UNIT-IV

MICROBIAL SPOILAGE

Ms.Manisha M.Patil
(Asist.Professor)
Department of Pharm.Chaemistry

INTRODUCTION

1. An aseptic area is a room within a clean area designed, constructed, serviced and used with the intention of preventing microbial contamination of the product.
2. Aseptic techniques are used to prevent the access of microbial & particulate contamination into ophthalmic & parental products.
3. Control of microbial contamination is also necessary to eliminate pyrogens and toxic bacterial products.
4. Terminally sterilized products are required formulated or prepared in an aseptic area.
5. Terminally sterilized products are the product sealed in container and then sterilized.
6. Such aseptically prepared products are required to be formulated and prepared in an aseptic room.

DESIGNING OF ASEPTIC AREA

Sterile Products should be carried out in a clean aseptic environment for prevent the risk of contamination of the products.

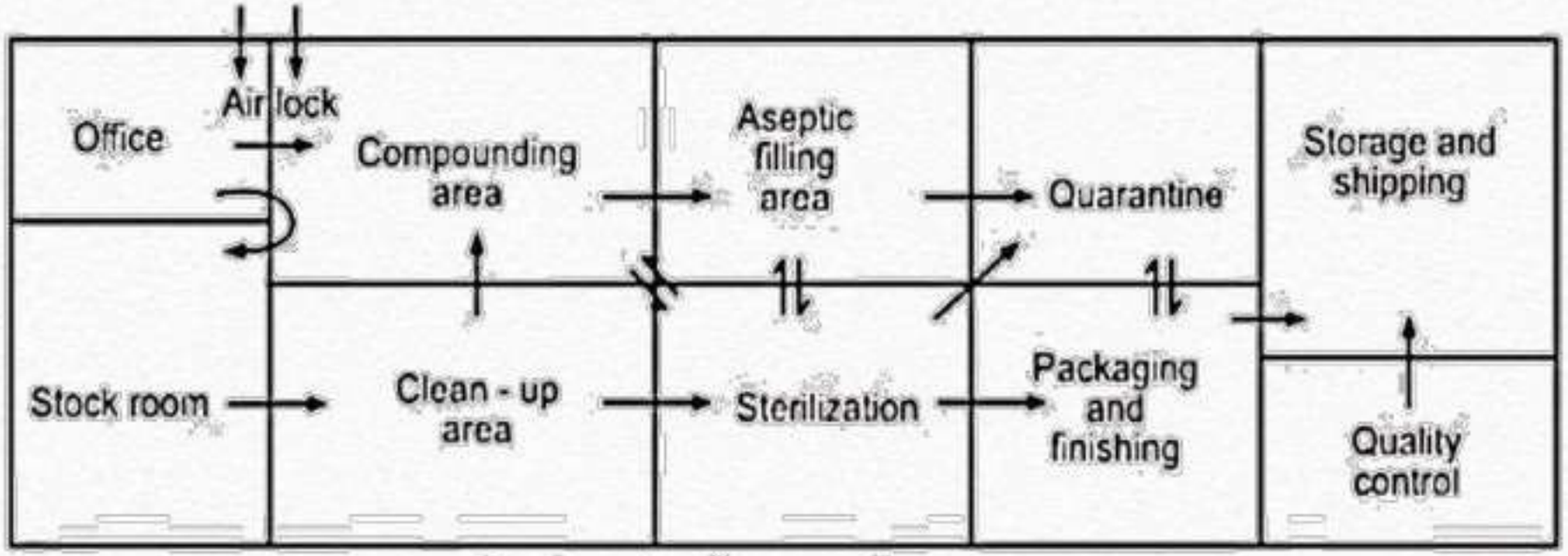
The production are normally divided into

- The Clean-up area,
- The Compounding area,
- The Aseptic area,
- The Quarantine area and
- The Packaging area

All these areas should be designed and constructed for

- Ease of clearing,
- Efficient operation,
- Attractiveness and
- Comfort of personnel

FLOW DAIGRAM FOR ASEPTIC AREA



- Clean area for production of sterile products are classified grades as A, B, C and D which is categorized by particulate of the environmental air when the clean area is operating in both a 'manned' and 'unmanned' state.
- These areas are grades by microbial monitoring of the environmental air, surfaces and operators when the area is functioning.

