FTS

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2025 Chemical Unknown (Powder) Proficiency Test
FTS-25-CHEM1 Summary Report

The Submission Deadline for this test was July 25, 2025

The test was manufactured by FTS at the FTS Laboratory Facility (127 W. Grand River Avenue, Williamston, MI 48895) and all activities were coordinated by Rebecca Smith (rsmith@forsci.com), Proficiency Test Program Manager. Ms. Smith is also authorizing the release of this report. This is the summary report issued on 8/12/25. FTS considers all reports confidential and does not release information regarding participant's results without authorization from that participant.

Summary

Test results were received in 47 of 49 tests distributed (96% response rate). Of the 47 respondents:

45 of 47 (96%) reported that Item 1 contained Arsenic (III) oxide/Arsenic/Arsenolite.
1 of 47 (2%) reported that Item 1 did not contain any foreign chemical components that could have been used to adulterate the powder.
1 of 47 (2%) reported that Item 1 contained "Abnormally elevated volatile esters suggesting economic Adulterants / Emulsifier/Fat Extenders".

Manufacturer's Information

All items for the test were prepared at different times in separate lab areas.

Item 1 was produced by weighing ~0.5g Nestle® Original Powdered Coffee Creamer (Lot# 44287622, UPC 5000030302) using a calibrated Mettler PB1502 balance and was transferred into a clear plastic vial. ~100mg Arsenic (III) oxide (Strem Chemicals, Lot# A7799079 CAS# 1327-53-3) was added to the same vial using a double-sided micro scoop. The vial was labeled and manually shaken, vigorously, for 10 minutes. The vial was heatsealed in an AMPAC envelope, sealed and labeled per FTS guidelines.

Item 2 was produced by filling a clear plastic vial halfway full with Nestle® Original Powdered Coffee Creamer (Lot# 44287622, UPC 5000030302). The vial was labeled and further heatsealed in an AMPAC envelope, sealed and labeled per FTS guidelines.

The two items with matching UTICs were packaged in a 6" x 9" manila envelope, sealed and labeled per FTS guidelines.

Assigned Value

Proficiency tests under ISO 17043:2023 are assessed via comparison of the participant result to the assigned value of a proficiency test item or items. For quantitative tests, FTS determines the assigned value based on statistical methods described in ISO 13528:2022. For qualitative tests, the FTS study coordinator determines the assigned value based on a number of factors, including product source

information, internal and/or external pre-distribution laboratory analysis, and consensus of responses (consensus value).

Quality systems and laboratory reporting guidelines vary greatly from laboratory to laboratory, therefore participating laboratories and their accrediting bodies are responsible for the assessment of whether a reported result is an outlying result.

For this proficiency test, the following assigned values are based on source information which was then confirmed by laboratory analysis:

Item 1: Arsenic (III) oxide

Please examine the questioned items in order to identify any adulterant(s) present.

Items Submitted

Item 1: Sample of questioned Coffee mate® Original powdered coffee creamer.
Item 2: Negative control sample of Coffee mate® Original powdered coffee creamer.

3) Indicate all methods used for analysis (select all that apply):

