

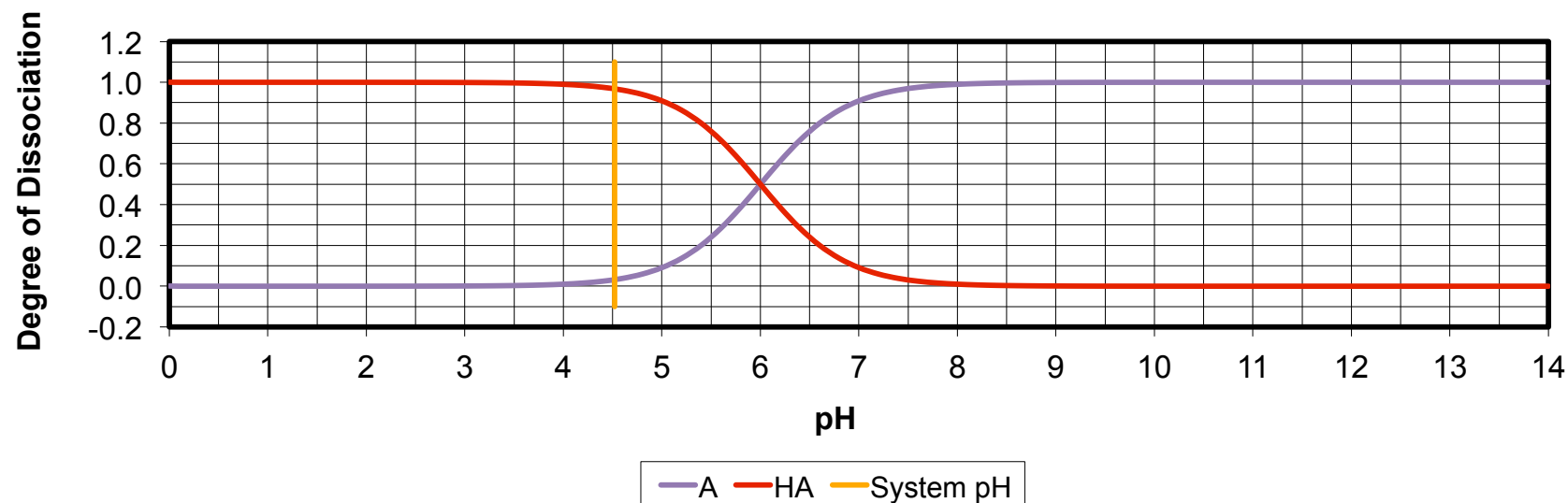
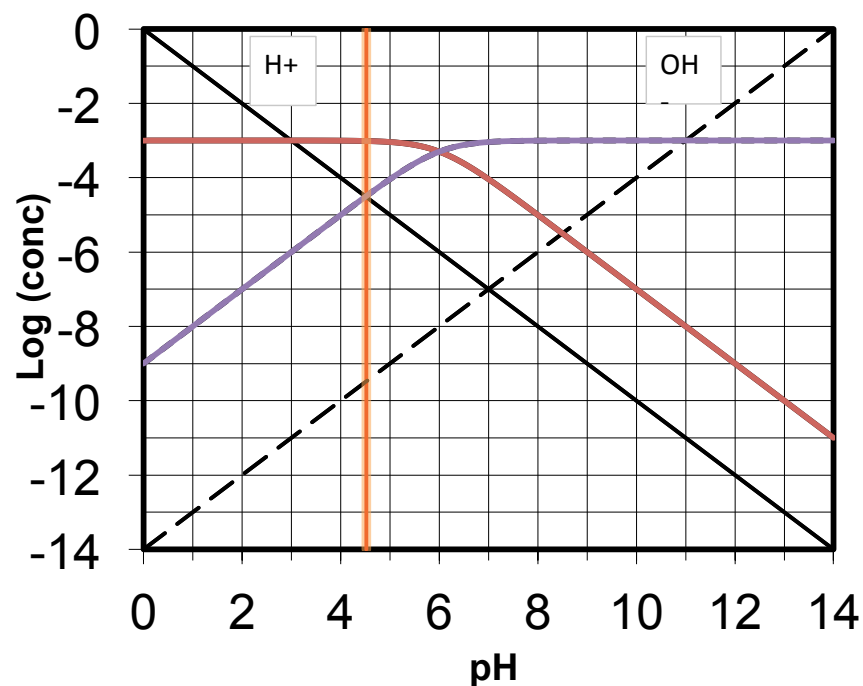
Input Data		pX
C_t	1.00E-03 M	3.00
K_a	1.00E-06	6.00
K_w	1.00E-14	14.00

Results		pX
pH	4.52	
H^+	3.02E-05 M	4.52
OH^-	3.31E-10 M	9.48
HA	9.68E-04 M	3.01
A^-	3.21E-05 M	4.49
α_{HA}	0.97	
α_{A^-}	0.03	

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	$\gg$	K_a
1.00E-03	$\gg$	1.00E-06
HA $\gg$ A		
HA = C_t		
Approximation Valid		
No Approx		Approx
3.00	p C_t	3.01
Error %		3.21%

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t \cdot K_a$	$\gg$	K_w
1.00E-09	$\gg$	1.00E-14
A $\gg$ OH		
A = H		
Approximation Valid		
No Approx		Approx
4.49	pH	4.49
Error %		0.00%



