

## High-Temperature Investigations on the Decomposition of Manganese Oxide

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TREMPER is an apparatus that was devised to study kinetic and thermodynamic aspects of high-temperature reactions under concentrated solar irradiation. The design allows investigations on solid or molten samples under inert or reactive atmospheres. The working temperature is adjustable; maximum temperatures of 2150 K have yet been measured under flux densities of about  $350 \text{ Wcm}^{-2}$ . TREMPER is equipped with a quench device to freeze the high-temperature composition of the sample and it is interfaced to a mass spectrometer for monitoring the gas phase. These features facilitate chemical reactivity studies on temperature levels that are difficult to access by other means. Studies were started with investigations on the decomposition of manganese oxide  $\text{MnO}_2$  under nitrogen. They revealed that the decomposition is initiated by a fast reaction. On-line gas analysis indicates that most of the oxygen is released during the heating period of the sample within the first few seconds of irradiation. Samples quenched after 20 s of irradiation contained already up to 50 mol-% MnO besides  $\text{Mn}_3\text{O}_4$ . Further irradiation increases the fraction of MnO before it levels off at 80 mol-% after 120 s (under flux densities of 350 to  $400 \text{ Wcm}^{-2}$ ). Decomposition under air proceeds similarly, however, the fraction of MnO is always lower and does not exceed 50 mol-%. This finding reflects the expected influence of the oxygen partial pressure.