Biosafety Cabinet (BSC)

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15.9.18

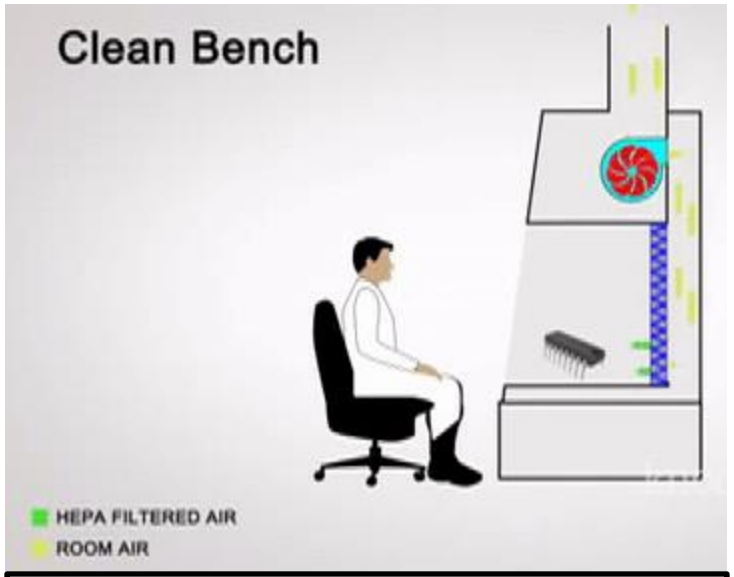
Introduction

BSC: Containment for working safely with microorganisms.

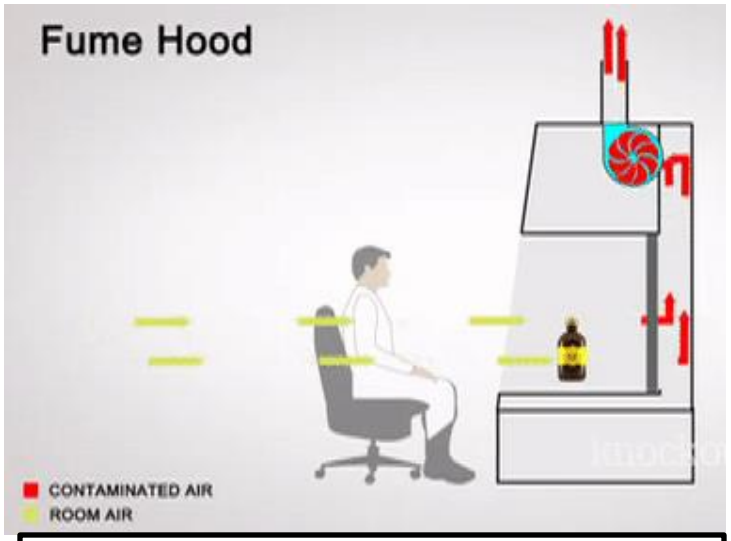
Biosafety level	Agents
1	• Non pathogenic microorganisms • No need of special containment equipment
2	• Pathogenic agents • Biosafety cabinets are used
3	• Microbes causing lethal disease on inhalation • Air from laboratory must be filtered
4	• Agents transmitted through aerosols • Protective-suit laboratories • Exhaust air is recirculated

BSC	Biosafety Level	Protection
Class I	1, 2 & 3	User only
Class II	1, 2 & 3	User & material
Class III	1,2,3 & 4	User & material

Centers for Disease Control and Prevention, US



- Designed for product protection
- HEPA filters to circulate clean air
- Flow is towards the user
- No user and environment protection
- Not for biological agents or chemicals.
- Products: Microprocessor chips

