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NEW INSIGHTS IN INDOOR AIR POLLUTION

INDOOR air pollution is often a cause for concern in unventilated and cramped indoor spaces. Generally, indoor air pollution is believed to occur due to the burning of inefficient stoves in poor households and from smoking tobacco products. However, some other sources of indoor air pollution also include building materials and furnishings, upholstery or carpet, asbestos-containing insulation, products for household cleaning and maintenance and even personal care, central heating and, of course, outdoor air pollution.

According to the WHO, household air pollution was responsible for an estimated 3.2 million deaths in 2020, including over 237,000 deaths of children under the age of 5. Exposure to household air pollution leads to non-communicable diseases including stroke, ischaemic heart disease, chronic obstructive pulmonary disease (COPD) and lung cancer. During the recent COVID-19 pandemic the SARS-CoV-2 virus was also shown to be easily transmitted within closed spaces.

And now, researchers from the Max Planck Institute for Chemistry in collaboration with researchers from the USA and Denmark have found that humans too could be potentially polluting the indoor air with chemicals released from their breath and skin. The researchers reported their findings in the journal *Science* (2022; 377 (6610): 1071 DOI: 10.1126/science.abn0340).

Outdoors, these chemicals naturally get cleaned during rains or through chemical oxidation. In the atmosphere when UV light from the sun interacts with ozone and water vapour it creates Hydroxyl (OH) radicals, which are largely responsible for this chemical cleaning. These reactive molecules are also called the detergents of the atmosphere.

Inside rooms, however, rain and sunlight do not enter. Since glass windows generally filter out UV rays it is assumed that the concentration of OH radicals is substantially lower indoors. So, generally ozone that enters from outdoors is the major oxidant of indoor airborne chemical pollutants.

But the researchers have now discovered that an interplay of humans with ozone could also generate OH radicals indoors. The levels the scientists found were even comparable to outside daytime OH concentration levels. The researchers say oils and fats from human skin react with ozone releasing gas phase chemicals with double bonds that react further in the air with ozone to generate substantial levels of OH radicals.

However, some questions still remain to be answered. For instance, could these reactions be altered by the presence of humidity? Besides, how would the OH radicals so formed transform other chemicals in our immediate vicinity and our breathing zone and what health impacts these could create, is another area that needs further research.

Another area that needs to be studied relates to chemical emissions from materials and furnishings in the indoor environment. These are currently tested in isolation before being approved for sale. However, the researchers say that in light of their findings such tests should also be conducted in the presence of people and ozone. This is because oxidation processes can lead to the generation of respiratory irritants and small particles that can have adverse effects, especially in children and the infirm.

Hasan Jawaid Khan

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