Evaporation rates of elements (e.g., Na) from silicate melts in the primordial solar nebula

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A quasi-equilibrium model on evaporation of elements from silicate melts was developed. It was revealed that the evaporation was divided into three regimes; free-evaporation-dominated, hydrogen reaction-dominated, and H2O/H2 buffer-dominated. The evaporation rates were obtained as a function of temperature, total pressure and nebula gas composition. These evaporation rates were consistent with previous experimental results. Evaporation regimes and the rates of Na evaporation during chondrule formation were estimated from the previous experimental data by using the relation between evaporation rate and oxygen partial pressure.