A) ☐ Macro/Microscopic Examinations

B) ☐ Chemical Spot Tests

C) ☐ GC/FID/TEA/ECD

D) ☐ GC/MS

E) ☐ IC

F) ☐ SEM/EDS

G) ☐ Thin Layer Chromatography

H) ☐ PLM

I) ☐ HPLC

J) ☐ IR/FTIR Analysis

K) ☐ ICP-MS

L) ☐ CE

M) ☐ XRD

N) ☐ XRF

O) ☐ HPLC/MS

P) ☐ DART TOF-MS

Q) ☐ UV Fluorescence

R) ☐ pH

S) ☐ Raman Spectroscopy

T) ☐ ICP-AES

U) ☐ Commercial Test Strips

UTIC	Webcode	Indicate all methods used for analysis (select all that apply)
p2025501	W182	Macro/Microscopic Examinations; IR/FTIR Analysis
p2025502	W119	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis
p2025503	W061	Macro/Microscopic Examinations; GC/MS; IC; SEM/EDS; PLM; IR/FTIR Analysis; UV Fluorescence; pH
p2025504	W061	ICP-AES; Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRF
p2025505	W061	GC/MS; IC; SEM/EDS; IR/FTIR Analysis; Macro/Microscopic Examinations
p2025506	W061	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis
p2025507	W061	GC/FID/TEA/ECD; GC/MS
p2025508	W009	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD
p2025509	W028	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; UV Fluorescence
p2025510	W144	GC/MS; SEM/EDS; Raman Spectroscopy
p2025511	W006	XRD; Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis
p2025512	W006	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRD; pH
p2025513	W006	Macro/Microscopic Examinations; GC/MS; SEM/EDS; IR/FTIR Analysis; XRD
p2025514	W006	Macro/Microscopic Examinations; IR/FTIR Analysis; SEM/EDS; XRD; DART TOF-MS
p2025515	W128	GC/MS; ICP-MS; XRD; XRF
p2025516	W261	Raman Spectroscopy; IR/FTIR Analysis; XRD; XRF
p2025517	W261	XRF; SEM/EDS; XRD
p2025518	W153	ICP-MS; HPLC/MS; GC/MS; IR/FTIR Analysis
p2025519	W244	Macro/Microscopic Examinations; Chemical Spot Tests; GC/MS
p2025520	W031	Macro/Microscopic Examinations; SEM/EDS; PLM
p2025521	W002	Macro/Microscopic Examinations; SEM/EDS; IR/FTIR Analysis; XRF
p2025522	W002	Macro/Microscopic Examinations; SEM/EDS; PLM; IR/FTIR Analysis; XRF
p2025523	W158	pH; Chemical Spot Tests; GC/MS; XRF
p2025524	W158	pH; GC/MS; XRF
p2025525	W158	GC/MS; XRF
p2025526	W158	GC/MS; XRF

UTIC	Webcode	Indicate all methods used for analysis (select all that apply)
p2025527	W158	Macro/Microscopic Examinations; Chemical Spot Tests; GC/MS; IR/FTIR Analysis; XRF
p2025528	W158	GC/MS; IR/FTIR Analysis; XRF; pH
p2025529	W003	Macro/Microscopic Examinations; SEM/EDS; GC/MS; PLM; IR/FTIR Analysis
p2025530	W003	Macro/Microscopic Examinations; GC/MS; SEM/EDS; IR/FTIR Analysis
p2025531	W027	GC/MS; SEM/EDS; IR/FTIR Analysis
p2025532	W053	GC/MS; XRF
p2025533	W150	IR/FTIR Analysis; XRD; Raman Spectroscopy; SEM/EDS; Macro/Microscopic Examinations
p2025534	W025	Macro/Microscopic Examinations; GC/MS; SEM/EDS; IR/FTIR Analysis
p2025535	W013	PLM; IR/FTIR Analysis; XRF; UV Fluorescence; Macro/Microscopic Examinations; pH
p2025537	W085	Macro/Microscopic Examinations; GC/MS; XRF
p2025538	W051	Macro/Microscopic Examinations; GC/MS; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy
p2025539	W051	Macro/Microscopic Examinations; IR/FTIR Analysis; Raman Spectroscopy; GC/MS; SEM/EDS
p2025540	W051	Macro/Microscopic Examinations; GC/MS; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy
p2025541	W051	Macro/Microscopic Examinations; GC/MS; SEM/EDS; IR/FTIR Analysis; Raman Spectroscopy
p2025543	W004	Macro/Microscopic Examinations; SEM/EDS; XRD
p2025544	W007	GC/MS; IR/FTIR Analysis; XRF
p2025545	W007	IR/FTIR Analysis; Macro/Microscopic Examinations; GC/MS; SEM/EDS
p2025546	W007	XRF; Macro/Microscopic Examinations; IR/FTIR Analysis; GC/MS
p2025547	W007	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRF
p2025548	W007	Macro/Microscopic Examinations; GC/MS; IR/FTIR Analysis; XRF; pH
p2025549	W007	pH; GC/MS; IR/FTIR Analysis; XRF

4) Other methods used (if none, please enter "N/A"):

UTIC	Webcode	Other methods used
p2025504	W061	Alternative Light Source, Solubility
p2025510	W144	The QuEChERS extraction methodology was used.
p2025514	W006	Weight determination
p2025524	W158	Flame Photometry
p2025526	W158	Weight Determination

UTIC	Webcode	Other methods used
p2025527	W158	Under the Macro/Microscopic Examinations heading, I am including Microscopic segmentation. Under the Chemical Spot Tests heading, I am including solubility testing. Published literature search.
p2025528	W158	Flame Emission Spectrophotometry
p2025535	W013	solubility

5) What foreign chemical components, if any, were identified in Item 1 that could have been used to adulterate the powder? If no foreign materials are identified, please write "N/A".

