Battery electrolyte

Standard Operating Procedure

Lab: ESB 155

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Section 1: Overview

Type of SOP: ☐Process ☐Hazardous Material ☒**Hazardous Class of Materials** ☐Equipment

Synopsis:

This SOP is written to standardize the operating procedure of secondary battery electrolyte, protect the materials from being contaminated and protect users from potential hazards.

Section 2: Risk Assessment Summary (Hazards and control measures)

Materials:

Material (name, CAS #, other ID)	Hazards
Ethylene carbonate, 96-49-1	Skin, eye contact (irritant), inhalation, ingestion, combustible
Dimethyl carbonate, 616-38-6	Skin, eye contact (irritant), inhalation, ingestion, flammable, toxic
Lithium perchlorate, 7791-03-9	Skin, eye contact (irritant), inhalation, ingestion, flammable, toxic
Lithium, 7439-93-2	Skin, eye contact (irritant), inhalation, ingestion, flammable, toxic

Hazardous Conditions:

Elevated pressure: *can cause explosion ($LiClO_4$).*
High temperature: *can cause fire.*

Technique Hazards:

Expose Lithium to water: *can cause fire or even explosion.*

Personal Protective Equipment

Nitrile gloves, Safety glasses, Lab coat, Close-toe shoes

Engineering Controls

All of the processes should be performed in glove box or in chemical fume hood (except lithium).

Section 3: Procedures

For ethylene carbonate: *To transfer ethylene carbonate,*

i) if the container is unopened, put as-received container in a convection oven at 65 ºC for about 3 hours (could be longer if necessary) until it melts (you should be able to hear liquid flowing when you shake the container carefully).

ii) If ethylene carbonate needs to be transferred from an opened container inside glove box, put the container on hotplate, set the heating temperature to 80 ºC, wait for about 3 hours (could be longer if necessary) until it melts.

Then ethylene carbonate could be transferred to another container inside glove box.

For dimethyl carbonate: *Dimethyl carbonate can be used outside glove box in chemical fume hood if necessary. Dimethyl carbonate can be used to rinse away lithium perchlorate on the testing sample.*

For lithium: *In a specific case, the testing battery cell should be disassembled inside the glove box. Lithium should be disposed of to the waste bottle inside glove box.*

For as-received materials: *All of as-received materials should be open inside glove box.*

Section 4: Waste Disposal/Cleanup

Battery electrolyte and lithium should be disposed of to the waste bottles INSIDE glove box. Dimethyl carbonate waste generated outside glove box should be disposed of according to Division of Research Safety (DRS) ChemTrek requirements. Clean up after experiment. If spills happen, use kimwipes to clean up the spills, then the kimwipes should be disposed of OUTSIDE glove box.

Section 5: Additional Information

Advice:

1. *Use smallest amount of battery electrolyte if possible.*

Checklist:

A checklist can be written in the SOP as a reminder for the steps needed to take in order to perform the procedure. Potential checklist items include:

☒ ***Read (Material) Safety Data Sheets.***

☒ ***Proper fire extinguisher is nearby.***

☐*Another researcher is nearby and knows the hazards present.*

☐*All calculations are done prior to beginning the procedure.*

☒ ***The required glassware is of the proper size to accommodate all steps of the procedure.***

☐*Received necessary immunizations.*