Standard Operating Procedure

Palladium

This is an SOP template and is not complete until: 1) lab specific information is entered into the box below 2) lab specific protocol/procedure is added to the protocol/procedure section and 3) SOP has been signed and dated by the PI and relevant lab personnel.

Print a copy and insert into your
Laboratory Safety Manual and *Chemical Hygiene Plan*.
Refer to instructions for assistance.

Department:	Chemistry
Date SOP was written:	5/25/2017
Date SOP was approved by PI/lab supervisor:	5/25/2017
Principal Investigator:	Rongbiao Tong
Internal Lab Safety Coordinator/Lab Manager:	Jingxun Yu
Lab Phone:	23587393
Office Phone:	23587357
Emergency Contact:	Rongbiao Tong 53484541 *(Name and Phone Number)*
Location(s) covered by this SOP:	*CYT/6014* *(Building/Room Number)*

Type of SOP: ☐ Process ☒Hazardous Chemical ☐ Hazardous Class

Purpose

Palladium is and **flammable solid**, and slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, or inhalation.

Palladium dust is also flammable.

Palladium is widely used in a variety of manufacturing processes, the largest use being in catalytic converters.

It is used in gold, silver and copper alloys for bearings, strings, and balance wheels in watches.

Physical & Chemical Properties/Definition of Chemical Group

CAS#: 7440-05-3

Class: **Flammable solid**

Molecular Formula: Pd

Form (physical state): solid

Color: metallic/gray

Boiling point: 3167°C

Potential Hazards/Toxicity

Palladium is and **flammable solid**, and slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, or inhalation.

Palladium dust is also flammable.

Palladium undergoes a violent reaction with arsenic, methanol, ethanol and alcohols.

The toxicity of soluble palladium compounds in mice is 200 mg/kg (LD_{50}) for oral and 5 mg/kg for intravenous administration.

Personal Protective Equipment (PPE)

Respirator Protection

A dust respirator is suggested for use with Palladium.

Respirators should be used only under any of the following circumstances:

- As a last line of defense (i.e., after engineering and administrative controls have been exhausted).
- When Permissible Exposure Limit (PEL) has exceeded or when there is a possibility that PEL will be exceeded.
- Regulations require the use of a respirator.
- An employer requires the use of a respirator.
- There is potential for harmful exposure due to an atmospheric contaminant (in the absence of PEL)
- As PPE in the event of a chemical spill clean-up process

Lab personnel intending to use/wear a respirator mask must be trained and fit-tested by EH&S. This is a regulatory requirement. (http://map.ais.ucla.edu/go/1004655)

Hand Protection

Gloves must be worn, nitrile gloves are recommended.

NOTE: Consult with your preferred glove manufacturer to ensure that the gloves you plan on using are compatible with Palladium.

Refer to glove selection chart from the links below:
http://www.ansellpro.com/download/Ansell_8thEditionChemicalResistanceGuide.pdf
OR
http://www.allsafetyproducts.biz/page/74172

OR
http://www.showabestglove.com/site/default.aspx
OR
http://www.mapaglove.com/

Eye Protection
ANSI approved properly fitting safety glasses or chemical splash goggles.

Skin and Body Protection
Flame resistant lab coats must be worn and be appropriately sized for the individual and buttoned to their full length. Laboratory coat sleeves must be of sufficient length to prevent skin exposure while wearing gloves. As outlined in UCLA Policy 905 personnel should also wear full length pants, or equivalent, and close-toed shoes. Full length pants and close-toed shoes must be worn at all times by all individuals that are occupying the laboratory area. The area of skin between the shoe and ankle should not be exposed.

Hygiene Measures
Wash thoroughly and immediately after handling. Remove contaminated clothing and wash before reuse.

Engineering Controls

Handle using a chemical fume hood with good ventilation and electrically grounded lines and equipment.

First Aid Procedures

If inhaled
Move into the fresh air immediately and give oxygen. If not breathing give artificial respiration. Get medical attention immediately.

In case of skin contact
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

In case of eye contact
Check for and remove any contact lenses. Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician. Seek immediate medical attention and continue eye rinse during transport to hospital.

If swallowed
Do NOT induce vomiting unless directed by medical personnel. Never give anything by mouth to an unconscious person. Seek medical attention immediately.

Special Handling and Storage Requirements

Wash hands thoroughly after handling. Minimize the generation and accumulation of dust. Avoid contact with eyes, skin, and clothing. Keep containers tightly closed. Store in a cool, dry and well-ventilated area away from incompatible substances.

Spill and Accident Procedure

Chemical Spill Dial 911 and x59797

Spill – Assess the extent of danger. Help contaminated or injured persons. Evacuate the spill area. Avoid breathing vapors. If possible, confine the spill to a small area using a spill kit or absorbent material. Keep others from entering contaminated area (e.g., use caution tape, barriers, etc.).

Small (<1 L) – If you have training, you may assist in the clean-up effort. Use appropriate personal protective equipment and clean-up material for chemical spilled. Double bag spill waste in clear plastic bags, label and take to the next chemical waste pick-up.

Large (>1 L) – Dial **911** (or 310-825-1491 from cell phone) and EH&S at x59797 for assistance.

