LAB EQUIPMENT

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BIOAIR®

TECHNICAL NOTES

BioAir Activated carbon filters

Chemical decontamination of the air is based on the properties of charcoal obtained from coconut shells and activated by steam at high temperature process. The finely porous active carbon has a structure criss-crossed by millions of minute channels and an enormous exchange surface, about 1300 square meters per gram.
Air passing through the carbon invades these channels and the chemical substances it contains are captured very efficiently, owing to their size, by the physical-chemical process defined as **Adsorption**.
This process is enhanced by **Chemisorption**, that is impregnating the carbon with chemical substances to improve the retention of simple, light and linear molecules. Active carbon filters can adsorb any chemical compound possessing a molecular weight over 30 and a boiling point higher than 60°C. Some compounds that fall outside these limits are still satisfactorily retained owing to their molecular structure and size.

State of the art construction

In order to obtain the highest degree of efficiency and filtration the design criteria and operation of the cabinet fitted with active carbon filters are of vital importance.
It is essential that the air passing through the active carbon filter stays there for about 0.1 seconds (residence time) at a linear speed not exceeding 0.5 meters per second in order to obtain a high filtration efficiency, while a mass of carbon of about 13.5 kg per 1000 cubic meters per hour of airflow is required to achieve adequate filtration capacity.
All BioAir fume cupboards are designed to ensure a time of permanence longer than 0.3 seconds and an air speed through the filter never higher than 0.5 meters per second.
All BioAir fume cupboards, moreover, are equipped with carbon filters weighing over three times the required minimum.

Environmental friendly

Chemical filtration based on active carbon makes it possible to install fume hoods in any environment with no need for expensive ducting of exhausted air.
Since fume cupboards fitted with active carbon filters recirculate the air within the room, energy is also saved since there is no need to cool or warm fresh air that replaces the air exhausted from the room as with the use of traditional ducted fume cupboards.

Types of filters

Different types of active carbon filters are available, some impregnated with chemical substances to enhance their filtration capacity when organic molecules with low molecular weight or inorganic gases and vapours are present.

1. **GENERAL USE (GP):** this is the filter more commonly used to capture a broad range of substances, especially vapours of organic solvents.
2. **FORMALDEHYDE (FOR):** This type of filter is impregnated with an oxidising agent to oxidise the formaldehyde.
3. **AMMONIA (AMM):** The filter is impregnated with copper compounds for effective removal of vapours generated by diluted ammonia solutions and of low molecular weight ammines.
4. **INORGANIC ACIDS (ACI):** This impregnated filter neutralises volatile inorganic acid vapours such as chloridric acid, fluoridric acid and gaseous acids such as sulphur bioxide and nitrogen bioxide.
5. **MERCAPTANS (SUL):** This filter is impregnated with potassium iodate for removing low molecular weight hydrosulfuric acid and mercaptans.
6. **MERCURY VAPOURS (ACM):** This filter is impregnated with iodate compounds to remove mercury vapours and has a degree of efficiency of up to 5 ppb in the air expelled, starting from a saturated solution.
7. **ETHER (ETH):** Diethyl ether is adsorbed by the specially impregnated and is retained to a satisfactory degree despite its very low boiling point.
8. **ALCALINE ODOURS (OAL):** This filter is used to retain odours emanating from excretes, urine and other alkaline organic materials.

9. **ACID ODOURS (OAC):** This filter retains acid odours caused by bacterial decomposition, such as cadaverine, putrescine and animal odours.
10. **MULTILAYER (ML):** These filters may be formed by up to three layers of different carbon types and can retain small quantities of very dissimilar compounds.
11. **RADIOACTIVE ISOTOPES (ACR):** This filter is impregnated with alogenures and is used for removing low radioactive emission iodides and methyl iodides.
12. **HEPA (HEP):** This filter can be used for trapping thin powdered chemical componds.

