Constrains on the timing of partial melting events in the Sulu UHP rocks

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Fertile components in UHP rocks could undergo partial melting at both water-present or –absent conditions during deep subduction as well as early stages of rapid exhumation of continental materials [1, 2, 3]. Petrographic and geochemical observations had shown that the Sulu UHP rocks experienced partial melting at UHP-HP conditions, which led to the formation of quartzo-feldspathic inclusions [4], granitic veins or plutons [5], and substantial geochemical effects [6]. To further constrain the timing of these partial melting events, we have carried out SHRIMP zircon U/Pb dating on UHP metapelite (SYK08) as well as concordant K-rich granitic dike (SYK20) from Yangkou, Shandong Province. Zircon separates from both samples have core-mantle-rim structure. Zircon cores from metapelite yield $^{206}Pb/^{238}U$ ages from 282-633 Ma, which represents different crustal components incorporated into the protiolith of metapelite. The mantle and rim yield $^{206}Pb/^{238}U$ ages of 233±3 Ma and 214±4 Ma, representing the timing of UHP and amphibolite facies retrograde reactions, respectively. Zircon grains from the synkinematic peraluminous granitic dike (A/CNK=1.2) yield similar wide range $^{206}Pb/^{238}U$ ages (483-800 Ma) from the core, implying that it might be derived from metasediments similar to sample SYK08. Except for one spot from the mantle yields $^{206}Pb/^{238}U$ age of 234.6±3.9 Ma, all the other spots yield a concordant $^{206}Pb/^{238}U$ age of 220.8±2.9 Ma. These mantle domains also contain mineral inclusions of Pl+Kfs+Qtz+Ap, typical of granitic composition. Such an association indicates that the Sulu UHP metasediments underwent partial melting at ~221 Ma and prior to the widespread amphibolite retrograde metamorphic events.

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Metastable phase equilibria of the quaternary system KCl + K_2CO_3 + $K_2B_4O_7$ + H_2O at 273 K

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Metastable phase equilibrium and phase diagram play an important role in exploiting the brine resources. The system KCl+K_2CO_3+$K_2B_4O_7$+H_2O is one of a subsystem of Zabuye Salt Lake brines. So far, no report has been found about the metastable phase equilibria of this quaternary system. The present paper covers the metastable equilibria of the quaternary system KCl+K_2CO_3+$K_2B_4O_7$+H_2O at 273 K. The solubilities and the densities of the equilibrated solution were measured.

Figure 1 is the metastable phase diagram of the system at 273 K. The phase diagram of the system consists of three univariant curves, three crystallization fields and one invariant point. This system is of eutonic type, no double salt or solid solution was formed. The three crystallization fields were corresponding to single salt $K_2CO_3 \cdot 3/2H_2O$, KCl and $K_2B_4O_7 \cdot 4H_2O$, respectively. Invariant point E was saturated with salts $K_2CO_3 \cdot 3/2H_2O$, KCl and $K_2B_4O_7 \cdot 4H_2O$. The mass fraction composition of the equilibrium solution corresponding to E is *w* (K_2CO_3)=44.85 %, *w* (KCl)=0.77 %, *w* ($K_2B_4O_7$)=1.25 %, *w* (H_2O)=53.13 %. Results show that the salt KCl has salting out effect to the salt $K_2B_4O_7$.

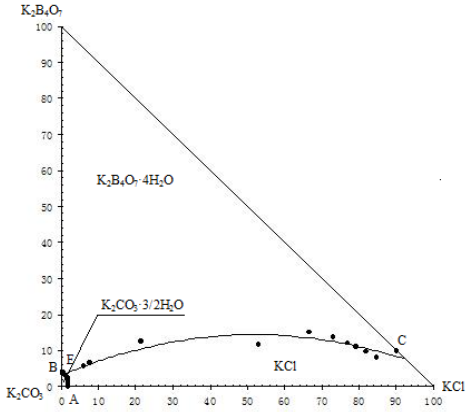

Figure 1: Metastable phase diagram of the quaternary system $K^+//Cl^-, CO_3^{2-}, B_4O_7^{2-}$-$H_2O$ at 273 K

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