

工程热物理

助剂对CaSO4载氧体化学链燃烧的影响

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摘要:

在固定床实验台架上,研究了CaSO4和添加助剂的CaSO4与气体燃料发生反应的特性。结果表明:助剂可大幅度地提高CaSO4的反应活性,缩短反应时间。在950℃下,所有复合载氧体的转化率均超过95%。在还原和氧化过程中,载氧体释放的SO2曲线呈单峰特性,且随温度显著增大;温度对COS的释放没有明显的影响作用。含Ni-Fe的载氧体等转化率下硫的损失率最小。通过程序升温还原、X射线衍射和场发射扫描电镜等表征分析,研究了样品的反应性能,成分与结构变化,并提出了一个可能的催化还原反应和硫释放机制。

关键词: 化学链燃烧 复合载氧体 硫酸钙 助剂 硫释放

Effect of Additives on CaSO4 Oxygen Carrier in Chemical-looping Combustion

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Abstract:

The experimental research was carried on the fixed bed reactor, investigating the reactions between gaseous fuel and oxygen carriers, which were made by impregnating CaSO4 with additives. The results indicate that additives can greatly improve the activity of CaSO4 and shorten the reaction time. The conversion rates of all compound oxygen carriers are more than 95% at 950℃. The curves of sulfur dioxide show single peak characteristic, and obvious increase with temperature during the reduction and oxidation process. Temperature has no obvious effect on the release of COS, and sulfur loss of the Ni-Fe compound oxygen carrier is minimum under the same conversion. Reactivity, component and structure changes of samples were studied by using temperature programmed reduction (TPR), X-ray diffraction (XRD) and field emission scanning electron microscope (FSEM) measurements, and a possible mechanism of catalytic reduction and sulfur release is proposed.

Keywords: chemical-looping combustion compound oxygen carriers calcium sulphate (CaSO4) additives sulfur release

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参考文献:

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2. 沈来宏 肖军 肖睿 张辉.基于CaSO<sub>4</sub>载氧体的煤化学链燃烧分离CO<sub>2</sub>研究[J]. 中国电机工程学报, 2007,27(2): 69-74
  3. 秦翠娟 沈来宏 郑敏 肖军.不同气化介质下CaSO<sub>4</sub>载氧体的煤化学链燃烧实验研究[J]. 中国电机工程学报, 2009,29(26): 48-55
  4. 顾海明 吴家桦 郝建刚 沈来宏 肖军.基于赤铁矿载氧体的串行流化床煤化学链燃烧试验[J]. 中国电机工程学报, 2010,30(17): 51-56
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