شبكة المعلومات الجامعية

بسم الله الرحمن الرحيم

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

جامعة عين شمس

التوثيق الالكتروني والميكروفيلم

قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها
علي هذه الأفلام قد أعدت دون أية تغيرات

يجب أن

تحفظ هذه الأفلام بعيدا عن الغبار

في درجة حرارة من ١٥-٢٥ مئوية ورطوبة نسبية من ٢٠-٤٠%

To be Kept away from Dust in Dry Cool place of 15-25- c and relative humidity 20-40%

بعض الوثائق الاصلية تالفة

بالرسالة صفحات لم ترد بالاصل

BENEFICIATION OF CHROMITE ORE AND ITS APPLICATION TO THE PRODUCTION OF VARIOUS GRADES OF FERROCHROMIUN ALLOYS

A THESIS

Presented in Partial Fulfillment to

Faculty of Science, (Quena) South Valley University

For the Degree of Master of Science Chemistry

By

Mamdouh El-Seid Ahmed Aly

Supervised

Prof. Dr. R.M. Awadallah
Professor of Analytical and Inorganic Chemistry and the Former Chairman of Chemistry Department, Faculty of Science, Aswan

Prof. Dr. S.A. Ibrahim
Professor of Inorganic Chemistry
Faculty of Science,
Assiut University

Dr. N.M. Rageh
Lecturer of Inorganic Chemistry
Faculty of Science,
Quena University

To

Chemistry Department, Faculty of Science, Quena, South Valley University, 1999

ACKNOWLEDGEMENT

CHAPTER I

INTRODUCTION, LITERATURE

chrome spinelds and olivines coexisting with diamond in inclusions and xenoliths of natural peridotite, nitrogen was detected with a 7XA-5A microprobe at an accelerating voltage of 8 Kev. The differences in the nitrogen content extracted from a single diamond crystal, were comparable with the variations in the distribution of nitrogen in individual diamond crystals. The nitrogen content of most diamond ranged from negligible to 0.25% and it was probably correlated with N_2 content of the chromite and olivine which typically coexisted with diamond, indicated that nitrogen played a definite role in the formation of rocks of the lithosphere (Sobolev et al., 1989). A goal of the Bureav of mines in the mantainance of an adequate supply of critical minerals and metals to meet national economic and strategic needs as part of this effort, the Bureav's Albany Research Centre analyzed many samples of chromium metals and ferrochrome applying methods based on standard techniques (Baker, 1990). Anionic activation was applied to the flotation process of low grade chromite ore collected from Bird River, which was best floated at pH $\approx$ 2 using Armac (Cocoamine - acetate) as a flotation collector and sulphuric acid as pH modifier. Grinding of the ore to (100-150 μm) was necessary for liberation and flotation selectivity to be enhanced perior desliming the concentrate. A concentrate of 24.2% Cr_2O_3 with recovery of 90.2% was obtained after three cleaning stages from ore containing 6.05% Cr_2O_3. The total collector dose was equal to 500 g/Ton and cleaner collector dose was equal to 380 g/Ton. Similar grades and recoveries were obtained in a pilot plant when a concentrate analyzing 22.3% Cr_2O_3 with recovery of 93% and the total amount of collector doses used was equal to 630 g/Ton (Andrews, 1990). Platinum group elements (P.G.E.) occured in ore grade concentration in some chromite deposits related to the ultramafic section of the Acoje Block of the Zambales ophiolite complex (Bacuta et al., 1990) were investigated where Fe/Cr ratios were reduced in

chromite concentrate. The concentrate was used for the production of ferrochrome by dissolving the chromite concentrate in sulphuric acid at 303-363 k. The effect of stirring rate, temperature and particle size on dissolution rate was studied (Sharma et al., 1990). Laboratory and industrial test experiments showed that the chromite briquitte, which was about 94%, was the same as that for ferrochrome finished steel produced by this alloying process and showing steedy chemical composition, good mechanical properties and microstructure. Therefore, the chromite briquette could be used as a substitute for ferrochrome in steel making with obvious economic benefits (Shuechi, 1990).

The kinetics of $ZnCr_2O_4$ formation was followed by calcining a powder of (1:1) $ZnCrO_4$-CrO_3 mixture (Molarratio) at 150-1000°C in air. The structural changes were performed. It was found that $ZnCr_2O_4$ formation started at 275°C because a major phase was formed at 400°C and reached its maximum formation at 400°C. The kinetic analysis was performed using the coats-red fern equation. The reaction order followed first order kinetics and the activation energy (19.65 Kj/mole^2) was determined. The lowest activation energy was found to equal 0.172 e.v at 600°C (Gabr et al., 1992). Leaching process of chromite with commercial sulphuric acid was achieved using a ball mill type autoclave. This process yielded chromium sulphate which might be used in chemical industry or used to produce chromium metal. The rate of dissolution depended upon temperature, time, particle size and sulphuric acid concentration (Amer et al., 1992). The duplex-pellet method was proposed for roasting chromite ore to slove the irregular operation of the rotory kiln. This pellet was consisted of core and shell. The shell prevented aggregation. The residue which was produced on leaching the roast of chromite ore had higher melting point than the conventional roast charge. To research the basic problem of the duplex pellet technology, the

CHAPTER II

EXPERIMENTAL