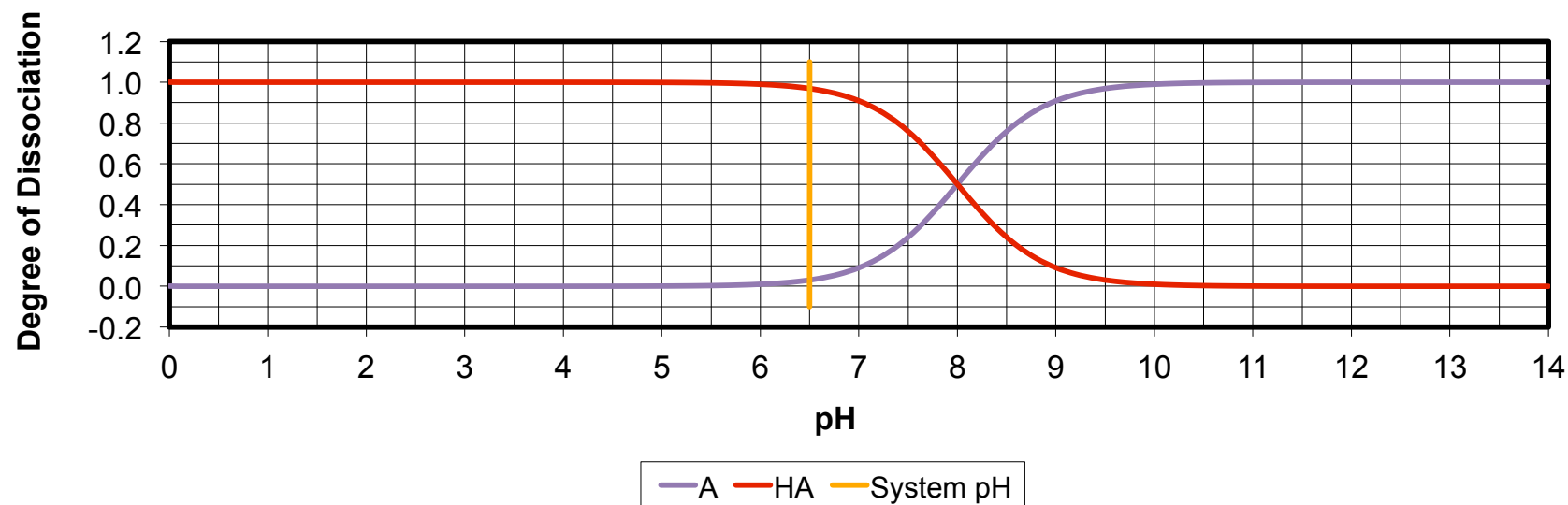
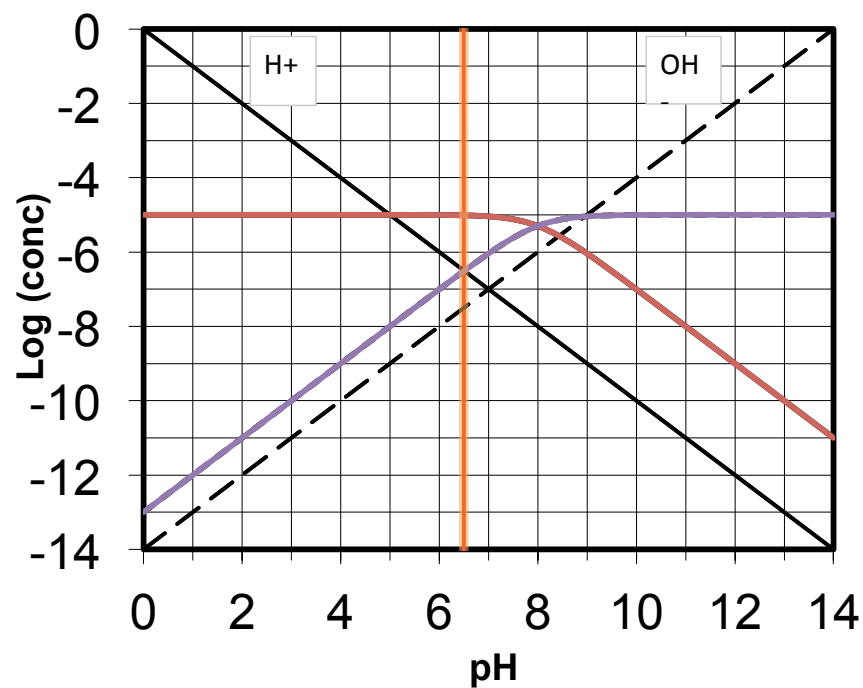
Input Data		pX
C_t	1.00E-05 M	5.00
K_a	1.00E-08	8.00
K_w	1.00E-14	14.00

Results		pX
pH	6.50	
H^+	3.16E-07 M	6.50
OH^-	3.16E-08 M	7.50
HA	9.69E-06 M	5.01
A^-	3.07E-07 M	6.51
α_{HA}	0.97	
α_{A^-}	0.03	

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	$\gg$	K_a
1.00E-05	$\gg$	1.00E-08
HA $\gg$ A		
HA = C_t		
Approximation Valid		
No Approx		Approx
5.00	p C_t	5.01
Error %		3.07%

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t \cdot K_a$	=	K_w
1.00E-13	=	1.00E-14
OH = A		
Retain full CB		
No Approx		Approx
6.47	pH	6.51
Error %		9.35%



