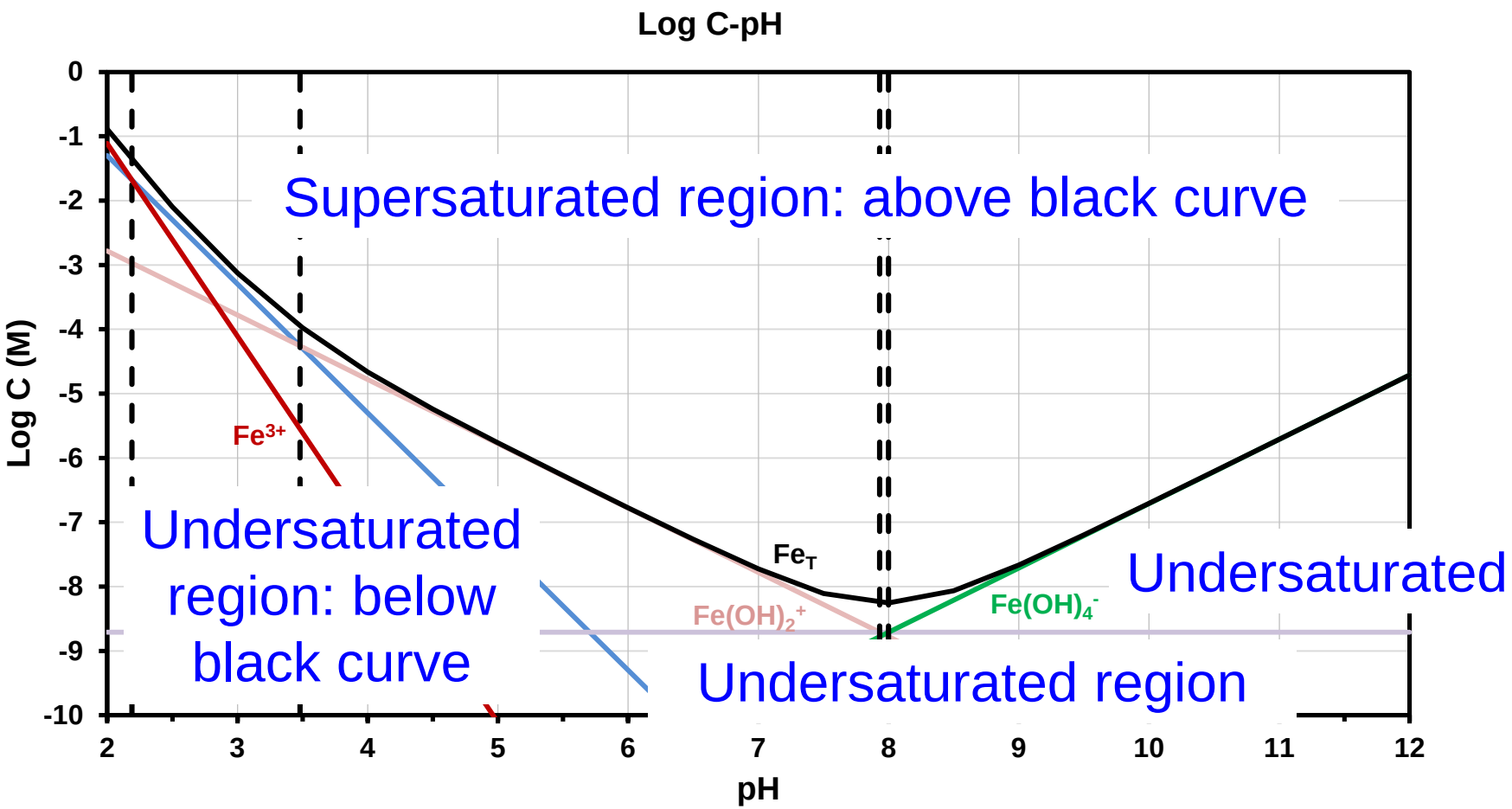
Solubility Curve for $Fe(OH)_{3(s)}$

$$[TOTFe_{diss}] = [Fe^{3+}] + [Fe(OH)^{2+}] + [Fe(OH)_2^{+}] + [Fe(OH)_{3(aq)}] + [Fe(OH)_4^{-}]$$

$$= [Fe^{3+}](1 + \beta_1^*/[H^+] + \beta_2^*/[H^+]^2 + \beta_3^*/[H^+]^3 + \beta_4^*/[H^+]^4)$$



