

## Selenium in wastes from the old mine of São Domingos in southern Portugal (IPB): already attached to oxygen or retained in relics of former chalcogenide minerals?

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Selenium is a naturally occurring element that may be released by various anthropogenic processes - mining, industry, agriculture. Despite being an essential nutrient for humans, animals and microorganisms, it configures a serious concern because it becomes toxic at concentrations slightly above the nutritional levels [1]. In the environment, this element displays a variety of oxidation states ranging from selenide ( $\text{Se}^-$ ) to  $\text{Se}^{6+}$ , including  $\text{Se}^{4+}$  and elemental selenium ( $\text{Se}^0$ ).

Recently [2], selenium contents above 900 ppm were assigned in mine wastes from the old sulphur factory at the São Domingos exhausted pyrite mine [3], exploited since Roman times until fourty years ago. In the perspective of sustainably remediating this mining site, an X-ray absorption spectroscopy study using synchrotron radiation, combined with X-ray diffraction, was carried out to clarify the speciation state of selenium and the nature of possible Se-carrier phase(s) in the debris left by this exhausted IPB mine. The results of this Se K-edge XANES study are described, showing that selenium does not significantly replace sulphur in the dominant sulphate phases of the mine waste materials, being rather linked to oxygen as a selenite anion ( $\text{SeO}_3^-$ ) and remaining as a minor substituting selenide in residual sulphide phases contained in the mine debris.

### References

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