Upon ingestion, the artificial sweetener, aspartame is metabolized to formaldehyde in the body and has been reportedly associated with systemic contact dermatitis in patients exquisitely sensitive to formaldehyde. We present a case of a 9-year-old Caucasian boy with a history of mild atopic dermatitis that experienced severe systematized dermatitis after being started on montelukast chewable tablets containing aspartame. Patch testing revealed multiple chemical sensitivities which included a positive reaction to formaldehyde. Notably, resolution of his systemic dermatitis only occurred with discontinuation of the montelukast chewables.