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高铝褐铁矿铝铁分离新工艺及其机理

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摘要:系统地研究高铝褐铁矿工艺矿物学特性, 开发钠盐焙烧—溶出铝铁分离新工艺, 运用XRD和SEM等分析铝铁的分离机理。结果表明: 铝主要呈微细颗粒嵌布于褐铁矿中或以类质同象形式存在于针铁矿中, 采用常规的磁选、浮选和磁化焙烧等工艺不能有效地分离铝铁; 采用钠盐焙烧—溶出铝铁分离新工艺, 当焙烧温度为 1 000 °C, 焙烧时间为10 min, Na₂CO₃质量分数为14.0%时, 可制备全铁品位63.21%, Al₂O₃含量为2.13%的铁精矿, 有效实现铝铁分离; 原矿中的铝经钠盐焙烧后转变为铝硅酸钠、铝酸钠、 α -Al₂O₃; 铝酸钠、铝硅酸钠经溶出后被脱除, 残留在铁精矿中的铝主要为呈微细颗粒嵌布在铁矿物中的 α -Al₂O₃。

关键字: 高铝褐铁矿; 焙烧; 溶出; 脱铝

Novel process and mechanisms of aluminum-iron separation of high-aluminum limonite ore

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Abstract: A novel process of removal aluminum from the high aluminum limonite ore by sodium-salt-added roasting-leaching was developed based on the investigation on properties of mineralogy. And the mechanism of aluminum-iron separation was studied by XRD and SEM. The results show that aluminum minerals are mainly dispersed among the iron ore as a manner of superfine grains or scattered into the iron minerals in isomorphism, thus magnetic separation, floatation and magnetized roasting are unable to remove aluminum from the ore effectively. Aluminum can be removed from the ore by sodium-salt-added roasting followed leaching processing, and the iron concentrate with the iron grade of 63.21% and Al₂O₃ content of 2.13% can be obtained under the conditions of roasting temperature of 1 000 °C, roasting time of 15 min and mass fraction of Na₂CO₃ of 14.0%. Aluminum in the ore is transformed to sodium aluminate, sodium aluminosilicate and α -Al₂O₃, among which sodium aluminate and sodium aluminosilicate can be leached by water and acid solution in turn, while α -Al₂O₃ remains in iron concentrate as a manner of superfine grains.

Key words: high-aluminum limonite; roasting; leaching; removing aluminum

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