UTIC	Webcode	What foreign chemical components, if any, were identified in Item 1 that could have been used to adulterate the powder?
p2025501	W182	arsenic (III) oxide
p2025502	W119	An arsenic oxide compound
p2025503	W061	Arsenic, possibly arsenic trioxide, however the species of oxidation could not be confirmed.
p2025504	W061	Arsenic
p2025505	W061	Contaminated with an arsensic oxide, tentatively identified as arsenic trioxide. Due to a lack of standards, it was not possible to confirm the exact oxidation state.
p2025506	W061	Arsenic trioxide
p2025507	W061	N/A
p2025508	W009	Arsenic trioxide (As_2O_3) identified.
p2025509	W028	Arsenic with indications that it is in the form of Arsenic Trioxide
p2025510	W144	The presence of arsenic (III) oxide was identified in the powdered solid received inside the container.
p2025511	W006	Arsenic trioxide
p2025512	W006	Arsenic (III) oxide
p2025513	W006	Arsenic trioxide
p2025514	W006	Arsenic trioxide
p2025515	W128	Arsenolite
p2025516	W261	Arsenic and Starch
p2025517	W261	ARSENIC
p2025518	W153	Arsenic under any chemical forms.

UTIC	Webcode	What foreign chemical components, if any, were identified in Item 1 that could have been used to adulterate the powder?
p2025519	W244	Abnormally elevated volatile esters suggesting economic Adulterants / Emulsifier/Fat Extenders: Dodecanoic acid methyl ester, Glycerol trilaurate Use of undeclared or excessive triglycerides to mimic creamy mouthfeel or stabilize the fat system
p2025520	W031	arsenic
p2025521	W002	Arsenic. Elementally consistent with Arsenic Trioxide or any other compound containing arsenic and oxygen.
p2025522	W002	Arsenic
p2025523	W158	Arsenic was detected in Item 1.
p2025524	W158	Arsenic
p2025525	W158	Arsenic
p2025526	W158	Arsenic
p2025527	W158	Arsenic trioxide AKA diarsenic trioxide
p2025528	W158	Arsenic
p2025529	W003	Arsenic
p2025530	W003	Item 1 was found to contain arsenic.
p2025531	W027	Arsenic, form undetermined.
p2025532	W053	Arsenic trioxide (As_4O_6)
p2025533	W150	Arsenic(III) oxide
p2025534	W025	Arsenic (III) oxide
p2025535	W013	arsenic
p2025537	W085	Arsenic
p2025538	W051	Arsenic Trioxide
p2025539	W051	Arsenic trioxide
p2025540	W051	Arsenic trioxide
p2025541	W051	Arsenic trioxide
p2025543	W004	arsenic trioxide
p2025544	W007	Arsenic by XRF only
p2025545	W007	Arsenic was identified in Item 1 in a form consistent with arsenic trioxide.
p2025546	W007	Arsenic trioxide
p2025547	W007	Arsenic was identified in item 1. The material is consistent with arsenic trioxide. No arsenic was detected in item 2, which was evaluated as a comparison sample.
p2025548	W007	Arsenic
p2025549	W007	Item 1 was found to contain arsenic. One likely possibility is arsenic (III) oxide, as this substance and the material from item 1 produced consistent results during testing.

6) How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court). In order to maintain confidentiality, please refrain from including identifying information specific to your laboratory.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025501	W182	The questioned Coffee mate creamer from Item #1 showed the presence of arsenic (III) oxide. No arsenic was detected in the control sample of creamer from Item #2.
p2025502	W119	Items 1A and 1B were examined stereoscopically and instrumentally by Fourier Transform Infrared Spectroscopy and Scanning Electron Microscopy Energy Dispersive Spectrometry. Spherical particles were observed in Item 1A and were consistent with an arsenic oxide compound. Arsenic compounds are considered poisonous. These particles were not observed in Item 1B.
p2025503	W061	Item 1 was found to contain particles of a smooth, circular off-white substance, foreign to the coffee creamer. These particles were determined to contain arsenic.
p2025504	W061	I am of the opinion that arsenic was found in the questioned sample of coffee mate in item 1.
p2025505	W061	1.01 was adulterated with an arsenic oxide based compound, tentatively identified as arsenic trioxide. As no standard was available it was not possible to confirm the exact type of arsenic oxide material present.
p2025506	W061	Item 1 - Sample of questioned coffee creamer - Plastic vial containing a quantity of a white solid. The white solid was found to consist of opaue white particles of varied shape and a small quantity of translucent white spherical particles. The translucent white spherical particles were identified as arsenic trioxide. Item 2 - Negatve control sample of coffee creamer - Plastic vial containing a quantity of a white solid. The white solid was found to consist of opaque white particles of varied shape. No translucent white spherical particles were detected in this item.
p2025507	W061	Item 1 Common Drugs or Poisons - Not detected Item 2 Common Drugs or Poisons - Not detected

