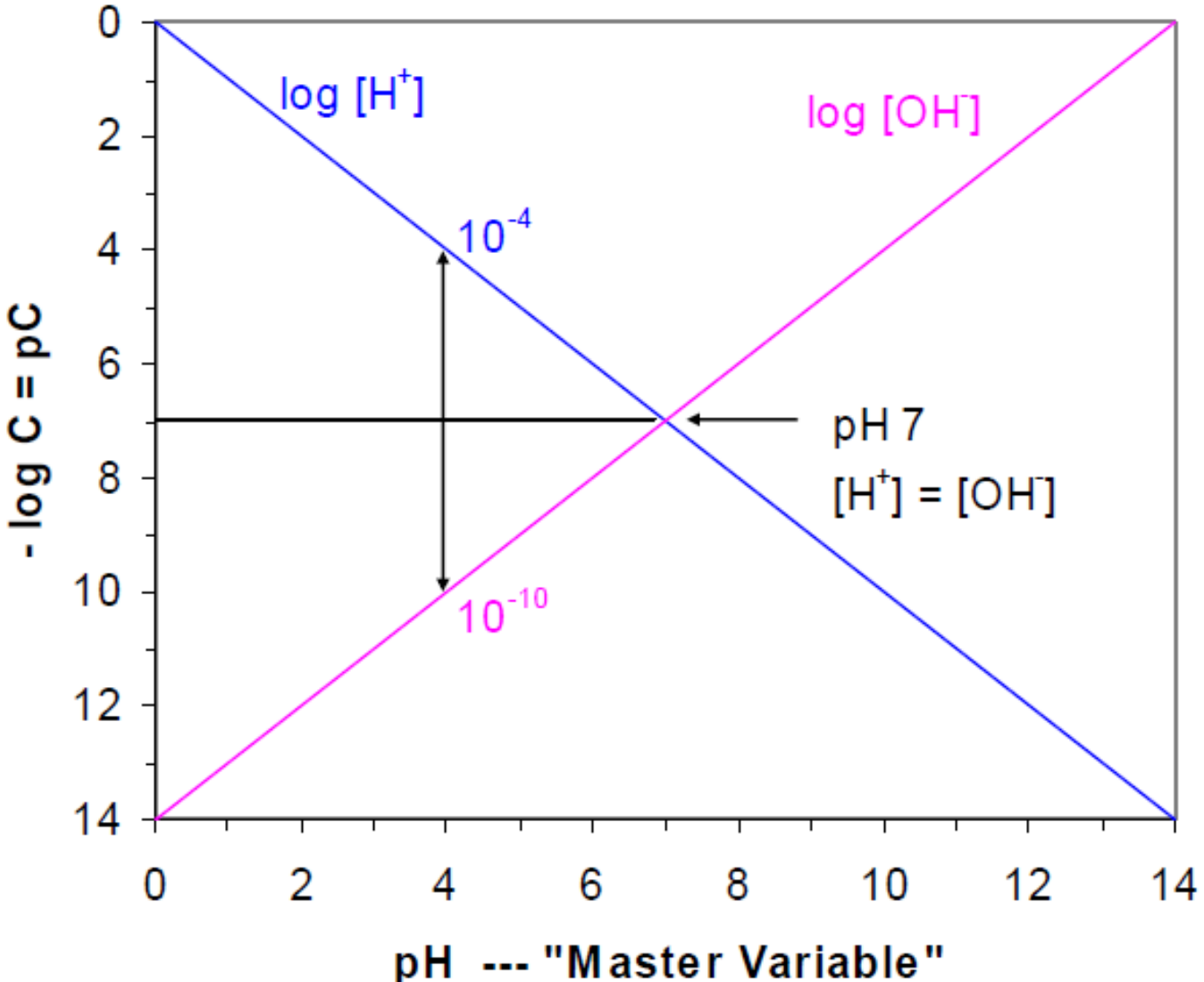
$$[OH^-]\,[H^+] = 10^{-14}$$

$$\underbrace{-\log [OH^-]}_{-\log C} \underbrace{-\log [H^+]}_{pH} = 14$$

Log C - pH

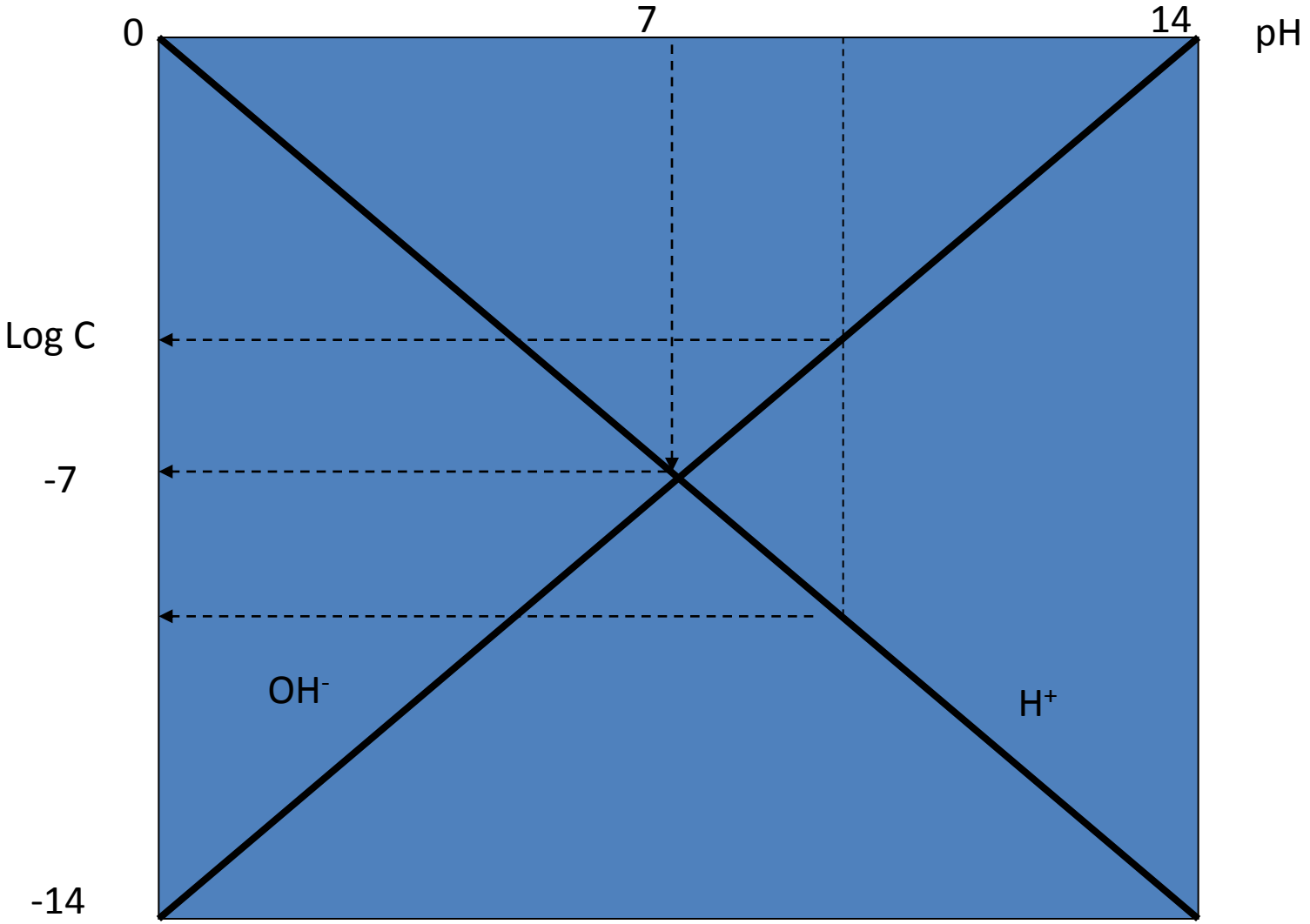


Log C – pH


log [H+]
log [OH-]
10-4
10-10
pH 7
[H+] = [OH-]
- log C = pC
0
2
4
6
8
10
12
14
pH --- "Master Variable"

Log C-pH Diyagramları

$[OH^-][H^+] = 10^{-14}$



$$\mathrm{H_2CO_3} \rightleftharpoons \mathrm{HCO_3^-} \rightleftharpoons \mathrm{CO_3^{2-}}$$

$$\frac{[\mathrm{H^+}][\mathrm{HCO_3^-}]}{[\mathrm{H_2CO_3^*}]} = K_1 = 10^{-6.3}$$

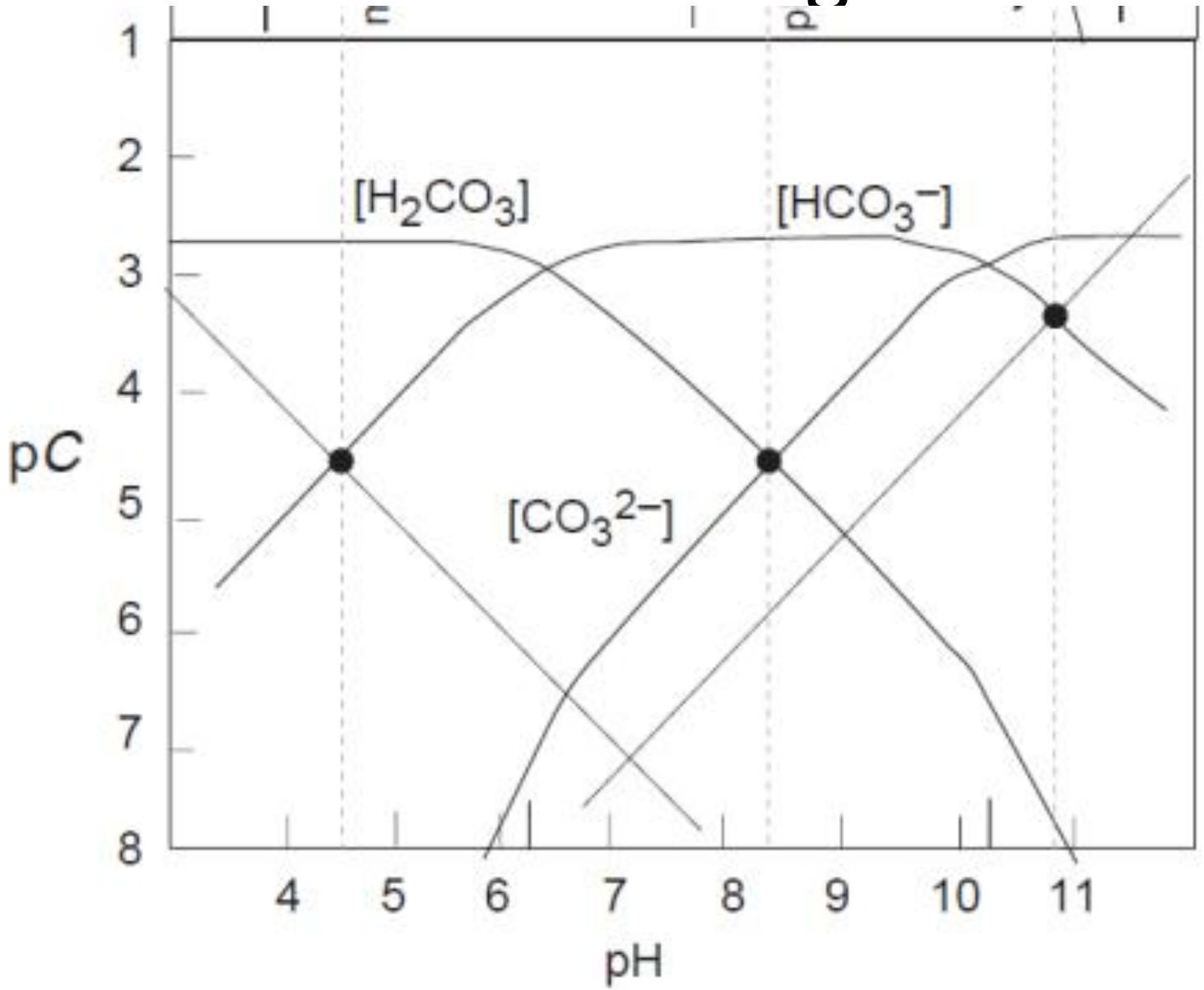
$$\frac{[\mathrm{H^+}][\mathrm{CO_3^{2-}}]}{[\mathrm{HCO_3^-}]} = K_2 = 10^{-10.3}$$

$$[\mathrm{H^+}][\mathrm{OH^-}] = K_w$$

$$C_\mathrm{T} = [\mathrm{H_2CO_3^*}] + [\mathrm{HCO_3^-}] + [\mathrm{CO_3^{2-}}] \quad \text{(mass balance)}$$

$$[\mathrm{H^+}] - [\mathrm{HCO_3^-}] - 2[\mathrm{CO_3^{2-}}] - [\mathrm{OH^-}] = 0 \quad \text{(charge balance)}$$

Karbonat Dengesi



Problem Example 1

Calculate the pH of a 0.0250 M solution of CO_2 in water.

