UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Minor and trace elements in coal--
A selected bibliography of reports
in English, January 1976

By

U.S. Geological Survey

Open-File Report 76-481

1976

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Abstract:--A bibliography of 175 selected references on trace elements in coal is presented as a guide to readily available information and as an aid to further study. All the reports cited are in English, and most are applicable to the United States.

The occurrence of a wide variety of trace elements in coal is a natural phenomenon of great scientific interest, environmental concern, and possible economic importance. The release of these elements in increased quantities by the prospective future increase in use of coal poses problems and opportunities that must be anticipated by full knowledge of the relative abundance, geologic distribution, and chemical association of each element.

The following bibliography of 175 selected references was prepared as an aid to geologists, chemists, and others who wish to review available information on trace elements in United States coals, or who wish to initiate studies.

This bibliography is restricted to reports in English because (1) most work on United States coal is published in English; (2) a fair sample of the trace element content of coal worldwide is summarized in the cited reports; and (3) with the exception of a few key summary reports, information in foreign journals is too voluminous for inclusion in this bibliography.

Although the bibliography is devoted mainly to reports on trace elements, it includes a few reports dealing with major ash constituents and with coal geochemistry; it does not include references to reports dealing exclusively with sulfur or chlorine. Most of the cited reports contain specialized bibliographies.

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[1]Compiled by Paul Averitt, Joseph R. Hatch, and Vernon E. Swanson, Denver, Colorado; Irving A. Breger, S. Lynn Coleman, Jack H. Medlin, and Peter Zubovic, Reston, Virginia; and Harold J. Gluskoter, Illinois Geological Survey, Urbana, Illinois.

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GEOCHEMICAL CONVERSION FACTORS

Percent	Milligram percent (mg/100g)	Grams per gram	Parts per million (ppm) Micrograms per gram (µg/g) Milligrams per kilogram (mg/kg) Milligrams per liter [1] (mg/l)	Parts per billion (ppb) Nanograms per gram (na/g) Micrograms per kilogram (µg/kg) Micrograms per liter [1] (µg/l)
100			1,000,000	
10		1×10^{-1}	100,000	
1.		1×10^{-2}	10,000	
.1	100	1×10^{-3}	1,000	
.01	10	1×10^{-4}	100	
.001	1.	1×10^{-5}	10	10,000
.0001	.1	1×10^{-6}	1.	1,000
.00001	.01	1×10^{-7}	.1	100
.000001	.001	1×10^{-8}	.01	10
.0000001	.0001	1×10^{-9}	.001	1

[1] Approximate. Validity decreases with increased salinity of liquid.

Smaller subdivisions of 1 gram

1×10^{-9} = 1 ng = 1,000 picograms (pg)
1×10^{-12} = 1 pg = 1,000 femtograms (fg)
1×10^{-15} = 1 fg = 1,000 attograms (ag)
1×10^{-18} = 1 ag