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Table 3.5 The Average Amounts of the Elements in Crustal Rocks in Grams per Ton or Parts per Million*

Atomic Number	Element	Crustal Average	Granite (G-1)	Diabase (W-1)
1	H	1,400	400	600
3	Li	20	22	15
4	Be	2.8	3	0.8
5	B	10	1.7	15
6	C	200	200	100
7	N	20	59	52
8	O	466,000	485,000	449,000
9	F	625	700	250
11	Na	28,300	24,600	16,000
12	Mg	20,900	2,400	39,900
13	Al	81,300	74,300	79,400
14	Si	277,200	339,600	246,100
15	P	1,050	390	610
16	S	260	58	123
17	Cl	130	70	200
19	K	25,900	45,100	5,300
20	Ca	36,300	9,900	78,300
21	Sc	22	2.9	35
22	Ti	4,400	1,500	6,400
23	V	135	17	264
24	Cr	100	20	114
25	Mn	950	195	1,280
26	Fe	50,000	13,700	77,600
27	Co	25	2.4	47
28	Ni	75	1	76
29	Cu	55	13	110
30	Zn	70	45	86
31	Ga	15	20	16
32	Ge	1.5	1.1	1.4
33	As	1.8	0.5	1.9
34	Se	0.05	0.007	0.3
35	Br	2.5	0.4	0.4
37	Rb	90	220	21
38	Sr	375	250	190
39	Y	33	13	25
40	Zr	165	210	105
41	Nb	20	24	9.5
42	Mo	1.5	6.5	0.57
44	Ru	0.01		
45	Rh	0.005		<0.001
46	Pd	0.01	0.002	0.025
47	Ag	0.07	0.05	0.08
48	Cd	0.2	0.03	0.15
49	In	0.1	0.02	0.07
50	Sn	2	3.5	3.2
51	Sb	0.2	0.31	1.0
52	Te	0.01	<1	<1
53	I	0.5	<0.03	<0.03
55	Cs	3	1.5	0.9
56	Ba	425	1,220	160
57	La	30	101	9.8
58	Ce	60	170	23

Table 3.5 (continued)

Atomic Number	Element	Crustal Average	Granite (G-1)	Diabase (W-1)
59	Pr	8.2	19	3.4
60	Nd	28	55	15
62	Sm	6.0	8.3	3.6
63	Eu	1.2	1.3	1.1
64	Gd	5.4	5	4
65	Tb	0.9	0.54	0.65
66	Dy	3.0	2.4	4
67	Ho	1.2	0.35	0.69
68	Er	2.8	1.2	2.4
69	Tm	0.5	0.15	0.30
70	Yb	3.4	1.1	2.1
71	Lu	0.5	0.19	0.35
72	Hf	3	5.2	2.7
73	Ta	2	1.5	0.50
74	W	1.5	0.4	0.5
75	Re	0.001	<0.002	<0.002
76	Os	0.005	0.00007	0.0003
77	Ir	0.001	0.00001	0.003
78	Pt	0.01	0.0019	0.0012
79	Au	0.004	0.004	0.004
80	Hg	0.08	0.1	0.2
81	Tl	0.5	1.2	0.11
82	Pb	13	48	7.8
83	Bi	0.2	0.07	0.05
90	Th	7.2	50	2.4
92	U	1.8	3.4	0.58

*Omitting the rare gases and the short-lived radioactive elements.

enrichment or depletion of an element in any rock. The figures for G-1 and W-1 also show that some elements (such as Be, Rb, Ba) are markedly enriched in the granite, others (such as B, Sc, Ni) are enriched in the diabase, whereas some (such as Zn, Ga, Ge) show a rather uniform abundance in these contrasted rock types.

Some interesting features of Table 3.5 may be noted. Eight elements—O, Si, Al, Fe, Ca, Na, K, Mg—make up nearly 99% of the total. Of these oxygen is absolutely predominant. As Goldschmidt first pointed out, this predominance is even more marked when the figures are recalculated to atom percent and volume percent (Table 3.6). The earth's crust consists almost entirely of oxygen compounds, especially silicates of aluminum, calcium, magnesium, sodium, potassium, and iron. In terms of numbers of atoms oxygen exceeds 60%. If the volume of the different atoms, or rather ions, is calculated, oxygen makes up more than 90% of the total volume occupied by the elements. Thus the crust of the earth is essentially a packing of oxygen anions, bonded by silicon and the ions of the common metals. As Goldschmidt remarked, the lithosphere may well be called the oxysphere.

Table 3.5 shows that some of the elements that play a most important part in our