Solution: Applying the usual approximation $[H^+] = [HCO_3^-]$ (i.e., neglecting the H^+ produced by the autoprotolysis of water), the equilibrium expression becomes

$$\frac{[H^+]^2}{0.0250 - [H^+]} = 4.47\text{E}{-7}$$

The large initial concentration of H_2CO_3 relative to the value of K_1 justifies the further approximation of dropping the $[H^+]$ term in the denominator.

$$\frac{[H^+]^2}{0.0250} = 4.47\text{E}{-7}$$

$$[H^+] = 1.06\text{E}{-4}; \qquad \text{pH} = 3.97$$

temperature	pKH	pK_1	pK_2	pK_w
fresh water 5 °C	1.19	6.517	10.56	14.73
25	**1.47**	**6.35**	**10.33**	**14.00**
50	1.72	6.28	10.17	13.26
seawater 25 °C	1.54	5.86	8.95	13.20

Table 3: Some concentration equilibrium constants relating to CO_2 equilibria

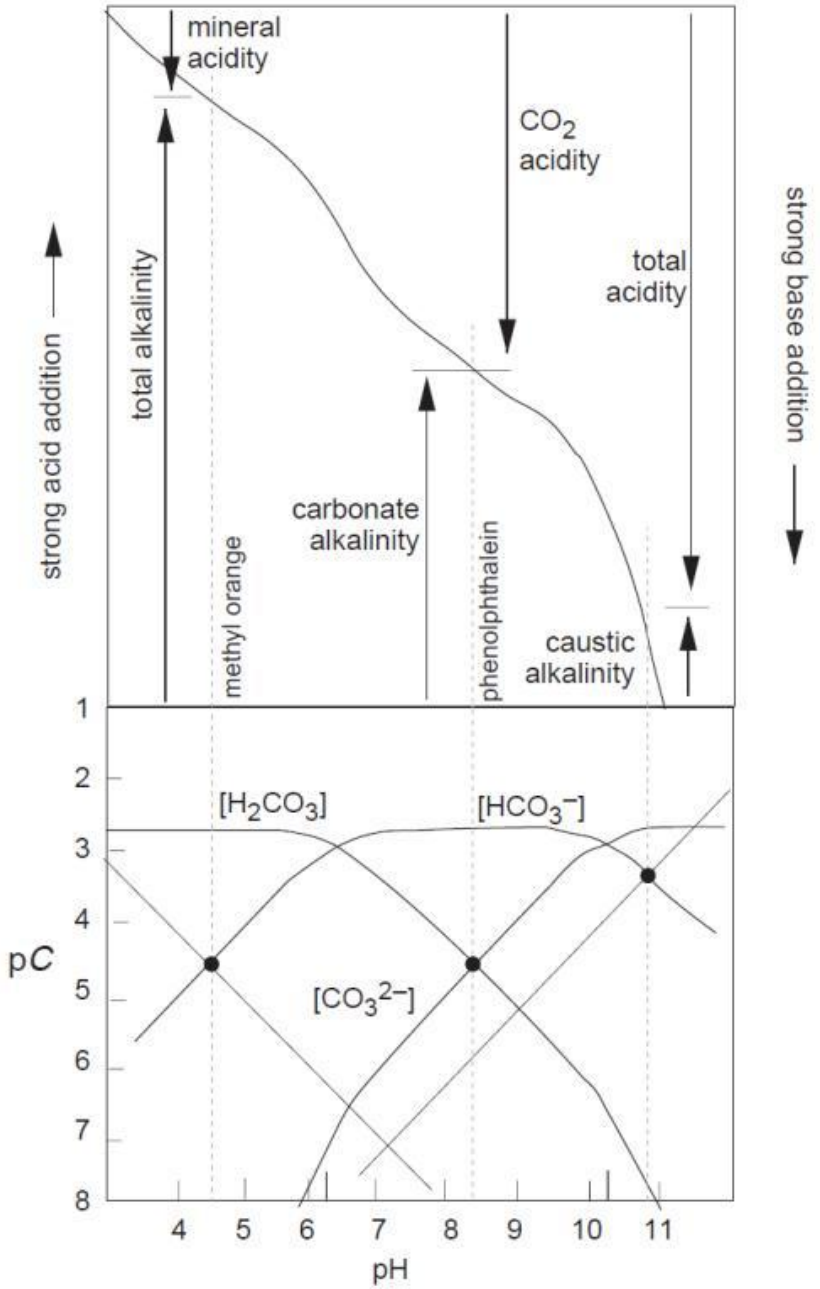
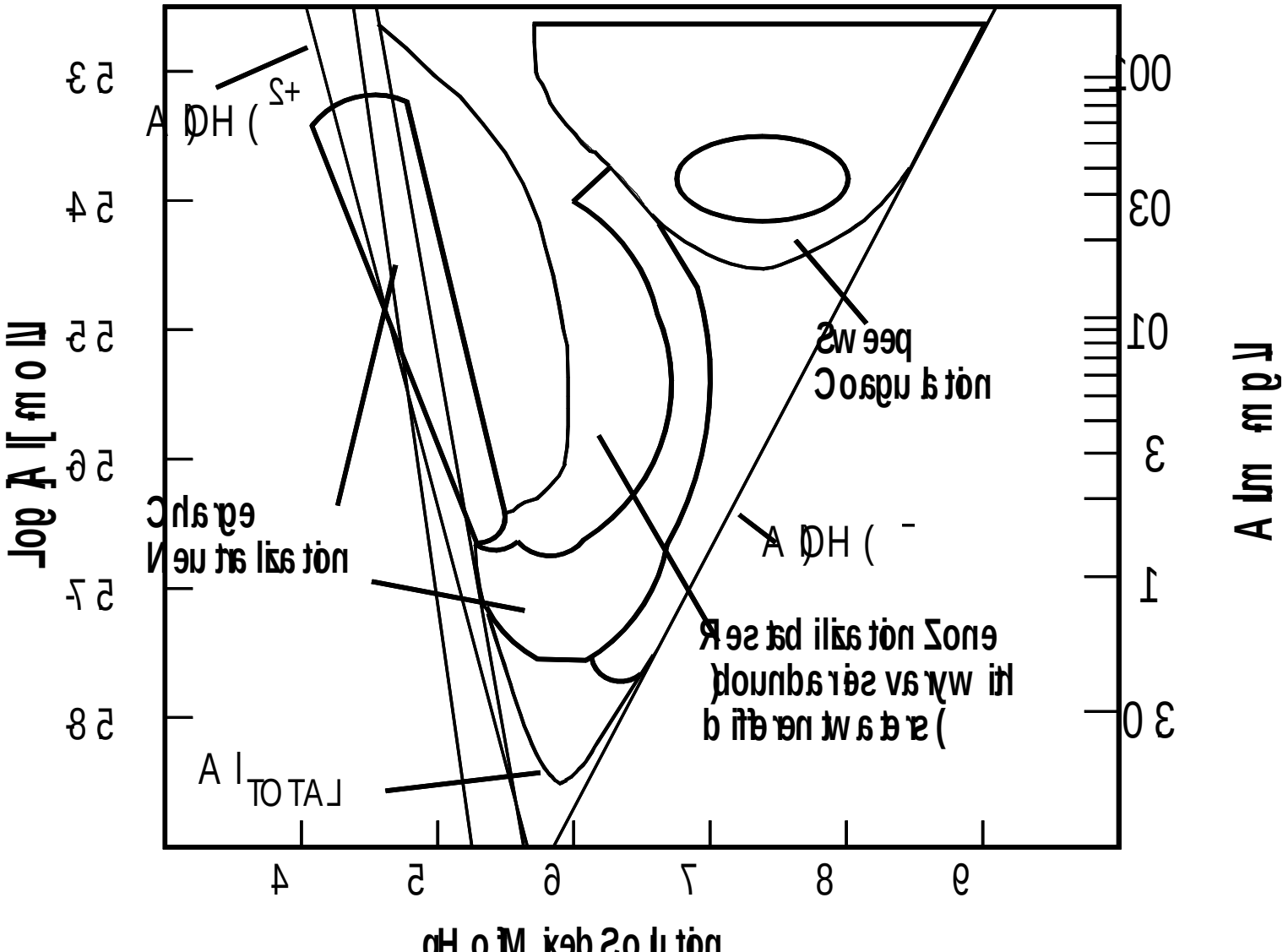


