The main alkoxyl radical reactions with NO and NO_2 are:

$$RO + NO \longrightarrow RONO \quad (66a)$$

or

$$\longrightarrow RCHO + HNO \quad (66b)$$

and

$$RO + NO_2 \longrightarrow RONO_2 \quad (67a)$$

or

$$\longrightarrow RCHO + HONO. \quad (67b)$$

The reaction of alkylperoxyl radicals with NO is generally assumed to proceed by the oxidation of NO to NO_2 with formation of an alkoxyl radical:

$$RO_2 + NO \longrightarrow NO_2 + RO. \quad (41)$$

Reaction 41 is believed to be an important route for the oxidation of NO to NO_2 in the atmosphere (the alkoxyl radical may react further to produce HO_2, which also converts NO to NO_2).

It has been postulated that longer chain peroxyalkyl radicals ($n > 4$) from alkane photooxidation will add to NO to form an excited complex that can be stabilized to produce an alkyl nitrate (Darnall et al., 1976):

$$RO_2 + NO \longrightarrow RONO_2. \quad (68)$$

The peroxyalkyl-NO_2 reaction proceeds principally by

$$RO_2 + NO_2 \longrightarrow RO_2NO_2. \quad (69)$$

The peroxynitrate may thermally decompose according to

$$RO_2NO_2 \longrightarrow RO_2 + NO_2. \quad (70)$$

Measured rate constants for the RO_2-NO_2 reaction and the RO_2NO_2 decomposition are not currently available.