Carbon filters safety use

The wide range of carbon filters allows to trap a significant percentage of the chemicals handled in the laboratory. Furthermore the Carbon filters are not suitable when massive quantities of substances are used. Avoid use of carbon filters when unknow reactions are carried out or when highly toxic chemicals are used.
When Carbon filters are saturated, they do not present any the risk of fire. No spillage of retained substances is reported.

Filters replacement

The replacement frequency can be determinated in respect to the amount of chemicals used, the carbon saturation index (see table) and the exposure levels to the used substances.
Filters need to be checked at scheduled intervals, using gas pumps equipped with the proper reaction tube. As the exposure limit value is reached, the filter must be replaced. SAFEHOOD series Fume cupboards are equipped with an electrochemical sensor, to monitor the filter performances: the filter needs to be replaced as soon as the relative alarm is activated.
If a main spillage occours, it is important to replace immediately the filter as it could be completely saturated.
Filters can be easily removed from every BioAir Fume Cupboards. Dispose filters complying to the local waste regulation.

Filters specification

BioAir recirculating Fume cupboards use specific filters for the available models, as detailed in the table below:

Model	Filter Dim. mm (W x D x H)	Filter n°/weight ea. cad./tot. weight
Safehood S	600 x 450 x 100	n° 1 / 15 kg / 15 kg
Safehood 75 (Main filter)	530 x 370 x 100	n° 1 / 12 kg / 12 kg
Safehood 75 (Safety filter)	420 x 420 x 40	n° 1 / 4 kg / 4 kg
Safehood 120 (Main filter)	530 x 370 x 100	n° 2 / 12 kg / 24 kg
Safehood 120 (Safety filter)	420 x 420 x 40	n° 2 / 4 kg / 8 kg
Safehood 165 (Main Filter)	530 x 370 x 100	n° 3 / 12 kg / 36 kg
Safehood 165 (Safety filter)	420 x 420 x 40	n° 3 / 4 kg / 12 kg

How to order

[filter n° for model)	SAFEHOOD 75[1] / 120[2] /165[3]		SAFEHOOD S [1]
Filter type	Main	Safety	Main
GENERAL PURPROSE (GP)	CP31000	CP41000	CP21000
FORMALDEHYDE (FOR)	CP32000	CP42000	CP22000
AMMONIA (AMM)	CP33000	CP43000	CP23000
INORGANIC ACID (ACI)	CP34000	CP44000	CP24000
MERCAPTANS (Sul)	CP34200	CP44200	CP24200
MERCURY Vapours (ACM)	CP37000	CP47000	On request
ETHER (ETH)	CP39000	CP49000	On request
ALCALINE ODOURS (OAL)	On request	On request	CP23500
ACID ODOURS (OAC)	On request	On request	CP24500
MULTILAYER for SCHOOLS (ML)	On request	On request	CP20000
RADIOACTIVE ISOTOPES(ACR)	On request	On request	CP26000
HEPA FILTER (HEP)	CP38000	Not available	On request

Carbon Saturation Index

In the following table a selection of chemical substances is listed, together with the suggested carbon filter and an indication of the saturation index.

This is intended as the percentage in weight of the substance adsorbed on the filter in respect to the weight of the filter itself.

Compound	Filter	Saturation (%)
Inorganic Acids		
Hydrogen chloride	ACI	5
Nitric	ACI	10
Sulfuric	ACI	15
Organic Acids		
Acetic	GP	33
Acetic anhydride	GP	33
Acrylic	GP	30
Butyric	GP	40
Caprylic	GP	40
Carbolic	GP	40
Formic	GP	20
Lactic	GP	40
Osmium tetroxide	GP	40
Palmitic	GP	40
Phenol	GP	40
Propionic	GP	40
Valeric	GP	40
Alcohols		
Ethil	GP	32
Amyl	GP	40
Butyl	GP	40
Cyclohexanol	GP	45
Isopropyl	GP	40
Methyl	GP	32
Propyl	GP	40
Aliphatic Hydrocarbons		
Acetylene	GP	20
Iso-butane	GP	10
Butylene	GP	10
Cyclohexane	GP	35
Hexane	GP	35
Pentane	GP	26
Propylene	GP	10
Aromatic Hydrocarbons		
Benzene	GP	40
Naphtalene	GP	47
Styrene	GP	47
Toluene	GP	47
Toluidine	GP	47
Xylene	GP	40

