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We report nitrogen partitioning data applicable to core formation with the goal of constraining how volatile elements are distributed within growing terrestrial bodies. We have conducted N partitioning experiments in C- and S-bearing metal-silicate systems from 1 to 20 GPa and from 1773 to 3500 K in the piston cylinder and laser-heated diamond anvil cell (DAC). Preliminary experimental data suggest that N partitions preferentially into cores (DN metal-silicate >> 1) up to the most extreme pressures and temperatures explored here; when oxygen fugacity is above IW-2 and under C-saturation.

Our low-pressure data obtained in the piston cylinder apparatus demonstrate that more reducing conditions, higher temperatures, more polymerized melts, and higher Ni, C, and S concentrations in the metal all make N less siderophile. Results for the redox and Ni dependencies are consistent with partitioning literature data, while results for C and S are consistent with the steelmaking literature and other recently reported partitioning data. Thus, N becomes less siderophile during pulses of volatile-rich core formation or reduced core formation.

Extrapolation of low-pressure data to the temperatures of DAC experiments uniformly underpredicts the N partition coefficients measured in these experiments, suggesting a role for pressure in making N more siderophile. Because of the countering effects of temperature and pressure, N may remain a moderately siderophile element up to the most extreme conditions associated with core formation that Earth experienced. A substantial portion of Earth's N budget may be sequestered in the core.