19a Modeling and Simulation of Fate and Transport of Chromium Species in the Atmosphere

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Chromium present in the atmosphere originates from anthropogenic sources as well as from natural sources. The main human activities contributing to the chromium increase in the atmosphere are: electroplating, combustion of fuels and production of chromium chemicals. The main natural sources are volcanic eruptions and erosion of soils and rocks. A chemical kinetic mechanism for the atmospheric chemistry of chromium has been developed. The chemistry of chromium is of particular interest because its oxidation state affects its toxicity. Chromium can be reduced from the hexavalent form to the trivalent form by reacting with iron and vanadium. Trivalent chromium can be oxidized to hexavalent chromium by reactions with manganese. The typical conditions favor the reduction of Cr (VI) to Cr (III). Under some extreme conditions, Cr (III) could be oxidized slowly to Cr (VI).Concerns about the toxicity of Chromium species in the environment require an evaluation of Chromium species fate and transport in the atmosphere to evaluate human exposure to hexavalent chromium. This paper describes the model used to determine the concentration of chromium species in the atmosphere.