Characterization of polycyclic aromatic hydrocarbons (PAHs) in aerosols around Guiyang City, China

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PAHs pollution researches are still limited in the southwest part of China and up to now, no data about PAHs in aerosols of Guiyang City have been reported. This study reports the PAHs characterization in aerosols collected in Guiyang city during 2005. From January to December, 182 samples were collected at a single station located in the urban center and were complemented by 12 aerosols samples collected during January and July in suburban areas. 16-PAHs, identified as priority pollutants by the USEPA, were detected.

A high-performance liquid chromatographic system (HP1100) equipped with a fluorimetric detector (FLD) was used for PAHs determination. A Waters PAH column (4.6×250mm, 5μm) was used for the separation of PAHs, using acetonitrile and water as the mobile phase. Aerosols samples were extracted ultrasonically with dichloromethane and purified with silica gel.

The analysis showed that the 16-PAHs concentrations ranged from below detection limit (ND) to 72.3ng/m^3 and from ND to 17.7ng/m^3 for the urban and suburban samples, respectively. The total 16-PAHs concentrations vary from 6.02 to 80.2ng/m^3 in urban aerosols and from 1.18 to 84.8ng/m^3 in suburban samples. It was clear that 5-and 6-ring PAHs dominated the total PAH burden in aerosols. Higher concentrations of total PAHs were found in winter and spring samples compared to summer and fall samples. Good correlations were observed between total concentrations of PAHs and total suspended particles (TSP). Total PAHs concentrations were negatively correlated with relative humidity and the highest PAHs concentrations were observed under southern wind direction whereas the lowest PAHs concentrations were measured under northern wind direction. Obviously, this study shows different PAHs levels in urban and suburban airborne particles, the concentration of PAHs being higher in urban samples than in suburban samples, excepted in suburban samples collected near industrial areas. Coal-burning is thought to be the major source of airborne particle-associated PAHs in Guiyang City.

A microstructural study of pietersite gemstones from Namibia and China

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Since its discovery in the Kuraman District of Namibia in 1962, the gem variety pietersite has been considered a close relative of tiger's-eye due to their mineralogical and optical similarities. Both contain quartz with inclusions of blue crocidolite that often is partly oxidized to brown hematite and goethite. Pietersite differs from the common South African tiger's-eye in its brecciated rather than banded texture, generating a lovely chaotic chatoyancy. In 1997, a new variety of pietersite from Henan Province, China appeared on the international market. In this study, we examined Namibian and Chinese pietersite specimens using powder X-ray diffraction, scanning electron microscopy, light optical microscopy, and conventional gemological methods. We hoped to discover quantitative approaches to discriminate between pietersite samples from the two localities and to develop petrogenetic models for these two gems.

Our investigations revealed that Namibian pietersite can be distinguished from its Chinese cousin in several ways. Namibian pietersite exhibited a measurably lower density (SG = 2.50-2.58) in comparison with Chinese pietersite (SG = 2.67-2.74). Namibian pietersite fluoresced bright green in response to short-wave UV radiation whereas Chinese pietersite was inert. Textural differences were evident with respect to clast size and shape. Namibian pietersite tends towards blue coloration and Chinese pietersite appears reddish-brown. Contrary to some reports, Mg concentrations were comparable within the amphibole fibers, which can be classified as magnesioriebeckite in both varieties.

Neither variety appears to have formed by the crack-seal mechanism proposed for tiger's-eye [1]. Rather, we interpret both pietersite varieties as solution breccias, and Namibian pietersite specifically can be traced to the infiltration of silica-rich fluids within an ankeritic host. Length-fast chalcedonic spherules enveloped by hematite rims replaced the host rock, and a second fluid pulse induced a reaction between the chalcedony and the hematite to generate magnesian crocidolite embedded within length-slow quartzine. No evidence for pseudomorphism of quartz after crocidolite exists, despite general assumptions to the contrary.

[1] Heaney & Fischer (2003) *Geology* **31**, 323-326.