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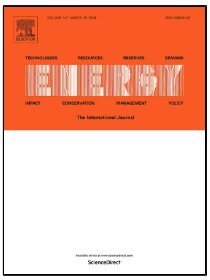

Combined fluidized bed retorting and circulating fluidized bed combustion system of oil shale: 3. Exergy analysis

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Combined fluidized bed retorting and circulating fluidized bed combustion system of oil shale: 3. Exergy analysis

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Abstract

Exergy analysis as well as energy analysis is applied to Chinese comprehensive utilization system, in which oil shale is firstly introduced to fluidized bed (FB) retort for obtaining oil and resulting semicoke is fed to circulating fluidized bed (CFB) reactor for further utilization. During the calculation, linear programming helps optimize the efficiency of FB retort in the system. In the light of the results, the process flow diagram of the whole system is redrawn. Also, this paper discusses how three operating parameters (the retorting temperature, the mass of burned fuel gas and the temperature of circulating ash) influence the system, especially exergy efficiency. With the retorting temperature increasing, the exergy efficiency first increase and then decrease, and the highest exergy efficiency is in the temperature range 460-490 ^{o}C. Compared with retorting temperature, the mass of burned fuel gas and circulating ash temperature have less effect on the exergy efficiency of the whole system. But it is a good strategy for stable operation of the system to burn more fuel gas to provide more energy and exergy to FB retorting unit. This work could give further detailed suggestions and more reference data to operate the system stably and efficiently.

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