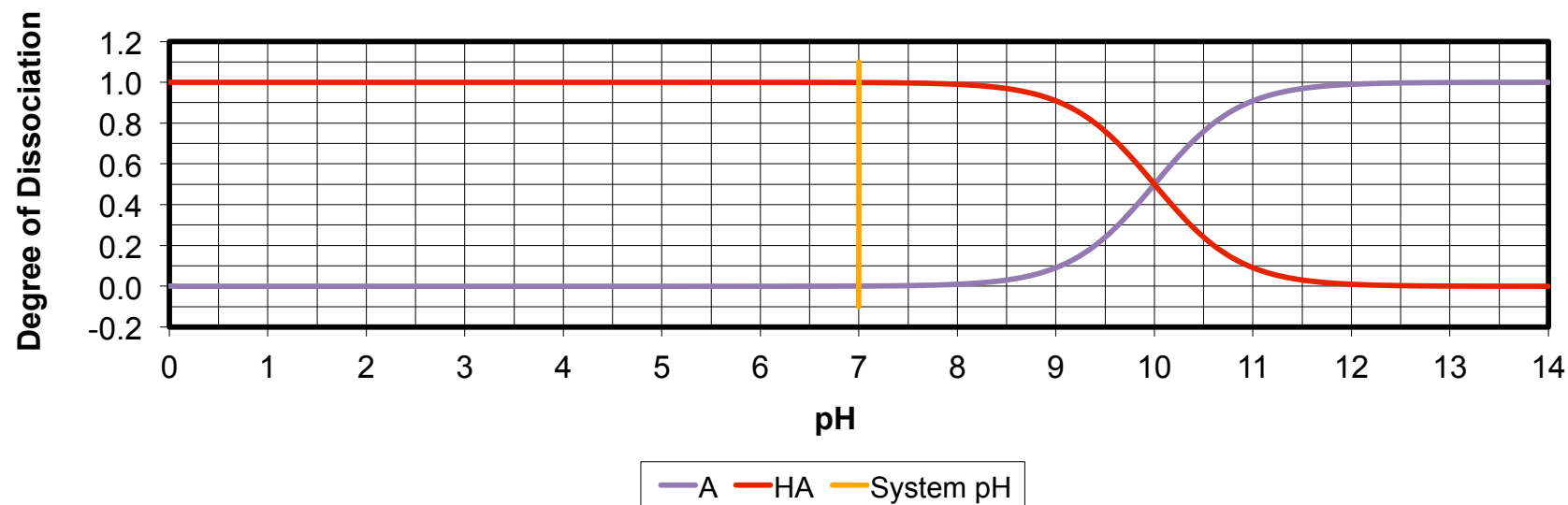
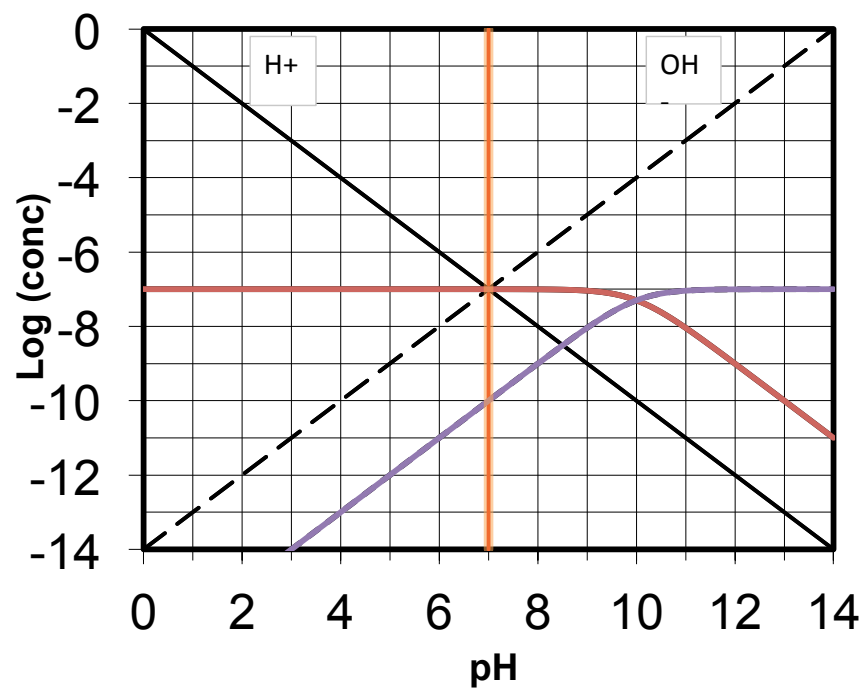
Input Data			pX
C_t	1.00E-07 M		7.00
K_a	1.00E-10		10.00
K_w	1.00E-14		14.00

Results			pX
pH	7.00		
H^+	1.00E-07 M		7.00
OH^-	1.00E-07 M		7.00
HA	9.99E-08 M		7.00
A^-	9.99E-11 M		10.00
α_{HA}	1.00		
α_{A^-}	0.00		

Acceptable Error 5.00%

Mass Balance Approx.			
$C_t = HA + A^-$			
C_t	$\gg$	K_a	
1.00E-07	$\gg$	1.00E-10	
HA $\gg$ A			
HA = C_t			
Approximation Valid			
No Approx		Approx	
7.00	p C_t	7.00	
Error %		0.10%	

Charge Balance Approx.			
$H^+ = OH^- + A^-$			
$C_t \cdot K_a$	$\ll$	K_w	
1.00E-17	$\ll$	1.00E-14	
OH $\gg$ A			
OH = H			
Approximation Valid			
No Approx		Approx	
7.00	pH	7.00	
Error %		0.10%	



