Laboratory Incident & Near-Miss Report

Environmental Health & Safety (EHS) Department

1 General Incident Information

This section classifies the event and identifies the reporting parties, key personnel involved, and the specific location and time of the occurrence. Please ensure all contact details are complete for follow-up investigations.

Classification & Metadata

Incident ID:	VAL-INC-2026-0142	**Report Date:**	August 3, 2026
Classification:	☒ Chemical Exposure ☐ Physical Injury ☐ Near-Miss (No Injury)	**Severity Level:**	MODERATE
		Incident Type:	☒ Incident ☐ Near-Miss
Facility Location:	Vertex Bldg B, Lab 304B	**Chemicals Involved:**	Dichloromethane, Acetyl Chloride

Personnel & Reporting Details

Reporter Name:	Marcus Vance	**Job Title:**	Chemical Lab Technician II
Department:	Organic Synthesis & Catalysis	**Email / Ext:**	m.vance@vertex.com / Ext. 4812
Injured/Exposed:	Dr. Sarah Jenkins	**Job Title:**	Senior Research Chemist
Supervisor Name:	Dr. Robert Chen	**Job Title:**	Principal Investigator / Lab Manager

Timeline of Occurrence

Date of Event:	August 3, 2026	**Time of Event:**	14:15 (2:15 PM)
Shift Type:	Regular Day Shift	**Specific Experiment:**	Friedel-Crafts Acylation
Normal Ops Active?	☒ Yes ☐ No	**Witnesses:**	Elena Rostova (Postdoctoral Fellow)

2 Description of the Incident & Sequence of Events

This section provides a detailed chronological account of the incident. It should describe the work being performed, the sequence of events leading to the failure, the moment of occurrence, and the immediate follow-up.

2.1 Narrative Description

On August 3, 2026, at approximately 14:00, Dr. Sarah Jenkins (Senior Research Chemist) was performing a standard Friedel-Crafts acylation of anisole using acetyl chloride and dichloromethane (DCM) as the solvent. The reaction was conducted in a 250 mL three-neck round-bottom flask equipped with a reflux condenser, addition funnel, and a magnetic stirrer, placed inside a fume hood (Hood #12, Building B).

At 14:10, Marcus Vance (Lab Technician II) observed that the addition of acetyl chloride from the dropping funnel had been completed, and Dr. Jenkins activated the heating mantle to bring the mixture to a mild reflux.

At 14:15, Dr. Jenkins noticed that the reaction mixture was boiling more vigorously than expected and that a yellowish residue was accumulating in the lower section of the reflux condenser. She reached into the fume hood to adjust the addition funnel valve. At that moment, a sudden pressure buildup within the closed system caused a glass joint connecting the addition funnel to pop open, releasing a small spray of the pressurized liquid mixture (acetyl chloride and DCM).

The spray hit the glass sash of the fume hood, which was partially raised (above the safe operating line, at approximately 18 inches). However, a portion of the spray escaped the hood opening, making contact with Dr. Jenkins's face, neck, and right forearm.

2.2 Sequence of Events Timeline

Below is a chronologically ordered breakdown of the events:

1. **13:30** – Reaction apparatus assembled by Dr. Jenkins. Standard checks on water flow in the condenser and magnetic stirring performed. Acetyl chloride addition began.
2. **14:10** – Addition completed. Heating mantle set to 45 °C. Fume hood sash raised to approximately 18 inches to allow adjustment of the thermo-controller.
3. **14:13** – Blocking of the venting pathway occurred due to crystallization of a byproduct in the gas outlet, unrecognized by the operator.
4. **14:15** – Overpressure resulted in the glass joint failure. Pressurized liquid sprayed outwards. Dr. Jenkins received skin exposure.
5. **14:16** – Alarm raised by Marcus Vance. Dr. Jenkins guided immediately to the emergency safety shower and eyewash station.

2.3 Equipment and Materials Involved

Equipment Type	Model/ID	Chemical Name	CAS Number
Fume Hood	Thermo-Flo / HF-12	Acetyl Chloride	75-36-5
Glassware	Pyrex 250 mL RBF	Dichloromethane (DCM)	75-09-2
Heating Mantle	Electrothermal / EM-250	Anisole	100-66-3

3 Injury, Illness, and Exposure Assessment

This section documents the clinical and physical assessment of the affected employee, the exposure pathways, the specific substances involved, and the medical response actions taken.

