# Safe job analysis – Glove boxes

Name of department: Department of Chemistry (Kjemisk Institutt)

Working tasks regarding this Safe job analysis: Using the glove box.

Date: 01/11-2010, Per-Anders Hansen

**Only trained personnel are allowed to use the glove box! Contact Per-Anders Hansen for training.**

See the next page for description of the classes of chemicals used here.

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| Task | What can go wrong | What can minimize the risk |
| Taking harmless chemicals/  containers into the glove box | Closed containers may explode or powder may fly off during antechamber evacuation (vacuum), spreading sample/chemical everywhere into the antechamber | Be 100 % sure that the container/ sample/ chemical is vacuum compatible. |
| Taking flammable/ pyrophoric/  highly pyrophoric/ poisonous chemicals into the glove box | When pumping the antechamber down to vacuum, the container may leak or rupture and cause fire/ poisoning hazards | After the pumping to vacuum has started, the container must be brought into the glove box, and not out of it. This is in case the container has ruptured (not vacuum compatible) |
| Removing pyrophoric chemicals from the glove box | The container with the chemical may leak or accidentally open or rupture, causing immediate fire hazards | Wear face mask, leather gloves. Carefully open the hatch a few millimeters and look for smoke. If smoke, take sample back into the glove box following normal procedures. If no smoke, carefully and slowly open the hatch fully. |
| Removing highly pyrophoric chemicals from the glove box | The container may leak or accidentally open, causing immediate risk of serious injury or burn damage | Wear face mask, leather gloves and fire resistant suit, and follow the steps in the previous point.  If smoke is detected, immediately close the hatch and bring the container back into the glove box following normal procedures. Contact the person responsible for the glove box |
| Removing poisonous chemicals from the glove box | The container with the chemical may leak or accidentally open or rupture, causing immediate poisoning hazards | Follow the safety instructions regarding handling of the poisonous chemical in the data sheets that came with the chemical |
| Spilling flammable/ pyrophoric chemicals inside the glove box | May cause fire and explosion hazards during cleaning or subsequent use of the antechambers | Wipe up the spill with paper, and put it into a sealed container. Leave the container in the box. Put a clearly visible warning with big letters on the window of the glove box. Contact the person responsible for the glove box. |
| Rupturing/ puncturing the gloves | If the hole is larger than about 1 mm, pyrophoric or poisonous vapors may leak out of the gloves | Use the yellow Kevlar gloves on top of the butyl gloves when handling sharp objects to minimize the risk of puncturing. Seal the glove according to the BOP for the glove box. |
| Using chemicals incompatible with the butyl gloves | Certain chemicals may dissolve, react or soften the butyl gloves, which can lead to direct skin contact to the hand through the glove. | Make sure that the chemicals you are using are compatible with butyl gloves. This should be stated in the data sheets that came with the chemical. If not, you can buy another set of gloves to put on top of the butyl ones, but contact the person responsible of the box first! |

Classes of chemicals used in this Safe job analysis:

Harmless: Chemicals that you normally handle without any precautions, like quartz or iron chloride. Chemicals which would be destroyed by exposure to air without causing any risk, like water-free FeCl3 absorbing humidity from the air, falls into this category.

Flammable: Chemicals that burn if ignited. Hexane for example falls into this category.

Pyrophoric: Chemicals that can spontaneously ignite in air or react slowly producing heat. Many metals like the alkali metals falls into this category.

Highly pyrophoric: Chemicals that will react violently with air. TMA (trimethylaluminium) fine powders of pyrophoric/ flammable chemicals falls into this category.

Poisonous: Chemicals that can cause poisoning. A lot of organic solvents falls into this category.

# Safe operation procedures – Glove boxes

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Date: 01/11-2010, Per-Anders Hansen

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* To avoid cracking of glass in the transfer chamber, always make sure that you container is vacuum compatible.
* When entering or exiting flammable, pyrophoric or toxic chemicals, always take the chemical into the box if you suspect that it has ruptured or leaked in the transfer chamber.
* When you remove flammable or pyrophoric chemicals from the transfer chamber, wear a face shield and leather gloves. If it is highly pyrophoric (metal organic compounds), wear a fire resistant suit.
* When handling toxic chemicals, follow the safety guidelines in the data sheets that came with the chemical.
* If the gloves get a puncture larger than 1 mm, seal the glove following the procedures in the BOP for the glove box. Contact the person responsible for the glove box.
* **If in doubt about anything, contact the person responsible for the glove box!**