THE CHEMISTRY OF POLLUTION CONTROL THROUGH COMBUSTION MODIFICATIONS, D. W. Pershing and E. E. Berkau, Environmental Protection Agency, Office of Air Programs, Research Triangle Park, North Carolina 27711.

The major pollutant emissions from fossil-fuel burning boilers and furnaces are sulfur oxides (SO_x), nitrogen oxides (NO_x), and particulates. Of these, NO_x and particulates are strong functions of the combustion system and are, therefore, amenable to control through combustion modification. Techniques such as flue gas recirculation, stagged combustion, and off stoichiometric firing have been extremely effective in reducing NO_x emissions from many gas fired boilers and to a lessor extent from oil and coal-fired units. Recent studies have also shown that burner design and air introduction scheme can have pronounced effects on NO_x formation. In an effort to better understand the controlling phenomena kinetic and aerodynamic modelling programs were initiated. Their results indicate that for natural gas systems it is possible to utilize existing chemical rate data and predict qualitatively the results observed in the field. Unfortunately, similar successes were not achieved with oil and coal-fired systems. Thus, this paper is an attempt to review and explain the existing control techniques, to show the theoretical basis upon which they are founded and to point out those areas where more experimental work is needed, especially in the areas of chemical kinetics and reaction mechanism.