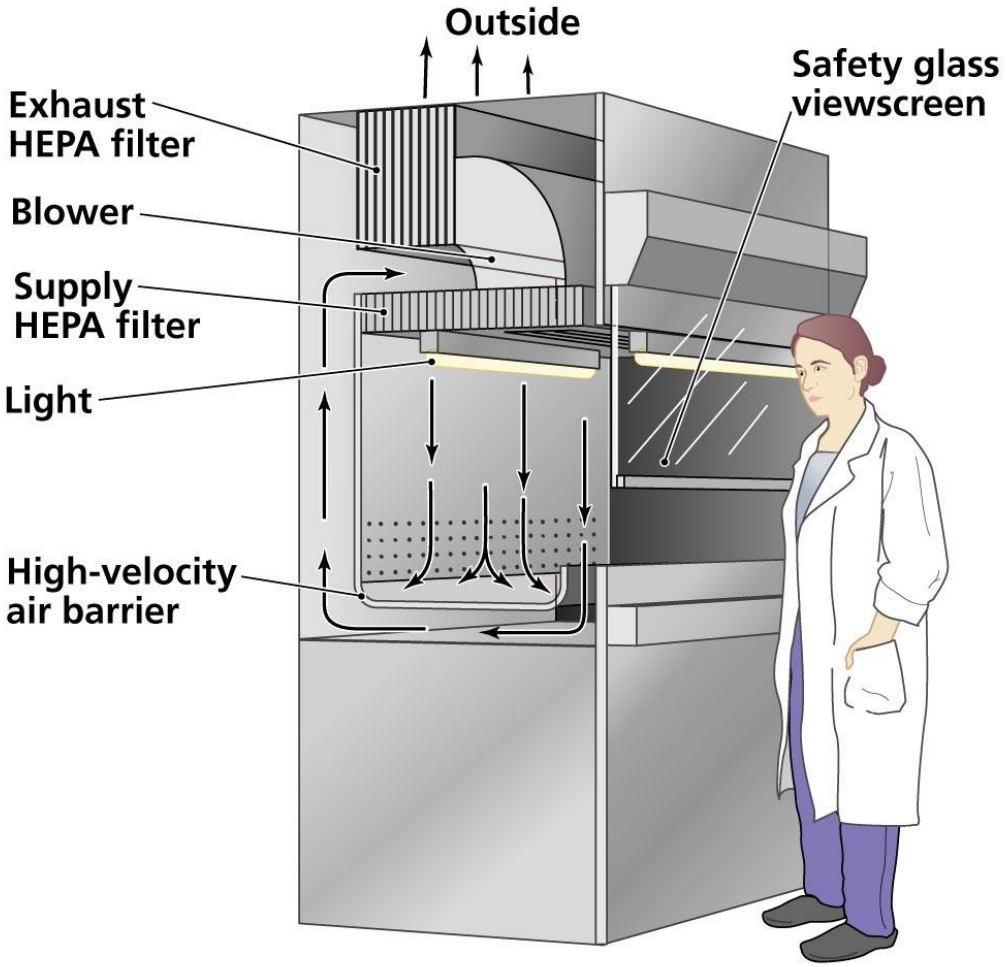


- Designed for user protection
- Capture, contain and remove chemical fumes and vapors
- No product and environmental protection
- Not suitable for biological agents

Isolator

- Enclosed system with physical barriers
- Internal workspace separated from the surroundings
- Pharmaceuticals

