

NATIONAL UNIVERSITY OF SINGAPORE
FACULTY OF SCIENCE

Experiment-Based Risk Assessment Form

Name of Department	Chemistry	Location of Lab	S5-01
Name of Laboratory	General Teaching Lab	Name of PI (lecturer-in-charge)	Thyagarajan Saradha / Jeremiah Chen
Name of LO	Teo Ai Hwee Irene / Irwan Iskandar Bin Roslan	Name of Activity/Experiment	CM2143: Equivalency Testing of Potentiometric Titration vs. Indicator Titration for the Determination of Silver Ion Concentration

Hazard Identification				Risk Evaluation & Control						
No	Description / Details of Steps in Activity	Hazard(s)	Possible Accident(s) or ill Health, and Persons-at-Risk	Existing Risk Control (Mitigation)	Severity	Likelihood (probability)	Risk Level	Additional Risk Control	Person Responsible	By (Date)
1	Part 1: Dispense a 20 mL solution of silver ions sample into 50 mL beaker	1) Breakage of glass apparatus (e.g. beaker).	Injury / cuts from broken glass.	- Visual inspection of glassware before use to ensure that there are no cracks. - Do not use bare hands to pick up any broken pieces. Ensure proper disposal into the designated broken glass container / box.	1	1	1			
		2) Chemical contact from accidental spillage. i) Silver nitrate: Irritant, corrosive, oxidant	- Skin irritation or eye injury upon contact (irritant and corrosive). - Harmful if ingested or inhaled. - May stain surfaces upon contact. - Additional notes for silver nitrate: The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Prolonged exposure may result in skin burns and ulcerations. Over-exposure by inhalation may cause respiratory irritation.	- Proper PPE (gloves, goggles, lab coat) to be worn. - No eating or drinking in the lab. - Minimise the amounts and concentration of chemicals used (<50 mL, <1M). - Clean up any spills immediately. - Keep chemical away from reducing agents.	2	1	2			
2	Set up the 2-electrode cell system as shown in the manual (figure 1). Use a 10 mL burette for the KCl solution.	1) Glass breakage from glass apparatus or silver/silver chloride reference electrode. Ag/AgCl reference electrode (small & fragile) handle with care to prevent breakage.	- Injury from broken glass or broken silver/silver chloride reference glass electrode.	- Visual inspection of glassware and Ag/AgCl reference electrode before use to ensure that there are no cracks. - Do not use bare hands to pick up any broken pieces. Ensure proper disposal into the designated broken glass container / box.	1	1	1			
		2) Chemical contact from accidental spillage. i) Potassium chloride: skin and eye irritant ii) Silver chloride: skin and eye irritant	- Skin irritation or eye injury upon contact (irritant and corrosive). - Harmful if ingested or inhaled.	- Proper PPE (gloves, goggles, lab coat) to be worn. - No eating or drinking in the lab. - Minimise the amounts and concentration of chemicals used (<50 mL, <1M).	1	1	1			
		3) Electric hazard when operating the electrode device.	- Possible electric shock from malfunctioning of equipment, electric socket or wires that are improperly exposed.	- Check that the device is in good working condition and that all cables are properly insulated. - Handle the electric switches only with dry hands. - Keep solutions away from electrical sources.	2	1	2			

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3	Record the volume of KCl added and the corresponding (E) on the meter after each addition of KCl. Note volume of KCl that give the large E change (equivalence point). Notice silver is formed on the Ag wire (WE). Use sandpaper to polish the WE before repeating the above titration with 0.1 mL increments near the equivalence point. Dispose ALL silver chloride waste in waste carboys provided in the sink.	1) Glass breakage from glass apparatus or silver/silver chloride reference electrode. Ag/AgCl reference electrode (small & fragile) handle with care to prevent breakage.	- Injury from broken glass or broken silver/silver chloride reference glass electrode.	- Visual inspection of glassware and Ag/AgCl reference electrode before use to ensure that there are no cracks. - Do not use bare hands to pick up any broken pieces. Ensure proper disposal into the designated broken glass container / box.	1	1	1			
		2) Chemical contact from accidental spillage. i) Potassium chloride: skin and eye irritant ii) Silver chloride: skin and eye irritant	- Skin irritation or eye injury upon contact (irritant and corrosive). - Harmful if ingested or inhaled.	- Proper PPE (gloves, goggles, lab coat) to be worn. - No eating or drinking in the lab. - Minimise the amounts and concentration of chemicals used (<50 mL, <1M).	1	1	1			
		3) Electric hazard when operating the electrode device.	- Possible electric shock from malfunctioning of equipment, electric socket or wires that are improperly exposed.	- Check that the device is in good working condition and that all cables are properly insulated. - Handle the electric switches only with dry hands. - Keep solutions away from electrical sources.	2	1	2			
4	Part 2: Dispense 20 mL silver ions sample into a 150 mL conical flask. Add 3-5 drops of ferric indicator. Titrate against 0.12 M KSCN in a 25ml burette. Note the volume of KSCN that gave a colour change (endpoint). Perform 2 accurate titrations with 0.1 mL increment near the endpoint. Dispose silver thiocyanate waste in carboys provided in the sink.	1) Glass breakage from glass apparatus (e.g. beaker, conical flask, burette).	- Injury from broken glass or broken silver/silver chloride reference glass electrode.	- Visual inspection of glassware and Ag/AgCl reference electrode before use to ensure that there are no cracks. - Do not use bare hands to pick up any broken pieces. Ensure proper disposal into the designated broken glass container / box.	1	1	1			
		2) Chemical contact from accidental spillage. i) Ferric ammonium sulphate indicator in nitric acid medium: skin irritant, eye irritant ii) Potassium thiocyanate: skin irritant and permeator, eye irritant iii) Silver thiocyanate: skin irritant, eye irritant	- Skin irritation or eye injury upon contact (irritant and corrosive). - Harmful if ingested or inhaled.	- Proper PPE (gloves, goggles, lab coat) to be worn. - No eating or drinking in the lab. - Minimise the amounts and concentration of chemicals used (<50 mL, <1M).	1	1	1			

Conducted By

Name Thyagarajan Saradha / Jeremiah Chen

Signature _____

Date _____




22/7/2022

Approved By

Name Assoc Prof Yeo Boon Siang, Jason

Signature _____

Approval date _____



22/7/2022

Next Revision date
(Maximum 3 years)

22/7/2025