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Nontargeted Pattern Recognition in the Search of Pyrolysis Gas Chromatography/Mass Spectrometry Ageing Markers in Burmese amber

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Abstract: Burmese amber evolved from plant resin in the Cretaceous throughout various geological periods. It is the oldest amber variety with multi-components, organic polymer of mesh large molecule, which is an excellent geological activities recorder. Bloodishred amber appears natural ageing characteristics such as powdered and crust-like skin, and different oxidization degrees appearing on transection (yellow-red). Aging process leads to the fragmentation of macromolecule chain and the production of oxygen-containing groups. Tracing amber ageing mechanism by nontargeted pattern recognition is rarely investigated previously, and is the core of this research. Four Burmese bloodishred amber samples are collected and applied Pyrolysis Gas Chromatography/Mass Spectrometry (Py-GC/MS) to assess different color parts from a same sample. Principal Component Analysis (PCA) is used to analyze the results of Py-GC/MS based on untargeted metabolomics technique, in order to screen out key ageing-markers. Finally, the ageing mechanism of Burmese amber is established based on ageing marker essence from the molecular structure level, and it is conformed to heated ageing process related to geothermal energy.