Solubility Constants of Solids of Interest

Table 8.7 The K_{s0} values of some solids of interest

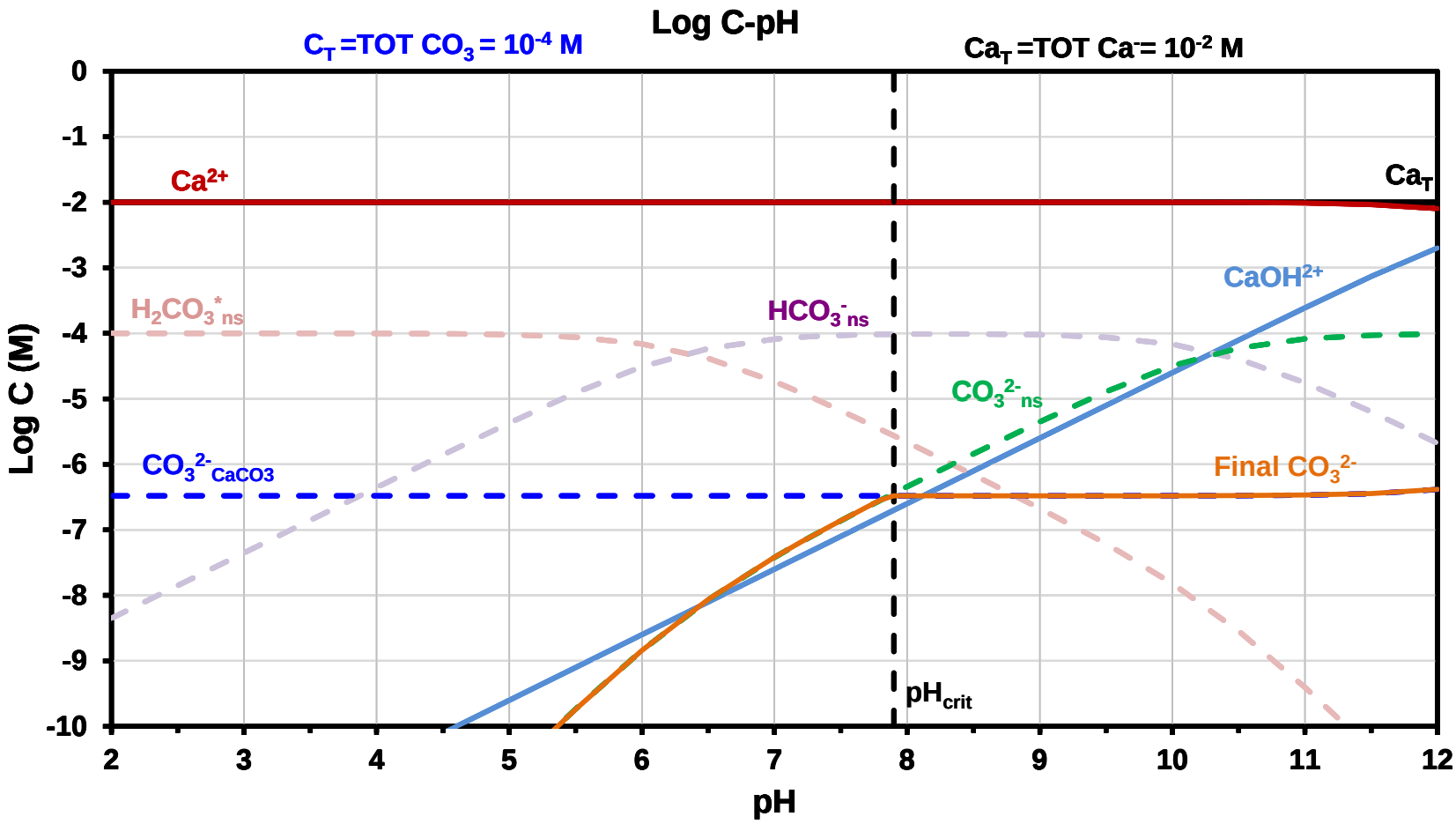
Metal	Mineral Name	Formula	Log K_{s0}
Ag^+		$AgOH(s)$	−7.70
		$Ag_2CO_3(s)$	−11.07
		$Ag_3PO_4(s)$	−17.55
		$Ag_2S(s)$	−48.97
		$AgCl(s)$	−9.75
Al^{3+}		$Al(OH)_3(s)$	−31.62
	Gibbsite	$Al(OH)_3(s)$	−33.23
		$AlPO_4(s)$	−22.50
Ca^{2+}	Calcite	$CaCO_3(s)$	−8.48
	Aragonite	$CaCO_3(s)$	−8.36
	Portlandite	$Ca(OH)_2(s)$	−5.32
	Lime	$CaO(s)$	4.80
	Gypsum	$CaSO_4(s)$	−4.85
	Hydroxylapatite	$Ca_5(OH)(PO_4)_3(s)$	−44.2
Cu^+	Nantokite	$CuCl(s)$	−6.76
Fe^{2+}		$Fe(OH)_2(s)$	−15.90
	Siderite	$FeCO_3(s)$	−10.55
	Vivianite	$Fe_3(PO_4)_2(s)$	−36.00
		$FeS(s)$	−16.84
Fe^{3+}	Ferrihydrite	$Fe(OH)_3(s)$	−37.11
	Goethite	α-$FeOOH(s)$	−41.50
	Lepidocrocite	γ-$FeOOH(s)$	−46.00
	Hematite	α-$Fe_2O_3(s)$	−40.63
Hg^{2+}		$Hg(OH)_2(s)$	−25.40
		$HgO(s)$	−25.55
		$Hg(CN)_2(s)$	−39.28
		$HgCO_3(s)$	−22.52
	Cinnabar	$HgS(s)$	−52.01

