

APPENDIX E

pH_c Values for Adjusted Sodium Absorption (SAR) Ratios

TABLES FOR CALCULATING pHc VALUES & WATERS

pHc can be calculated, using the table below; $pHc = (pK_1 - pK_2) + p(Ca+Mg) + pAlk$ where $pK_1 - pK_2$ is obtained from Ca+Mg+Na
 $p(Ca+Mg)$ " " " Ca+Mg
 $pAlk$ " " " CO_3+HCO_3

Tables for Calculation pHc

Conct. Ca+Mg+Na (mc/l)	$pK_1 - pK_2$	Conct. Ca+Mg (mc/l)	$p(Ca+Mg)$	Conct. CO_3+HCO_3 (mc/l)	pAlk
.5	2.11	.05	4.60	.05	4.30
.7	2.32	.10	4.50	.10	4.00
.9	2.33	.15	4.12	.15	3.82
1.2	2.14	.2	4.00	.20	3.70
1.6	2.15	.25	3.90	.25	3.60
1.9	2.36	.32	3.80	.33	3.51
2.4	2.17	.39	3.70	.40	3.40
2.8	2.18	.50	3.60	.50	3.30
3.3	2.19	.63	3.50	.63	3.20
3.9	2.20	.79	3.40	.79	3.10
4.5	2.21	1.00	3.30	.99	3.00
5.1	2.22	1.25	3.20	1.25	2.90
5.8	2.23	1.58	3.10	1.57	2.80
6.6	2.24	1.98	3.00	1.98	2.70
7.4	2.25	2.49	2.90	2.49	2.60
8.3	2.26	3.14	2.80	3.13	2.50
9.2	2.27	3.90	2.70	4.0	2.40
11	2.28	4.97	2.60	5.0	2.30
13	2.30	6.30	2.50	6.3	2.20
15	2.32	7.90	2.40	7.9	2.10
18	2.34	10.00	2.30	9.9	2.00
22	2.36	12.50	2.20	12.5	1.90
25	2.38	15.80	2.10	15.7	1.80
29	2.40	19.80	2.00	19.8	1.70
34	2.42				
39	2.44				
45	2.46				
51	2.48				
59	2.50				
67	2.52				
76	2.54				

$pAlk = -4.35 (1 + CO_3 + HCO_3) + 2.998$
 or
 $pAlk = -1.001 (\log CO_3 + HCO_3) + 2.998$

Example: To calculate adj.SAR of water from

$$adj.SAR = \frac{Na}{\sqrt{\frac{Ca+Mg}{2}}} [1 + (8.4 - pHc)]$$

With report of water analysis

Na	=	3.5 mc/l			
Ca+Mg	=	3.0 mc/l	5.14	5.0	1.44
Ca+Mg+Na	=	4.5 mc/l	5.67	5.6	2.44
CO_3+HCO_3	=	3.0 mc/l	3.17	3.2	1.00

$pHc = 2.21 + 3.30 + 2.5 = 8.01$ (from tables)

$$adj.SAR = \frac{3.5}{\sqrt{1.5}} [1 + (8.4 - 8.01)] = 4.95 (1 + .39)$$

adj.SAR = 6.88

NOTE: Values of pHc above 8.4 indicate tendency to dissolve lime from soil through which the water moves; values below 8.4 indicate tendency to precipitate lime from waters applied.

(ref: L.V. Wilcox, U.S. Salinity Laboratory, mimeo Dec. 30, 1960)