

# Mask Toxicity: Four Studies Document Toxic Materials in Masks that Leach Out Many Carcinogens!

Heavy metals, organic chemicals (plasticizers & solvents), microplastics & microfibers, free radicals

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Theme: [Science and Medicine](#)

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[COVID Intel](#)

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*I will briefly review these 4 recent studies on toxic compounds in masks:*

- [Mar. 2022 - Bussan et al](#)
- [May 2022 - Ze Liu et al](#)
- [April 2023 - Ana Oliveira et al](#)
- [May 2023 - Hajoo Ryu et al](#)

[Mar. 2022 - Bussan et al](#) – Quantification of trace elements in surgical and KN95 face masks widely used during the SARS-COVID-19 pandemic

- heavy metals – observed detectable concentration levels for Cu, Sb and Pb
- copper (Cu) was detected in most of the surgical masks
- a children's mask had the 2nd highest amount of Sb (antimony) detected, largest concentrations of Sb (antimony) were in KN95 masks
- inhalation of Sb (antimony) can cause pneumoconiosis, chronic bronchitis, chronic emphysema, pleural adhesions and respiratory irritation.
- a bestselling children's mask also had lead (Pb) – inhaled and ingested lead can cause severe brain damage, reproductive system damage and death
- Zinc (Zn) was also detected – excess can cause lethargy , respiratory tract problems and neuronal death
- different masks of the same brand, in the same box, were found to contain different concentrations of metals – lack of quality control by manufacturer
- In a saline solution mimicking saliva, half of the lead (Pb) leached out – exposure could occur in people who may use contaminated masks for extensive periods of

time or for children who may chew the mask material.

- human saliva contains enzymes that could also enhance metal leaching from masks = additional exposure

[May 2022 – Ze Liu et al](#) – Generation of environmental persistent free radicals (EPFRs) enhances ecotoxicological effects of the disposable face mask waste with the COVID-19 pandemic

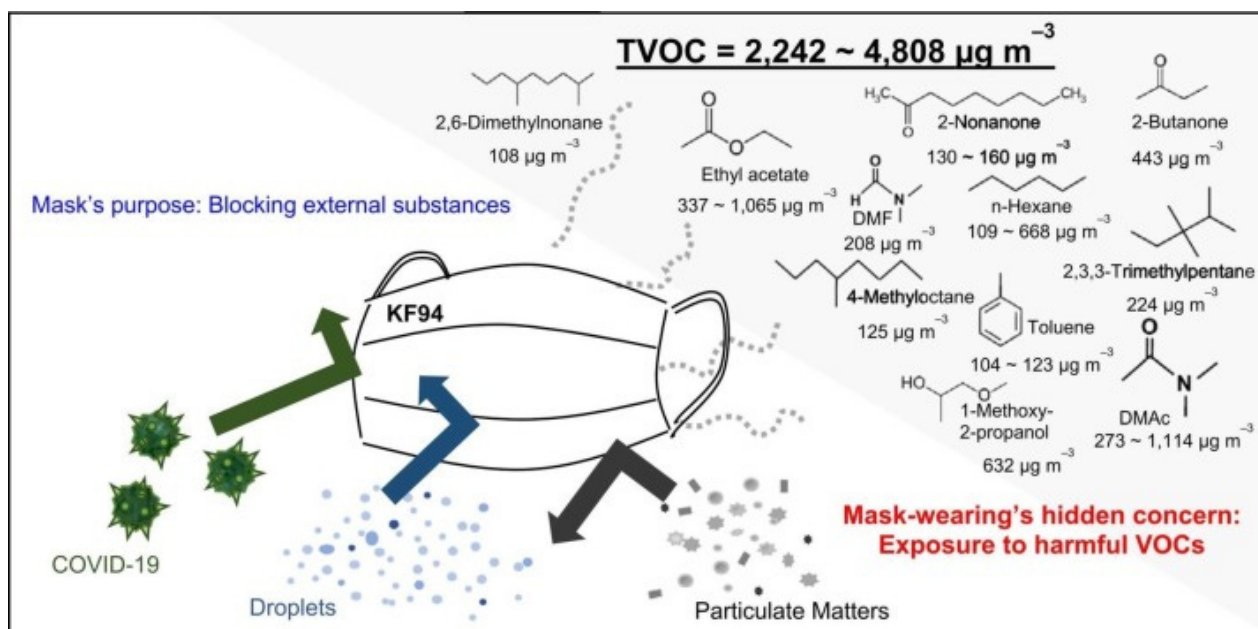
- 10 heavy metals identified in disposable face masks: Zn, Sr, Ti, Co, Cu, Mn, Ni, Cd, Pb, Cr
- organic chemicals – plasticizers and organic solvents – benzothiazole, DTBP (2,4-di-tert-butylphenol), BPA (bisphenol-A), phthalide
- microplastics (polypropylene), microfibers
- EPFRs environmentally persistent free radicals – in vitro assay confirmed these cause cytotoxicity and oxidative stress
- Surgical masks release more heavy metals, organic chemicals, microplastics and free radicals than N95 masks after exposure to water.
- bisphenol-A exhibits toxic, endocrine, mutagenic and carcinogenic effects in living organisms ([source](#))
- benzothiazoles are “probably carcinogenic to humans” ([Health Canada](#))
- DTBP (2,4-di-tert-butylphenol) “exhibits potent toxicity against almost all testing organisms” ([source](#))

