

Recommended Fume Hood Work Practices

A Safe, Healthy Work Environment

Most people think of a scientific laboratory as a clean, safe place to work. But for the people who work there every day, the typical laboratory—filled with flammable and toxic chemicals, harmful vapors, gases and corrosive acids—can be an extremely hazardous place.

By containing harmful contaminants and venting them out of the work area, laboratory fume hoods help create and maintain a safe, healthy environment for you—the laboratory worker—and your co-workers.

Your fume hood is designed to protect you by providing an enclosed work area that has an air barrier between you and the harmful materials you

work with. Behind this protective air barrier, the hood's directional air flow carries harmful contaminants away from you toward the rear of the hood. Also, the properly tuned hood and its exhaust system dilutes the contaminants with large volumes of air and safely exhausts them.

If anything interferes with the protective air barrier or the fume hood or disrupts the proper air flow, the hood's ability to protect you and your co-workers may be seriously reduced.

Since 1906, we at Kewaunee Scientific Corporation have been designing and building laboratory fume hoods to help keep laboratory work environments safe and healthy.

Based on our knowledge and experience, we've outlined a number of basic safety practices for you and your co-workers to follow when choosing, using and maintaining laboratory fume hoods. The following practices are based on the superior design found in Kewaunee Supreme Air hoods.

We urge you to familiarize yourself with the recommended fume hood work practices on these pages and, even more important, to make a habit of applying them every day. We think you'll agree—it's the best way to help ensure a safe, healthy work area for you and your co-workers.

The Right Fume Hood for the Job

If your laboratory fume hood is to properly protect you, it must be designed for the type of work you're doing.

For example, if you work with radioisotopes, carcinogens or other toxic materials for which decontamination is important, you should always use a hood with a non-

absorbent lining that is designed to be easily decontaminated.

If you work with large volumes of flammable substances, you may need a hood equipped with such features as a non-absorbent lining, explosion-proof lights and electrical receptacles, a fire-suppression system, and a spark-resistant exhaust fan.

If you use perchloric acid heated above ambient temperature then you need a hood and exhaust system specifically designed for this hazard.

To be sure your fume hood is the right one for the work you're doing, contact your local Kewaunee sales representative.

Checking Fume Hood Performance

To confirm that your fume hood exhaust system is working properly, you should equip the hood with an air flow monitor. Inspect both the monitor and the system periodically for malfunctions.

For some applications a pressure gauge (e.g. No. 844 Inclined Manometer) connected to the exhaust duct is sufficient. The safe pressure range should be marked on the gauge. When using more hazardous contaminants, a fume hood alarm such as the Kewaunee Air Alert 300 or Digital Face Velocity Alarms should be used. These alarms provide both a visual and audible warning when the exhaust flow becomes unsafe.

If your hood is equipped with a variable air volume controller (VAV) with alarm capabilities, then an additional alarm is not necessary.

You should have a qualified technician thoroughly test your fume hood before you use it the first time and at least

once a year after that. You should also have your hood tested after any modification to the laboratory ventilation system or other factors which may affect hood exhaust capability or room air flow patterns.

Kewaunee Supreme Air hoods are provided with one of three baffle configurations: fixed, internally adjustable, or internal single point adjustable.

On the fixed baffle configuration the size of the slots in the baffle are optimized to provide the best performance for general purpose use. On the adjustable baffle options the size of the slots in the baffle can be adjusted to provide control over the air flow patterns within the hood. In the internally adjustable baffles the size of the upper and lower slots is adjusted by moving baffle strips. In the internal remote adjustable baffle option, an adjustment knob rotates a damper behind the lower rear baffle to change the relative size of the slots.

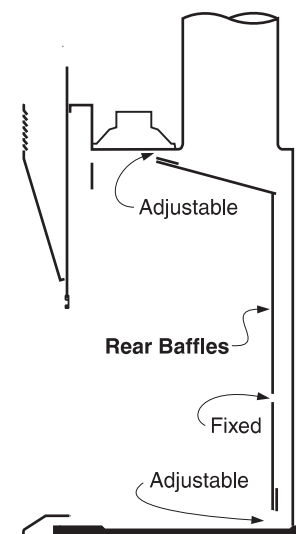


Figure 1. Rear Baffle Arrangements for Internally Adjustable Baffles

Recommended Work Practices (continued)

Checking Fume Hood Performance (continued)

In most uses of the hood, the contaminants quickly mix with air to form mixtures which have almost the same density as air. In these cases, baffle position **A (Figure 2)** gives the best performance as it provides good flow in both the lower and upper parts of the hood work area.