In terms of OH^-

K_{s0} : $Fe(OH)_{3(s)} = Fe^{3+} + 3OH^-$

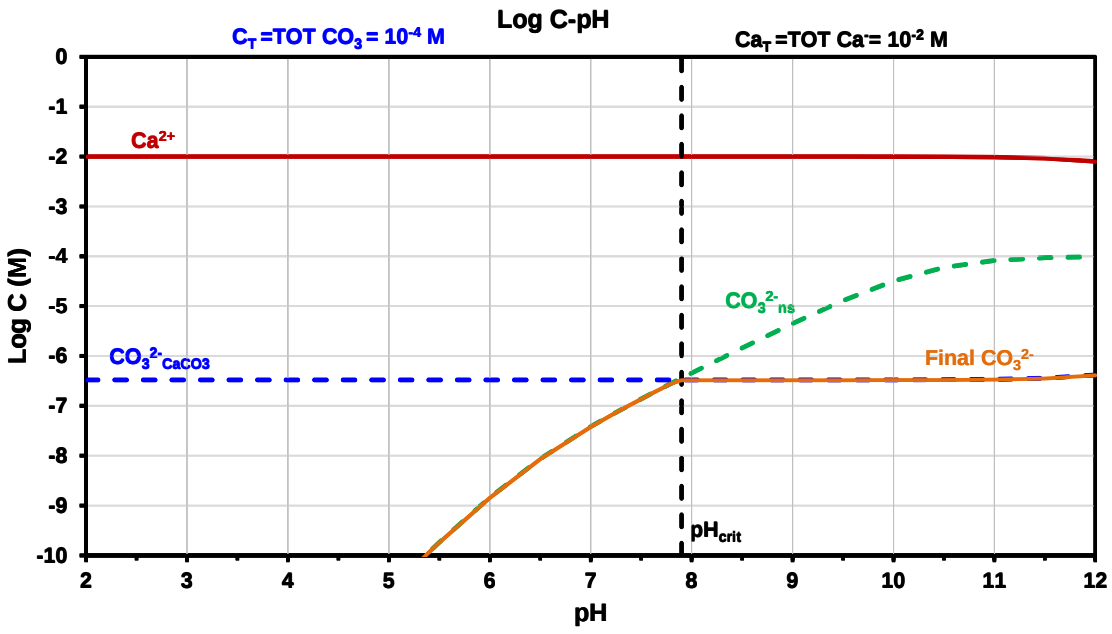
Source: Water Chemistry, Benjamin, 2002

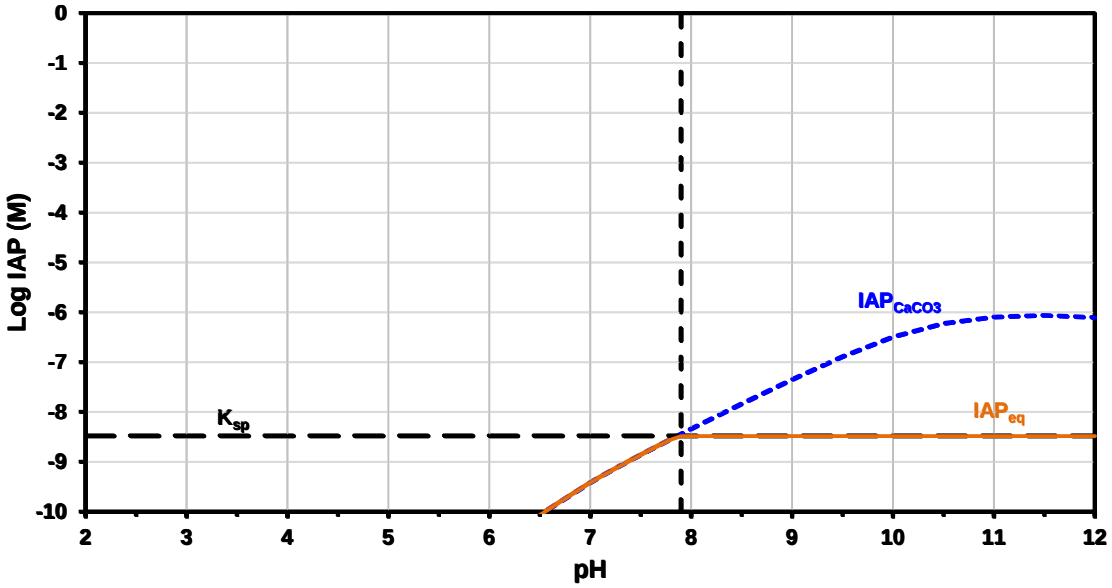
Solubility of $CaCO_{3(s)}$



Solid does not precipitate below pH_{crit} = 7.9