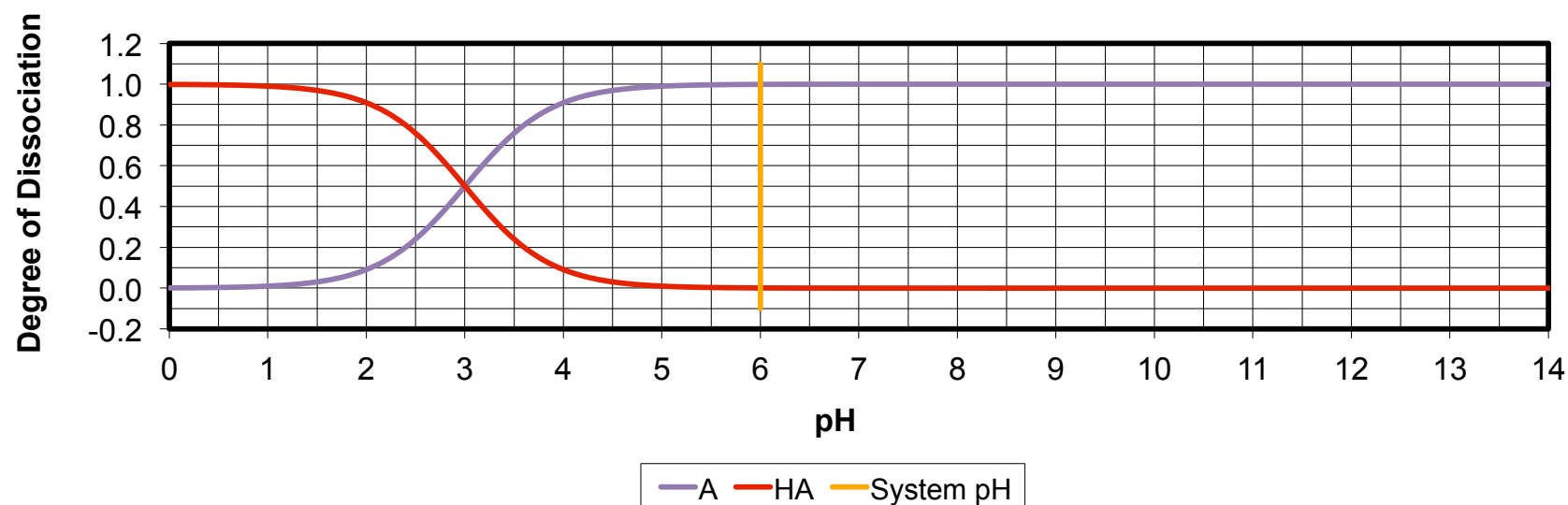
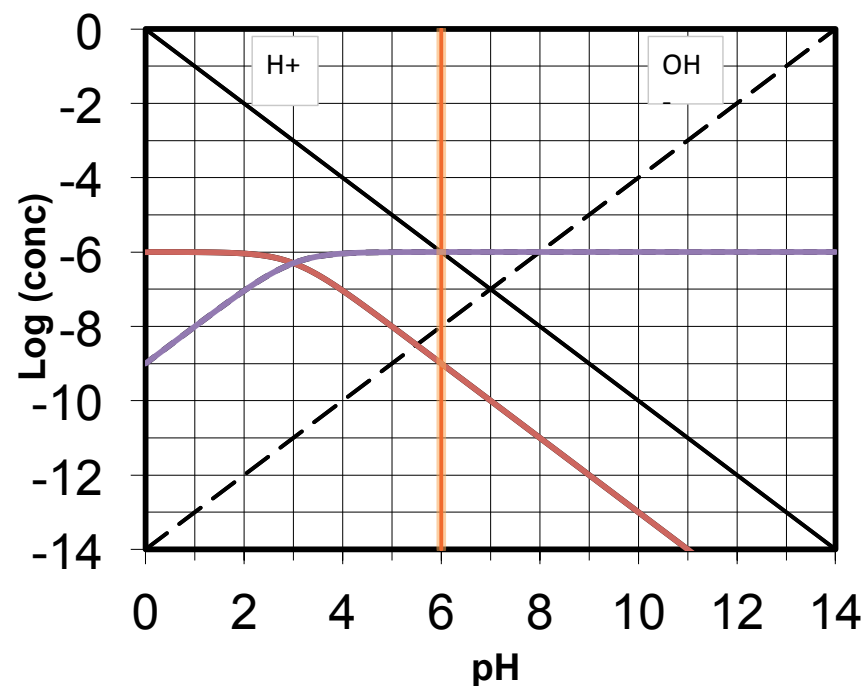
Input Data		pX
C_t	1.00E-06 M	6.00
K_a	1.00E-03	3.00
K_w	1.00E-14	14.00

Results		pX
pH	6.00	
H^+	1.00E-06 M	6.00
OH^-	1.00E-08 M	8.00
HA	9.99E-10 M	9.00
A^-	9.99E-07 M	6.00
α_{HA}	0.00	
α_{A^-}	1.00	

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	<<	K_a
1.00E-06	<<	1.00E-03
$A \gg HA$		
$A = C_t$		
Approximation Valid		
No Approx		Approx
6.00	pC_t	6.00
Error %		0.10%

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t \cdot K_a$	>>	K_w
1.00E-09	>>	1.00E-14
$A \gg OH^-$		
$A = H^+$		
Approximation Valid		
No Approx		Approx
6.00	pH	6.00
Error %		0.99%



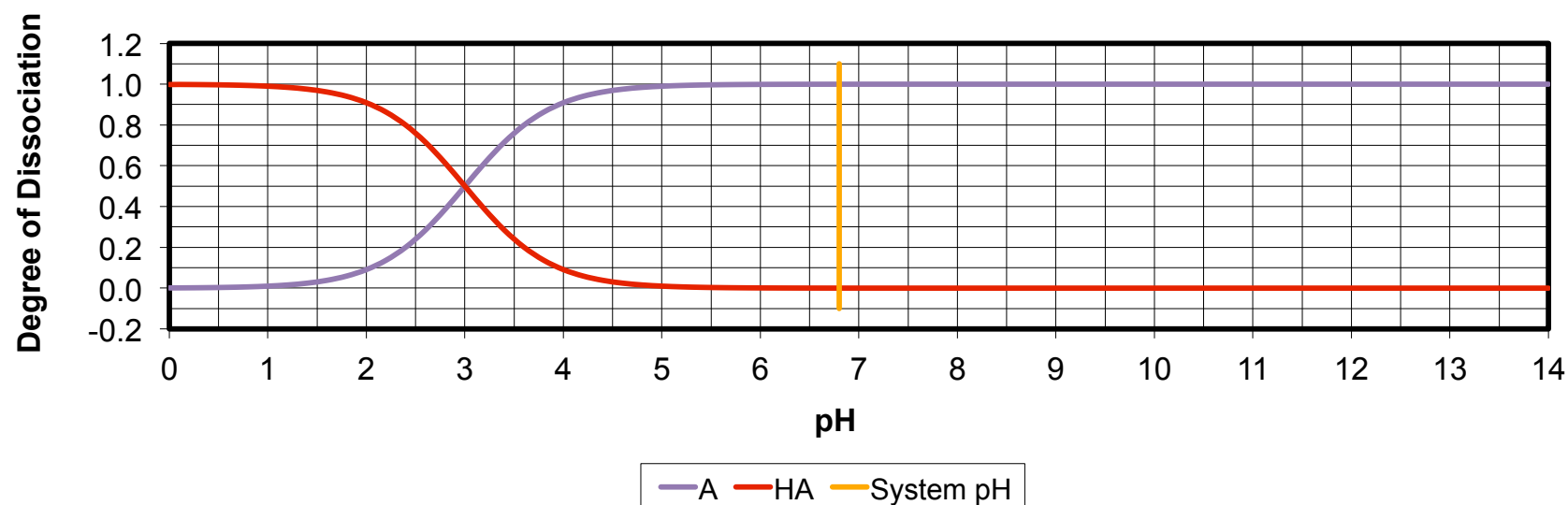
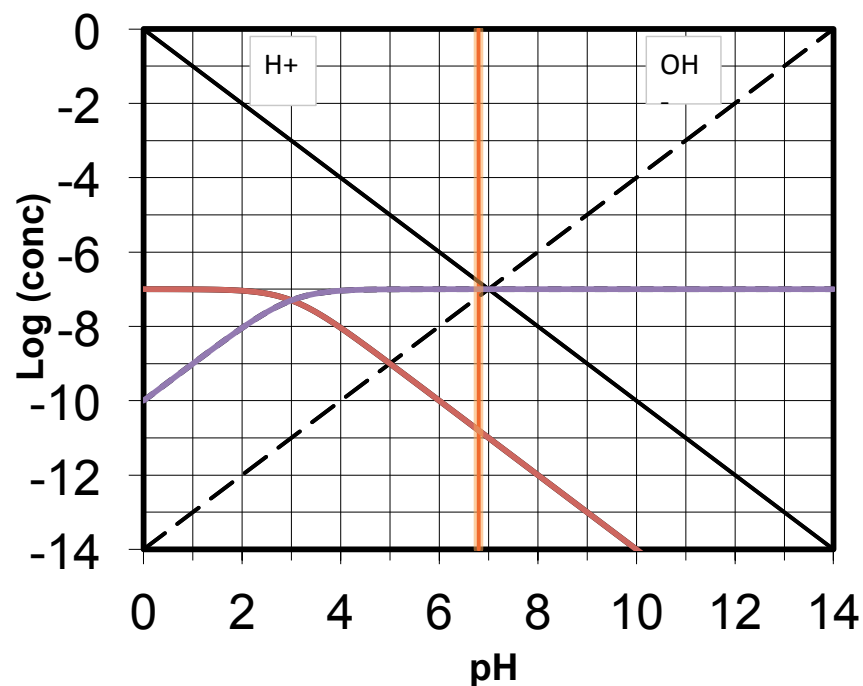
Input Data		pX
C_t	1.00E-07 M	7.00
K_a	1.00E-03	3.00
K_w	1.00E-14	14.00

