1976/28. A computer programme for water analyses.

W.C. Cromer

Original departmental water analyses list concentrations of dissolved species in parts per million (ppm) or milligrams per litre (mg/*l*). The figures then need to be manipulated to obtain equivalents of dissolved constituents (meq/*l*) and their relative proportions (% meq/*l*).

The programme (17A1-3) tabulates original data (as ppm or mg/*l*) as mg/*l*, meq/*l*, and % meq/*l* in a form adaptable for publication and filing. It also calculates: % difference in cation and anion equivalents, per cent sodium, sodium adsorption ratio and additional ratios useful for triangular or other plots. Subsequent printouts must be manually indexed.

OPERATING INSTRUCTIONS

The programme is in three blocks, the first two of which print the data sheet. Block 3 receives input, calculates and tabulates.

Block 1. PRIME
LOAD PROGRAM (V = 6573)
PRIME
SEARCH 0 (prints constituents; draws line beneath).

Block 2. PRIME
LOAD PROGRAM (V = 3044)
PRIME
SEARCH 1 (completes format; draws line beneath).

Block 3. PRIME
LOAD PROGRAM (V = 7133)
PRIME, GO
KEY pH GO; Alkalinity, GO; temporary hardness, GO; permanent hardness, GO; total hardness, GO; total dissolved solids, GO; Cl, GO; NO_3, GO; SO_4, GO; HCO_3, GO; CO_3, GO; K, GO; Na, GO; Mg, GO; Ca, GO; Al, GO; Fe, GO; SiO_2, GO.
(If a constituent has not been determined, key 0, CHANGE SIGN, GO).

Ratios

(a) % difference of cation and anion equivalents
$$= \left| \frac{\text{cation meq/}l - \text{anion meq/}l}{\text{total meq/}l} \right|$$

If all major constituents have been determined, this ratio should approximate to zero. It may therefore be used as a check on the accuracy of the analysis.

(b) Sodium adsorption ratio (S.A.R.)
$$= \frac{\text{Na}}{\sqrt{\dfrac{\text{Ca + Mg}}{2}}} \quad (\text{meq/}l)$$

(c) Per cent sodium (% Na)
$$= \frac{100(\text{Na + K})}{\text{Na + K + Ca + Mg}} \quad (\text{meq/}l)$$

[25 May 1976]

WATER ANALYSES

Survey:

Field No.

Dept. of Mines Reg. No.   760719

AMG coords.

Remarks

CONSTITUENT	mg/l	meq/l	% meq/l
Silica (SiO2)	65.0		
Total iron (Fe)	.1	.00	.0
Aluminium (Al)	.2	.02	.0
Calcium (Ca)	25.0	1.25	5.1
Magnesium (Mg)	37.0	3.03	12.5
Sodium (Na)	180.0	7.82	32.3
Potassium (K)	4.3	.10	.4
Carbonate (CO3)	.0	.00	00.0
Bicarbonate (HCO3)	80.0	1.31	5.4
Sulphate (SO4)	79.0	1.64	6.7
Nitrate (NO3)	nd	.00	00.0
Chloride (Cl)	320.0	9.01	37.2
Dissolved solids	620.0	24.2	
Total hardness (CaCO3)	215.0		
permanent	150.0		
temporary	65.0		
Alkalinity (CaCO3)	65.0		
pH	6.6		

% diff. cation
and anion meq/l =   1.1.

Sodium-adsorption
ratio   =   5.3

Percent sodium   =   64.9

CHEMICAL   RATIOS   (meq/l)

Na/total = .32 Ca/Mg   = .41 Na/Cl   = .86

Cl/total =   .37 HCO3/total =.05   HCO3/Ca =1.04

For triangular plots:

Na+K/total cation = .64   Ca/total cation = .10

Cl/total anion =   .75   HCO3/total anion =.10

ACCEPTABILITY

Domestic:

Agricultural: