TSR effects on occurrence of diamondoids and thiadiamondoids in Tarim basin oils and condensates

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One to three cages diamondoids and thiadiamondoids were detected from most of the oils and condensates analyzed from deeply buried Cambrian and Ordovician reservoirs in the Tarim Basin. Diamondoids concentrations and most of the presumed diamondoids maturity proxies (including MAI, EAI, DMAI2 and TMAI) and source rock lithology proxy (4,8DMD/3,4DMD) show increase with increasing total thiaadamantanes concentrations or the extents of thermochemical sulfate reduction (TSR), indicating that they are controlled by TSR process. TSR can destroy all compounds but newly generate and concentrate light *n*-alkanes, diamondoids and organic sulfur compounds. The most extensive TSR condensate is found to contain 3.2 wt% total dibenzothiophenes, 0.4 wt% thiadiamondoids and 7 wt% diamondoids, in which tetramantane and pentamantane are associated with polythiadiamondoids incuding dithiaamantanes, trithiaamantanes and tetrathiaamantanes, and diathiadiamantanes and trithiadiamantanes. These higher diamondoids and thiadiamondoids are unlikely to have been generated from Lewis acid-catalyzed rearrangement of polycyclic hydrocarbons or sulfides but likely from reactions with free radicals generated from TSR in the carbonate reservoirs during late diagenesis and catagenesis. Thus, we propose that those diamondoids parameters cannot be used to reflect maturity and source rock in the TSR active areas, and that TSR may have generated both higher diamondoids and polythiadiamondoids.

[1] Cai et al. (in press) *GCA*; [2] Dahl et al. (2010) *Chemie International Edition* **49**, 9881-9885. [3] Gvirtzman et al. (2015) *GCA* **167**, 144-161.