The origin of coloration in garnets: An optical spectroscopic study

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Minor and trace elements provide important information about the formation conditions of minerals, although their location within the mineral structure has been often debated [1]. In addition, transition elements impart minerals and gems characteristic colors. A broad range of coloration in the same mineral group may arise from ions retaining the same oxidation state and substituted site, but experiencing variations in crystal field intensity. The recent evidence of a structural relaxation around octahedral Cr^{3+} substituted in garnets and spinels demonstrates the role played by mineral chemistry in defining the actual crystal field responsible for the green or red color in these mineral groups [2, 3].

The color of garnets has been investigated in samples from Thailand and East Africa, the composition and homogeneity of which have been determined using electron microprobe analysis. The origin of color will be discussed at the light of optical spectroscopic data in the UV-visible-near IR range. The comparison with other Cr-containing minerals indicates the importance of the contribution of additional absorption bands arising from various transition elements (V^{3+}, Mn^{2+}, Fe^{2+} and Fe^{3+}). By assigning the respective transitions observed, we will discuss the oxidation state, coordination number and relative concentration of these transition elements as a function of sample origin.

[1] Galoisy (1996) *Physics & Chemistry of Minerals* **23**, 217–225. [2] Juhin *et al*. (2008) *American Mineralogist* **93**, 800–805. [3] A. Juhin *et al*. (2007) *Physical Review B* **76**, 054105.

Geochemical and hydrocarbon generation differences of source rocks in diverse depositional settings in Biyang depression, Central China

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Biyang depression is a typical of terrestrial rifted basin with small area and extraordinarily rich reserves located in Zaoxiang Basin, Central China. The main hydrocarbon source rocks in the depression occur in the third member of Hetaoyuan Formation. The lithology of hydrocarbon source rocks in the lower member of the formation is mudstone and the Upper member contains abundant dolomitic mudstone. Based on the data of seismic, well logging, the previous geochemical results and experimental data, three styles of sedimentary facies in the member were recognized including fan-delta, braided-river delta and lacustrine facies in the deep zone of the depression. The content of Total Organic Carbon (TOC) in Lower member is lower than that of Upper member. Further researches showed that the higher content of TOC was distributed in the predelta and the distributed trends of TOC controlled by the sedimentary facies and the transported direction of provenance.

Two types of hydrocarbon source rock samples covered the mudstone and dolomitic mudstone were pyrolysed in open system under heating (300-700°C) conditions, and chemical compositons of its generated was measured online with a Rock-Eval Pyrolysis Instrument. A kinetic model for kerogen pyrolysis was established and extrapolated to the geological conditions. The kinetic parameter of petroleum generation shows that the activation energy of mudstone was lower than that of dolomitic mudstone, the generation time of mudstone is earlier than that of dolomitic mudstone in the same geological conditions. But when the two types of mudstone with similar content of TOC, the potential of hydrocarbon generation of dolomitic mudstone is better than that of mudstone. This new data has important information to revaluate the potential of hydrocarbon source rock and instruct the farther petroleum prospecting in the depression.