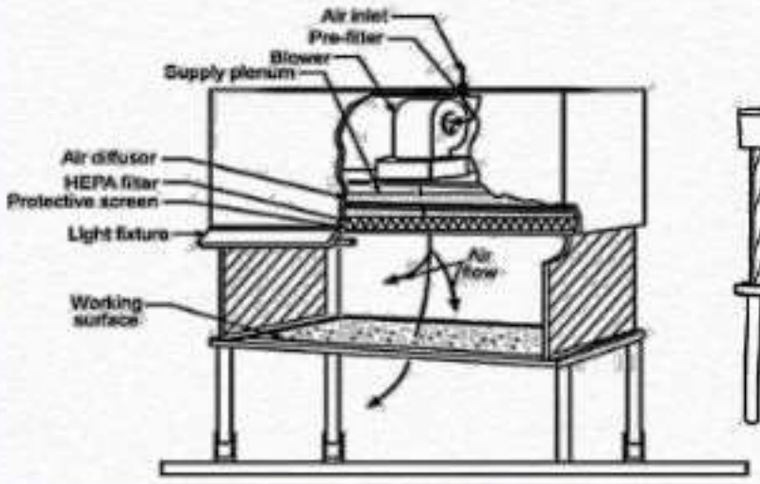
1. Floors, Walls & Ceilings: They must e smooth, impervious, easily cleaned and disinfected to minimize microbial & particulate contamination. Walls must be made of non-inflammable or fire-resistant materials. The ceilings are sealed to prevent the entry of microbial contaminants.
2. Doors, Windows & Services: Doors & Windows should be flush with walls and non-open-able. Limited doors, airlock doors, wall ports, autoclaves and dry heat sterilizers fitted inside interlocked doors. Gas cylinder & non-essentials switches should be outside the aseptic rooms. Sinks, drains & light sources fitted inside the aseptic rooms.
3. Personnel & Protective Clothing: Personnel must be in good health, well-trained for good manufacturing practises and aseptic techniques, free from dermatological conditions. Protective clothing is designed to prevent contamination from body. Clothes should be sterilized by moist heat sterilization , fresh sterile clothing. The operator must wear headwear, powder-free rubber or plastic gloves, a non-fibre shedding facemask and footwear.
4. Cleaning & Disinfectant: This used for removal of microbial and particulate contamination. Different disinfectants must be employed in rotation to prevent the development of resistant strains of micro-organisms.

LAMINAR FLOW EQUIPMENT

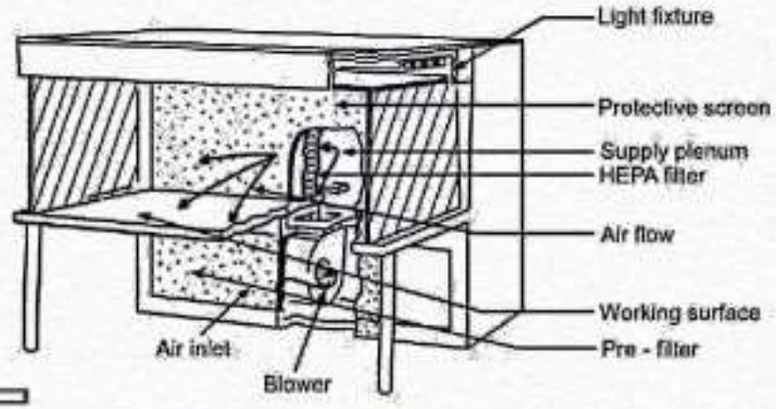
Laminar air flow equipment can deliver clean air in direction

- **Vertical** Laminar Air Flow bench
- **Horizontal** Laminar Air Flow bench.