When a large hot plate is used in the hood, the heat will cause the contaminants to rise within the hood. Baffle position **B (Figure 2)** allows for more air to be exhausted from the upper part of the work area and gives the best containment in this instance. If large volumes of very dense vapors are given off in the hood they will tend

to sink within the hood. In this case, the amount of air drawn through the lower work area should be increased by using baffle position **C (Figure 2)**. Before setting up apparatus in the hood verify that the baffle setting is correct for the procedure to be performed.

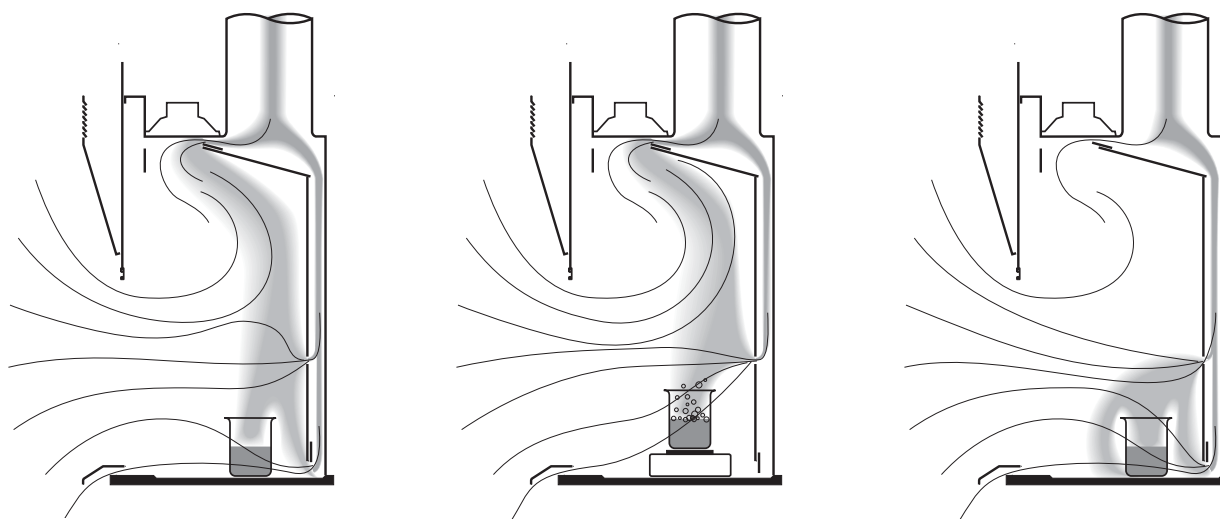


Figure 2

Position **A**

Slot Adjustment for Normal Operation

Position **B**

Slot Adjustment for Large Hot Plates

Position **C**

Slot Adjustment for Heavy Gases and Vapors

Maintaining the Protective Air Barrier for a Safe Work Area

When you stand in front of a laboratory fume hood, the air passing your body to enter the hood forms a zone of low air pressure directly in front of you which extends into the hood for about four inches. Since contaminants may enter this turbulent area from inside the hood, you should keep all hazardous materials at least six inches inside the hood, behind the protective air barrier. (See Figure 3.)

The farther behind the fume hood protective air barrier you place the source of contaminants, the greater the protection the hood provides you. Therefore, you should place the equipment and contaminants you're using as far back inside the hood as you can, being careful not to block the lower slot in the rear baffle. (See Figure 4.) You should never place apparatus so far back that you have to put your head into the hood while your procedure is generating contaminants.

