Solubility of Palladium (Pd) in Hydrocarbons: Application to Ore Genesis

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In natural systems, the platinum group elements (PGE) are commonly associated spatially with hydrocarbons. For example, pyrobitumen in the Kupferschiefer, Poland, has been shown to have high concentrations of Pd and Pt [1]. Black shales in South China likewise have been shown to contain elevated Pd and Pt (0.4 ppm Pd and 0.3 ppm Pt in the Zunyi deposit) [2]. These observations and preliminary experiments showing that crude oils can dissolve metals to potentially exploitable concentrations, suggest that liquid hydrocarbons could constitute important ore fluids [3]. The concentration of Pd in dodecane was 0.33 ppm ± 0.18 ppm and in dodecanethiol was 0.90 ppm ± 0.45 ppm. These data show that Pd is very soluble in these simple analogues of natural liquid hydrocarbons, and therefore could be very effective agents of Pd transport. This and the observed close spatial association of Pd with hydrocarbons in some PGE deposits suggest that liquid hydrocarbons could be important ore fluids for these deposits.