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OBTAINING MoO_3 FOR THE MOLYBDENUM ALLOYS PRODUCTION

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Abstract – This work aims to characterize the possible oxidizing roasting products of an molybdenum sulphide concentrate (molibdenite) as few works has been published related to chemical processing of moybdenum containing materials [1,2].The roasting experiments carried out at 600 and 650 ^{o}C, even at long reaction time (180 minutes), did not remove the whole sulphur content in the concentrate. However at 700 ^{o}C, most of the sulphur was removed in 60 minutes. Both, MEV/EDS and X-ray diffraction, indicated that a very good quality molybdenum oxide (MoO_3) was obtained. Also, a material collected on the inner wall of the ceramic reactor tube was characterized, the results indicating the presence of an extremely pure molybdenum oxide (MoO_3) crystals.

Molybdenum trioxide is one of the main sources of metallic Mo and it can be obtained through the molybdenite, MoS_2, roasting. Molybdenite is the most common natural molybdenum compound and can occur together with cooper minerals. Pure molybdenum trioxide can also be produced by condensation from a vapor phase. This work aims to present a brief characterization of Mo trioxide samples, comparing those obtained from the roasting of a Brazilian molybdenite concentrate with the one already commercialized. As per comparison, it was also analyzed high purity oxide collected by condensation in special parts of the reactor as well as samples from the molybdenite concentrate. The major difference between the trioxides was the silica content, mainly due to its presence in the roasted Brazilian concentrate. Morphological and chemical characterization has been carried out employing scanning electron microscopy (SEM) and energy dispersive spectroscopy (EDS) analysis.

Figures 1 to 4 show the SEM representative images and EDS spectra of the analyzed samples. The Brazilian molybdenite concentrate shows a clear presence of Si and also the peaks of Ca, Fe and K (Fig. 1). The Brazilian molybdenum oxide sample and the commercialized one present similar chemical composition, where Mo and O are the predominant species in the resulting EDS spectra. The compositional difference between the two samples lies on the small amount of Si compounds detected on the MoO_3 produced from the Brazilian concentrate (Spectra 2 and 3). However, the two oxides are morphologically different (Figures 2 and 3), since the Brazilian one is not as homogeneous as the commercialized oxide. While the former has no predominant shape, the later is characterized by the presence of well distributed small spherical particles (Figure3). The oxide sample produced by condensation shows mono-crystals with high chemical purity (Spectrum 4), coarsely distributed (Figure 4).

Aluminium reduction tests with the Brazilian produced MoO_3 has shown that this material is adequate for preparation of the molybdenum alloys used in the steel making industry.

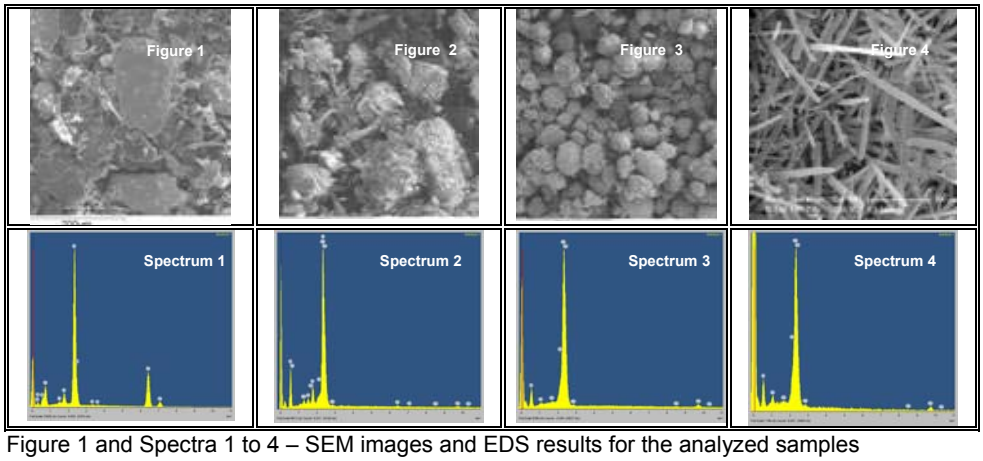

Figure 1 and Spectra 1 to 4 – SEM images and EDS results for the analyzed samples

1- Metallurgical and Materials Transactions, v.38B (4), (2007) 689-693
2- Metallurgical and Materials Transactions, v.39B (5), (2008) 738-745