Chemical Spill on Body or Clothes – Remove clothing and rinse body thoroughly in emergency shower for at least 15 minutes. Seek medical attention. *Notify supervisor and EH&S at x59797 immediately.*

Chemical Splash Into Eyes – Immediately rinse eyeball and inner surface of eyelid with water from the emergency eyewash station for 15 minutes by forcibly holding the eye open. Seek medical attention. *Notify supervisor and EH&S at x59797 immediately.*

Medical Emergency Dial 911 or x52111

Life Threatening Emergency, After Hours, Weekends And Holidays – Dial **911** (or 310-825-1491 from cell phone) or contact the Ronald Reagan UCLA Medical Center (emergency room) directly at **x52111** (located at 757 Westwood Plaza, enter from Gayley Avenue). *Note: All serious injuries must be reported to EH&S at **x59797** within 8 hours.*

Non-Life Threatening Emergency – Go to the Occupational Health Facility (OHF), **x56771,** CHS room 67-120 (This is on the 6th floor, 7th corridor, room 120. Enter through the School of Dentistry on Tiverton Drive and proceed to the "O" elevator to the 6th floor.)Hours: M - F, 7:30 a.m. to 4:30 p.m. At all other times report to Ronald Regan UCLA Medical Center (emergency room) at **x52111**. *Note: All serious injuries must be reported to EH&S at x59797 within 8 hours.*

Needle stick/puncture exposure (as applicable to chemical handling procedure) – Wash the affected area with antiseptic soap and warm water for 15 minutes. For mucous membrane exposure, flush the affected area for 15 minutes using an eyewash station. Page the needle stick nurse by dialing **231** from a campus phone, enter **93333** when prompted and then enter your extension. Hours: M – F, 8:00 a.m. to 4:00 p.m. At all other times report to Ronald Regan UCLA Medical Center (emergency room) at **x52111**. *Note: All needle stick/puncture exposures must be reported to EH&S at x59797 within 8 hours.*

Decontamination/Waste Disposal Procedure

Using proper personal protective equipment as outlined above, decontaminate equipment and bench tops using soap and water and properly dispose of all chemical and contaminated disposables as hazardous waste following the guidelines below.

General hazardous waste disposal guidelines:

Label Waste

- Affix an on-line hazardous waste tag on all waste containers using the Online Tag Program http://otp.ucop.edu/ as soon as the first drop of waste is added to the container

Store Waste

- Store hazardous waste in closed containers, in secondary containment and in a designated location

- Double-bag dry waste using transparent bags http://map.ais.ucla.edu/go/1002774
- Waste must be under the control of the person generating & disposing of it

Dispose of Waste

- Dispose of regularly generated chemical waste within 90 days
- Call EH&S at x61887 for questions
- Empty Containers
    - Dispose as hazardous waste if it once held extremely hazardous waste (irrespective of the container size) http://ehs.ucla.edu/Pub/ExtremelyHazardousWaste.pdf
    - Consult waste pick-up schedule http://ehs.ucla.edu/pub/HazWaste%20Pickup%20Schedule.pdf

  Prepare for transport to pick-up location
        - Check on-line waste tag
        - Write date of pick-up on the waste tag
        - Use secondary containment

Safety Data Sheet (SDS) Location

Online SDS can be accessed at http://msds.ehs.ucla.edu.

Protocol/Procedure (Add lab specific Protocol/Procedure here)

Use the one on your website, I think that is good enough.

1) Evacuate the reaction vessel (this should have at least two openings) and backfill with an inert gas (nitrogen or argon).

2) Transfer the desired amount of Pd/C into the reaction vessel under an inert atmosphere.

3) Add a small amount of ethyl acetate, dichloromethane, or toluene to the reaction flask, making sure to wash down any Pd/C stuck to the flask walls. All the Pd/C should be submerged at this point.

4) Carefully add methanol by creating a stream down the side of the flask wall.

5) Add the reaction substrate either as a solution or neat.

6) Begin stirring the reaction mixture and then evacuate the flask just until the solvent begins to bubble, then carefully backfill with inert gas.

7) Repeat step 6 twice more.

8) Attach a balloon of hydrogen to your flask with an adapter that allows the balloon to be closed off from the reaction flask.

9) With the hydrogen balloon closed off, evacuate the flask until the solvent begins to bubble, and then open the balloon to the flask.

10) Repeat step 9 twice more.

Workup:

1) Detach the hydrogen balloon from the flask and fill with inert atmosphere.

2) Filter the reaction mixture through a bed of Celite (or similar filter aid)

3) Taking care not to let the filter cake filter to dryness, wash with the desired solvent (typically the same solvent used in the reaction)

4) Disconnect the filter from the receiving flask, and then add several mL of water to the filter.

5) Discard the slurried Pd/C and filter aid in a dedicated waste jar that contains water.

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NOTE

Any deviation from this SOP requires approval from PI.

Documentation of Training (signature of all users is required)

- Prior to conducting any work with Paladium designated personnel must provide training to his/her laboratory personnel specific to the hazards involved in working with this substance, work area decontamination, and emergency procedures.
- The Principal Investigator must provide his/her laboratory personnel with a copy of this SOP and a copy of the SDS provided by the manufacturer.
- The Principal Investigator must ensure that his/her laboratory personnel have attended appropriate laboratory safety training or refresher training within the last one year.

I have read and understand the content of this SOP:

Name	Signature	Date
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