Occurrence forms of Antimony in the Huaibei Coals

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For Hg, all samples (0.1g) were treated with 12 mL of an oxidizing mixture and 3 mL of HF in a Telfon digestion vessel put in a microwave oven. After cooling, the solutions were diluted to 50mL with double-distilled de-ionized water. A flow-injection system was used. The six-step sequential extraction procedure is carried out in our Lab. The procedure allows us to determine the forms of Sb in these coals as water-leachable, ion-exchangeable, organic matter-bound, carbonate-bound, silicate-bound, and sulfide-bound, and the results of proximate and ultimate analyses and trace element contents in coals are determined.

The Sb content in five selected coals is in the range of 0.11 - 0.43 μg/g with an average of 0.27 μg/g. It is significantly lower than the average world value of 3 μg/g.

Antimony is poorly correlated with total sulfur content in five coals (r^2= 0.12). Sulfide-bound Sb accounts for 16% to 28% of the total Sb in four coals with the exception of sample HB, which may contain negligible amount of pyrite.

Antimony is not correlated with the ash content (r^2= 0.04). But silicate-bound Sb is the most abundant form of Sb in the coals (33% - 61%). Fraction of silicate-bound Sb in coals decreases in the order of HB (60%), HA (41%), and HC (35%). Organic matter- and carbonate-bound fractions of Sb are higher in bituminous coals than in anthracite and natural coke. It indicates that the Sb in the organic matter and carbonate may be incorporated into silicates and sulfide during metamorphism.

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Discussion on origin of the Dabashan witherite deposits, China

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Barium in the form of barite deposits is wide distribution in the world, but in the form of witherite deposits is extremely rare. A lot of stratiform witherite and barite deposits are occured in early Paleozoic silicalite formation in Dabashan area. The two types of deposits show both paragenesis and separation in space distribution, which constitute the unique large barium ore belt in the world. The systematic study of fluid inclusions in witherite mineral show that the homogenization temperatures are 110-250°C, the components are characterized by CH_4, N_2, CO_2, H_2S and other components. Based on these evidences the authors suggested that the thermochemical sulfate reduction was main metallogenic mechanism of the witherite deposits.

In early Cambrian period, the abroad developed activity of oceanic currents, volcanoes and hydrotherm in Dabashan depresssion basin, not only provide abundant nutrients which survive and impel extreme growth of creatures for seawater, also provide abundant Ba^{2+}. By means of the biogenicagency, Ba^{2+} in the seawater concentrated and precipitated on the sea floor in the form of biogenic barite, and formed the barite deposits. But the effusional hydrothermal fluids rich of CH_4 and other hydrocarbon mixed with seawater in the active state of hydrotherm. Since seawater rich of SO_4^{2-}, hydrocarbons transit from reduction state carbon to the oxidation state of carbon inevitably, and thus, provide necessary CO_3^{2-} for the forming of witherite. The special mechanism of forming the witherite deposits can be summarized in the general form:
Sulfate+Hydrocarbos—$BaCO_3$+H_2S+H_2O+Other Productions

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