

Working Safely in Laboratories – Basic Principles and Guidelines

BGI/GUV-I 850-0e

In the Guidelines for Laboratories in the German version (BGI/GUV-I 850-0 dated March 2014) the following changes (in red color) have been included. The editorial changes both in the text and in the bibliography are not shown here.

Chapter 3.6 Substituting hazardous materials (page 30)

...

Procedures can also be substituted. In particular when small quantities are involved, for example, phosgene can be generated from di/triphosgene in a process that is easy to control and can be interrupted at any time instead of using phosgene from compressed-gas cylinders.

It should be noted that replacing a substance, its application or a procedure does not necessarily remove all hazards. It is even possible that one hazard is reduced while other new hazards arise, for example if a toxic, incombustible substance is replaced by a less toxic but combustible substance. Although, when diazomethane is replaced by trimethylsilyldiazomethane, dangerous decay is avoided, the toxicity remains.

For product development purposes, the question of whether hazardous materials are used that could be problematic at later stages of development, production or marketing should be considered as early as the laboratory phase.

Product development

Chapter 4.5.3 Hand protection (page 43)

...

Wearing gloves frequently and for long periods is bad for the skin and can lead to skin disorders. Unnecessary wearing is not permitted.

Problems associated with wearing gloves

Chapter 5.2.9.1 Refrigerators and freezers (page 98)

The interior of refrigerators and freezers in which hazardous explosive atmospheres can develop must not contain any ignition sources.

Explosion protection

Hazardous explosive atmospheres can develop, for example, from open or un-tight vessels containing flammable liquids. Ignition sources in the vicinity of the door must therefore also be avoided. Appropriate refrigerators are available on the market. In the case of refrigerators and freezers of standard design, ignition sources can be avoided if lights and light switches are disconnected and temperature controllers are equipped with an intrinsically safe electrical circuit. Internal fans must be disconnected and the automatic defrosting system must be switched off. In refrigerators with automatic defrosting systems, the thawed

liquid must be diverted into a collection vessel inside. This collection vessel has to be emptied when necessary. If the automatic defrosting system inside works with a heating system, this must be disconnected from the outside. The refrigerator must be defrosted by switching it off and opening the door. Locations where tubes or cables pass through the walls must be closed with silicone or similarly tight and durable materials. Converting the appliance on one's own initiative amounts to adopting the manufacturer's responsibility in the sense of the Produktsicherheitsgesetz (ProdSG).

Refrigerators and freezers contain flammable cooling agents such as isobutane in quantities of up to 1.5 kg. In addition, insulating foams contain pentane. Although no accidents caused by escaping cooling agent in the laboratory have been reported, electrical defects are a known cause of fire. DIN-Fachbericht CEN/TR 14739 provides assistance for assessing the risk posed by flammable cooling agents in household appliances. According to this, no hazard is presented by an increase in temperature.

Chapter 5.2.23 Chromatography (page 119)

...

Hazardous materials escaping from gas chromatographs have to be effectively captured and removed. See Fig. 21.

For gas chromatographs where hydrogen is used as the carrier gas, explosion protection procedures are to be observed, in particular in oven chambers.

Gas chromatographs with an electron capture detector contain a source of ^{63}Ni .

The literature No. [3] is restructured and contains references to useful assistances on the homepage of the BGRCI: (page 157)

[3] <http://www.bgrci.de> → Prävention → Fachwissen-Portal → Laboratorien → Arbeitshilfen (Web code: page ID #KCFM) (visited: 2014-03-01) with the keywords on the subpages

Gasherstellung im Labor – Volumenbegrenzung (Laboratory gas production – Limits on volumes) (Web code: page ID #3Z1J)

Gefahrstoffverzeichnis (Directory of hazardous materials) (Web code: page ID #EEHX)

Muster-Betriebsanweisungen (Sample operating instructions) (Web code: page ID #EEHX)

Muster-Freigabeschein (Sample permit procedure) (Web code: page ID #KE44)

Muster für Flucht- und Rettungsplan (Sample escape and rescue plan) (Web code: page ID #8GR8)

Muster für Hautschutzplan (Sample skin protection plan) (Web code: page ID #EEHX)

Prüfungen im Labor (Laboratory inspections) (Web code: page ID #U562)

Tischzentrifugen (Centrifuges) (Web code: page ID #EEHX)