

Effect of lighting power density on realgar alteration

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Exposure of deep-red realgar to light engenders alteration to friable yellow-orange micro-nodules on the surface and fissures at some critical thickness (Douglass et al. 1992). The yellow-orange products covering the realgar consist of pararealgar, which transforms with light at wavelengths between about 500 and 670 nm (Douglass et al. 1992). Such alteration always proceeds from realgar via c phase to pararealgar. Bonazzi et al. (1996) showed that formation of the x phase is preceded by a strong anisotropic increase of the unit cell volume of realgar: a and c sin(beta) increase linearly with increasing exposure times, whereas b remains substantially unchanged. The transformation into x phase occurs by exposure for 7 h to light having 700W/m² power density (Bonazzi et al. 1996). In addition, Bullen et al. (2003) exhibited that alteration to pararealgar is observed by exposure for 24h to light having power density greater than 100W/m². But, realgar from Pampa Larga, Chile did not transform after 20 yr of exposure to sunlight in the mine dump, and material taken from the mine did not alter under direct sunlight (Douglass et al. 1992). The present study addresses effect of lighting power density on realgar using single crystal X-ray diffraction study. We will present a correlation between lighting power density and light induced alteration of realgar.

* Bonazzi, P., Menchetti, S., Pratesi, G. Muniz-Miranda, M., and Sbrana, G. (1996) Light-induced variations in realgar and b-As₄S₄: X-ray diffraction and Raman studies. *American Mineralogist*, 81, 874-880.

* Bullen, H.A., Dorko, M.J., Oman, J.K., and Garrett, S.J. (2003) Valence and core-level binding energy shifts in realgar (As₄S₄) and pararealgar (As₄S₄) arsenic sulfides. *Surface Science*, 531, 319-328.

* Douglass, D.L., Shing, C., and Wang, G. (1992) The light-induced alteration of realgar to pararealgar. *American Mineralogist*, 77, 1266-1274.