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## The Adsorption and Reaction of Halogenated Volatile Organic Compounds (VOCs) on Metal Oxides

Project ID: 55115

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### Research Objective

The goal of the research is to elucidate the properties of the material responsible for the activation of halocarbons and the nature of the intermediates formed in the dissociative adsorption of this general class of compounds. This information is essential for interpreting and predicting stoichiometric and catalytic pathways for the safe destruction of halocarbon pollutants. The specific research objectives are: (1) to study the adsorption and reactivity of chloromethanes, chloroethanes, and chloroethylenes on basic, neutral, and acidic oxides, including magnesium oxide, chromium oxide, silica, alumina, silica-alumina, and iron and cobalt oxides, both supported and unsupported; (2) to identify the reaction intermediates of the above halocarbons by Raman spectroscopy, NMR methods, and infrared reflection absorption and high resolution electron energy loss spectroscopies (IRAS and HREELS, respectively); (3) to define rate laws and kinetic models for the reaction of the above halocarbons with O<sub>2</sub> on oxides surfaces; (4) to investigate the effect of H<sub>2</sub>O on the selectivity with respect to formation of Cl<sub>2</sub> and HCl; and (5) to determine the role of adsorbed oxygen and chlorine as poisons for halocarbon activation on oxides.