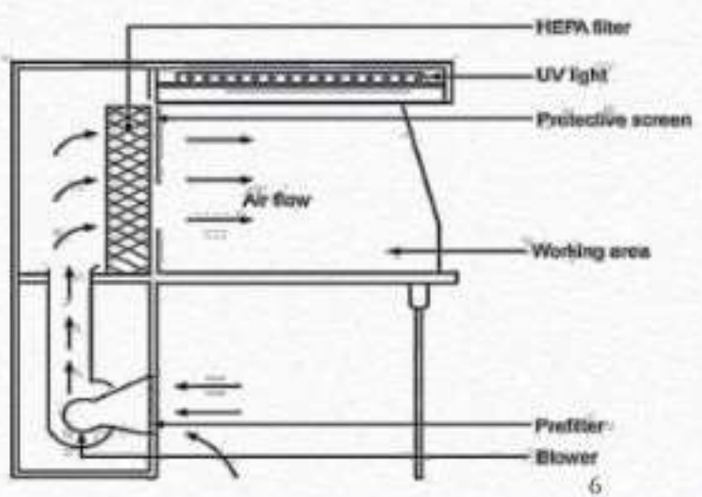
Vertical Laminar Air Flow bench



Horizontal Laminar Air Flow bench



Horizontal Direction for Air Flow



1. Air Supply: The air supply to a clean room must e filtered through **high-efficiency particulate air [HEPA] filters**.

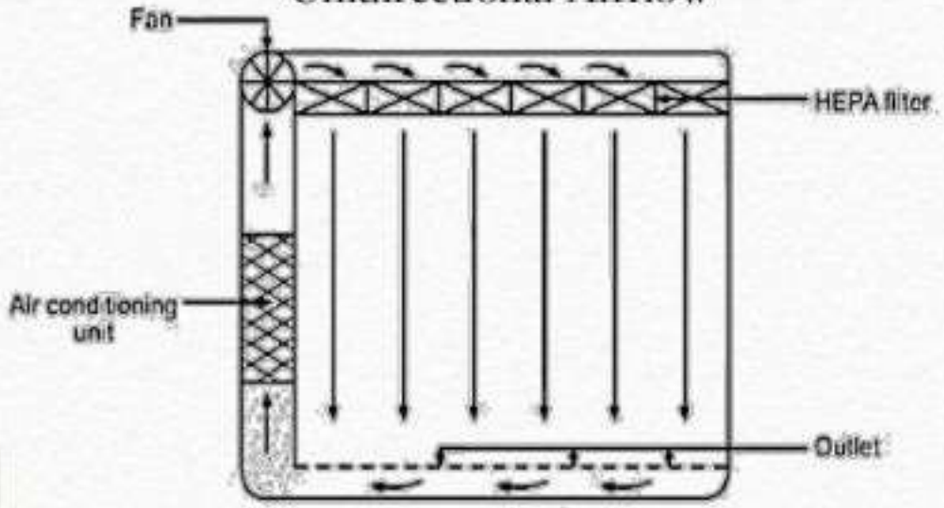
- The air filtered by laminar air flow is **99.97%** free from microbial contamination
- This level is based upon the removal of **dioctylphtalate** [DOP] Particles of size 0.3 µm and larger.
- Air velocity at all parts of the filter should be **90 ± feet/min** [0.54 m/sec].
- Air quality is evaluated using **settle plates, microbial air sampler or by particle counters**

2. Air Flow Pattern: The air flow pattern within the clean room must e carefully regulated to avoid generating particles from the clean room floor, walls and operators.

