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Atmos. Chem. Phys., 5, 3433-3440, 2005

www.atmos-chem-phys.net/5/3433/2005/

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Kinetic study of the gas-phase reaction of atomic chlorine with a series of aldehydes

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Abstract. The reactions of Cl atoms with a series of unsaturated aldehydes have been investigated for the first time using a relative method. In order to obtain additional information for a qualitative structure versus reactivity discussion, we have also determined the rate coefficients for the reactions of atomic chlorine with their respective saturated aldehydes. These relative measurements were performed at room temperature and atmospheric pressure of air and N₂, by using ethane, propene and 1-butene as reference compounds. The weighted average relative rate constants obtained, $k_{Cl} \pm 2\sigma$ (in units of cm³ molecule⁻¹ s⁻¹) were: trans-2-pentenal $(1.31 \pm 0.19) \times 10^{-10}$; trans-2-hexenal $(1.92 \pm 0.22) \times 10^{-10}$; trans-2-heptenal $(2.40 \pm 0.29) \times 10^{-10}$; n-pentanal $(2.56 \pm 0.27) \times 10^{-10}$; n-hexanal $(2.88 \pm 0.37) \times 10^{-10}$; n-heptanal $(3.00 \pm 0.34) \times 10^{-10}$.

Finally, results and atmospheric implications are discussed and compared with the reactivity with OH and NO₃ radicals.

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Citation: Rodríguez, D., Rodríguez, A., Notario, A., Aranda, A., Díaz-de-Mera, Y., and Martínez, E.: Kinetic study of the gas-phase reaction of atomic chlorine with a series of aldehydes, Atmos. Chem. Phys., 5, 3433-3440, 2005. [Bibtex](#) [EndNote](#) [Reference Manager](#)

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