

EXPERIMENT RISK ANALYSIS

Experimental Number: **CH3802**

Beamline: **BM23**

Main Proposer: **Daniela Zanchet**

Title of the Experiment: **Comparison of Pt and Rh catalysts and the effect of support to steam reforming of methane**

1 EXPERIMENT (only if changes since the proposal)

Classification of the sample:

- Radioactive Contaminant Corrosive Oxidising
 Explosive Biological
 Other: no risk

Sample Description:

- Crystal Powder Polycrystalline Multilayer
 Liquid Gas Nanoparticles
 Other:

Container:

- Capillaries Flat plate Pressure cell – Type:
 Other: Oven for experiments in fluorescence mode (sample environment)

ESRF equipment to be used:

- Furnace Magnet Cryostat Cryogenic gas stream
 Refrigerator Laser High pressure Fixed temperature
 Other: Oven for experiments in fluorescence mode (sample environment)

The Safety Group must immediately be informed of all modifications made and which differ from the original proposal and this at least two weeks before your arrival on site.

Your equipment has been tested by your home institute. No changes can be made before your arrival at the ESRF and until your experiment has started.

2 Risks associated with equipment to be used on site

Equipment used (please tick Yes or No)	Risks	Preventive measures
<i>Pressure equipment (e.g.: autoclave, high pressure cell, vacuum chamber, compressor, boosters...):</i>		
Gas pressure equipment <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Projection of fragments	
	<input type="checkbox"/> Gas leak	
	<input type="checkbox"/> Burns	
	<input type="checkbox"/> Whipping of hoses	
	<input type="checkbox"/> Other	
Vapour pressure equipment <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Projection of fragments	
	<input type="checkbox"/> Vapour leaks	
	<input type="checkbox"/> Burns	
	<input type="checkbox"/> Whipping of hoses	
	<input type="checkbox"/> Other	

Equipment used (please tick Yes or No)	Risks	Preventive measures
Liquid pressure equipment <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Projection of liquids	
	<input type="checkbox"/> Whipping of hoses	
	<input type="checkbox"/> Burns	
	<input type="checkbox"/> Other	
Equipment used in vacuum <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Implosion	
	<input type="checkbox"/> Other	
Furnace <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> Fire	Preliminary tests were done in the chemistry laboratory.
	<input checked="" type="checkbox"/> Thermal burns	The oven is cooled with a thermal bath
	<input checked="" type="checkbox"/> Electrical	Check if all the wires are well isolated.
	<input type="checkbox"/> Other	

Equipment used (please tick Yes or No)	Risks	Preventive measures
Cryostat <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Cryogenic burns	
	<input type="checkbox"/> Quenching (sudden vaporisation of refrigerated liquid gas with the possibility of asphyxiation)	
	<input type="checkbox"/> Electrical	
	<input type="checkbox"/> Asphyxiation	
	<input type="checkbox"/> Other	
Cryo-magnet <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Cryogenic burns	
	<input type="checkbox"/> Quenching (sudden vaporisation of refrigerated liquid gas with the possibility of asphyxiation)	
	<input type="checkbox"/> Electrical	
	<input type="checkbox"/> Asphyxiation	
	<input type="checkbox"/> Harmful effects on human health	

Equipment used (please tick Yes or No)	Risks	Preventive measures
Cryo-magnet	<input type="checkbox"/> Metallic objects in movement	
	<input type="checkbox"/> Other	
Other equipments generating magnetic fields <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Electrical	
	<input type="checkbox"/> Harmful effects on human health	
	<input type="checkbox"/> Metallic objects in movement	
	<input type="checkbox"/> Other	
Electrochemical cells <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Chemical risk (see use of toxic and corrosive products)	
	<input type="checkbox"/> Electrical	
	<input type="checkbox"/> Other	

Equipment used (please tick Yes or No)	Risks	Preventive measures
Laser <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Accidental eye and skin exposure <input type="checkbox"/> Electrical <input type="checkbox"/> Fire <input type="checkbox"/> Other	
IR, UV, Hg lamps <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Eye and skin exposure <input type="checkbox"/> Contact burns <input type="checkbox"/> Electrical <input checked="" type="checkbox"/> Other	
Electromagnetic wave generator <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Exposure to non-ionising radiation <input type="checkbox"/> Electrical <input type="checkbox"/> Other	

