

Table VIII-5. Compositions of various coals, crude oils, and organic rich shales (all in ppm, noted otherwise).

	Average coal (1)	Illinois coal (2)	Coal SRM1632 (3)	Average petroleum (4)	Alberta crude oil (5)	Black shale SDO-1 (3)	Oil shale SGR-1 (3)
Ag-47	0.05	0.03	0.063	0.0001			
Al-13	10000	12000	17300	0.5		65000	34500
As-33	5	7.4	5.8	0.01	0.11	69	67 g
Au-79	0.0004		0.00092	0.001 b	0.00044		(0.0089)
B-5		98	41	0.002		(130)	54
Ba-56	200	75	330	0.1		400	290
Be-4	1	1.6	1.6	0.0004		3.3	1.1
Bi-82	0.05		1.1				0.94
Br-35	5	10	18		0.49		
C-6 %	80	70	71	85 n		10 <sup>a</sup>	6.4 <sup>a</sup>
Ca-20	1500	5100	4200	5		7500	60000
Cd-48	0.2	0.59	0.21	0.01	0.01		(0.93)
Ce-58	12	12	21	0.01		79	36
Cl-17	500	800	880		39		(32)
Co-27	4	6	5.6	0.2	0.054	47	12
Cr-24	10	16	20	0.3	0.093	(66)	30
Cs-55	0.3	1.2	1.5	0.004 b	0.0043	(6.9)	5.2
Cu-29	15	13	17	0.14		(60)	66
Dy-66	2.5	1	1.2			6.0 g	(1.9)
Er-68	0.5		0.7	0.001		3.6 g	1.1
Eu-63	0.5	0.25	0.36	0.005 b	0.00094	(1.6)	0.56
F-9	80	63	80				2000
Fe-26	8000	19000	8500	2.5	11	65000	21000
Ga-31	5	3	5.9	0.01		17	(11)
Gd-64	1.2		1.3			7.4 g	(2)
Ge-32	4	4.8	2.6	0.001			(1.6)
Hf-72	0.9	0.49	0.98			(4.7)	1.4
Hg-80	3 ?	0.16	0.12	0.05 b	0.051	(0.19)	(0.31)
Ho-67	0.19		0.25			(1.2) g	(0.38)
I-53	1	1.2	3.2		0.72		
In-49	0.02	0.13	0.035				(0.096)
Ir-77	0.005		0.028				
K-19	3000	1600	2800	3 b		28000	14000
La-57	5	6.4	10	0.005		39	20
Li-3	10		26	1 b		29	(150)
Lu-71	0.07	0.08	0.13			0.54 g	(0.14)
Mg-12	2000	500	1600	0.1		9300	27000
Mn-25	50	40	41	0.1	0.1	330	260
Mo-42	3	6.2	3.8	10		130	35
N-7 %	1.5	1.3	1.2				
Na-11	400	300	380	2	3.6	2800	22000
Nb-41	10		5			11	(5.2)

	Average coal (1)	Illinois coal (2)	Coal SRM1632 (3)	Average petroleum (4)	Alberta crude oil (5)	Black shale SDO-1 (3)	Oil shale SGR-1 (3)
Nd-60	9		9	0.01 b		37	16
Ni-28	10	19	15	10	9.4	100	(29)
Os-76							
P-15	130	45	140			480	1400
Pb-82	10	15	28	0.3		28	38
Pd-46	0.005						(0.0052)
Pr-59	1.8		3.8			8.9 g	3.9
Pt-78			0.23				(0.003)
Rb-37	20	17	21	0.015 b	0.15	(130)	83
Re-75				<0.2 b			
Rh-45							
Ru-44	0.02		0.018				
S-16 %	1.5	3.4	1.3	0.34	0.83	5.4	1.5
Sb-51	1	0.81	3.4	1 b	0.0062		3.4
Sc-21	5	2.5	3.8	0.001	0.0078	13	4.6
Se-34	3	2	3	0.17 b	0.052		(3.5)
Si-14 %	3.0	2.3	3.1			23	13
Sm-62	1.2	1.1	1.6			7.7	2.7
Sn-50	2	0.94	9.3	0.01		(2.9)	(1.9)
Sr-38	150	30	150	0.1		75	420
Ta-73	0.2	0.14	0.25			(1.1)	(0.42)
Tb-65	0.22	0.18	0.28			(1.2)	0.36
Te-52	0.1		0.71				(0.25)
Th-90	2	1.9	3.2			11	4.8
Ti-22	500	600	940	0.1		4300	1600
Tl-81	0.2	0.59	0.55				(0.33)
Tm-69	0.06		0.3			(0.45) g	(0.17)
U-92	1	1.3	1.4	0.01		49	5.4
V-23	20	29	34	50	14	160	130
W-74	0.5	0.63	0.74				2.6
Y-39	7		7.5	0.001		41	(13)
Yb-70	0.37	0.53	0.79			3.4	(0.94)
Zn-30	50	87	37	5 b	0.46	64	74
Zr-40	50	41	34	0.1 b		170	(53)

Data sources: (1) Bowen (1979), (2) Gluskoter et al. (1977), (3) Govindaraju (1989), (4) Bertine and Goldberg (1971), (5) Hitchon et al. (1975), b: Barwise and Whitehead (1983), g: Govindaraju (1994), n: Neumann et al.(1981). Values in parenthese for geostandards are uncertified, thus may be less reliable. a: carbon include 0.28% and 3.2% carbonate carbon in black shale and oil shale respectively.