

Formaldehyde and Electronic Cigarettes

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“Formaldehyde is normally present at low levels, usually less than 0.03 ppm, in both indoor and outdoor air. The outdoor air in rural areas has lower concentrations while urban areas have higher concentrations. Residences or offices that contain products that release formaldehyde to the air can have formaldehyde levels greater than 0.03 ppm. Products that may add formaldehyde to the air include particleboard used as flooring underlayment, shelving, furniture, and cabinets; MDF in cabinets and furniture; hardwood plywood wall panels, and urea-formaldehyde foam used as insulation.”¹

“Our results verify previous observations that it is possible for ECs to generate high levels of aldehydes [e.g. formaldehyde]; however, this is observed only under dry puff conditions. In contrast, minimal amounts of aldehydes were released to the aerosol at normal vaping conditions, even when high power levels were used. At those conditions, aldehyde emissions were far lower than tobacco cigarette smoke . . . Dry puffs are experienced by vapers infrequently and in specific situations. Most usually, they are associated with very low levels of liquid. New-generation atomizers have a clear window (plastic or glass), which gives vapers the ability to see the levels of liquid in the atomizer. Thus, such cases of dry puffs are uncommon.”²

Formaldehyde exposure to the e-cigarette user is estimated to be between <.0003 to .01 ppm.³ Formaldehyde measured in a sealed chamber measuring 2m x 2m x 2m (78” x 78” x 78”) after 1.5 hours of e-cigarette use (three e-cigarettes) was less than 0.02 ppm⁴, below the 0.03 ppm normally present in residences and offices.

Formaldehyde exposure limits are as follows:

OSHA

PEL (permissible exposure limit)⁵: .75 ppm. However, “Airborne concentrations of formaldehyde above 0.1 ppm can cause irritation of the respiratory tract.”⁶ According to Schripp et al, this “irritation” concentration would require at least five persons using e-cigarettes over a 1.5 hour period in a sealed room smaller than 7 ft by 7 ft by 7 ft and is unlikely to be encountered in practice. For the PEL of 0.75 ppm to be reached, this would require 25 e-cigarette users to share that same size (sealed) room for eight hours.

STEL (short term exposure limit)⁷: 2.0 ppm. That would require at least 100 people in the same small sealed room previously mentioned for 15 minutes.

ACGIH

TLV (Threshold Limit Values)⁸: 0.3 ppm. At least 15 people in that same small sealed room for 1.5 hours.

HUD

Indoor levels: Below 0.4ppm⁹

1 An Update on Formaldehyde. U.S. Consumer Product Safety Commission. 1997. p.4.

2 Burstyn, I. Peering through the mist: systematic review of what the chemistry of contaminants in electronic cigarettes tells us about health risks. BMC Public Health. 2014, 14:18.

3 Id at Chart 1.

4 Schripp, T. et al. Does e-cigarette consumption cause passive vaping? Indoor Air, 23: 25–31. 2013.

5 The PEL is measured as an eight hour time weighted average.

6 https://www.osha.gov/OshDoc/data_General_Facts/formaldehyde-factsheet.pdf

7 STEL is the maximum exposure allowed during a 15-minute period.

8 Threshold Limit Values are defined as an exposure limit to which it is believed nearly all workers can be exposed day after day for a working lifetime without ill effect.

9 An update on Formaldehyde, Supra.