Equipment used (please tick Yes or No)	Risks	Preventive measures
Micro blowtorch <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> Burns	
	<input type="checkbox"/> Fire	
	<input type="checkbox"/> Other	
Heating Ribbon <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Electrical	
	<input checked="" type="checkbox"/> Burns	Glass wool was kept around the heating tape.
Other equipment: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Water saturator	<input checked="" type="checkbox"/> No risk	

3 Risks associated with the use of chemicals and gases

3.1 Chemicals and gases to be used:

Chemicals:






Name	CAS number	Quantity	Concentration	Use




Extra rows needed? Just type Yes in the box which will appear when you have completed the final cell in the above table



Gases:

Type of gas	%	Size	Number of cylinders	Continuous flux
Helium	pure	50 L	1	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Hydrogen in helium	5%	20 L	1	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
CO in helium	5%	20 L	1	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
				<input type="checkbox"/> Yes <input type="checkbox"/> No
				<input type="checkbox"/> Yes <input type="checkbox"/> No


3.2 Risks and associated preventive measures

Classification of the chemical / gas	Name(s)	Risks	Preventive measures
 Explosive (unstable) <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Explosion (dispersion in the air, incompatibilities, presence of static electricity, impacts, possible friction...)	
 Flammable <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5%/He	<input checked="" type="checkbox"/> Projection <input checked="" type="checkbox"/> Fire <input checked="" type="checkbox"/> Explosion	Leaking test and detectors
 Oxidising <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Fire <input type="checkbox"/> Explosion	
 Corrosive <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Skin and eye burns <input type="checkbox"/> Attack of materials	
 Toxic <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5%CO/He	<input checked="" type="checkbox"/> Chronic or acute intoxication	Leaking test and detectors

Classification of the chemical / gas	Name(s)	Risks	Preventive measures
 CMR (Carcinogenic, Mutagenic or toxic to Reproduction) <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Serious effects on human health (cause cancer, modifies DNA, harms fertility)	
 Harmful, Irritating <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Skin and eye irritations	
Nanoparticles <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Toxic effect on human health	
		<input type="checkbox"/> Explosion	
		<input type="checkbox"/> Dispersion	
 Biological samples <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Allergenic	
		<input type="checkbox"/> Secondary infection	
		<input type="checkbox"/> Oncogenic	
		<input type="checkbox"/> Toxic	

Classification of the chemical / gas	Name(s)	Risks	Preventive measures
 Biological samples		<input type="checkbox"/> Pin prick	
		<input type="checkbox"/> Cut	
		<input type="checkbox"/> Other	
 Radioactive samples <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Contamination	
		<input type="checkbox"/> Irradiation	
		<input type="checkbox"/> Pyrophoric	
		<input type="checkbox"/> Other	

Use of gas cylinders

 Gas under pressure <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	5%H ₂ /He	<input checked="" type="checkbox"/>	Explosion (due to heat or following a fall)	Leaking test
	He and 5%CO/He	<input checked="" type="checkbox"/>	Asphyxiation	Leaking test

4 Stage by stage description of the experiment

In this description you must indicate, stage by stage, all the preparation, set-up and testing phases of your experiment which you will carry out on site.

For each phase you must specify:

- which of the above-mentioned equipment will be used,
- the conditions in which the equipment, products will be used,
- the particular risks of the stage,
- feedback on previous use (incidents which already occurred involving this type of equipment or installation),

The associated preventive measures will appear in the table below (sections 2 and 3.2).

The oven will be mounted and a leaking test (using helium) for the gases will be done.
We will keep the sample in the cell and another leaking test will be done (every time that we need to change the sample a leaking test will be done).
The sample will be reduced in 5%H₂/He (maximum flux of 100mL/min), 5 °C/min until 500 °C. The sample will be kept in this temperature per 1 hour.
Then, the temperature will be decreased and a mixture of 5%CO/He with H₂O (carried by He) will be used as the reactants for the reaction. The highest temperature that will be used for the reaction will be 400 °C.
Experiments using just one of the reactants per time will also be done.

5 In the event of an emergency

Should a problem occur with your samples, equipment, chemicals, processes... during the preparation of your experiment or while it is taking place, indicate what interventions you propose:

In case of gas leaking the cylinder should be closed until the problem be solved.
In case of problems with the oven the power should be turn off.

6 Documents which must accompany the dossier

- Photo (jpg) of the installations and equipment which belong to you
- Compliance certificates for the equipment or documents which prove compliance (lasers, furnace ...)
- Documents proving the tests which were carried out (*high pressure cells (except Paris-Edinburg and diamant), home-made equipment*)

Documents and images may be inserted here (insert - object – browse to file – select display as an icon):