Solubility of $CaCO_{3(s)}$





Solid does not precipitate below pH_{crit} = 7.9

Saturation Index

$SI = \log_{10} (IAP/ K_{sp})$

If SI < 0, Undersaturated

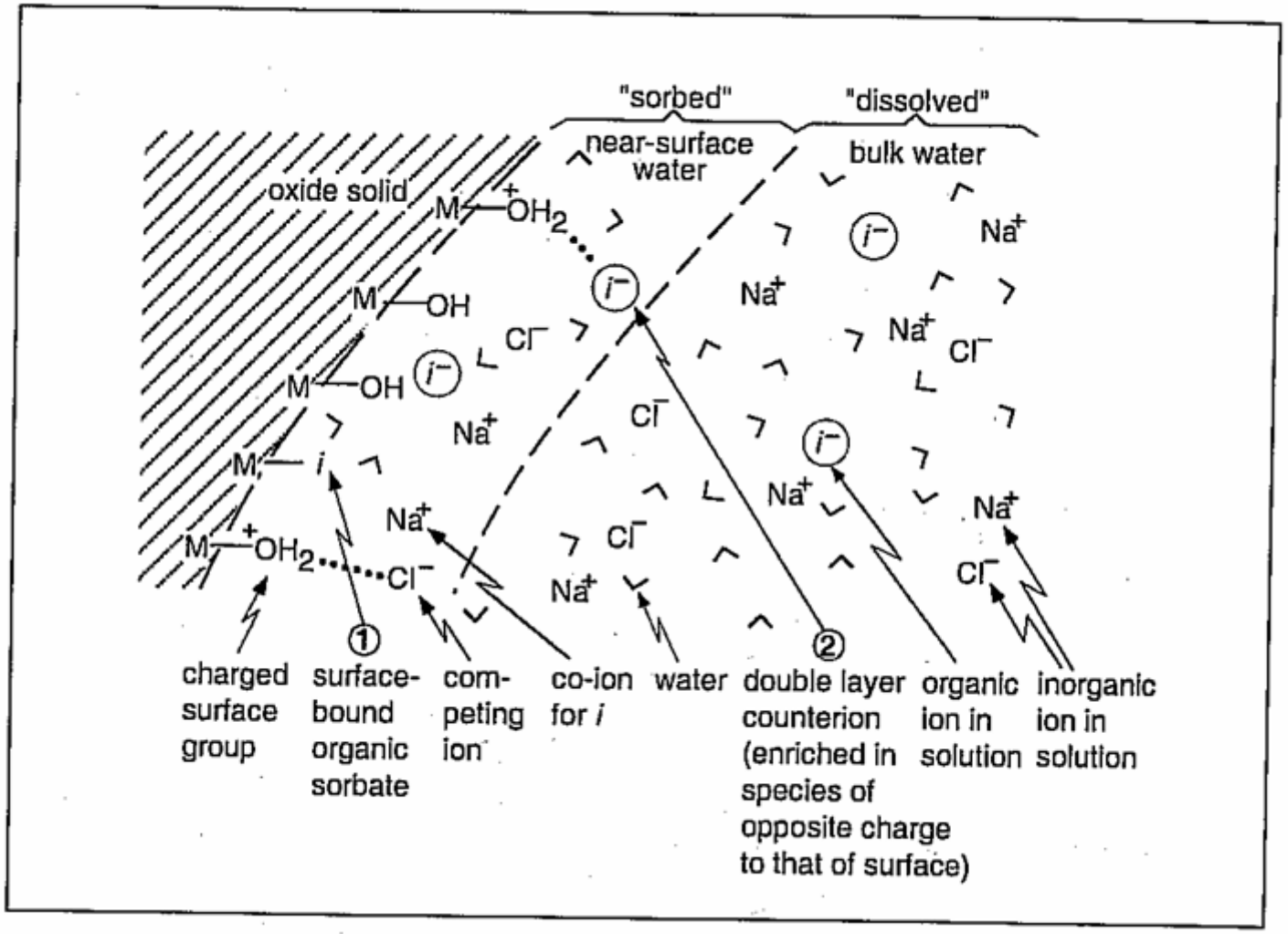
If SI = 0, At saturation