3.1 Affected Individual Profile

Name:	Dr. Sarah Jenkins	**Employee ID:**	VEX-89021
Job Role:	Senior Research Chemist	**Affiliation:**	Vertex Research Division
Medical Status:	Evaluated and Released	**Lost Workdays:**	0 Days

3.2 Exposure Details

- **Type of Exposure:** Chemical splash leading to direct skin contact.
- **Anatomical Location:** Right lateral neck (small splash) and dorsal aspect of the right wrist/forearm (approx. 3 cm area of contact).
- **Inhalation or Ingestion:** None reported. Eyewash was used as a precaution, but safety glasses successfully prevented ocular exposure.
- **Physical Symptoms:** Immediate burning sensation, followed by localized erythema (redness) and mild swelling.

3.3 Personal Protective Equipment (PPE) Assessment

An evaluation of the PPE worn by Dr. Jenkins during the incident was conducted to identify any failures or protection gaps:

PPE Item	Worn?	Performance and Protection Gaps Identified
Safety Glasses	☒ Yes	Prevented ocular contact. Splashes were visible on the outer lens surface.
Standard Lab Coat	☒ Yes	Absorbed a portion of the splash. However, the sleeves rode up when reaching, leaving the wrist exposed.
Nitrile Gloves (4 mil)	☒ Yes	Protected hands. Dichloromethane/acetyl chloride penetrated the glove material rapidly, but gloves were removed quickly.
Face Shield	☐ No	Not worn; not mandated by the current SOP for this chemical volume.
Fume Hood Sash	☒ Yes	Raised to 18 inches (above the 12-inch maximum safe operational height indicator).

3.4 Medical Response & First Aid Treatment

Following the splash, the following response protocol was executed immediately:

a. **Immediate Wash:** Marcus Vance assisted Dr. Jenkins to the emergency safety shower. The affected neck and arm areas were flushed with cold water for a continuous 15 minutes.

b. **Contaminated Clothing Removal:** Dr. Jenkins removed her contaminated lab coat and outer shirt while in the shower area to prevent further absorption.

c. **Emergency Transport:** Dr. Robert Chen (Lab Manager) escorted Dr. Jenkins to the Vertex Occupational Health Center (Building C).

d. **Clinical Care:** Occupational Health Physician Dr. Alan Turing examined the affected areas. He diagnosed first-degree chemical burns from acetyl chloride hydrolysis (releasing hydrochloric acid). The areas were cleaned, treated with a topical soothing ointment, and bandaged.

e. **Prognosis:** Dr. Jenkins was cleared to return to light duties with no lost time. A follow-up check was scheduled for 48 hours post-incident.

4 Immediate Actions and Spill Containment

This section documents the immediate actions taken to control the hazard, secure the area, neutralize the chemical spill, and ensure the safety of other lab personnel.

4.1 Emergency Containment & Spill Response

Directly after securing the safety of the exposed personnel, the remaining lab staff acted to contain the hazard:

- **Power Shutdown:** Marcus Vance immediately switched off the power source to the heating mantle and magnetic stirrer for Hood #12 to prevent further temperature rises or thermal runaway.
- **Spill Neutralization:** Since the splash involved acetyl chloride (which reacts violently with water to release hydrochloric acid gas), using water for spill cleanup was strictly avoided. Vance used the spill kit located in Lab 304B to apply an amphoteric neutralizing absorbent (brand: Spill-Sorb) over the spilled liquid inside the fume hood.
- **Ventilation Boost:** The fume hood exhaust was set to "Emergency Purge" mode to maximize air flow and draw out any hydrochloric acid (HCl) vapors generated by hydrolysis of the acetyl chloride with ambient humidity.
- **Area Isolation:** The laboratory room 304B was evacuated of all other research students and staff. A temporary warning sign reading **"DO NOT ENTER – Chemical Spill Containment in Progress"** was posted on the main door.

4.2 EHS Department Notification

The EHS hotline was called by Dr. Robert Chen at 14:22. The timeline of EHS response is outlined below:

Timestamp	Responder	Action Performed
14:22	Dr. Robert Chen	Contacted EHS Emergency Hotline (Ext. 9911).
14:30	EHS Officer Lisa Patel	Arrived at Lab 304B with air monitoring equipment.
14:35	EHS Team	Measured volatile organic compounds (VOCs) and HCl levels.
14:45	EHS Team	Cleared the hood of chemical waste and declared the spill neutralized.
15:15	EHS Director	Authorized re-entry to Lab 304B, excluding Fume Hood #12 which remained locked out.

4.3 Waste Disposal and Site Remediation

The neutralized spill residue and contaminated absorbent were collected in a heavy-duty polypropylene container, labeled as hazardous chemical waste, and transferred to the Vertex hazardous waste storage bunker. The volume of waste collected was approximately 1.5 L of solid-absorbent mixture. Fume Hood #12 was locked and tagged out of service (**LOTO ID: LOTO-2026-0803**) pending a full inspection of the ventilation sashes and mechanical exhaust system.

