

Performance Data for a Dust Collection Device that is Compatible with Most Commercial U.S. Vacuum Cleaners

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RATIONALE

Assessment of allergen exposure is routinely performed by measuring allergen levels in reservoir dust samples.

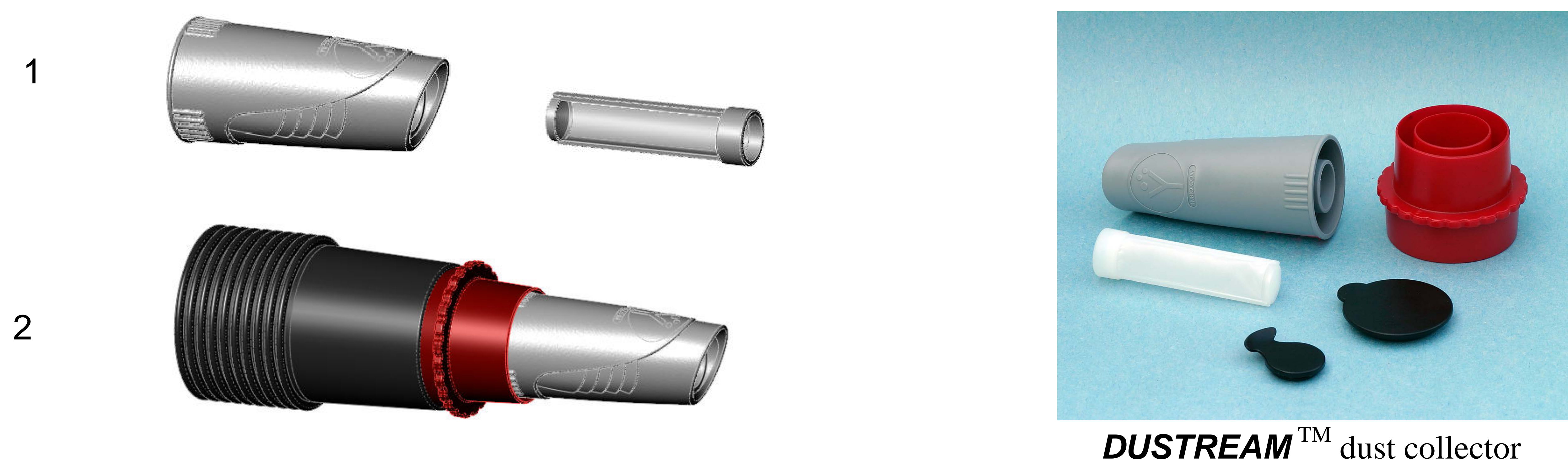
Our aim was to develop a new dust collection device that fits most vacuum cleaner models through use of a universal adapter and which contains low levels of organic compound contaminants, such as endotoxin, bisphenol A, and phthalates. The device enables the convenient collection of sufficient amounts of reservoir dust for allergen analysis.

METHODS

The disposable plastic dust collection device consists of a collector, a nylon filter and a bi-directional universal adapter.

The nylon filter is inserted into the collection device (1)

and fitted to a vacuum cleaner hose with or without using the universal adapter (2).



The dust collection device was fitted to 48 current vacuum models from various vendors.

Each of the vacuums tested was categorized depending on whether the collector fit without the adapter, with the adapter, or with the adapter reversed.

Dust samples (n=84) were collected using the new collector from an area ~0.25m² for 2 minutes using four different brands of vacuum cleaners.

Samples were weighed to determine the amount of dust collected for each filter.

Endotoxin levels were measured by extracting samples in the filter device and then using the Limulus Amoebocyte Lysate assay (LAL) to test the collected extracts. Phthalates and bisphenol A were confirmed to be less than 25ppm by participating plastic companies (documentation on file at INDOOR Biotechnologies, Inc.).

RESULTS

The collection device fit all 48 vacuum cleaner models that were tested.

The dust weights collected from different sources using the device generally exceeded 100mg fine dust and were more than sufficient for allergen, endotoxin or mold analysis.

Vacuum cleaner models tested (n = 48)		
Fit without adapter	Fit with adapter	Fit with adapter reversed
Bissell Liftoff Revolution	Dirt Devil Reaction Dual Cyclone	Bissell Clean View
Dyson Swivelball	Dirt Devil Vibe	Bissell Cleanview Revolution
GE Canister	Dirt Devil Vibe Quick Vac	Bissell Power Track
Kenmore Progressive Canister	Dirt Devil Vision	Bissell PowerForce
Shark Transformer Lightweight	Dyson DC07 Off Floors	Dirt Devil Reaction
Sanitaire Systems	Dyson DC14 Drive	Dirt Devil Ultravision Turbo
Oreck Canister BB110DC	Eureka Boss SmartVac	Electrolux Upright
Oreck Ironman	Floor Master Wet/Dry	Eureka Altima (+4 models)
Oreck DutchTech	Hoover Duros Canister (+8 models)	Galaxy Bagged Upright
	Miele Uprights	Kenmore Grab & Go Pro (+6 models)
		VAX X5

Dust collection on different materials using the collection device

Sample source	Dust Collected (mg) mean	Range (mg)
Bed/Mattress (n=28)	254	4 - 1640
Carpet (n=18)	326	64 – 854
Rug (n=25)	596	154 – 1534
Sofa (n=13)	122	14 - 354

The dust collection device is essentially free of endotoxin, bisphenol A, and phthalate and collects sufficient dust samples to run on both ELISA and MARIA technologies.

CONCLUSIONS

The disposable dust collector with a universal adaptor can be used to collect a sufficient amount of dust for detection of indoor biologics and is suitable for use in IAQ investigations allowing IAQ professionals, industrial hygienists, and consumers to sample home environments. The collector is compatible with the majority of the vacuums that are currently available at retail stores in the U.S.