RISK ASSESSMENT **EcoSolve High School**

Making hydrogen

Written by: Phillip Crisp **Commenced on:** 20 Feb 2018 **Expires:** 20 May 2019

Classes for which experiment is required

Teacher: Phillip Crisp (training code 1) **Year Group:** 10

Room	Period	Date
611	3	Thu 1/3/18

Items to be prepared by laboratory technician (training code 2)

8 groups of
2 x magnesium ribbon, 2 cm
1 x 2M hydrochloric acid, bottle, 50 mL

Procedure or reference, including variations

Science World 7, p.52
Cork to be used to trap hydrogen gas prior to "popping".

Equipment to be used

box of matches

Potential hazards
Box burns violently if ignited.

Standard handling procedures
Keep dry. Used matches should never be returned to the box. Count boxes out and in.

cork

test tube, small (~75 x 8 mm), borosilicate ("pyrex")

Potential hazards
Breakage of test tubes. Cuts from chipped test-tube rims. Small test tubes more likely to eject material during exothermic reactions.

Standard handling procedures
Inspect and discard any damaged test tubes. Sweep up broken glass with brush and dustpan; do not use fingers.

wooden splint

Potential hazards
When lit, it acts as an ignition source; may cause burns. Possibility of splinters, especially if damaged.

Standard handling procedures
Extinguish all tapers with water before disposal.

Chemicals to be used and produced

hydrochloric acid 3-8 M (10-25% wt/wt)

$HCl_{(aq)}$
CAS: 7647-01-0

Class: nc PG: none Users: 7-12 Training: 1-5

GHS data:

WARNING

Causes serious eye irritation
Causes skin irritation

Potential hazards
Irritates eyes, lungs and skin.

Standard handling procedures
Avoid inhalation of vapour or skin contact.

hydrogen, gas generated during experiment

H_2
CAS: 1333-74-0

Class: 2.1 PG: none Users: 7-12* Training: 1,2,5*

GHS data:

DANGER

Extremely flammable gas

Potential hazards
EXTREMELY FLAMMABLE GAS. Forms dangerously explosive mixtures with air. Not toxic, but can act as asphyxiant; hydrogen/air mixture in lungs can explode if ignited. Detonation ("popping") of small volume of hydrogen/air mixture in sturdy test tube by ignition with

Standard handling procedures
DO NOT GENERATE HYDROGEN IN A CLOSED CONTAINER SINCE THE CONTAINER MAY EXPLODE. Generate hydrogen only in small volumes (<1 mL). Detonate hydrogen/air mixtures only in small undamaged test tubes (<8 cm; <5 mL). Use borosilicate ("pyrex") test tubes; do not use

match or wooden taper is generally safe; breakage of test tube is possible.

thin-walled soda glass test tubes. Protect against flying broken glass from breakage of test tubes.

magnesium, ribbon **Mg**

Class: 4.1 PG: III Users: 7-12* Training: 1-5 UN: 1869 CAS: 7439-95-4

GHS data:

DANGER  In contact with water releases flammable gases which may ignite spontaneously

Potential hazards

Burns with white-hot flame; UV radiation emitted from flame may cause eye damage; do not allow students to view flame from close distance. Reaction with ethanol may be violent after a long induction period. Reactions of magnesium with dichromate salts, nitrate salts, sulfur, phosphorus or halogenated solvents can be dangerously violent. Reaction of magnesium with silica (sand) to form silicon may be dangerously exothermic if the silica is not completely dry. Do not use magnesium as an alternative to aluminium in the thermite reaction; the reaction is dangerously explosive. Magnesium ribbon can, however, be used as a fuse for the thermite reaction.

Standard handling procedures

Keep containers tightly sealed to prevent corrosion.

Knowledge

I have read and understood the potential hazards and standard handling procedures of all the equipment, chemicals and biological items, including living organisms.
I have read and understood the (Material) Safety Data Sheets for all chemicals used and produced.
I have copies of the (Material) Safety Data Sheets of all the chemicals available in or near the laboratory.

Risk assessment

I have considered the risks of:

fire	breakage of equipment	electrical shock	radiation
explosion	cuts from equipment	escape of pathogens	waste disposal
chemicals in eyes	sharp objects	heavy lifting	inappropriate behaviour
inhalation of gas/dust	rotating equipment	slipping, tripping, falling	allergies
chemicals on skin	vibration and noise	falling objects	special needs
runaway reaction	pressure	heat and cold	other risks

Certification by Teacher

I have assessed the risks associated with performing this experiment in the classroom on the basis of likelihood and consequences using the School's risk matrix, according to International Organization for Standardization Standard ISO 31000:2009.

I consider the inherent level of risk (risk level without control measures) to be:

Low risk **Medium risk** High risk Extreme risk

Control measures:

Hold test tube away from body when popping.
Explain possibility of test tube breakage and importance of safety glasses.
Ensure students check test tubes for signs of damage before popping.
Additional measures: safety glasses

With the specified control measures in place, I have found that all the risks are "low risk". Risks will therefore be managed by routine procedures in the classroom, in combination with the specified control measures.

Name: ..... **Signature:** ..... **Date:** .....

Certification by Laboratory Technician

I have assessed the risks associated with preparing the equipment, chemicals and and biological items, including living organisms, for this experiment and subsequently cleaning up after the experiment and disposing of wastes, on the basis of likelihood and consequences using the School's risk matrix, according to International Organization for Standardization Standard ISO 31000:2009.

I consider the inherent level of risk (risk level without control measures) to be:

Low risk Medium risk High risk Extreme risk

Risks will therefore be managed by routine procedures in the laboratory.

Name: ..... **Signature:** ..... **Date:** .....

Monitoring and review

This risk assessment will be monitored using comments below and will be reviewed within 15 months from the date of certification.

Attach further pages as required