SAMPLES FROM DIFFERENT STAGES IN COPPER PRODUCTION AS SEEN BY NEUTRON ACTIVATION

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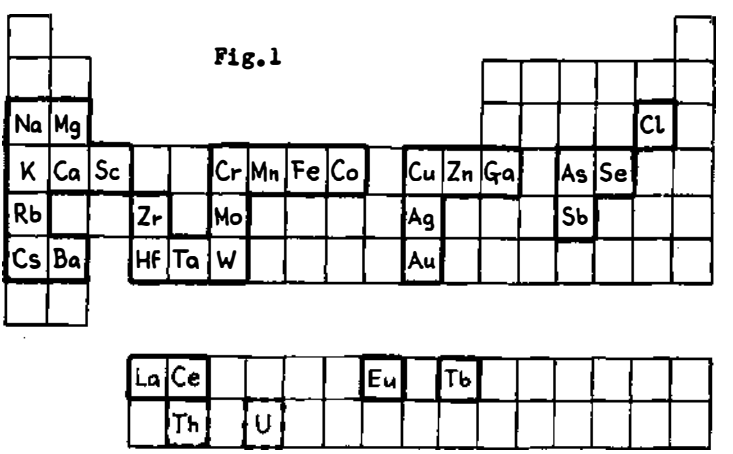
The relevant features are listed below:

- Samples of 1) grinded copper ore, 2) bulk concentrate and 3) waste, were analysed,
- Samples were representative of a total mass of 10^9 kg; grain size ~40 μm; sample mass ~5 mg, shown to give nicely reproducible results,
- Irradiations performed in a reactor neutron flux of (2-5)x10^{13} ncm^{-2}s^{-1},
- Irradiation times were 30m, 40h and 15d, for each sample,
- Flux was monitored in three ways; with internal monitors (Cu,Fe), external monitors (Au,Zn) and double neutron capture on Au. Values were found consistent to within 5%,
- Ge(Li) detector used was of 5% eff. and 3 keV res. at Co,
- Corrections due to fast neutron contributions and interfering reactions, and pile-up effects, were estimated,
- Concentrations ranging from 0.1 ppm to 10%, with errors from 0.3% to 50%, were determined for 30 elements (Fig.1),

Fig.1



- Internal consistency of the data and comparison with the independent mass spectrometric data were found satisfactory.

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