

# How a Gas and Vapour Cartridge Works



Workers can reduce their exposure to many different organic vapours with 3M gas and vapour respirator cartridges. To achieve this objective, respirator cartridges are filled with activated carbon. Activated carbon is typically made from coal or renewable resources like wood or coconut shells. It is “activated” by heating the material in nitrogen or steam at approximate temperatures of 800 – 900°C. The resulting material has a significant number of micropores that help adsorb various organic vapours. These micropores can be measured and optimized for specific product needs and performance.

## How the technology works

Activated carbon by itself cannot adsorb other types of gases or vapours such as acid gases, ammonia, formaldehyde, etc. In some cases, additional metals and salts are added to the carbon to selectively remove these compounds. For this reason, 3M offers a variety of cartridges and facepieces to help protect workers in different environments and satisfy personal preferences.

When organic vapours are drawn through an organic vapour cartridge, the air is filtered as vapours condense into the carbon pores. Vapours move through the cartridge from one pore to the next. This occurs more quickly for small volatile vapours with lower boiling points (e.g., acetone). Some migration of organic vapours can even occur during storage, so care must be taken before reusing the cartridge. The effective service life is the time until vapours begin to exit the cartridge.

Unlike particulate filters, service life is not indicated by change in breathing resistance. Instead, cartridges must be changed according to local regulations; end-of-service-life indicator; taste, smell, or irritation from the contaminant; or according to 3M™ Service Life Software calculation, whichever comes first.

## Factors that influence service life:

- ▷ Exposure concentration
- ▷ Temperature
- ▷ Humidity (water vapour takes up space in carbon pores)
- ▷ Breathing rate

3M is committed to develop high-quality safety products to help protect workers. For more information about 3M gas and vapour cartridges, or to establish a cartridge change schedule, visit [3M.ca/RespiratoryProtection](https://3M.ca/RespiratoryProtection).



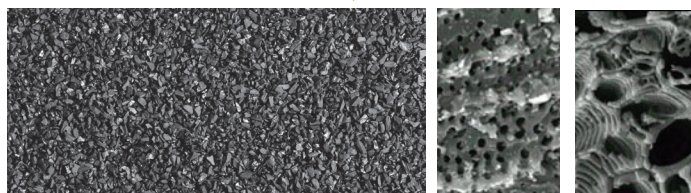
Coal or renewable resources, such as coconut shells



Coal or renewable resources are heated without oxygen

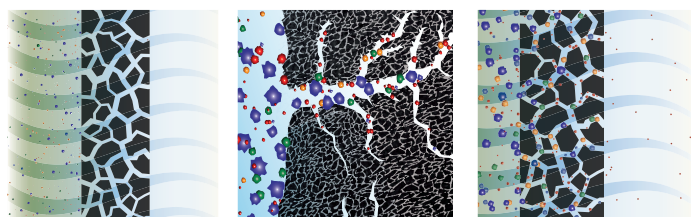


High-temperature steam or nitrogen activation



High-grade activated carbon

Electron micrographs of activated carbon pores



Unfiltered organic vapours are drawn into the cartridge.

Activated carbon adsorbs organic vapours on molecular level.

Service life continues until vapours begin to escape the cartridge.

### Warning

These respirators help reduce exposures to certain airborne particulates. Before use, the wearer must read and understand the User Instructions provided as a part of the product packaging. A written respiratory protection program must be implemented meeting all the requirements of the authority having jurisdiction in your region and/or CSA Standard Z94.4 including training, fit testing and medical evaluation. Misuse may result in sickness or death. For proper use, see package instructions, supervisor, or call 3M PSD Technical Service in Canada at 1-800-267-4414.



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