Results		pX
pH	6.80	
H^+	1.58E-07 M	6.80
OH^-	6.31E-08 M	7.20
HA	1.58E-11 M	10.80
A^-	1.00E-07 M	7.00
α_{HA}	0.00	
α_{A^-}	1.00	

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	<<	K_a
1.00E-07	<<	1.00E-03
$A \gg HA$		
$A = C_t$		
Approximation Valid		
No Approx		Approx
7.00	pC _t	7.00
Error %		0.02%

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t \cdot K_a$	>>	K_w
1.00E-10	>>	1.00E-14
$A \gg OH^-$		
$A = H^+$		
Approximation not Valid		
No Approx		Approx
6.79	pH	7.00
Error %		38.69%



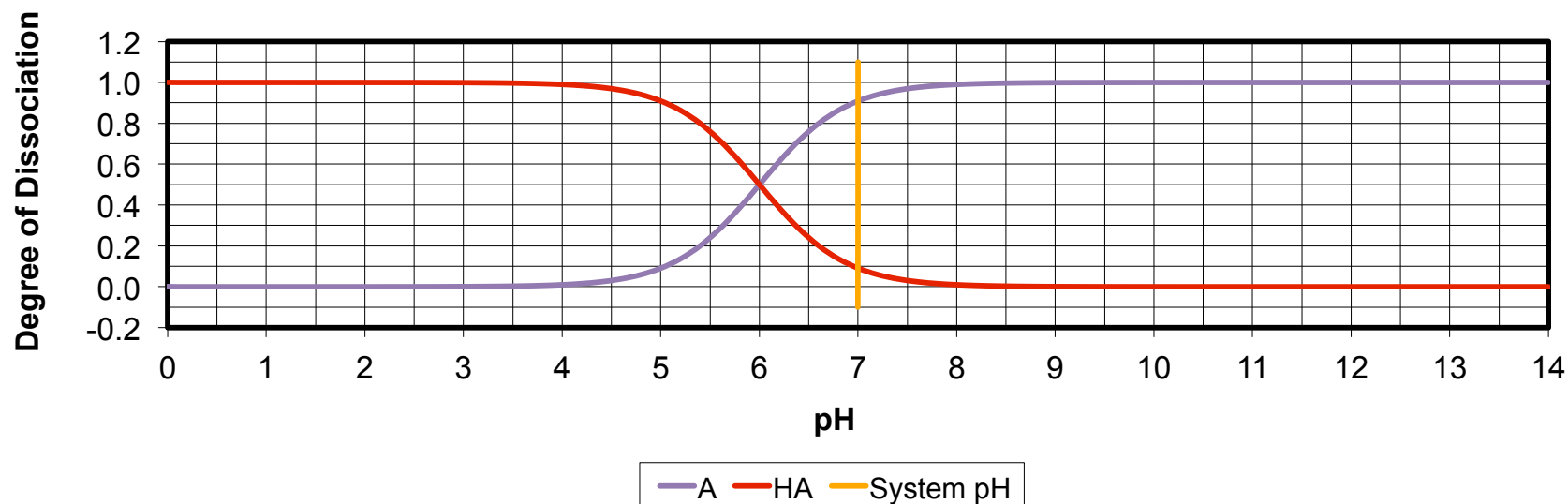
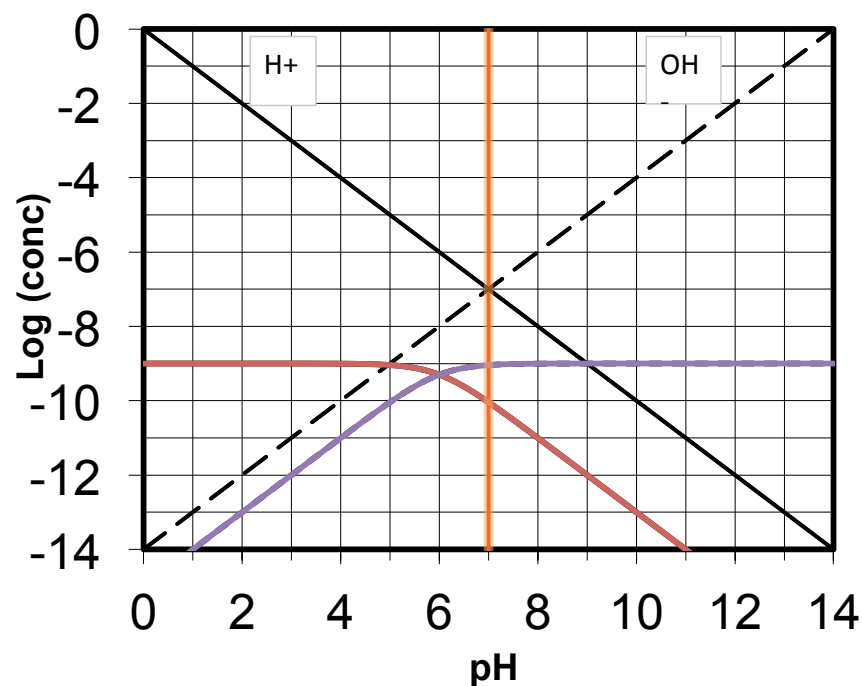
Input Data		pX
C_t	1.00E-09 M	9.00
K_a	1.00E-06	6.00
K_w	1.00E-14	14.00