If SI > 0, Supersaturated

NEW TOPIC

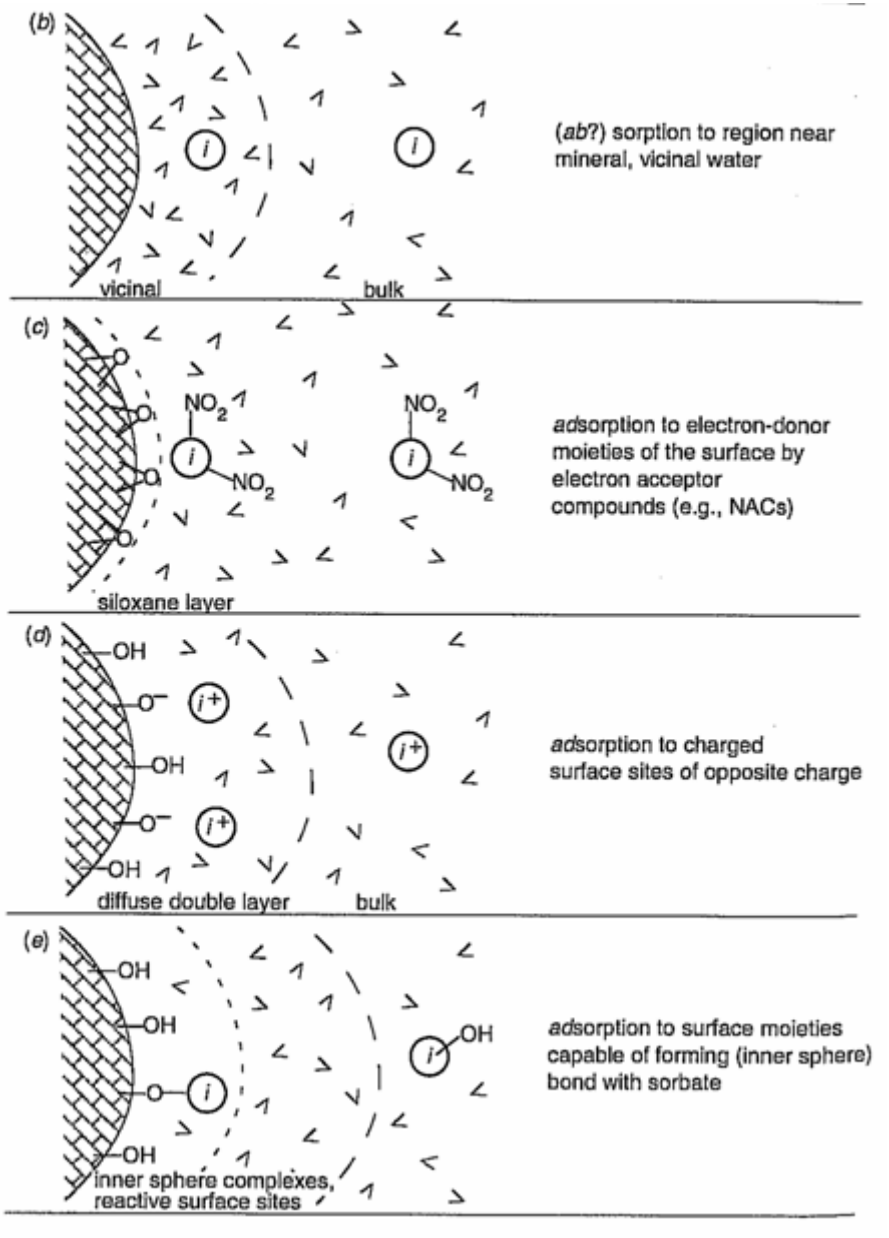
SORPTION OF POLLUTANT SPECIES ON SOLIDS

Ion Associations Near Mineral Surface

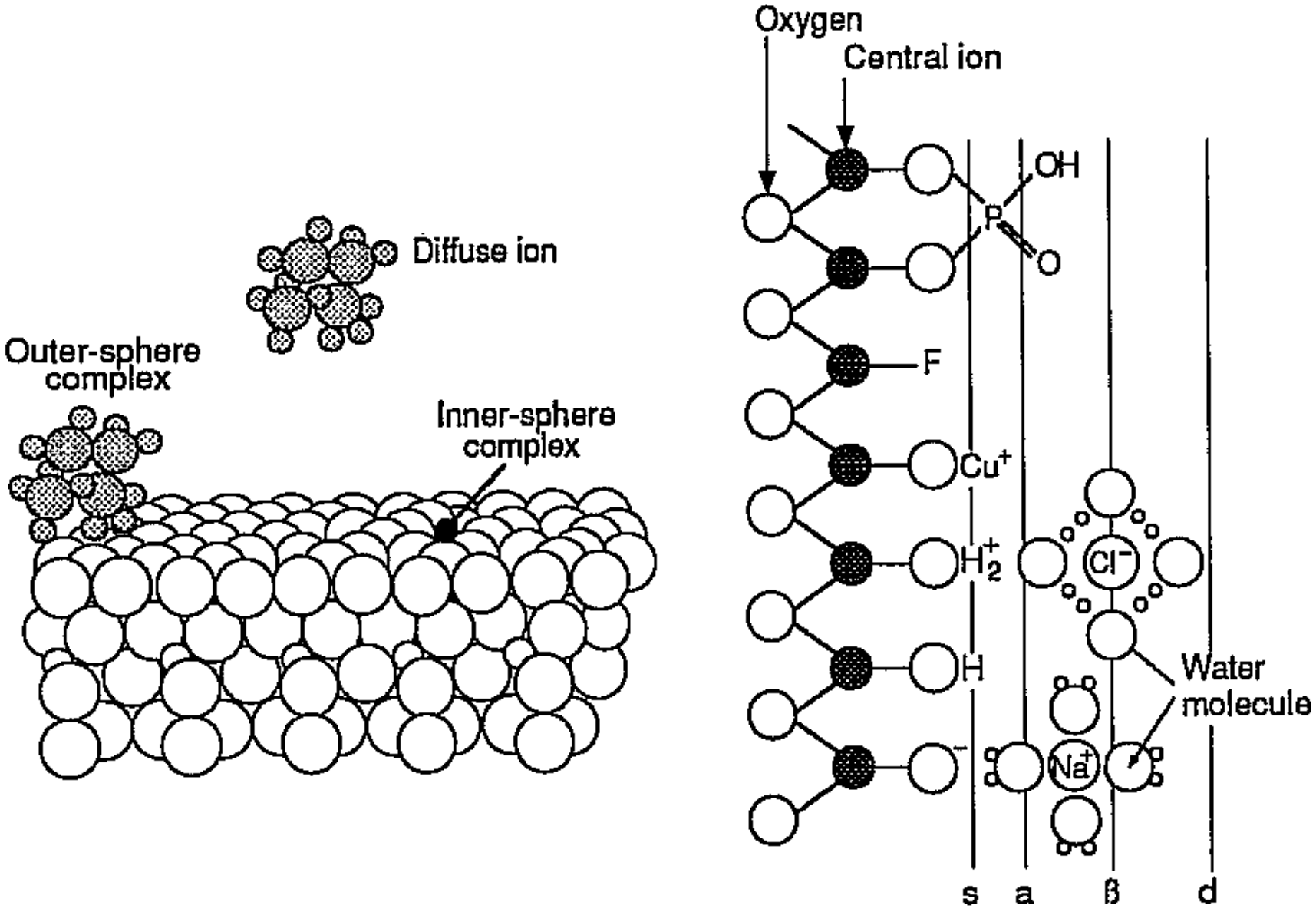


Source: Environmental Organic Chemistry, 2nd