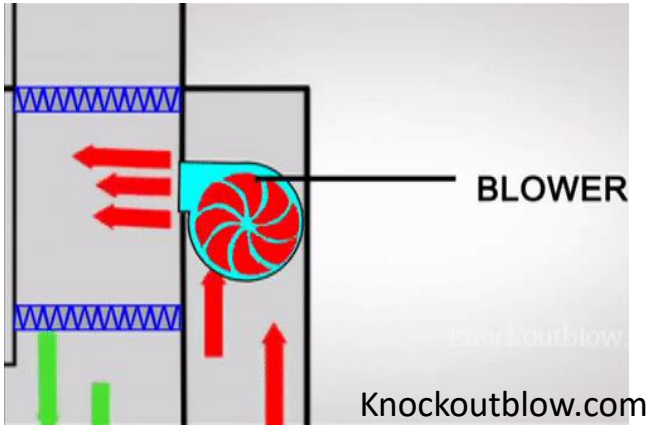
Components



UV LAMP

Aquasana.com

- UV-C lamps (254 nm)
- Intensity> 40µW/cm^2



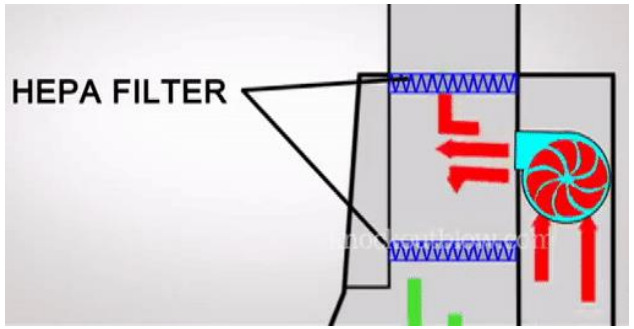
Knockoutblow.com

- Ensure laminar flow of air
- 0.25-2 HP motor

High Efficiency Particulate Air (HEPA) Filter

- HEPA by industry standards, an air filter that **removes 99.97%** of particles that have a size **greater-than-or-equal to 0.3 µm** (most penetrating particle size)
- HEPA filters are composed of a mat of randomly arranged fibres.
- The fibers are typically made of fiberglass
- Diameters: 0.5-2.0µm.

allergyandair.com



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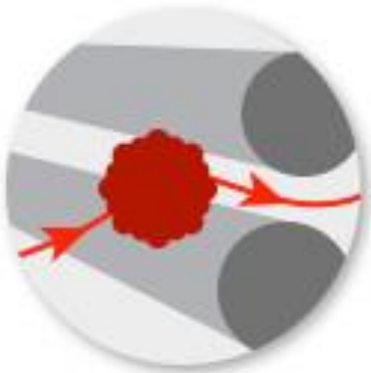
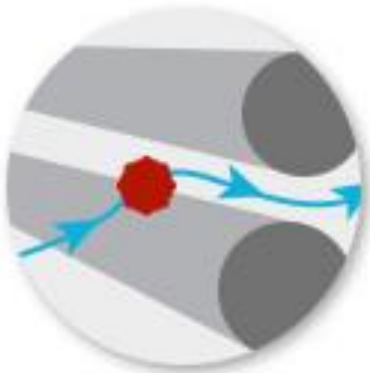
DIRECT IMPACTION

- Large contaminants
- Dust, mold & pollen
- Stick to fiber



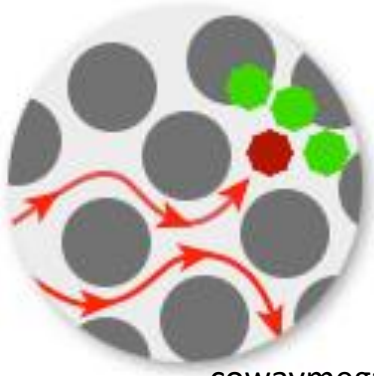
SIEVING

- Particle is larger than the gap
- Particle is ensnared



INTERCEPTION

- Reroute around fibers
- Inertia
- stick to the sides of fibers



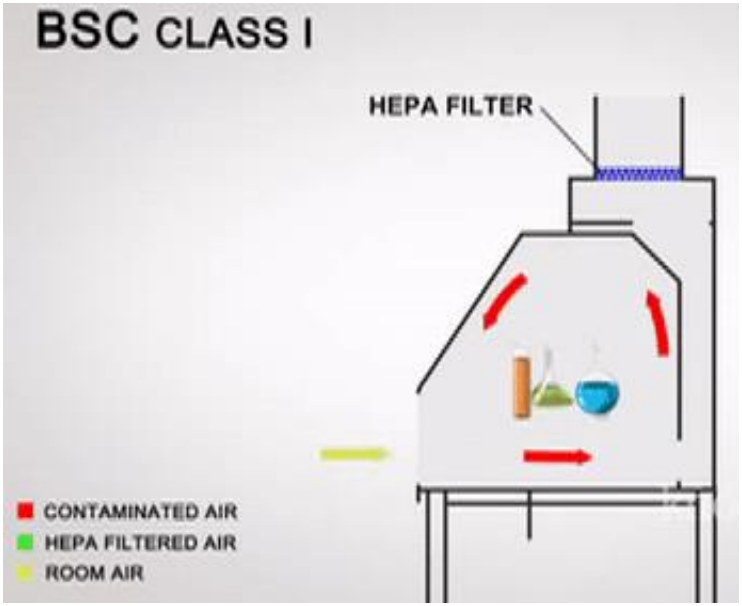
cowaymega.com

DIFFUSION

- Ultrafine particles
- Hit and stick to fibers.

