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Effect of temperature and humidity on the gas–particle partitioning of nicotine in mainstream cigarette smoke: a diffusion denuder study

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ABSTRACT

During cigarette smoking, nicotine deposition in the mouth, upper airways and deep lung can occur via rapid diffusion of gas-phase nicotine and via deposition of particle-bound nicotine, with changing proportions, dependent on physical and chemical equilibria. We have used a diffusion denuder approach to physical equilibria to evaluate comprehensively the percentage of nicotine that is initially in the gas phase of mainstream cigarette smoke under different temperature (*T*) and relative humidity (*RH*) conditions. Smoking experiments with University of Kentucky 3R4F research cigarettes were performed at six denuder *T* values (291–335 K) and three *RH* values (30%, 45% and 60%). G/P partitioning of nicotine increased significantly with