

New Research Casts Further Doubt On Philip Morris International's "Smoke-Free" IQOS Claims

Researchers from the University of Nottingham have published a paper titled "[Should IQOS Emissions Be Considered as Smoke and Harmful to Health? A Review of the Chemical Evidence.](#)" The researchers conducted a literature review of studies examining emissions from heated tobacco products (HTPs).

The authors concluded that emissions from Philip Morris International (PMI)'s HTP, IQOS, fit the definitions of both [aerosol](#) and [smoke](#), noting that smoke can arise without combustion. The chemical evidence also confirms that IQOS generates harmful and potentially harmful constituents (HPHCs), however at lower levels and formed at lower temperatures than those from the reference cigarette used for comparison. These findings raise questions about PMI's claims that IQOS is "smoke-free" and highlight where more independent data is needed to help inform the regulation of HTPs.

Recommendations

The authors call for further independent research on IQOS emissions. To more clearly understand the potential health effects, more data on the entire range of compounds released from HTPs is needed—as of now, more than 5,000 individual components of cigarette emissions have been characterized, compared to just 529 in HTPs. The authors also emphasize the need to study the impact of repeated use of IQOS in order to provide a more reliable assessment of the compounds it releases.

More independent toxicological data and continued analyses will better inform the future regulation of IQOS and other HTPs.

[Read the full paper.](#)

Key Takeaways

IQOS emissions can be defined as both aerosol and smoke.

- IQOS emissions contain carbon particles, which fit the definitions of both aerosol and smoke, noting that smoke can occur without combustion.
- In terms of constituents released, IQOS emissions contain compounds (for example, [levoglucosan](#)) and polycyclic aromatic compounds (PAHs) that are markers of tobacco, wood and biomass smoke.
- The HPHCs present in IQOS emissions are the same as those in cigarette smoke, though at lower levels when compared using a per stick basis. These are analogous to emissions from an earlier generation of HTPs that were classed as smoke.

Current comparisons of IQOS emissions and cigarette emissions do not offer an accurate "like against like" comparison.

- All comparisons to date have compared IQOS against a reference cigarette, the 3R4F cigarette.
- In general, an IQOS tobacco stick contains less tobacco than the reference cigarette (177-203 mg for an IQOS stick versus 645 mg of tobacco smoked from the 3R4F cigarette for comparison). To get a true like against like comparison of HPHCs and other components, the yields from IQOS aerosol need to be multiplied by between 3.2 and 3.6.
- To provide a true like against like comparison of each product's emissions, the researchers recommend that comparisons be made on a mass-of-tobacco basis instead of a stick basis.

PMI studies may have underestimated IQOS emissions HPHC yields.

- On a tobacco basis, the tar and nicotine yields are roughly twice as high from IQOS, consistent with the higher temperatures in cigarettes resulting in much of the primary tar and nicotine being cracked to lower molecular weight organic compounds.
- The researchers note a previous study that confirmed deposits of tar on the IQOS device. They highlight the concern that continual reheating of deposited tar in the IQOS device will occur with real-life use, likely leading to generation of even higher concentrations of HPHCs and particulate matter.

There are uncertainties over the maximum temperatures reached in the tobacco sticks and in localized hot spots, raising concerns about the formation of harmful compounds.

- Evidence suggests that IQOS heats to a maximum of 350° C, but the authors note that there is uncertainty over the highest temperatures reached in the tobacco sticks.
- They also raise the concern of local hot spots occurring in the device or stick that could contribute to the formation of PAHs, which are classified as carcinogens.



Glossary

Biomass: organic material used as fuel, e.g. wood.

Carcinogen: a substance that has the potential to cause cancer.

Combustion: the process of burning.

Cracking (cracked): the process of breaking down complex organic molecules to simpler molecules.

HPHCs (harmful and potentially harmful constituents): chemicals present in tobacco products and tobacco smoke that are recognized by the U.S. Food and Drug Administration as being harmful or potentially harmful.

Polycyclic aromatic compounds: widespread environmental contaminants, found naturally in fossil fuels. They are created and released into the environment by burning organic material.

Pyrolysis: thermal decomposition of organic material when heated under limited oxygen or in the absence of oxygen.

Reference cigarette: In 1968, the University of Kentucky's Tobacco and Health Research Program was tasked with developing a 'Reference Cigarette' that could be used as an international standard for research on smoking and health. The 3R4F standard reference combustible cigarette is still used in laboratory studies and provides a basis for comparing data collected in different laboratories.

Tar and nicotine yield: the amount of tar and nicotine generated through the use of tobacco.

