International Foundation
High Altitude Research Stations
Jungfraujoch + Gornergrat HFSJG
Sidlerstrasse 5
CH-3012 Bern

Sensitive measurements in progress at the Sphinx

Your activities may jeopardize the integrity of ongoing measurements at the Jungfraujoch

Please take a moment to read this:

If you are a scientist conducting experiments at the Jungfraujoch, or a technician on maintenance duty, or just a visitor getting a tour through the labs — your activities could potentially harm the quality of ongoing measurements. The purpose of this information pamphlet is to provide you a list of substances/activities that may cause problems without your awareness. Please check carefully, whether any of your activities could cause a problem. Some of the trace gas measurements are conducted at sub-ppt mixing ratio, so miniscule quantities can cause a major problem for our measurement records.

Example of problem devices and compounds are, but are not limited to **coolers/refrigerators** (cooling substances), **foams** (structural, insulation for coolers), **metered dose inhalers** (asthma sprays), **solvents** (for painting or cleaning dirty surfaces) **fire retardants and extinguisher** substances, **old sports shoes** (NIKE), **calibration -, buffer -, and carrier gases** used for your instruments, and **smoke** (cigarettes). The use of these substances in the entire Sphinx area may be problematic, especially near sampling inlets. Some of these substances may not be avoidable for your work, but your report of their presence is extremely valuable to us.

In general, keep your presence at the upper-most outdoor level of the Sphinx at a minimum despite the spectacular view.

It is **absolutely prohibited to smoke, cook (or to light any kind of fires)** on the outer platforms to avoid contamination of aerosol measurements.

Below is a list of compounds that may be problematic.

Fluorocarbons (HFCs), halogenated chlorofluorocarbons (HCFCs), halogenated olefins (HFOs, HCFOs), chlorofluorocarbons (CFCs), perfluorated hydrocarbons (PFCs), halons, SF6, NF3, COS, SO2F2

used as cooling agents, foaming agents, propellants in sprays, fire testing equipment, fire-extinguishing equipment.

Contact: martin.vollmer@empa.ch

Common name	Formula	Alternative names/mixtures	use
HFCs			
HFC-134a	CH_2FCF_3	R-134a	Cooling, foams
HFC-152a	CH_3CHF_2		foams
HFC-125, HFC-32, HFC-23	CHF_2CF_3, CH_2F_2, CHF_3	R-125, R-32, R-23	cooling
HFC-143a	CH_3CF_3	R-143a	
HFC-365mfc, HFC-245fa	$CH_3CF_2CH_2CF_3$, $CHF_2CH_2CF_3$		foams
HFC-236fa	$CF_3CH_2CF_3$		
HFC-227ea	$CF_3CHFCCF_3$		Inhalers, fire extinguishers, calibration gas for nephelometer
Other HFCs (e.g. HFC-4310-mee, HFC-41)			
R-XXX, e.g. R-404, R-407, R-410 and similar	Blends of above HFCs		cooling
HCFCs			
HCFC-22, HCFC-141b	$CHClF_2$, CH_3CCl_2F		Cooling, foams
HCFC-142b	CH_3CClF_2		cooling
HCFC-132b, HCFC-133a etc.			
Halons			
H-1211, H-1301	$CBrClF_2$, $CBrF_3$		Fire extinguisher
H-2402	$CBrF_2CBrF_2$		Fire extinguisher
PFCs and SF_6			
PFC-116, PFC-218, PFC-318, C4F10 etc.	C_2F_6, C_3F_8, c-C_4F_8, C_4F_{10} etc.		
carbon tetrafluoride	CF_4		
sulfur hexafluoride	SF_6		calibration gases, electrical insulator
CFCs			
CFC-12, CFC-11, CFC-113, CFC-114, CFC-115	CCl_2F_2, CCl_3F, CCl_2FCClF_2, $CClF_2CClF_2$, $CClF_2CF_3$	F-12/R-12, F-11, F-113, F-114/R-114, F-115/R-115	Cooling (old refrigerators), foam, cleaning of electronics and lasers
HFOs, HCFOs		Halogenate olefins	
HFO-1234yf, HFO-1234ze(E/Z), HFO-1336mzz(E/Z), HFO-1225, HCFO-1233zdE	Fluorinated and chlorinated alkenes		Cooling, Foam, spray cans
R-xxx		Blends of HFOs and HFCs	Cooling
All other halogenated compounds, e.g.:			
methyl bromide, methyl chloride	CH_3Br, CH_3Cl		
chloroform	$CHCl_3$		
trichloro-ethylene	CH_3CCl_3		cleaning
carbon tetrachloride	CCl_4		cleaning
dichloromethane	CH_2Cl_2		
trichloro-ethene	$CHClCCl_2$	TCE	solvents
perchloro-ethene	CCl_2CCl_2	PCE	solvents
dichloroethane	$C_2Cl_2H_4$		

Other important substances:

Common name	Formula	Use	Contact
Volatile organic compounds (VOCs)			martin.vollmer@empa.ch
Butane, pentane, hexane,		Refrigerants, Cleaning, fuel	
xylenes, benzene, toluene			
Other Gases			
hydrogen	H_2		
carbon monoxide	CO	Cigarette smoke, calibration and buffer gases	martin.steinbacher@empa.ch
carbon dioxide	CO_2	Emissions of CO_2, combustion	markus.leuenberger@unibe.ch martin.steinbacher@empa.ch
radiocarbon	14C	used in some particle monitors	markus.leuenberger@unibe.ch martin.steinbacher@empa.ch
methane	CH_4		martin.steinbacher@empa.ch
ozone	O_3	chemiluminescence	martin.steinbacher@empa.ch
nitrous oxide	N_2O		martin.steinbacher@empa.ch
nitrogen oxides	NOx		martin.steinbacher@empa.ch

General Questions/Contacts:

Empa Dübendorf (trace gases)	Martin Vollmer	martin.vollmer@empa.ch
		phone: +41 58 765 42 42
	Martin Steinbacher	martin.steinbacher@empa.ch
		phone: +41 58 765 40 48
	Stefan Reimann	stefan.reimann@empa.ch
		phone: +41 58 765 46 38
Paul Scherrer Institute (aerosols)	Martin Gysel	martin.gysel@psi.ch
		phone: +41 56 310 41 68
	Benjamin Brem	benjamin.brem@psi.ch
		phone: +41 56 310 24 65
University of Bern (trace gases)	Markus Leuenberger	markus.leuenberger@unibe.ch
Université de Liège	Christian Servais	christian.servais@ulg.ac.be
HFSJG	Markus Leuenberger	markus.leuenberger@unibe.ch