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SIMULATION OF A PRIMARY SMELTING REACTOR IN COPPER SMELTING PROCESS

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พิมพ์พร แจ่มเวหา: การจำลองเตาถลุงขั้นต้นในกระบวนการถลุงทองแดง (SIMULATION OF A PRIMARY SMELTING REACTOR IN COPPER SMELTING PROCESS) อ. ที่ปรึกษา: อ. ดร. อมรชัย อาภรณ์วิชานพ, 100 หน้า.

งานวิจัยนี้มุ่งเน้นที่การศึกษาผลของพารามิเตอร์การดำเนินงานที่มีต่อสมรรถนะเตาถลุงขั้นต้นในกระบวนการถลุงทองแดง แบบจำลองของเตาถลุงขั้นต้นได้ถูกพัฒนาโดยใช้โปรมแกรมแมทซิม (METSIM) ค่าพารามิเตอร์ที่ใช้ในแบบจำลองเตาถลุงขั้นต้น ได้แก่ ความร้อนสูญเสีย การกระจายเฟสของของไหลในเตา เช่น ไวท์เมทัล (white metal) สแลก (slag) และก๊าซ และค่าขอบเขตของการเกิดปฏิกิริยา ได้จากการประมาณค่าโดยใช้ข้อมูลจากโรงงาน ผลการคำนวณที่ได้จากแบบจำลองถูกนำไปตรวจสอบกับข้อมูลจริงที่ได้จากโรงงานและพบว่าสอดคล้องกับข้อมูลที่ได้ แบบจำลองเตาถลุงที่ได้ถูกนำไปใช้ในการศึกษาผลของค่าพารามิเตอร์ต่างๆ ได้แก่ อัตราการไหลของหัวแร่ทองแดง (copper concentrate) ออกซิเจน อากาศ ซิลิกา และรีเวิร์ท (Revert) ที่มีต่อสมรรถนะของเตาถลุงโดยพิจารณาจากค่าเปอร์เซ็นต์ทองแดงในไวท์เมทัลและ สแลก เปอร์เซ็นต์แมกนีไทต์และซิลิกาในสแลก และอุณหภูมิภายในเตา นอกจากนี้ยังศึกษาผลกระทบของการเปลี่ยนแปลงองค์ประกอบทางเคมีของหัวแร่ทองแดงที่มีต่อสมรรถนะของเตาถลุงขั้นต้น

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The present research is focused on the study of the effect of operating parameters on the performance of a primary smelting reactor (PSR) in a copper smelting process. The model of the PSR is developed by using METSIM program. Reactor parameters, i.e., heat loss, phase distributions of white metal, slag and gas, and the extent of reactions, are estimated based on actual plant data. The model prediction is validated with plant data and a good agreement is observed. The developed model is used for investigating the effect of various parameters such as feed rates of copper concentrate, oxygen, air, silica flux and revert, on the performance of the PSR in terms of the percentage of copper in white metal and slag, the percentage of magnetite and silica in slag and the temperature of the PSR. In addition, the influence of the variation of chemical contents in copper concentrate on the reactor performance is also investigated.

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