Ed., Schwarzenbach, Gschwend, and Imboden, 2003.

Sorption Mechanisms to Inorganic Surface

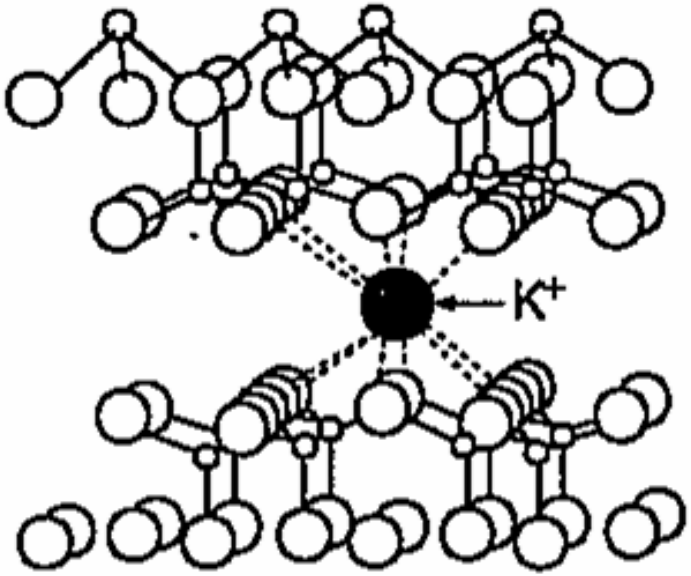


Source: Environmental Organic Chemistry, 2nd Ed., Schwarzenbach, Gschwend, and Imboden, 2003.

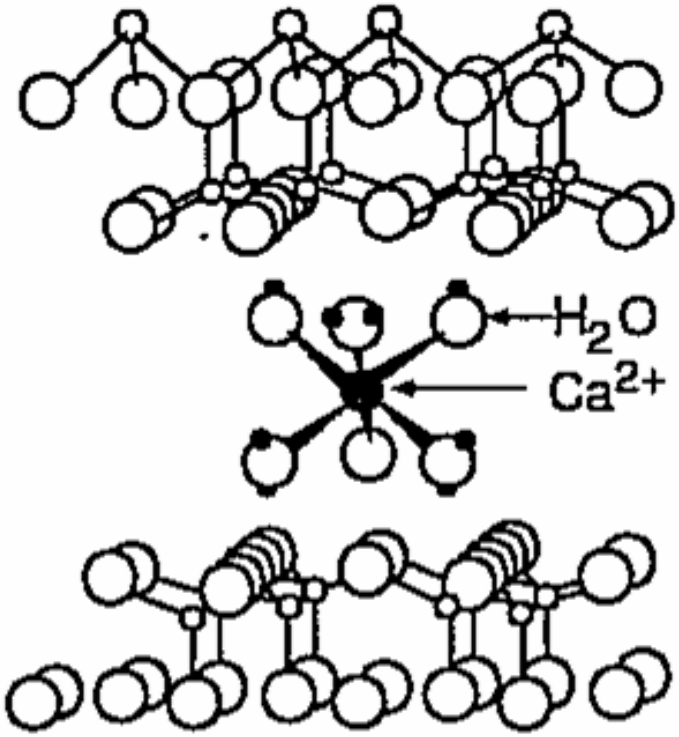


Source: Stumm and Morgan, Aquatic Chemistry, 1996

Clay Structure



Inner-sphere surface complex:
K^+ on vermiculite



Outer-sphere surface complex:
$Ca(H_2O)_6^{2+}$ on montmorillonite

Source: Aquatic Chemistry, Stumm and Morgan, 1996