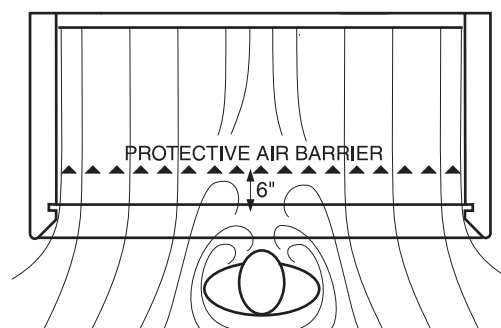


Figure 3

Formation of Protective Air Barrier

Recommended Work Practices (continued)

Maintaining the Protective Air Barrier for a Safe Work Area (continued)

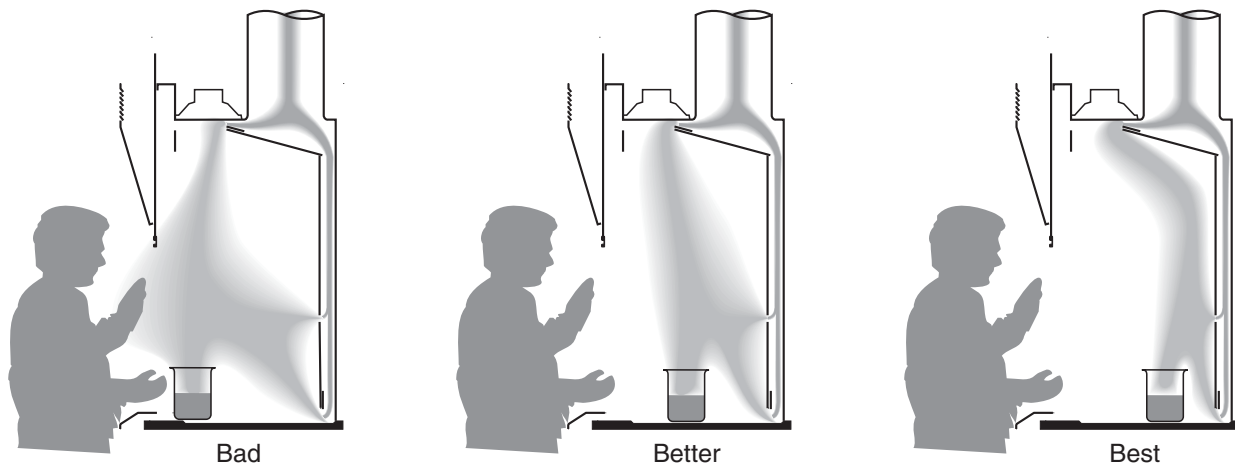


Figure 4 Effect of placement of contaminate source

Large containers or equipment such as furnaces, incubators and oil baths often interfere with air flow inside the fume hood by causing reverse flows and dead spots which may allow contaminants to escape from the hood. Putting large, bulky equipment you are using on legs will help reduce reverse air flows by allowing air to circulate beneath the equipment. (See Figure 5.)

The fume hood should not be used for storage of chemicals and apparatus. You should remove all but the containers and equipment you're actually using from the hood.

The air velocities used to provide containment in fume hoods are relatively low (in the range of 100 feet per minute) and the air flow patterns are easily disrupted. You should avoid making rapid movements while working at the hood or walking past the hood.

When you're working at your fume hood, you should always open the sash only as far as you need to for access to your work area.

The lowered sash increases the distance (**D** in Figure 6) between your breathing zone and the area where contaminants may escape. Also, the smaller hood face area makes the hood less susceptible to room drafts and other external air disturbances.

The sash also protects you by replacing part of the protective air barrier with a solid barrier against contaminants and splashing chemicals.