Results		pX
pH	7.00	
H^+	1.00E-07 M	7.00
OH^-	1.00E-07 M	7.00
HA	9.09E-11 M	10.04
A^-	9.09E-10 M	9.04
α_{HA}	0.09	
α_{A^-}	0.91	

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	<<	K_a
1.00E-09	<<	1.00E-06
$A \gg HA$		
$A = C_t$		
Approximation not Valid		
No Approx		Approx
9.00	pC _t	9.04
Error %		9.09%

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t \cdot K_a$	=	K_w
1.00E-15	=	1.00E-14
$OH = A$		
Retain full CB		
No Approx		Approx
7.00	pH	7.00
Error %		0.90%



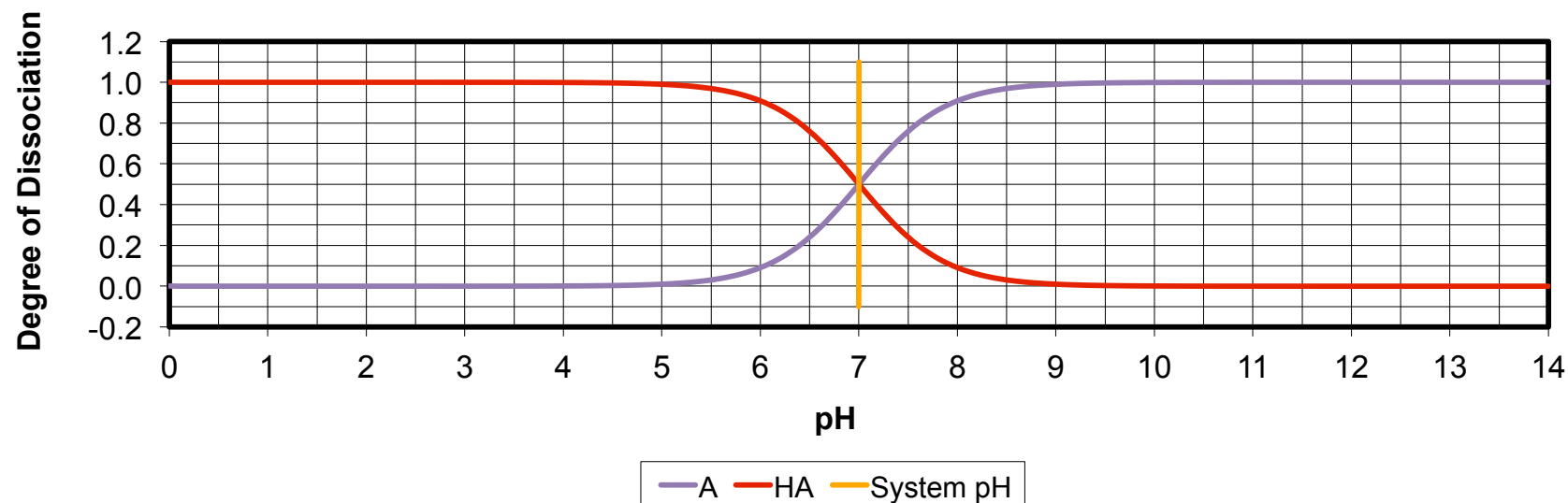
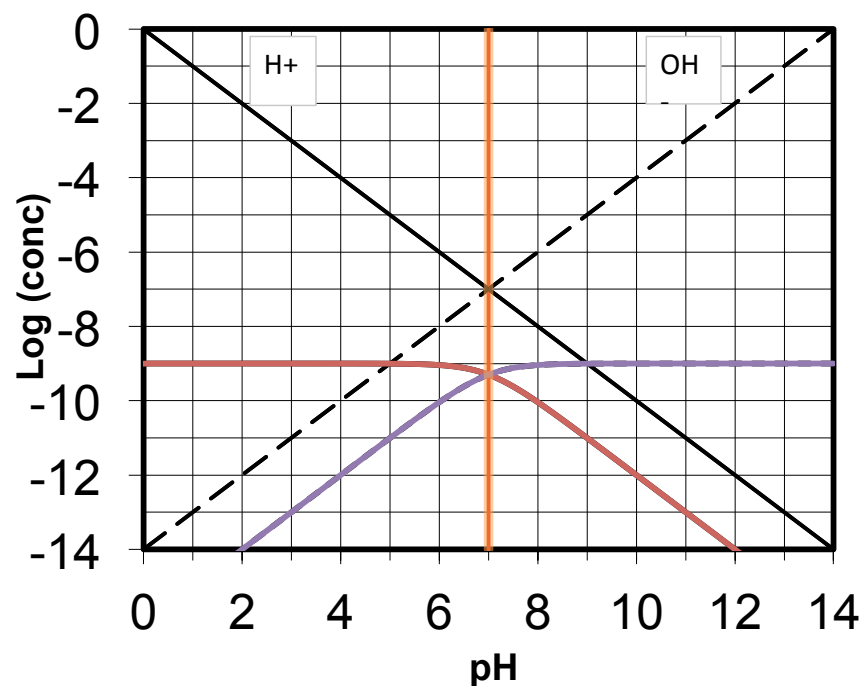
Input Data		pX
C_t	1.00E-09 M	9.00
K_a	1.00E-07	7.00
K_w	1.00E-14	14.00

