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## Determining the bulk concentration of S in Fe-S: a Auger electron spectroscopy study

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An Auger electron spectroscopy study was performed in order to determine the bulk concentration of S in Fe-S. A number of studies have been performed that employs AES to study diffusion and segregation in metals. The most common application is the use of the technique to determine the diffusion parameters i.e. activation energy ( $Q$ ) and the pre-exponential factor ( $D_0$ ). This approach makes use of a known bulk concentration and uses Fick's semi-infinite solution to extract the diffusion parameters. Our research employs AES to determine the bulk S concentration in Fe-S. With the diffusion parameters obtained from literature and the use of the adapted  $t^{1/2}$  equation, derived from Fick's semi-infinite solution, the bulk concentration of S was determined. AES measurements were performed at various temperatures for a fixed period of time in order to observe the segregation of S from the bulk of Fe to the surface. These constant temperature measurements were performed at temperatures in the range 200-800 °C where the temperature was increased in increments of 50 °C. A non-linear least square software program was developed to fit the adapted  $t^{1/2}$  equation to the data, in order to extract values for the bulk concentration of S. An average concentration value was calculated for the range of temperatures investigated and compared to concentration values obtain by linear programmed heating performed over the same temperature range with a linear increase in temperature.

**Level (Hons, MSc, &nbsp; PhD, other)?**

M.Sc

**Consider for a student &nbsp; award (Yes / No)?**

Yes

**Would you like to <br> submit a short paper <br> for the Conference <br> Proceedings (Yes / No)?**

Yes

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