[April 2023 – Ana Oliveira et al](#) – Current knowledge on the presence, biodegradation, and toxicity of discarded face masks in the environment

- face masks are a source of organic and inorganic contaminants including micro(nano)plastics and fibers.
- surgical masks are disposable and mostly made of different plastic nanofibers, most common [polypropylene](#) (PP). They usually have 3-5 layers.
- disposable masks possess a nose wire frame made of [metallic compounds](#) (iron constituting 4.58 wt% of the total mass of the face mask, and the trace amount of zinc, calcium, titanium, and manganese)
- disposable masks also release hazardous chemical compounds often added during their manufacturing
- polar organic species related to polyamide-66 monomer and oligomers (nylon-66 synthesis), polyethylene glycol, and phthalate esters plasticizers also detected
- face masks contain metals (such as titanium dioxide – TiO<sub>2</sub> in quantities ranging from 100 to 2000 mg/kg) that can induce carcinogenic and mutagenic effects
- Bussan et al. reported detectable levels of copper, antimony and lead which implicated a potential for their leaching. Surgical masks had higher heavy metals than N95 masks.
- Face masks have a three-dimensional porous structure in which the additives are dispersed but not bounded, which contributes to their release into the environment
- inorganic and organic contaminants released from face masks can lead to oxidative stress – for example, phthalates were detected in several disposable face masks which exhibited potential carcinogenic effects on humans
- A considerable amount of volatile organic compounds (VOCs), PAHs, and alkanes were also detected on face masks

- In addition to the adverse effects of face masks' chemicals, inhaled microplastics and microfibrils can induce lung inflammation – fibers may cause localized responses such as its additives and sorbed contaminants may result in genotoxicity, reproductive toxicity, [carcinogenicity](#) and [mutagenicity](#)

[May 2023 – Hajoo Ryu et al](#) – Measuring the quantity of harmful volatile organic compounds inhaled through masks



- volatile organic compounds (VOC) are emitted from many commonly used masks
- in KF94 masks, the total VOC (TVOC) released was about 14 times more than that released by the cotton masks
- 15 types of VOCs were detected released from masks – among these 15 chemicals, DMAc and DMF are known to potentially cause liver and reproductive toxicity, and aromatic compounds such as toluene and xylene are toxic to the nervous system
- Acetonitrile is also a harmful substance that can cause inflammation to the skin and eyes, and can cause neurological disorders
- n-Hexane is a skin irritant that can cause headaches and pulmonary edema when inhaled.
- Simultaneous exposure to n-hexane and 2-butanone can cause severe neurotoxicity

My Take...

There are many toxic compounds hiding in disposable face masks that can be categorized as:

1. Heavy metals (mainly lead, antimony, copper), one study found 10 heavy metals
2. organic chemicals – plasticizers, organic solvents, volatile organic compounds
3. microplastics (polypropylene) and microfibrils
4. environmentally persistent free radicals

All of these leach out of the masks, with surgical masks leaching more heavy metals and

chemicals when exposed to moisture and saliva, than N95 masks.

“Face masks have a three-dimensional porous structure in which the additives are dispersed but not bounded, which contributes to their release into the environment”

Some best selling children’s masks have high levels of heavy metals like lead.

Also, if children chew on their masks, they can have additional exposure to these heavy metals and various carcinogenic chemicals.

Several of the organic chemicals released by masks cause reproductive toxicity, neurological toxicity and are carcinogenic.

Microplastics and microfibers released by masks are also toxic to humans.

Quality control of disposable masks is lacking, with different masks from the same box containing different amounts of heavy metals, for example.

Personal comment: The level of contamination of surgical masks and N95 masks is much worse than I had suspected. It might be useful for people to print out these studies and send them to anyone thinking about implementing mask mandates again, advising them that they’re engaging in criminal conduct if they proceed.

That best selling children’s masks have high contamination with heavy metals like lead, actually does not surprise me at all. Our political and healthcare leaders have repeatedly shown a strong intent to harm children throughout the COVID-19 pandemic.

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*Featured image is from COVID Intel*

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by Michel Chossudovsky

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