The Misunderstood (Fume) Hood
By Stephen Larson

The origin of the fume hood is the fireplace of the Alchemists (600-1600AD).

In the early 20th century, Thomas Edison used the natural draft caused by fire to exhaust the air contaminants from his experiments. However, in the summer, he mounted a shelf outside a window and worked through the open window, shutting the sash to prevent entry of toxic, odorous or explosive air contaminants.

In 1790, Joseph Priestley designed a chemical exhaust hood for his chemical laboratory in Pennsylvania operated by a large man-powered bellows. However, it was not until the invention of electricity, the electric motor and the electric blower did the first fume hood appear. The earliest six-sided laboratory fume hood with a front moveable sash appeared at the University of Leeds, UK in 1923.

The US National Research Council (1995) defines a laboratory fume hood as: A fire and chemical resistant enclosure with an opening in the front fitted with a moveable sash. They continue, The laboratory fume hood is the most important component used to protect laboratory workers from exposure to hazardous chemicals used in the laboratory. Despite 90 years of use that have passed since the first fume cupboard (UK) was installed, there continues to be both misunderstandings and arguments as to how to use a laboratory fume hood:

1. Laboratory fume hoods should be kept clear at all times, free of unnecessary materials and equipment except that required for a specific experiment or operation;
2. Chemicals should not be stored in laboratory fume hoods, rather they should be stored in ventilated chemical storage cabinets. Separate cabinets for the storage of corrosive acids and bases and flammables are available;
3. The sash should be used as eye and face protection by lowering it to a height that permits entry of hands and arms only; some fume hoods have horizontal sliding sashes which can also be used for face and eye protection;
4. Small amounts of low volatility, low powder chemicals can be handled on the open bench however volatile toxic and flammable chemicals should be handled in a fume hood;
5. Place chemicals and equipment at least 6" behind the sash opening to ensure that emissions are contained in the fume hood;
6. Check the airflow monitor located on the front of the fume hood to ensure that the fan is operating and the airflow is safe; a sash height label may be placed to indicate when airflow is 100 feet per minute with a range of 80-120 feet per minute;
7. Elevate all large pieces of equipment 2" above the floor of the fume hood to permit airflow around the object e.g. water baths should raised up at least 2";
8. All electrical devices should be plugged into outlets mounted outside the fume hood usually on the side of the opening; electrical outlets below the sash opening are subject to damage from spilled chemicals that leak out the front of the cabinet;
9. Sinks in fume hoods are not recommended because of the risk of spilled chemicals entering the sewer system resulting in a reportable chemical release to the environment;
10. Sashes are made of safety glass to prevent flying objects from penetrating and breaking the glass as well as containing fires within the fume hood.

Damaged sash glass should be replaced when cracked or otherwise damaged. There are over 300 laboratory fume hoods of different ages and conditions at Tufts which are tested annually to ensure that the airflow meets recommended airflow rates to prevent air contaminants from entering the laboratory. However, laboratory workers should be aware that fast walking in front of the hood, supply air vents near the sash opening, and local fans can cause contaminated air to be drawn out into the room resulting in loss of containment. In summary, a laboratory fume hood should be available at all times for any individual that needs to prepare or use or dispose of a hazardous chemical. For more advice, go to the Tufts Research and Laboratory Safety Guide Section 2.4 Laboratory ventilation and fume hoods.