Results		pX
pH	7.00	
H^+	1.00E-07 M	7.00
OH^-	1.00E-07 M	7.00
HA	5.00E-10 M	9.30
A^-	5.00E-10 M	9.30
α_{HA}	0.50	
α_{A^-}	0.50	

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	<<	K_a
1.00E-09	<<	1.00E-07
$A \gg HA$		
$A = C_t$		
Approximation not Valid		
No Approx		Approx
9.00	pC_t	9.30
Error %		50.00%

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t \cdot K_a$	<<	K_w
1.00E-16	<<	1.00E-14
$OH^- \gg A$		
$OH^- = H$		
Approximation Valid		
No Approx		Approx
7.00	pH	7.00
Error %		0.50%



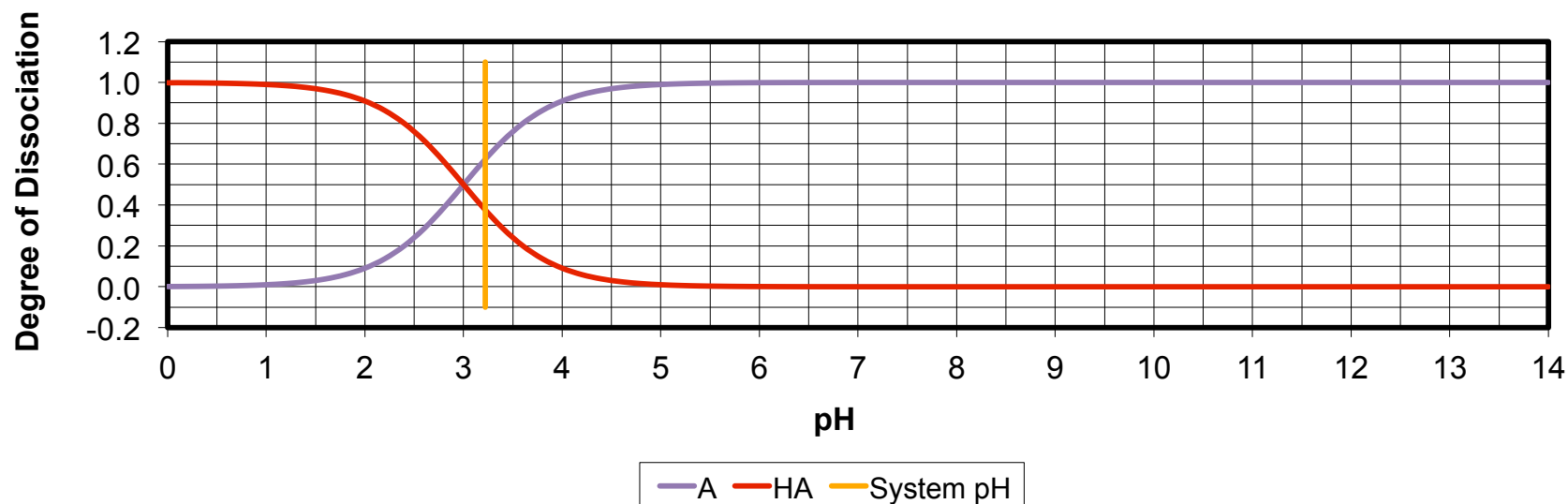
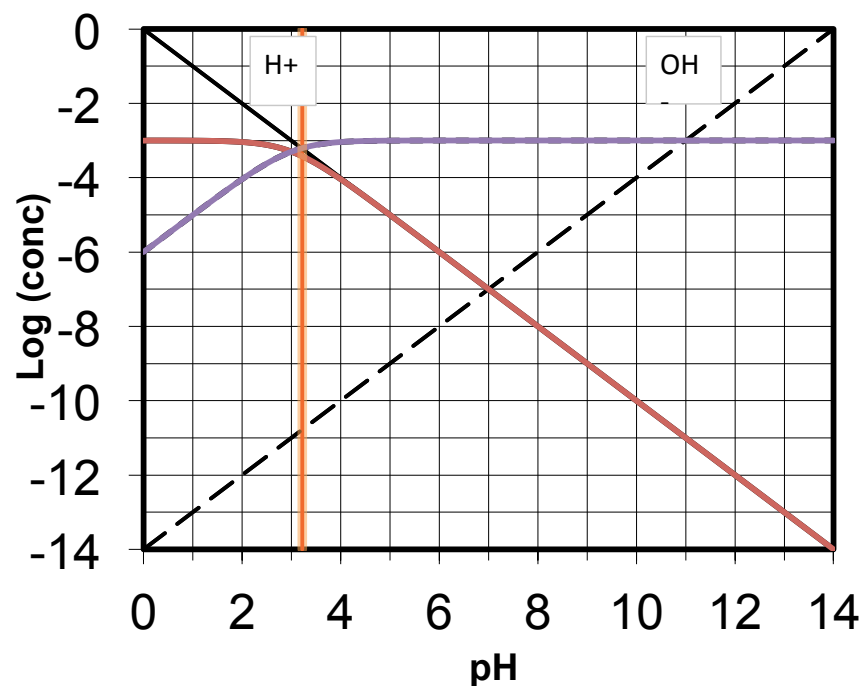
Input Data			pX
C_t	1.00E-03 M		3.00
K_a	1.00E-03		3.00
K_w	1.00E-14		14.00

Results			pX
pH	3.22		
H^+	6.03E-04 M		3.22
OH^-	1.66E-11 M		10.78
HA	3.76E-04 M		3.42
A^-	6.24E-04 M		3.20
α_{HA}	0.38		
α_{A^-}	0.62		

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	=	K_a
1.00E-03	=	1.00E-03
HA = A		
Retain full MB		
No Approx		Approx
3.00	p C_t	
Error %		

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t * K_a$	>>	K_w
1.00E-06	>>	1.00E-14
$A \gg OH$		
$A = H$		
Approximation Valid		
No Approx		Approx
3.20	pH	3.20
Error %		0.00%



