

## How Febreze and Acetaldehyde Affect the Survival of *Daphnia magna*

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Febreze is a brand of air fresheners and is marketed by Proctor and Gamble with world sales exceeding 1 billion dollars in 2011. In a 2009 study conducted by the Environmental Working Group, 89 air contaminants were detected in a can of *Febreze Air Effects Hawaiian Aloha* (FAEHA), of which only 3 were disclosed on the label. Among these ingredients were toxic substances such as acetaldehyde, a Group 1 carcinogen linked to developmental/reproductive toxicity, and Butylated hydroxytoluene (BHT), a known neuro and immunotoxin. Due to the presence of such toxic components in FAEHA and their ability to contaminate the aquatic environment, we sought to determine whether FAEHA is toxic to aquatic organisms and, if true, whether acetaldehyde, one of FAEHA compounds with known toxicity, could be responsible for this effect. To test this hypothesis, we used *Daphnia magna* (*D. magna*), a small planktonic crustacean, as a model organism. *D. magna* populations were exposed to various concentrations of FAEHA and acetaldehyde, and *D. magna* death rates were used as a measure of toxicity. We found that FAEHA was highly toxic (100% death rate in <5 hours) at concentrations of >1.38% freshener and partially toxic at a concentration of 0.05% (6.7% death rate in <7 hours). We also found that acetaldehyde was less lethal than FAEHA. While at a concentration of 25% a similar death rate was noted for the two substances, FAEHA-induced death rate was still high at a concentration of 1.38% (>93%), while acetaldehyde had no impact on *D. magna* survival at a concentration of 6.25%. These data argue that FAEHA can be toxic to aquatic organisms at low concentrations and that additional compounds present in FAEHA, other than acetaldehyde, are responsible for the high toxicity observed in our experimental design. In future studies, we will investigate the impact on *D. magna* death rate and reproduction of some of the other chemicals present in FAEHA starting with BHT.