

Periodic Graphics

A collaboration between C&EN and
Andy Brunning, author of the popular
graphics blog *Compound Interest*

More
online

To see more of
Brunning's work, go to
compoundchem.com.
To see all of C&EN's
Periodic Graphics,
visit [cenm.ag/
periodicgraphics](http://cenm.ag/periodicgraphics).

DO AIR POLLUTION MASKS WORK?

In cities where air pollution is a concern, some people wear filtration masks when outside to protect themselves. What do these masks filter out of the air, and how effective are they?

AIR POLLUTION AND PARTICULATE MATTER

Air pollution is caused by chemical pollutants. These can be in the form of gases or particulate matter (very small solid or liquid particles). Filtration masks aim to prevent inhalation of particulate matter.



Inhalation of particles smaller than 2.5 μm (PM_{2.5}) aggravates asthma and decreases lung function.



Credit: t_kimura/iStockPhoto

HOW WELL DO FILTRATION MASKS WORK?

Many filtration masks claim to be highly efficient at reducing particulate exposure. Studies have shown, however, that facial fit and movement of the mask can affect the actual exposure experienced by the wearer.



Occup. Environ. Med. 2018, DOI: 10.1136/oemed-2017-104765

The polypropylene filters in most masks block only particulate matter and not pollutant gases. Some masks use an activated carbon layer to adsorb some gases.

COMPONENTS AND SOURCES OF PM



C

ELEMENTAL CARBON

Combustion of fuels



Al Si Fe Ca

MINERAL COMPONENTS

Dusts from construction



Pb Ni Cd Cr

TRACE METALS

Fuel additives, brake/tire wear



NO_x

NITRATE

Atmospheric NO_x reactions



PAHs

ORGANIC CARBON

Combustion of fuels



NaCl

SODIUM CHLORIDE

Sea salt, road salts



SO₂

SULFATE

Atmospheric SO₂ reactions



H₂O

WATER

Atmospheric moisture