Compound	Filter	Saturation (%)
Esters		
Butile acetate	GP	40
Cellosolve acetate	GP	45
Etyl acetate	GP	40
Etyl acrylate	GP	45
Etyl formate	GP	40
Isopropyl acetate	GP	45
Methyl acetate	GP	40
Methyl acrylate	GP	40
Methyl formate	GP	40
Methyl metacrylate	GP	45
Aldehyde and Ketons		
Acetone	ETH	32
Acetaldehyde	FOR	20
Acroleine	GP	32
Benzaldehyde	GP	40
Butyraldehyde	GP	32
Caproaldehyde	GP	40
Cyclohexanol	GP	40
Diethil ketone	GP	32
Dipropyl ketone	GP	40
Formaldehyde	FOR	20
Glutaraldehyde	FOR	10
Mesitil oxide	GP	40
Methyl butyl ketone	GP	40
Methyl ethyl ketone	ETH	32
Methyl isobutylketone	GP	40
Propionaldehyde	GP	32
Valeraldehyde	GP	40
Ethers		
Amyl	GP	35
Butyl	GP	35
Cellosolve	GP	40
Dioxane	GP	45
Diethyl	ETH	10
Ethylene oxide	GP	20
Isopropyl	GP	25
Metil cellosolve	GP	45
Methyl	ETH	10
Propyl	GP	30

Compound	Filter	Saturation (%)
Halogens		
Bromine	GP	20
Butyl chloride	GP	40
Carbon tetrachloride	GP	55
Chlorine	GP	20
Chlorobenzene	GP	53
Chlorobutadiene	GP	40
Chloroform	GP	55
Chloropicrin	GP	55
Chloronitropropane	GP	55
Dibromoethane	GP	55
Dichlorobenzene	GP	55
Dichloromethane	GP	53
Dichloropropane	GP	53
Ethyl bromide	GP	20
Ethyl chloride	GP	20
Hydrogen bromide	ACI	5
Hydrogen chloride	ACI	5
Hydrogen iodide	ACI	7
Iodine	GP	55
Iodoform	GP	53
Methyl bromide	GP	25
Methyl chloride	GP	20
Methyl chloroform	GP	45
Methylene chloride	GP	45
Monochlorobenzene	GP	45
Fluorotrichloromethane	GP	45
Paradichlorobenzene	GP	45
Perchloroethylene	GP	45
Propylchloride	GP	40
Tetrachloroetane	GP	53
Tetrachloroethylene	GP	53
Vinylchloride	GP	20

Compound	Filter	Saturation (%)
Sulphur Compounds		
Carbon disulphide	GP	20
Dimethylsulphate	GP	20
Etylmercaptan	SUL	40
Hydrogen sulphide	SUL	20
Mercaptans	SUL	40
Sulphur Dioxide	ACI	10
Sulphur Trioxide	ACI	20
Nitrogen compounds		
Ammonia	AMM	10
Amines	AMM	10
Aniline	GP	40
Dietylamine	AMM	20
Dietylaniline	GP	53
Dimethylamine	AMM	20
Etylamine	AMM	20
Nicotine	GP	40
Nitric acid fumes	ACI	10
Nitrobenzene	GP	53
Nitroethane	GP	53
Nitroglycerine	GP	53
Nitromethane	GP	40
Nitropropane	GP	40
Nitrotoluene	GP	53
Pyridine	AMM	53
Urea	GP	53
Uric acid	GP	53
Miscellaneous		
Adhesives	GP	40
Animal odours	OAL	30
Camphor	GP	40
Hospital odours	OAC	30
Human odours	OAC	30
Ozone	GP	30
Putrescine	OAC	30
Resins	GP	30

Please enquire for filters suitable for not listed substances

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