5 Incident Investigation & Root Cause Analysis

This section outlines the findings of the joint investigation conducted by the EHS Committee and the Organic Synthesis Lab Management. It identifies the root causes and lists the Corrective and Preventive Actions (CAPA) to prevent recurrence.

5.1 Investigation Findings

A physical inspection of the reaction apparatus and interview with the involved personnel revealed the following:

1. **Condenser Blockage:** The glass reflux condenser gas outlet (which should vent to the atmosphere or a bubbler) was completely blocked by a white crystalline substance. Chemical analysis confirmed this was a mixture of acetyl chloride hydrolysis products and recrystallized substrate, which accumulated due to cooling parameters and poor vent flushing.
2. **Pressure Buildup:** Since the reaction was heated in a closed system with a blocked vent, volatile dichloromethane ($bp \approx 40\,^{\circ}\mathrm{C}$) and acetyl chloride vapors built up pressure. The ground-glass joints were clamped with standard plastic Keck clips, which held until the pressure exceeded their mechanical resistance, resulting in a sudden ejection of the glass joint.
3. **Fume Hood sash height:** The fume hood sash was positioned at 18 inches. While the hood's face velocity was within the safety range (105 ± 5 fpm), the high sash height allowed the pressurized spray to escape the physical containment zone and strike the operator.

5.2 Root Cause Analysis (5-Whys Method)

To determine the systemic failures, the investigation team applied the 5-Whys methodology:

Why 1? Why did the chemical splash occur? *Because a ground-glass joint on the reaction flask popped open, spraying liquid mixture out of the flask.*

Why 2? Why did the joint pop open? *Because pressure built up inside the round-bottom flask during heating.*

Why 3? Why did pressure build up? *Because the venting pathway on the reflux condenser was blocked by solid byproducts.*

Why 4? Why was the blockage not identified before heating? *Because the Standard Operating Procedure (SOP-ORG-042) did not require verification of vent path clearance before heating reactions.*

Why 5? Why was the SOP lacking this requirement? *Because the risk assessment for acylation reactions had not been updated to reflect the hazards of sublimation/byproduct blockage in venting ports (Root Cause).*

5.3 Corrective and Preventive Actions (CAPA)

The following actions have been defined and assigned to prevent recurrence of this incident.

ID	Action Item Description	Assigned To	Due Date	Status
CAPA-1	Revise SOP-ORG-042 to mandate venting line checks.	Elena Rostova	Aug 15, 2026	COMPLETED
CAPA-2	Procure and install pressure-relief valves/adapters.	Marcus Vance	Aug 20, 2026	IN PROGRESS
CAPA-3	Retrain all synthesis group members on sash limits and PPE.	Dr. Robert Chen	Aug 30, 2026	SCHEDULED
CAPA-4	Recalibrate fume hood sash height sensor alarms.	EHS Department	Sep 05, 2026	SCHEDULED

5.4 Standard Safety References

All incident investigations and corrective action plans are conducted in accordance with national safety regulations and laboratory best practices [1, 2, 3].

[1] National Research Council. *Prudent Practices in the Laboratory: Handling and Management of Chemical Hazards, Updated Version*. Washington, DC: National Academies Press, 2011. ISBN: 978-0-309-13864-2. DOI: 10.17226/12654.

[2] Occupational Safety and Health Administration. *Laboratory Safety Guidance*. Tech. rep. OSHA 3404-11F. U.S. Department of Labor, 2020. URL: https://www.osha.gov/sites/default/files/publications/OSHA3404laboratory-safety-guidance.pdf.

[3] American Chemical Society Joint Board-Council Committee on Chemical Safety. *Guidelines for Chemical Laboratory Safety in Academic Institutions*. Washington, DC: American Chemical Society, 2016. URL: https://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/publications/acs-safety-guidelines-academic.pdf.

6 Sign-Offs and Authorizations

By signing below, the affected employee, lab supervisor, and EHS representative acknowledge that they have reviewed the incident details, participated in or reviewed the investigation findings, and agree to implement the corrective and preventive actions outlined in this report.

Dr. Sarah Jenkins
Affected Employee / Research Chemist
Date: _____

Dr. Robert Chen
Laboratory Manager / Principal Investigator
Date: _____

Lisa Patel
EHS Safety Inspector
Date: _____

Dr. Robert Chen (Acting EHS)
Environmental Health & Safety Director
Date: _____

EHS Department Final Clearance:

This incident report will be archived in the Vertex Safety Management System (VAL-SMS) under record ID `VAL-INC-2026-0142`. Follow-up audits on CAPA implementation will be conducted at 30, 60, and 90-day intervals.