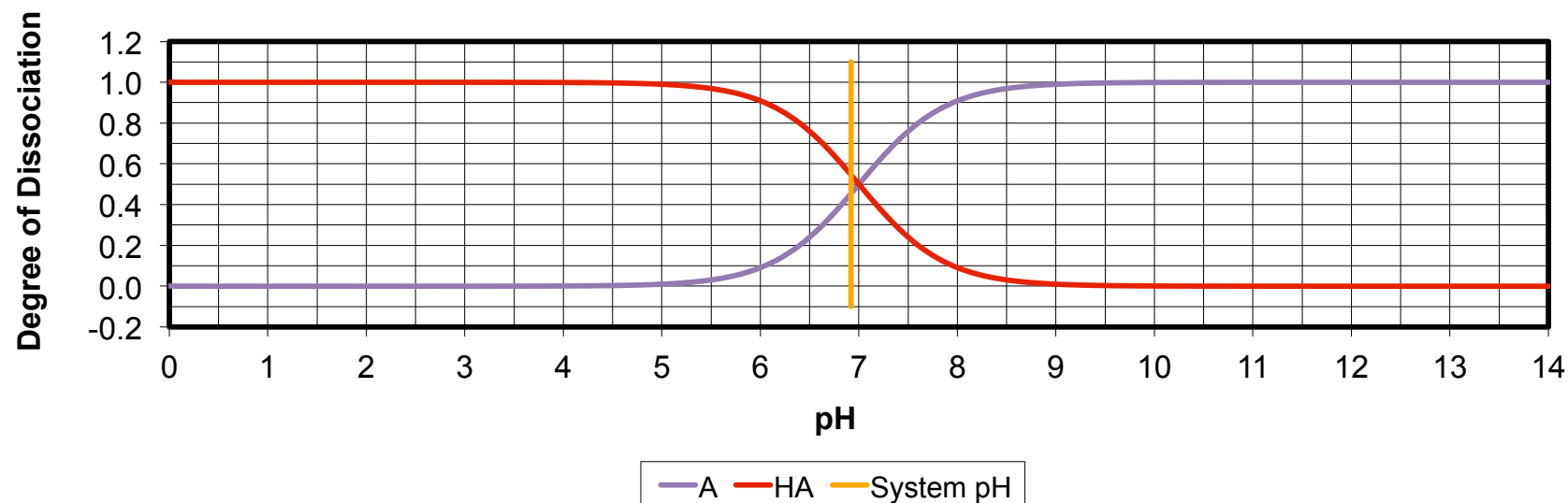
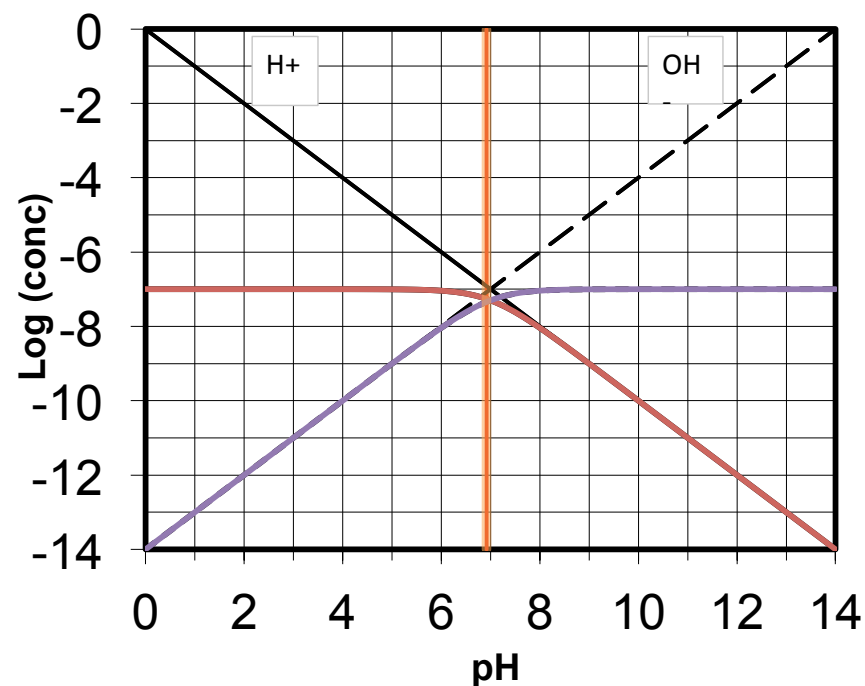
Input Data			pX
C_t	1.00E-07 M		7.00
K_a	1.00E-07		7.00
K_w	1.00E-14		14.00

Results			pX
pH	6.92		
H^+	1.20E-07 M		6.92
OH^-	8.32E-08 M		7.08
HA	5.46E-08 M		7.26
A^-	4.54E-08 M		7.34
α_{HA}	0.55		
α_{A^-}	0.45		

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	=	K_a
1.00E-07	=	1.00E-07
HA = A		
Retain full MB		
No Approx		Approx
7.00	p C_t	
Error %		

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t * K_a$	=	K_w
1.00E-14	=	1.00E-14
OH = A		
Retain full CB		
No Approx		Approx
6.89	pH	6.92
Error %		6.50%



Input Data		pX
C_t	1.00E-09 M	9.00
K_a	1.00E-09	9.00
K_w	1.00E-14	14.00

Results		pX
pH	7.00	
H^+	1.00E-07 M	7.00
OH^-	1.00E-07 M	7.00
HA	9.90E-10 M	9.00
A^-	9.90E-12 M	11.00
α_{HA}	0.99	
α_{A^-}	0.01	

Acceptable Error 5.00%

Mass Balance Approx.		
$C_t = HA + A^-$		
C_t	=	K_a
1.00E-09	=	1.00E-09
HA = A		
Retain full MB		
No Approx		Approx
9.00	pC _t	
Error %		

Charge Balance Approx.		
$H^+ = OH^- + A^-$		
$C_t * K_a$	<<	K_w
1.00E-18	<<	1.00E-14
OH >> A		
OH = H		
Approximation Valid		
No Approx		Approx
7.00	pH	7.00
Error %		0.01%

