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Searching for mineralogical evidence for the clay-sulfate transition region in Gale crater, Mars using the Sample Analysis at Mars-Evolved Gas Analyzer (SAM-EGA) onboard the *Curiosity* rover

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The *Curiosity* rover exited the phyllosilicate-bearing "Glen Torridon" (GT) region in Gale crater, Mars and is now driving towards a stratigraphically higher sulfate-bearing region that represents a major climatic change in Mars' history. *Curiosity* analyzed five sedimentary rock samples in the upper GT and clay-sulfate transition region as of March 2022 with its instrument suite, listed from the stratigraphically lowest to highest sample – Nontron (NT), Bardou (BD), Pontours (PT), Maria Gordon (MG), and Zechstein (ZE). The goal was to constrain their volatile chemistry, support mineralogical interpretations, and ultimately determine if the rover was entering the sulfate-bearing unit as indicated by orbital data. NT and BD evolved mid-temperature H_2O peaks consistent with dioctahedral smectites, similar to lower GT samples; however these peaks were minimal or absent in the stratigraphically higher samples (PT, MG, and ZE). The disappearance of the mid-temperature H_2O peak in the transition samples was consistent with a decrease in phyllosilicates, which was also observed in X-ray diffraction data from the Chemistry and Mineralogy (CheMin) instrument. All five samples evolved broad SO_2 releases consistent with Fe sulfates, which were also detected in lower GT samples. NT2 and the stratigraphically higher samples (PT, MG, ZE) evolved high-temperature SO_2 peaks consistent with Mg sulfate. This peak was especially prominent in the uppermost sample, ZE. The CO_2 and CO evolutions detected by SAM were highly variable and suggestive of varying contributions from adsorbed CO_2, carbonates, oxidized organic C, and instrument background. Evolved NO was very low/absent and varied between samples. The lack of O_2 detections in all samples suggested that (per)chlorates were either absent or only present at very low abundances. HCl releases were similar to previous samples and suggested the presence of chlorides. Overall, SAM-EGA results from the clay-sulfate transition region in Gale crater showed a notable decrease in evolved water from phyllosilicates and a slight increase in high-temperature SO_2 from Mg sulfate in the up-section samples. These results suggest that *Curiosity* is transitioning out of the clay-bearing Glen Torridon trough and towards the sulfate-bearing unit.