

论文

煤炭地下气化“三带”痕量元素析出规律模拟试验研究

王媛媛, 刘洪涛, 李金刚, 潘霞, 姚凯, 赵娟, 张尚军, 靳志伟

- 1. 煤基低碳能源国家重点实验室, 河北 廊坊 065001;
- 2. 新奥气化采煤有限公司, 河北 廊坊 065001

摘要:

分别采用燃煤灰、气化灰、热解半焦模拟煤炭地下气化“三带”(氧化带、还原带、干馏干燥带)残留物,分析其浸出液中汞、砷、氟、铬、铅5种痕量元素分布特征,并与原煤进行对比,考察其对地下水可能造成的潜在污染风险。研究表明,“三带”残留物及原煤的浸出液中5种痕量元素总含量排列次序为:干馏干燥带>氧化带>还原带>原煤,且各元素浸出量均符合煤炭工业污染物排放标准GB 20426—2006;其中,铅元素浸出量排列次序为:干馏干燥带>原煤>氧化带>还原带,浸出量差别不大且均很小,平均浸出量仅为0.003 0 mg/L;砷元素浸出量排列次序为:氧化带>还原带>干馏干燥带>原煤,氧化带残留物浸出量最大,为0.145 0 mg/L,是最小浸出量(原煤)的63倍;氟化物浸出量排列次序为:干馏干燥带>氧化带>还原带>原煤,且浸出量远远大于其他重金属元素,平均浸出量是其他重金属元素的476倍;Hg和Cr的浸出量为0。

关键词: 煤炭地下气化; 痕量元素; 析出规律; 残留物

Experimental study on leaching behavior of trace elements in the residues of “three zones” from underground coal gasification

Abstract:

Coal combustion ashes, gasification ashes, and pyrolysis chars were used to simulated the residues of “three zones” from underground coal gasification, which are oxidization zone, reduction zone and dry distillation zone. The distribution characteristics of mercury, arsenic, fluorine, chromium, lead five trace elements in the leaching solution was analyzed, and compared with that in raw coal, in order to investigate their potential threat to groundwater. The results indicate that total contents of the five trace elements in the leaching solution of raw coal and the residues of “three zones” follow the order of dry distillation zone>oxidization zone>reduction zone>raw coal, within the scope of of national standard GB 20426—2006. The contents of Pb follow the order of dry distillation zone>raw coal>oxidization zone>reduction zone, they are very low and the average value of Pb is only 0.003 0 mg/L. The contents of As follow the order of oxidization zone>reduction zone>dry distillation zone>raw coal, and the residues in oxidization zone have the highest As leaching content of 0.1450 mg/L, almost 63 times of that in raw coal. The contents of F follow an order of dry distillation zone>oxidization zone>reduction zone>raw coal, and 476 times higher than that of the other four heavy metals. The leaching of Hg and Cr are not detected.

Keywords: underground coal gasification; trace elements; leaching behavior; residue

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通讯作者: 王媛媛

作者简介: 王媛媛(1985—), 女, 山西运城人, 助理工程师

作者Email: wangyyd@enn.cn

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