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Partitioning coefficient of OH between melt inclusions and crystall matrix in garnets from lherzolite xenoliths from the Kimberly mine, South Africa

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An important feature in diamond exploration is to understand the mechanism of the kimberlite eruption and dynamics of kimberlites in terms of the composition of the kimberlitic melt. Water is found as OH in nominally water free minerals (NAMS), which is caused due to mantle metasomatism. The water has a higher solubility in the kimberlitic melt and thus is partly removed from the NAMS and grain boundaries during the uplift. The water in the studied garnets forms wet spots round defect structures as one and two-dimensional defects as totally embedded micro-cracks and around melt inclusions. Therefore, the OH concentrations in garnets and melt inclusions can be measured and the partitioning coefficient between these two phases can be calculated. We present for the first time high resolution FT-IR based synchrotron measurements of OH concentrations towards melt inclusions in lherzolitic garnets from the Victor Diamond Mine in South Africa. We measured hydrogen profiles towards totally embedded microcracks and melt inclusions in these garnet crystals. The measurements show a strong variation in OH-concentrations and demonstrate that the amount of water stored in diamond bearing layers has been underestimated for a long time due to the loss of water during the uplift of the kimberlite.