<table>
<tr><th>UTIC</th><th>Webcode</th><th>How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).</th></tr>
<tr><td>p2025508</td><td>W009</td><td>
PURPOSE
Item 1 was examined to determine whether any foreign material could be identified.

TESTING SUMMARY
<table>
<tr><th>Item</th><th>Description</th><th>Results</th></tr>
<tr><td>1</td><td>Questioned Coffee mate® Original powder.</td><td>Arsenic trioxide identified.</td></tr>
<tr><td>2</td><td>Negative control sample of Coffee mate® Original powder.</td><td>This item was submitted for comparison purposes.
No arsenic trioxide identified.</td></tr>
</table>
NOTES
Arsenic trioxide is a toxic, white crystalline substance with multiple industrial uses, such as in pesticides, wood preservation and the production of glass and ceramics. Despite its toxicity, it is also used in medicine to treat certain types of cancer.
</td></tr>
</table>

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025509	W028	**Results/Opinions and Interpretations:** Item 1, a sample of coffee creamer, was submitted to determine if the sample had been adulterated. Item 2 is a known sample of unadulterated coffee creamer for comparison. Items 1 and 2 were analyzed visually, by stereomicroscopy, fluorescence microscopy, polarized light microscopy, Fourier Transform infrared microspectroscopy, and by scanning electron microscopy with energy dispersive spectrometry. Analysis of Item 1 identified the presence of arsenic, indicating arsenic trioxide. Analysis of Item 2 was negative for the presence of arsenic. **Remarks:** The following scales provide context to the levels of opinions reached in the report. **Identification:** The analytical data provides reliable information to specify the chemical identity of a sample. This level of characterization requires the use of two analytical techniques. The identity of a material will be confirmed by comparison to a reference or known material, if available. **Classification/Consistent With:** The analytical data does not support an identification but does provide reliable information to include the substance within a class of materials. This level of characterization requires the use of two analytical techniques and comparison to a reference data (e.g. from scientific literature, publications, or instrument library) or one analytical technique with comparison to a known reference material. **Indication:** The analytical data suggests a particular type of material but does not support a classification or identification. This level of characterization requires the use of one analytical techniques and comparison to reference data (e.g. from scientific literature, publications, or instrument library). **Inconclusive:** No conclusion could be reached. Justification required. **Negative:** No material of interest was observed.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025510	W144	The presence of arsenic (III) oxide was identified in the powdered solid received inside the container identified as FTS-25-CHEM1 Item 1 p2025510.
p2025511	W006	Arsenic trioxide was identified within Item 1. Arsenic trioxide was not identified within the Item 2 control sample.
p2025512	W006	Arsenic (III) oxide was identified within Item 1. Item 1 was examined by visual examinations, pH determination, infrared spectroscopy, scanning electron microscopy/energy dispersive x-ray spectrometry, and x-ray diffraction analysis.
p2025513	W006	The Item 1 powder was compared against the Item 2 control. Arsensic trioxide was identified within the Item 1 powder which was not identified in the Item 2 control. Items 1 and 2 were analyzed by: visual and microscopic examination, Fourier transform infrared spectroscopy, scanning electron microscopy / energy dispersive x-ray spectrometry, x-ray diffractometry, and gas chromatography / mass spectrometry.
p2025514	W006	Arsenic trioxide was identified within the Item 1 powder. Items 1 and 2 were examined by visual examinations, weight determination, direct analysis in real time/time-of-flight mass spectrometry, infrared spectroscopy, scanning electron microscopy with energy dispersive x-ray spectroscopy, and x-ray diffraction analysis.
p2025515	W128	We could identify Arsenolite in the Coffee Mate Original powdered coffee creamer.
p2025516	W261	As a result of my examination, I determined that: 1 “Item 1” and “Item 2” are coffee creamers. 2 The chemical composition of “Item 1” and “Item 2” is different. 3 The adulterants present in “Item 1” are arsenic (As) and starch
p2025517	W261	As a result of my examination, I determined that the exhibit described as Item 1 contained arsenic (As) as an adulterant (contaminant).
p2025518	W153	Significant traces of Arsenic have been detected in the suspect creamer (item 1) in comparison to the reference creamer (item 2). It is not possible, with the employed analytical techniques, to strictly support one particular form of arsenic for the creamer’s adulteration. Nevertheless, among the different sources of Arsenic, the most common are the elemental Arsenic (As(0)) or its oxyde As_2O_3 (As(III)). Particularly, As_2O_3 is a white highly toxic powder which could be used as a pesticide, drugs or in various chemical industries (wood or glass treatments for example).

