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Extract Systems

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Safety Cabinets

Forensic Safety Cabinets

Polypropylene Cabinets

Storage Cabinets

Safelab Systems Service

Maintenance Contracts

Airflow Testing

Ductwork Testing

Filter Testing

DOP Testing

KI Discus Testing

Installation

Commissioning

Replacement filter service

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Carbon Filter Guide

Safelab are committed to providing the best solutions for each of our customers.

If you have any queries about any of the information in this guide or about filter selection, our dedicated team will be

Coverage

This guide was produced in response to a number of questions raised by customers about how filtration fume cupboards work. It is designed to provide additional information for those who wish to understand the basic principles of carbon filtration and may be of particular interest to school Science Technicians.

The information is relevant to all products in Safelab's Recirculating (non-ducted) Filtration Fume Cupboards, Chemical Storage Cabinet and Forensic Science Drying Cabinet Range:

- **Airone R (Fixed Filtration Fume Cupboard)**

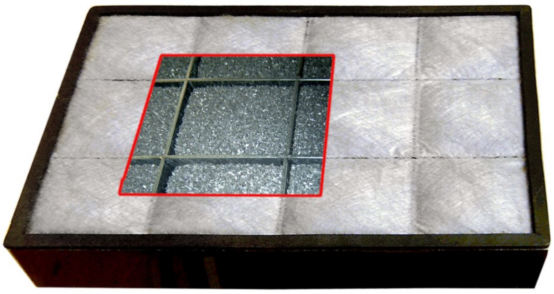
Safelab Systems Ltd

Tel: +44 (0) 1934 421 340 **Fax: +44 (0) 1934 641 569**

E-mail: safelab@safelab.co.uk **www.safelab.co.uk**

Airone Building, 8 Beaufighter Road, Weston-Super-Mare BS24 8EE

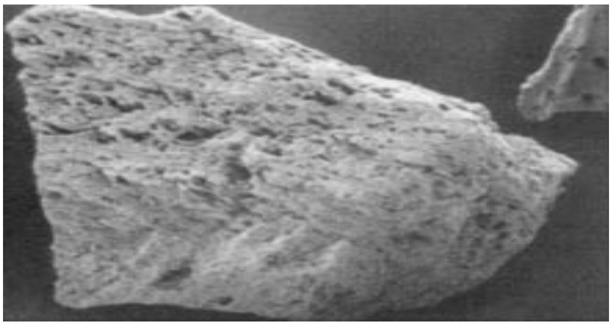
Recirculating Fume Cupboards



The purpose of a recirculatory filtration fume cupboard is to contain pollutants released inside the fume cupboard and remove these from the air. The fume cupboard can be fitted with a carbon filter for removal of chemical contaminants, a HEPA filter for removal of particulate or a combination of both.

The carbon filter is designed to remove a minimum of 98% of the contaminant before recirculating the air back into the room. This is achieved by filtration through activated carbon beds (shown left) to remove the chemical contaminant. A description of the basic chemical principals of carbon filtration are detailed in this document.

Adsorption of Gases



Activated carbon filtration works by the adsorption of gases to the surface of carbon.

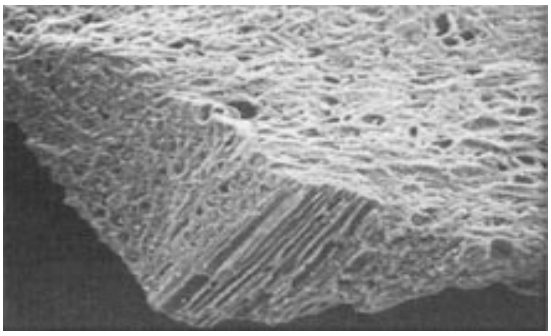
The adsorption of a gas to the surface of a solid occurs at the atomic level and relies on the instantaneous dipole interactions which occur when atoms and molecules come into close proximity.

Specifically known as London Dispersion Forces, the result is that a molecule of gas becomes attracted to the surface of the carbon due to the re-distribution of electrons.

Thus, an ideal environment to maximise the effect of these forces would be a structure in which a molecule of gas is in close proximity to many surfaces simultaneously, for example, the microporous structure of activated Carbon.

These forces are observed over an extensive range of commonly used chemicals and solvents and therefore, **an extensive range of chemicals and solvents are adsorbed onto the carbon surface**

The Microporous Structure

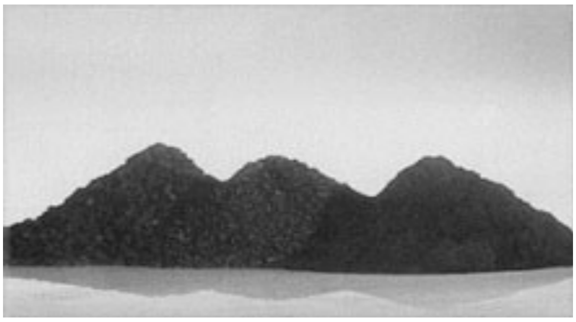


The image to the left shows the electron microscope image of coconut shell activated carbon. From the image, the microporous structure of the activated carbon can be clearly seen.

It is the micropores (<2 nm in diameter) exhibited in activated carbon which give it it's unique and highly desirable properties.

This vast network of micropores means that one gram of activated carbon has a surface area in excess of 400 m^2. This allows for an extensive number of sites available for adsorption and provides maximum interaction between the adsorbate gas and multiple surfaces inside the micropores.

Chemically Impregnated Carbon



There are some chemicals which will not adsorb effectively to the surface of pure activated carbon. For these chemicals, a range of chemically impregnated activated carbons are available.

The pure activated carbon (C-100 base carbon) is treated with a substance which is specific to the purpose of neutralising the chemical to be removed from the air and then binding it to the surface, this is known as chemisorption. This makes use of the vast surface area of carbon, allowing for a greater filtration capacity.

Saturation

After extensive or prolonged use, the carbon filters will become saturated. This occurs when all adsorption/chemisorption sites are occupied or exhausted. This is typically in the range of 15% to 50% by weight.

Once saturated, the efficiency of the filter will fall below 98% and the filter must be replaced. We are able to advise on filter saturation on an individual basis as it depends heavily on the frequency of use, the volumes used and the type of chemical.

Filter Replacement

Safelab Service holds the position of being able to offer replacement filters for the majority of other manufacturers' fume cupboards, downflow benches, safety cabinets and laminar flow systems.

We will always work to ensure you are provided with the most efficient filter available and so we will discuss the options on an individual basis. We have an extensive database of commonly used chemicals and an expert team dedicated to providing the ideal solution. A general guide to filter selection is shown below

Carbon name	Typical substances handled
C-100	The majority of aliphatic and aromatic hydrocarbons, solvents, odours, adhesives
C-100E	Ethers
CI-200	Aldehydes (and general organics)
CI-300	Ammonia & amines
CI-400	Acids
CI-410	Sulphur compounds & mercury vapours
CI-420	Cyanides
CI-RI	Radioactive iodine & methyl iodine
CMS	For use in schools up to and including "A" Level

Service Programs

Our engineers follow strict testing procedures which challenge the equipment's performance and proves whether it's safe for use. Should your equipment or filter fail during testing we are able to supply approved replacement parts and repair the equipment quickly ensuring that safety levels are restored and optimum performance achieved.

Safelab offer a choice of service programs because we understand you need flexibility in planning regular, routine inspections and maintenance visits that fit into your working schedule. Specialist testing is also provided for clients that need additional certification of their laboratory equipment's performance.

Free technical advice and support is available by contacting us direct

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