Table IV shows the various reaction combinations that are important between these radicals and NO and NO_2.

The reactions of HO with NO_2 and NO are reasonably well-understood and have been previously listed as reactions 37 and 38. Rate constants for these two reactions are available (Baulch et al., 1980; Tsang et al., 1977).

The rate constant for the reaction of HO_2 and NO has recently been determined by direct means and is substantially larger than previously calculated indirectly (Howard and Evenson, 1977). The HO_2-NO reaction, as noted earlier, is a key reaction in the atmospheric conversion of NO to NO_2.

The reaction of HO_2 and NO_2 has the following two possible mechanisms (Howard, 1977). Reaction 64b is not considered to be important in atmospheric chemistry:

$$HO_2 + NO_2 \longrightarrow HO_2NO_2, \tag{64a}$$

and

$$HO_2 + NO_2 \longrightarrow HONO + O_2. \tag{64b}$$

In addition, the peroxynitric acid formed in reaction 64a thermally decomposes as follows (Graham et al., 1977):

$$HO_2NO_2 \longrightarrow HO_2 + NO_2. \tag{65}$$

At the present time it appears that, at the temperatures prevalent in summer smog episodes (>20°C), peroxynitric acid does not represent an appreciable sink for NO_2 because of the rapid thermal decomposition reaction 65. At lower temperatures HO_2NO_2 will achieve higher concentrations and its importance as a sink for NO_2 increases.

The reactions of RO, RO_2 and RCO_3 with NO and NO_2 represent key reactions in the conversion of NO to NO_2 and the formation of organic nitrites and nitrates.