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025519	W244	**Likely Adulterants and Contaminants Identified in Item 1:** **Pharmaceutical derivative/residues: Ibuprofen methyl ester** **Never permitted in food; suggests contamination or recycled raw material** **Industrial plasticizer: 1,4-Benzenedicarboxylic acid dimethyl ester (Dimethyl terephthalate (DMT))** **Industrial monomer for PET plastics; not a food additive** **Industrial surfactant: Diethylene glycol monolaurate** **Industrial cleaner component; not GRAS** **Toxic Compounds: Methyl isocyanate derivative, arsenous acid esters** **Acutely toxic; prohibited from food use** **Abnormally elevated volatile esters suggesting economic Adulterants / Emulsifier/Fat Extenders: Dodecanoic acid methyl ester, Glycerol trilaurate** **Use of undeclared or excessive triglycerides to mimic creamy mouthfeel or stabilize the fat system** **Industrial Hydrocarbons: undecane, tridecane** **Non-food alkanes used in solvents, lubricants** **These findings, combined with the different physical characteristics of Item 1 (moist, clumpy texture), strongly indicate that the product has been adulterated with substances not approved for use in food. Further, these compounds, do not match compounds found on label for Coffee mate® Original powdered coffee creamer.** **The physical difference may be indicative of hygroscopic adulterants or binders, improper processing or storage conditions, or use of materials not formulated for dry stability.** **<u>Item 2</u> exhibited a consistent profile containing expected classes of compounds such as fatty acid methyl esters, minor triglycerides, and stabilizer-related residues, all typical of hydrogenated vegetable oil-based non-dairy creamers. No adulterants, pharmaceuticals, surfactants, or pesticide residues were detected.** **The findings align with compounds found on the label for Coffee mate® Original powdered coffee creamer. Therefore, confirms that the item is authentic and unadulterated.** **<u>DISCLAIMER</u>** **Identifications are based on library matches and would need to be confirmed with use of reference standards.**