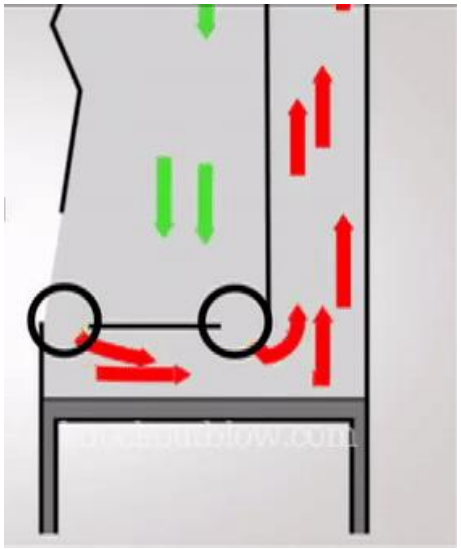
Class I BSC

- Stream of inward air moving into the cabinet
- Inflow air velocity: 75-100 fpm
- Decontaminated air is exhausted from the cabinet
- Protects the operator and the environment
- No protection of products as room air may contaminate.



Class II BSC

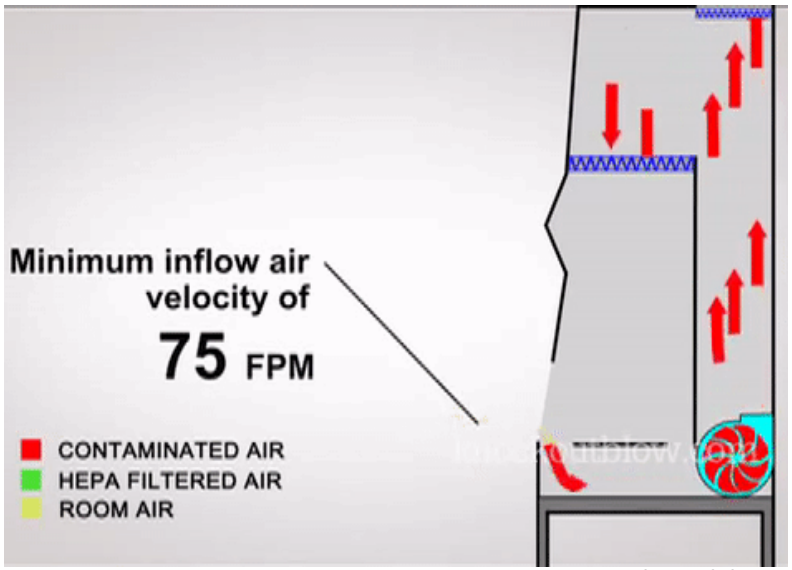
- Laminar downflow of air
- User, product and environmental protection.



Cross contamination prevention

Class II Type A1

- Positively-pressurized contaminated plenum bordering the ambient environment
- Thus, less safe.
- 30% of air is exhausted, and 70% re-circulated