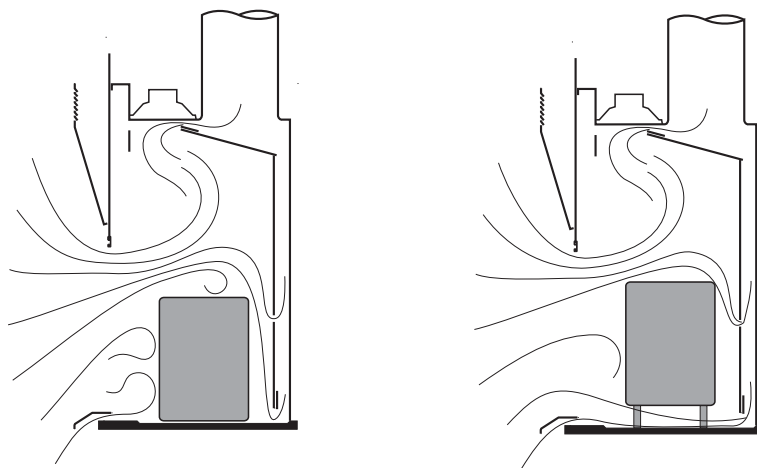


Figure 5 Effect of large equipment

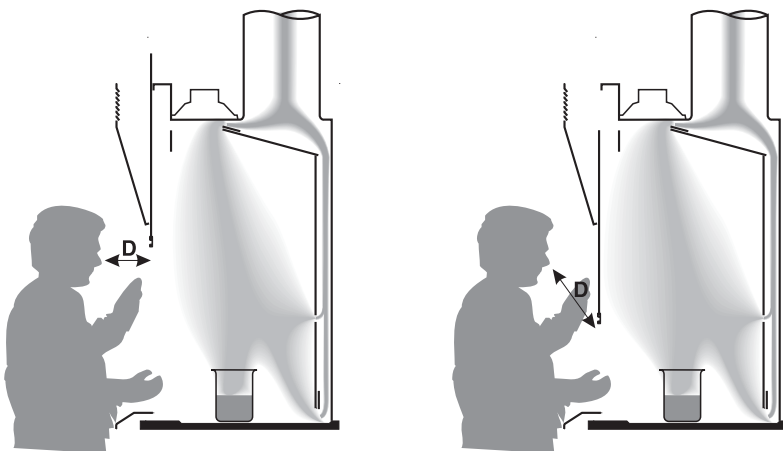


Figure 6 Effect of lowering the sash

Recommended Work Practices (continued)

Maintaining the Protective Air Barrier for a Safe Work Area (continued)

The lowered sash however, could create another problem because contaminants are present in the area behind the sash and may lead to increased corrosion of equipment in the hood. With a lowered sash, it is important for the operator to wear gloves when skin contact with airborne contaminants is objectionable.

If your hood has horizontal sashes, be sure they're all in place when you're working with contaminants inside the hood. Operating the hood with any of the sashes removed reduces the protection they provide by decreasing the velocity of the air entering the hood face. If you remove any hood sashes while setting up equipment, be sure to replace them before beginning the actual procedure.

If the hood has a sash stop with manual override to limit sash travel or is marked for a safe sash height, then the sash should not be raised above this point while contaminants are being generated within the hood.

If you don't need continuous access to the equipment inside the fume hood, you should close the sash completely. **(See Figure 7.)** The closed sash will protect you from the flying debris of a small explosion or runaway reaction. It will eliminate the effects of room drafts or other adverse air currents.

You should note, however, that keeping the sash closed can lead to increased corrosion of equipment inside the hood because any contaminants will be dispersed throughout the hood interior.

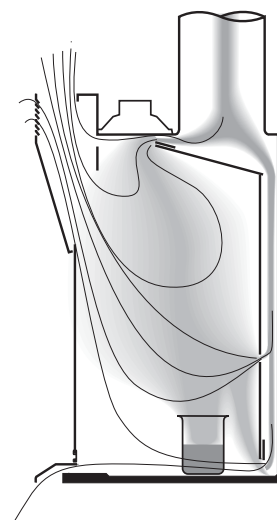


Figure 7 *Airflow through By-Pass with Sash Closed*

Fume Hood Safety Checklist

- The hood is the correct type for the work to be performed.
- The flow monitoring device indicates adequate air flow.
- The baffle setting is correct for the intended use.
- There are no unnecessary chemicals in the hood.
- All equipment is at least six inches behind the hood face.
- All procedures are performed with the laboratory worker's head remaining outside the hood.
- Equipment with large flat surfaces parallel to the hood face is placed on stands with legs.
- The sash is lowered to the minimum possible height.
- All safety equipment is close to the hood in case of fire or explosion.
- All laboratory workers are following the procedures outlined in this booklet, as well as any additional fume hood safety guidelines supplied by the hood manufacturer.

For More Information

We at Kewaunee Scientific hope these guidelines will be helpful to you as you choose, use and maintain your laboratory fume hood. If you have

questions we haven't answered in this section, please contact your local Kewaunee sales representative.