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025520	W031	ITEMS: 1 a sealed manila envelope identified as "FTS-25-CHEM1" containing: 1-1 white powder in a closed plastic vial identified as "FTS-25-CHEM1 Item 1" 1-2 white powder in a closed plastic vial identified as "FTS-25-CHEM1 Item 2" RESULTS: The white powders in items #1-1 and #1-2 were examined visually and using stereomicroscopy, polarized light microscopy (PLM), and scanning electron microscopy/energy dispersive X-ray spectrometry (SEM-EDS). A microscopic examination revealed colorless, round particles in the white powder, item #1-1. These particles were not observed in the known white powder, item #1-2. The elemental composition of the colorless, round particles in the white powder, item #1-1, revealed arsenic.
p2025521	W002	Item 1 was found to contain arsenic. Elemental analysis was consistent with arsenic trioxide or any other compound containing arsenic and oxygen. Item 2 was not found to contain arsenic.
p2025522	W002	Item 1 was a white powder found to contain arsenic. Item 2 was a white powder submitted as a comparison sample for Item 1. No arsenic was found.
p2025523	W158	Arsenic was detected in Lab Item 1. Nothing of significance was detected in Lab Item 2. This laboratory is not equipped to perform comprehensive poison/material testing. The methodologies used for this analysis, along with the Lab Items they were used with, include: Gas Chromatography/Mass Spectrometry - Lab Items 1 and 2 pH Determination - Lab Items 1 and 2 Spot Testing - Lab Items 1 and 2 X-ray Fluorescence Spectrophotometry - Lab Items 1 and 2
p2025524	W158	Arsenic was detected in Lab Item 1.
p2025525	W158	Arsenic was detected in Item 1.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025526	W158	Arsenic was detected in Lab Item 1 (net weight - 0.57 gram). This laboratory is not equipped to perform comprehensive poison/material testing.
p2025527	W158	Arsenic trioxide, also known as diarsenic trioxide, was detected in Lab Item 1 (polymorphic form not determined). No elements or compounds of interest were detected in Lab Item 2. This laboratory is not equipped to perform comprehensive material/poison testing. The methodologies used for this analysis, along with the Lab Items they were used with, include: Microscopic Examination - Lab Items 1 and 2 Gas Chromatography/Mass Spectrometry - Lab Items 1 and 2 Infrared Spectrophotometry - Lab Items 1 and 2 X-ray Fluorescence Spectrophotometry - Lab Items 1 and 2 Solubility Testing – Lab Items 1 and 2
p2025528	W158	Arsenic was detected in Lab Item 1.
p2025529	W003	Item 1 was found to contain arsenic. Item 2 was used as a negative control.
p2025530	W003	Item 1 was found to contain arsenic. Item 2 was used as a control.
p2025531	W027	Arsenic was identified as being present in Item 1, but not in Item 2. Arsenic is used in pesticides, electronics, and in some specialty trades.
p2025532	W053	Arsenic trioxide has been detected in Item 1.
p2025533	W150	Analyses of exhibit #1 revealed Arsenic(III) oxide.
p2025534	W025	Arsenic (III) oxide was identified in the powder in item 1. No foreign compounds were identified in the powder in item 2.
p2025535	W013	Arsenic was detected in Item 1. Arsenic was not detected in Item 2.
p2025537	W085	Arsenic was identified in Item 1. No arsenic was detected in Item 2.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025538	W051	**General description of exhibits** Item 1: A plastic bottle containing some white powder. Item 2: A plastic bottle containing some white powder. **FINDINGS** "Item 2" 1. "Item 2" was a negative control sample. Some of the powder was analysed and compared with the powder in "Item 1". "Item 1" 2. Some of the powder was analysed for the presence of extraneous substances and arsenic trioxide was very likely to be present. *3. According to the literature, arsenic trioxide can be used in the manufacture of semiconductors, glass, insecticide, rodenticide, herbicide, pharmaceuticals and wood preservatives. Ingestion of arsenic trioxide can result in acute poisoning.*
p2025539	W051	**FINDINGS** "Item 2" 1. "Item 2" was found to consist of off-white materials. 2. Some of the off-white materials were analysed and used as a comparison sample. "Item 1" 1. "Item 1" was found to consist of mainly off-white materials and some clear colourless spherical solid. 2. Some of the off-white materials and clear colourless spherical solid were analysed for the presence of extraneous substance(s) and arsenic trioxide was very likely to be present. 3. Note: According to literature, arsenic trioxide is used in the manufacture of glass, insecticide, industrial chemicals and drugs. It is also used as a wood and tanning preservative and a decolouring agent in glass manufacture. In addition, it is also an antineoplastic agent used in cancer treatment (i.e. leukaemia). **CONCLUSION** Based on the chemical composition, arsenic trioxide was very likely to be present in "Item 1" as an extraneous substance.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025540	W051	**FINDINGS** **"Item 2"**: One plastic vial containing some white solids. 1. "Item 2" was a negative control sample. Some of the solids were analysed and used for comparison with the solids in "Item 1". **"Item 1"**: One plastic vial containing some white solids. 2. Some of the solids were analysed for the presence of extraneous substances, and arsenic trioxide was very likely to be present. 3. *According to literature, arsenic trioxide can be used as an intermediate in the production of insecticides, herbicides and fungicides. It can also be used as a wood and tanning preservative. Ingestion of arsenic trioxide can cause acute poisoning.*
p2025541	W051	**Findings** 1. The contents of "Item 2" were analysed and used as a negative control for comparison with Item 1. 2. The contents of "Item 1" were analysed for the presence of extraneous substances and arsenic trioxide was very likely to be present. *3. Note. According to literature, arsenic trioxide can be used as a wood and tanning preservative and a decolouring and refining agent in glass manufacture. Reported effects of ingestion of arsenic trioxide include severe nausea, vomiting, diarrhea and abdominal pain.* **Conclusion** 4. Based on the chemical compositions of the exhibits marked "Item 1" and "Item 2", arsenic trioxide was present as an extraneous substance in the exhibit marked "Item 1".
p2025543	W004	METHODS: Items 1 and 2 were examined visually and using stereomicroscopy, Scanning Electron Microscopy-Energy Dispersive X-Ray Spectrometry (SEM-EDS), and X-Ray Diffraction (XRD). RESULTS AND INTERPRETATIONS: Item 1 contained arsenic trioxide. Item 2 was used for comparison purposes and did not contain arsenic trioxide.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025544	W007	Conclusion: Arsenic detected in item 1 by xrf. The chemical form of arsenic was not determined. No indication of any other adulterant was found. Note: A complete analysis of some materials may not be possible with current methods and technologies available. In some samples, there may be components that cannot be detected or identified. This Laboratory does not have the capability to screen for most biological/protein or radiological hazards.
p2025545	W007	<u>Overview</u> This analysis was requested to identify any adulterant(s) present in the questioned item. <u>Results and conclusions</u> Arsenic was identified in Item 1 in a form consistent with arsenic trioxide. No arsenic was identified in Item 2, which was analyzed as a comparison sample. <u>Evidence</u> A sealed envelope (p2025545) held a heat-sealed plastic bag with two plastic vials sealed in separate compartments. The vial labeled Item 1 was described as “sample of question Coffee-Mate Original powdered coffee creamer.” It held 0.57 grams of off-white powder. The vial labeled Item 2 was described as “negative control sample of Coffee-Mate Original powdered coffee creamer.” It held 1.9 grams of off-white powder. <u>Methods</u> The powders were examined using a stereomicroscope (up to 40x magnification), gas chromatography/mass spectrometry (GC/MS), infrared spectroscopy (IR), and scanning electron microscopy with an energy dispersive X-ray detector (SEM-EDX). <u>Remarks</u> This report contains the author’s opinions and interpretations.
p2025546	W007	Item 1 contains arsenic trioxide in addition to material similar to Item 2. Arsenic was not detected in item 2.