Class II Type A2

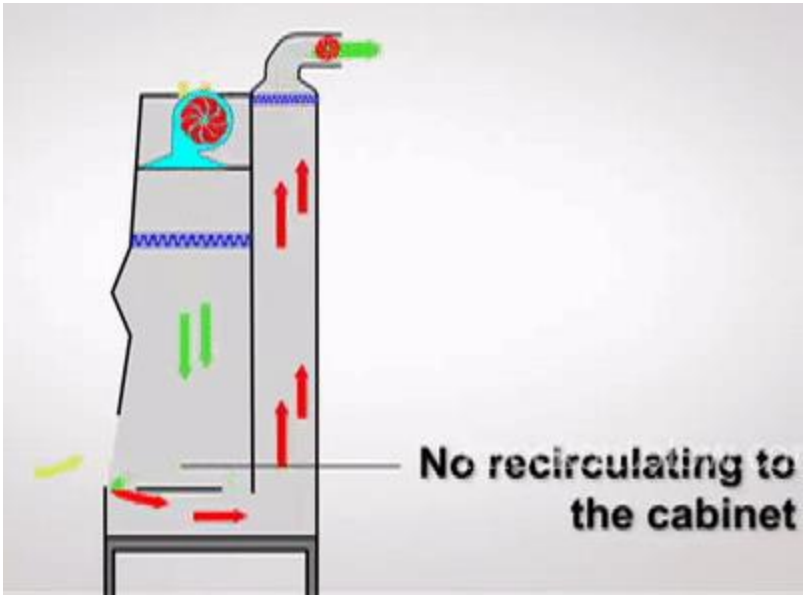
- **Negative pressure** surrounding the positively pressurized contaminated plenum
- Leaking aerosol will be pulled by the negative pressure
- About 70% of air from the positive plenum is recirculated as downflow, and the remaining 30% is discharged to the lab through the exhaust filter.

Class II Type B1

- **Type B:** Type B cabinets must be operated with an **external blower** and it exhausts air to the external environment via a dedicated ductwork system.
- 70% of air is exhausted, and 30% re-circulated to the work area as the downflow.
- Suitable for work with **toxic chemicals** used in microbiological processes.
- Difficult to install, balance and maintain.

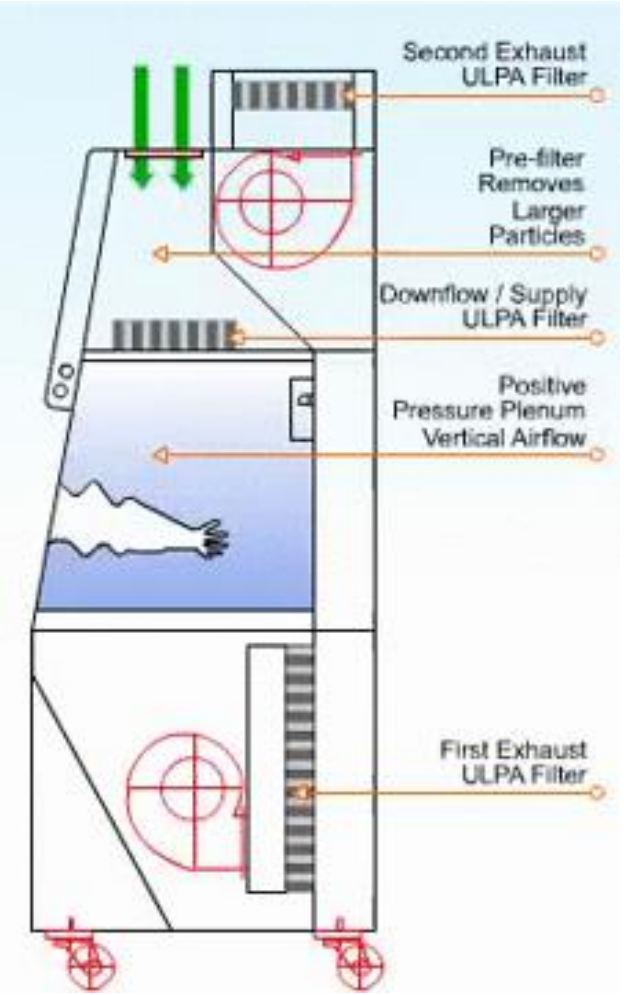
Class II Type B2

- **Exhaust** of **100% air** after filtration through HEPA filters.
- Suitable for **toxic** chemicals.
- **Safest** of the class II
- **Fail-safe** in the event that the downflow and / or exhaust HEPA filtration systems cease to function normally



Class III BSC

- Welded metal construction
- Gas tight
- Work through glove ports
- Negative pressure within the cabinet
- Exhaust air circulated back to the laboratory
- Specified for work involving the most lethal biological hazards (level 3 and 4)



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