

Physical Chemistry McElvain Seminar

11:00 AM

Tuesday, October 29, 2013

Room 1315

The Changing Face of U.S. Air Quality: Summer vs. Winter, Urban Smog vs. the Natural Gas Boom, and Why Chemical Mechanisms Matter



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Ozone (O_3) in the lower atmosphere is a secondary pollutant formed from nitrogen oxides (NO_x), volatile organic compounds (VOCs) and sunlight. It has well documented impacts on human health and is one of the principle components of summertime urban air pollution. Rapid decreases in ozone precursor emissions in the U.S. in recent decades have substantially mitigated this problem. The more recent development of natural gas resources, particularly in the western U.S., have led to rapid increases in ozone precursor levels in some regions. Indeed, the highest ozone levels recorded in recent years have occurred in mountain basins of Utah and Wyoming, areas with intensive oil and gas development. Contrary to the urban experience, however, high ozone in these regions occurs in winter, not summer. Winter ozone is a conundrum. While the known VOC and NO_x precursors are readily abundant, free radicals derived from sunlight-driven photolytic reactions and required to initiate ozone-forming oxidation chains are essentially absent. Why does ozone still form? Why only in the winter and not in the summer? Why don't the same cycles produce ozone in urban areas during the winter? This seminar will examine the causes of winter ozone and the challenge it presents to our understanding of atmospheric chemical mechanisms for nitrogen oxides, ozone and oxidants.

Please join us at 4:30 pm for a reception in the Shain Atrium