Figure 4: Titration and distribution curves illustrating alkalinity and acidity

Alum Yumaklaşma Diyagramı
Alum Coagulation Diagram



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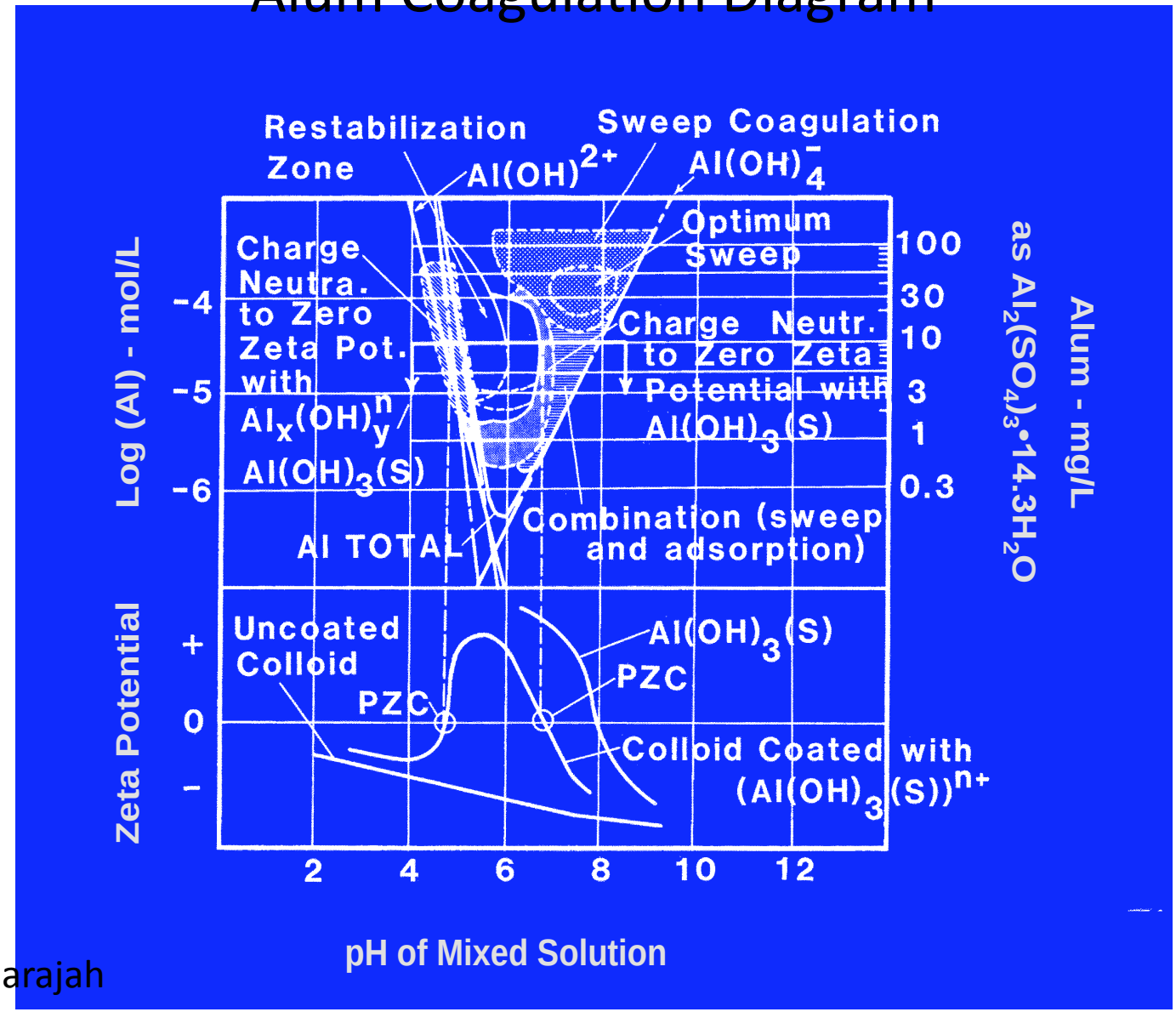

Ref: Amirtharajah