and organic nitrates. The nature of the system can be explained by considering its behavior as a function of the initial concentrations of NO_x and hydrocarbon in the irradiation of a static system, as well as the ratio of two reactants, i.e., the $[HC]/[NO_x]$ ratio.

At low $[HC]/[NO_x]$ ratios (usually ratios of less than about 1 to 2/1) the rate at which NO is converted to NO_2 is influenced by the availability of organic compounds. Therefore, the effects of reducing organic compounds are to slow the conversion of NO to NO_2, thereby lowering the NO_2/NO ratio. When this occurs, a larger proportion of the NO that is converted to NO_2 occurs through the reaction with ozone. This, then, has the overall effect of reducing the ozone buildup. If the oxidation of NO by organics is delayed sufficiently so that the sun has passed its zenith before significant amounts of NO_2 are created, photodissociation of NO_2 will be diminished and less ozone will accumulate on that date. At moderately high $[HC]/[NO_x]$ ratios (usually greater than about 5 to 8/1), the greater availability of organic radicals means that all of these radicals are not consumed as rapidly in reactions with NO, and more reactions between the radicals and NO_2 are able to occur. Thus, the amount of ozone formed and accumulated begins to become limited by the availability of NO_x, and becomes less sensitive to additional organic precursors. At very high $[HC]/[NO_x]$ ratios (greater than about 20 to 30/1), ozone cannot accumulate because either the ozone is consumed by reaction with hydrocarbons, NO_x becomes unavailable due to reactions with free radicals, and radical-radical termination reactions occur which reduce oxygen atom and, hence, ultimate ozone concentration.

Identification of the nitrogen-containing products in atmospheric reactions has been under investigation for a number of years (Gay and Bufalini, 1971; Spicer and Miller, 1976; Pitts, 1977). In general, the most important gaseous nitrogen-containing products in the NO_x-organic system are nitric acid and PAN. As noted, reactions of NO and NO_2 with free radicals produce, in addition to nitrous, nitric, and peroxynitric acids, a variety of organic nitrogen-containing species (Table IV). There currently exist important areas of uncertainty with regard to the formation of nitrogen-containing products in atmospheric reactions. The extent of formation and decomposition of peroxynitrates, RO_2NO_2, is unknown, and rate constants for the key reactions in the series, $RO_2 + NO$, are yet to be determined.