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Importance of typical indoor pollutants for designing sensing and detoxification devices to be used in large public spaces.

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Indoor air is polluted with a number of substances and particles. In order to avoid false-positive responses the sensors must not be sensitive to typical indoor pollutants in their normal concentration ranges. At the same time detoxification devices should not lose their capacity to remove toxic agents when they are exposed to normal concentrations of typical pollutants.

The type, diversity and concentrations of pollutants present indoors depend on many aspects, including outdoor concentrations, type of building materials, furnishing, technological processes, occupant density, activity, ventilation etc. The most typical

pollutants present indoors are ozone, nitric oxides, carbon oxides, particles, different types of Volatile Organic Compounds (like BTEX (benzene, toluene, ethyl benzene, xylenes), aldehydes), Semi Volatile Organic Compounds (including plasticizers, flame retardants), particles, but also mould, fungi, viruses and bacteria. Based on literature data for assembly buildings, airports and train/metro stations as well as office and school buildings, this paper lists ranges of the most typical indoor pollutants. The goal was to provide background information to be used by designers of sensing and detoxification devices, to acknowledge the difficulties originating from the complexity of indoor atmospheres. The results are presented in Table 1.

Table 1. Summary of typical indoor air concentrations in public buildings.

Pollutants	Concentration range	Pollutants	Concentration range
CO_2 (mg/m^3)	200 – 6000	Naphthalene (□g/m^3)	0.1 – 50 (400)
CO (mg/m^3)	0.01 – 10 (100[a])	TVOC (□g/m^3)	10 – 10000
NO_2 (□g/m^3)	1 – 200 (1000[a])	DEHP(□g/m^3)	0.0001 – 5
O_3 (□g/m^3)	0.01 – 200 (600[a])	DnBP (□g/m^3)	0.001 – 10
Formaldehyde (□g/m^3)	1 – 300 (1500[a])	ΣPBDEs (ng/m^3)	0.001 – 20
Acetaldehyde (□g/m^3)	0.1 – 50	ΣOPs (□g/m^3)	0.04 – 1.0
Benzene (□g/m^3)	0.1 – 100 (200[a])	$PM_{2.5}$ (□g/m^3)	1 – 150 (500[a])
Toluene (□g/m^3)	0.1 – 200 (10000[a])	PM_{10} (□g/m^3)	1 – 300 (1000[a])
Ethylbenzene (□g/m^3)	0.1 – 50	Ultrafine particles (particles/cm^3)	1000 – 20000 (100000[a])

Xylenes (□g/m^3)	0.1 – 100 (400[a])	Bacterial aerosol (cfu/m^3)	1 – 10^4
		Fungal aerosol (cfu/m^3)	1 – 10^4

[a]in traffic-related buildings (e.g. subway stations) or buildings with very strong indoor sources (e.g. copy rooms, rooms with allowed tobacco smoking).