

## Influence of pressure on chemical reaction of naphthalene

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Stability and chemical reaction of organic matters are important factors in the deep carbon cycle through the subduction, since organic matters are one of major carbon source of sediments at the Earth surface. Polycyclic aromatic hydrocarbons (PAHs) are present in the sediments and are found in some mantle derived rocks (e.g. [1]). Although stability and chemical reaction of PAHs under high pressure and high temperature conditions were investigated [2, 3], roles of pressure and temperature in the reaction processes were not distinguished. Here we report the influence of pressure on stability and chemical reaction of naphthalene (C<sub>10</sub>H<sub>8</sub>), which is one of PAHs.

Naphthalene was compressed using a Kawai-type multi-anvil apparatus up to 5-23 GPa at room temperature. The recovered samples after the high-pressure experiments were analyzed using GC/MS to identify and quantify the reaction products. After compression to >15 GPa, several reaction products were detected. The reaction products could be classified into three groups: dimers of a pair of naphthalene, binaphthyl isomers formed by the naphthylation, and benz[a]anthrene formed by the condensation. Similar reactions are also found in the case of the pressure-induced reaction of benzene at room temperature above 13 GPa [4]. The molar yield of the reaction products increased with pressure up to 23 GPa while most of naphthalene were still remained. These results suggest that the possibility of the oligomerization occurred locally with the approach of the neighbor naphthalene molecules with compression.

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