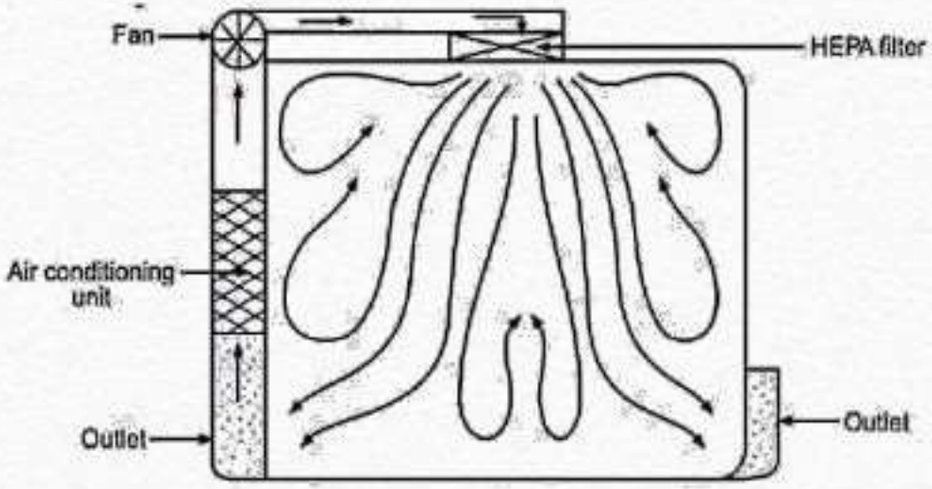
The general air flow patterns in clean rooms are,

1. **Unidirectional airflow**
2. **Non-unidirectional airflow**
3. **Combined airflow**

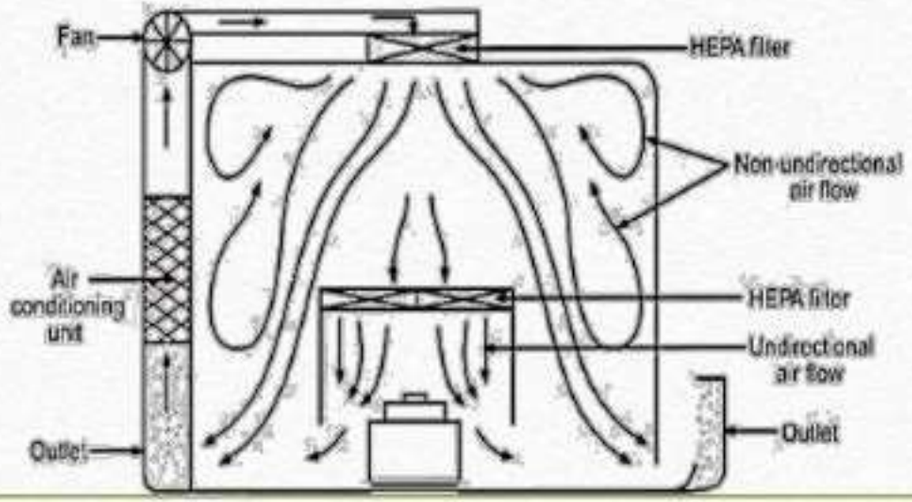
Unidirectional Airflow



Non-Unidirectional Airflow



Combined Airflow



SOURCES OF CONTAMINATION & PREVENTION

Source	1. Atmosphere	2. Operator	3. Raw material	4. Equipment
Prevention	• The air should be initially passed from Pre-filter Electrostatic HEPA filters • Periodic removal of air-borne dust settled on walls, floors & ceilings is essential	• Personnel must be proper hygienic. • Injured ones should be avoided	• Heat treatment, filtration, recrystallization, irradiation or any other sterilization process should be applied	• Equipment sterilized or disinfected by heat, gaseous agents or chemicals.

CLEAN AREA CLASSIFICATION

	Maximum permitted number of particles per m3 equal to or greater than the tabulated size			
	At rest		In operation	
Grade	0.5 µm	5.0 µm	0.5 µm	5.0 µm
A	3,520	20	3,520	20
B	3,520	29	352,000	2,900
C	352,000	2,900	3,520,000	29,000
D	3,520,000	29,000	Not defined	Not defined

- It is important to design the clean room to e the smallest size, earing in mind the operations to be undertaken and the number of people likely to e employed in the areas.

TESTING OF CLEAN & ASEPTIC ROOOMS

It is necessary to monitor the area by suitable environmental control tests.
∴ The methods are divided as

1. General methods

2. Air sampling methods

a) Slit-air sampler
b) Liquid impinger
c) Centrifugal air sampler [Bio test]

3. Surface sampling methods

a) Rodac plate
b) Swab-rinse test

THANKYOU