

Curie's Catalyst – Chemistry Trial

Trial Introduction

Curie's Catalyst places delegates in the role of chemists tasked with analyzing a failed laboratory experiment that led to an emergency shutdown. Using incomplete data, chemical reasoning, and experimental verification, teams must reconstruct what was meant to happen, what went wrong, and validate their conclusions through qualitative analysis.

Across the two rounds, delegates move from theoretical deduction to experimental verification. Round 1 tests analytical reasoning using a scattered lab report, while Round 2 tests experimental skills by matching deductions to chemical behaviour.

During a routine synthesis experiment in the BNA Laboratory, an unexpected reaction occurred. Temperature spiked beyond limits considered safe, unpredictable pH fluctuations occurred, unusual fumes formed, and an unanticipated product was made. The lab was shut down immediately to ensure safety.

Upon investigation, all that was found left behind in the lab was:

1. A scattered lab report.
2. Four residue samples: A, B, C & D.

The trial has **two integrated rounds**:

Round 1: Virtual deduction of reaction & anomaly

Round 2: Physical qualitative analysis

ROUND 1: Critical Variables (Virtual)

Round 1 focuses on chemical deduction. Delegates are given the incomplete laboratory report and must make deductions based on their ability to interpret imperfect data, a key skill in chemical research.

Step-By-Step Progression

- i. Each delegation will receive a PDF of the digital lab report containing: temperature-time & pH-time graphs, IR spectra of samples, partially redacted experiment notes, short riddles and cryptic hints.
- ii. You must analyse this report, and piece together the following: the intended reaction complete with the balanced chemical equation, the anomaly/error, identity of the unintended product, and the corrected experimental steps.
- iii. You will submit your analysis and deductions in the form of a one-page deduction sheet formatted as PDF, through a submission form link which will be provided to you. Submissions must be made within the given time window.

The following will be looked for while judging the submissions:

1. Logical interpretation of data
2. Chemical accuracy
3. Clear linkage between evidence and conclusion

Logistics/Required Tools

Delegates will require internet access & a laptop/tablet. They will be provided the digital lab report & the submission form link.

Elimination

Only the top 10 scoring teams will qualify for Round 2, all others will be eliminated. In order to qualify, a team must answer each submission point correctly as Round 2 will be based on their deductions.

ROUND 2: Aftermath (Physical)

Time Allotted: 1 hour

Delegate Cap: 1 delegate

Top 10 scoring teams from Round 1 will be invited to the Chemistry Lab to experimentally confirm their Round 1 deductions via physical qualitative analysis on the 4 residue samples: **A,B,C & D**, and simply must state which letter corresponds to the reactant, the catalyst, the unintended/anomalous product, and the intended product through a Google Form.

Round progression

1. Each delegation will be assigned **one lab station**, complete with the materials & equipment included in the logistics list, as well as a copy of the **qualitative analysis reference sheet** from which they must cross check their observations to draw a conclusion. The reference sheet will contain all permitted tests, their step by step procedures, and the expected observations similar to AS-Level Practicals. As such, no prior memorisation is required, however delegates will be provided with some reference material helpful to go through beforehand. Delegates are expected to accurately perform the tests, interpret observations and match them to relevant conclusions. To maintain the challenging aspect of the round, extra tests not required for the round will be added so delegates use their judgement instead of following a fixed sequence.
2. Teams will perform the following tests: pH tests, water solubility test, silver nitrate halide tests, acid-base neutralisation, as well as a flame test.
3. Using observations, teams match samples to deductions in Round 1.
4. For the final submission, a Google form will be sent to each team where they must match each sample to its correct identity. .

Evaluation (General Criteria)

- i. Correct execution of tests
- ii. Logical matching of samples to deductions
- iii. Consistency with Round 1 deductions

Resources/Preparation

Note: For Round 2, delegates are NOT expected to memorise tests/expected observations, as they will be provided a complete reference sheet. The resources serve to familiarise them with the concepts. For Round 1, an understanding of O-level or AS-Level Organic Chemistry is expected.

Round 1 Resources	Interpreting IR Spectra Catalysts Organic Chemistry Overview
Round 2 Resources	Performing Flame Tests Performing Halide Tests Acid-Base Neutralisations Solubility Test