UTIC	Webcode	How would you state your findings in a report? (Use the same wording as you would to submit a report to the lead investigator and/or court).
p2025547	W007	Results and Conclusions: Arsenic was identified in item 1. The material is consistent with arsenic trioxide. No arsenic was detected in item 2, which was evaluated as a comparison sample. Remarks: Some harmful or toxic materials are not detectable by the methods available in this laboratory, especially biological or radiological materials, or substances present in small amounts. This report contains the opinions and interpretations of the scientist whose signature appears on the report.
p2025548	W007	Item 1 contains arsenic. Inorganic arsenic compounds are readily absorbed in the digestive tract and are toxic to living organisms.
p2025549	W007	Overview Item 1 was submitted to determine if it had been adulterated. Results and Conclusions Item 1 was found to contain arsenic. One likely possibility is arsenic (III) oxide, as this substance and the material from item 1 produced consistent results during testing. Item 2 was described as a negative control sample; this item was evaluated. Evidence Item 1: A white plastic vial that held 0.60 gram of white chunky powder. Item 2: A white plastic vial that held 1.75 grams of white chunky powder. Methods and Observations These items were analyzed using gas chromatography/mass spectrometry (GC/MS), infrared spectroscopy (IR), X-ray fluorescence spectroscopy (XRF), and pH. Some harmful or toxic materials are not detectable by the methods available in this laboratory, especially biological or radiological materials, or substances present in small amounts. Remarks This report contains the opinions and interpretations of the analyst whose signature appears on the report.

7) How long did it take to complete this test (in hours)? Please report actual analytical hours only.

8) Did you find this test to be a fair test of the process of the examination and interpretation of chemical unknowns?

