



MINI-MOUDI™ IMPACTOR FOR CIGARETTE AND E-CIGARETTE RESEARCH MODEL 135

APPLICATION NOTE MOUDI-003 (US)

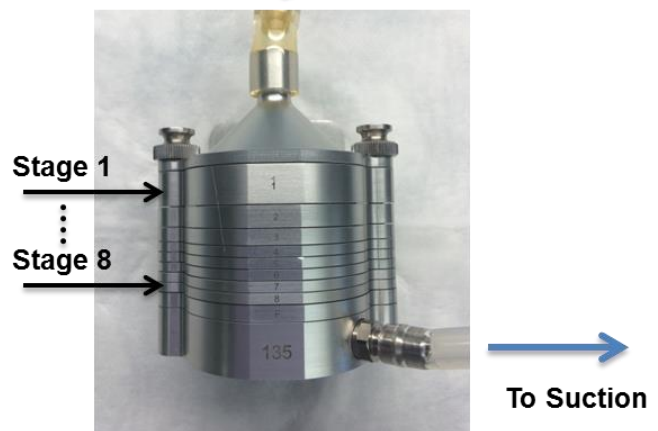
Research on the health effects of cigarette and e-cigarette often entails collection and chemical analysis of the smoke aerosol, in order to determine the amounts of nicotine, tar, carcinogens and other chemical components. Researchers are increasingly recognizing the importance of separating the smoke by particle size before conducting the chemical analysis. It is understood that coarse particles are deposited in the upper airways, while finer particles penetrate deeper in the lungs. Size separation of the smoke enables measurement of smoke contents reaching specific regions of the pulmonary system, i.e. throat, trachea, large airways, small airways, alveoli, etc.

Research on smoking now has a new impetus as the use of electronic cigarettes is on the rise worldwide as an alternative to conventional cigarettes. E-cigarette sales in the United States have increased from 1.5 to 3.6 billion US dollars between 2014 and 2018. It is claimed that e-cigarettes are helpful in smoking cessation and are less harmful than the conventional cigarettes, although there are recent cases of lung disease associated with them. Hence, clinical research on both the beneficial and the harmful effects of electronic cigarettes is needed.

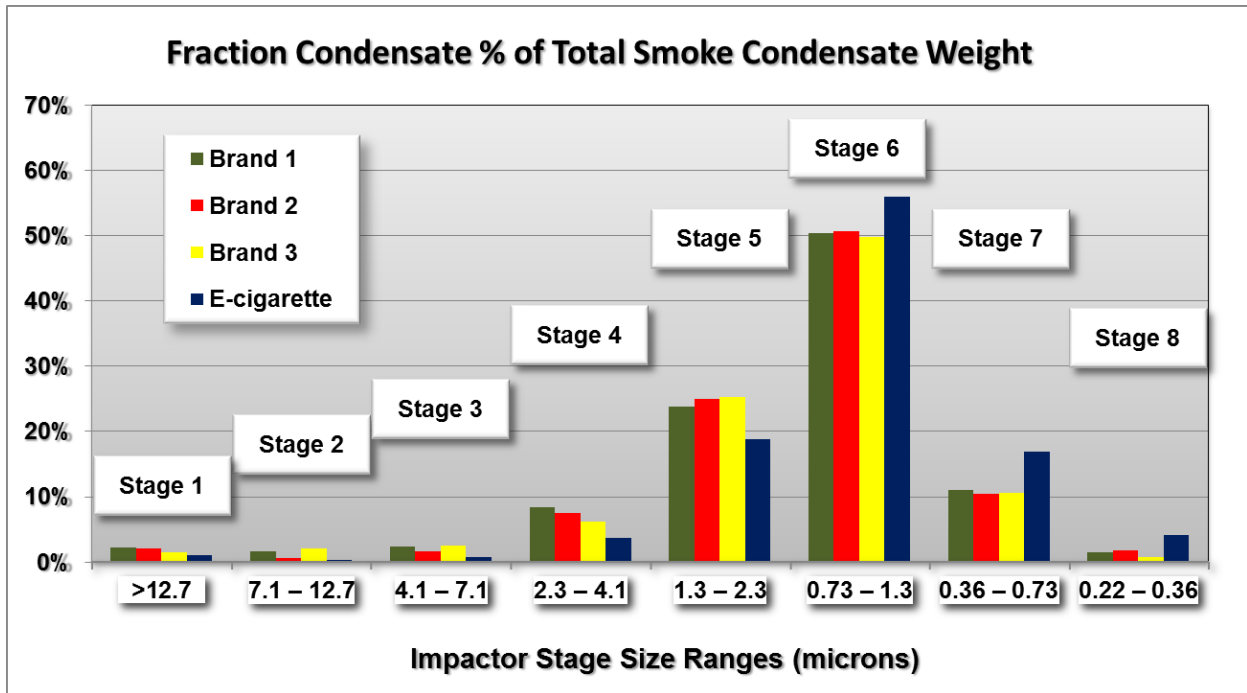
TSI offers a cascade impactor, the Model 135 Mini-MOUDI™ impactor, which enables separation of smoke aerosol by particle size. The Mini-MOUDI impactor has a small device volume and is designed to handle small flow rates (2 liters per minute or smaller), which match well with the typical smoking puff topographies.



Smoke
Condensate



Largest particles in the smoke condensate are deposited on a substrate (a piece of metal foil or a filter) in Stage 1. Successively smaller particles are collected by the lower stages. An eight-stage device is shown above. Typical results with various brands of cigarettes and an e-cigarette are shown below, and indicate the majority of the aerosol mass is collected in stages 4, 5, and 6 of the impactor, with particle sizes between 0.4 and 1.3 micrometers.



These results show how the Mini-MOUDI impactor enables determination of the aerosol mass contained in various particle size ranges. Further analysis of the samples collected on various Mini-MOUDI stages will reveal the distribution of chemicals, e.g., nicotine and tobacco-specific nitrosamines, in various size bins, providing valuable data concerning the access of the cigarette smoke contents to various regions of the smokers' lungs.



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