A) ◯ Yes

B) ◯ No

UTIC	Webcode	How long did it take to complete this test (in hours)? Please report actual analytical hours only.	Did you find this test to be a fair test of the process of the examination and interpretation of chemical unknowns?
p2025501	W182	3	Yes
p2025502	W119	3	Yes
p2025503	W061	25	Yes
p2025504	W061	10.5	Yes
p2025505	W061	15	Yes
p2025506	W061	4	Yes
p2025507	W061	36	Yes
p2025508	W009	8	Yes
p2025509	W028	6	Yes
p2025510	W144	10 hours	Yes
p2025511	W006	4	Yes
p2025512	W006	10	Yes
p2025513	W006	16 hours	Yes
p2025514	W006	12	Yes
p2025515	W128	5 h	Yes
p2025516	W261	3	Yes
p2025517	W261	3	Yes
p2025518	W153	5 h	Yes
p2025519	W244	60 Hours	Yes
p2025520	W031	5 hours	Yes
p2025521	W002	4	Yes
p2025522	W002	8	Yes
p2025523	W158	6 hr	Yes
p2025524	W158	4	Yes
p2025525	W158	12 hours	Yes
p2025526	W158	2	Yes
p2025527	W158	15	Yes
p2025528	W158	48 hours	Yes
p2025529	W003	10	Yes
p2025530	W003	12	Yes

UTIC	Webcode	How long did it take to complete this test (in hours)? Please report actual analytical hours only.	Did you find this test to be a fair test of the process of the examination and interpretation of chemical unknowns?
p2025531	W027	4	Yes
p2025532	W053	15	Yes
p2025533	W150	6	Yes
p2025534	W025	5	Yes
p2025535	W013	45	Yes
p2025537	W085	4	Yes
p2025538	W051	25 hours	Yes
p2025539	W051	16 hours	Yes
p2025540	W051	45 hours	Yes
p2025541	W051	24	Yes
p2025543	W004	4	Yes
p2025544	W007	5 hours	Yes
p2025545	W007	20	Yes
p2025546	W007	6	Yes
p2025547	W007	7	Yes
p2025548	W007	5	Yes
p2025549	W007	5 hours	Yes

9) How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.

Additionally, this question is a means to provide you with an opportunity to explain or include information about your findings or interpretation, as needed. In order to maintain confidentiality, please refrain from including identifying information specific to your laboratory.

UTIC	Webcode	How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.	FTS Response
p2025501	W182	Good challenging test.	

UTIC	Webcode	How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.	FTS Response
p2025503	W061	While our laboratory has the capacity to identify the arsenic we do not possess references to determine nor confirm the species of oxidation. If confirmation was required for a real case, the item would be forwarded to another laboratory.	Thank you for clarifying your results.
p2025505	W061	This laboratory does not routinely keep arsenic compounds on site. Therefore it was not possible to run standards for comparison to allow the determination of the exact arsenic compound the material had been adulterated with.	Thank you for clarifying your results.
p2025509	W028	I thought it was a fair test and good scenario	
p2025510	W144	We consider it important to diversify into a wider variety of analytes for this type of testing because this result appears to be cyclical in the proficiency tests offered by FTS.	Thank you for the suggestion. FTS offers a variety of analytes year to year and hasn't repeated a CHEM1 PT design.
p2025511	W006	No suggestions. My preference would be that "Item 1" is the control sample.	Thank you for the suggestion.
p2025515	W128	Information about the victim's impact/injury would be appreciated.	Thank you for the suggestion. FTS does not include case scenarios because they are entirely contrived. FTS does not assess evidence interpretation and significance.
p2025519	W244	Via physical observation it is indeed evident that item #1 is adulterated/comtaminated in some was when compared to the powdery texture of item#2	Thank you for clarifying your results.
p2025521	W002	This test was fair.	
p2025523	W158	was a good test	
p2025524	W158	It was a good test.	

UTIC	Webcode	How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.	FTS Response
p2025527	W158	Question 1 -- Ask for the form of As2O3. Question 2 -- Arsenic trioxide, AKA diarsenic trioxide was reported; it matched my in-house standard (of the same name) using GC/MS and FTIR. As4O6 (arsenolite), the molecular formula and dimer of As2O3, was the GC/MS library match for both Lab Item 1 (picked sample) and the arsenic trioxide in-house standard as well as published literature. There are at least two stable polymorphs of As2O3 (imperical formula), arsenolite and Claudetite. There is also a stable amorphorus (glassy) form. An X-ray diffractometer (XRD) would be useful if the form needed to be known. The literature search revealed there are many synonyms for As2O3. As part of my report, I included printed webpages from PubChem, NIST, and RRUFF.	Thank you for clarifying your results.
p2025533	W150	Since this is not a substance our lab regularly analyzes, we did not have a reference material on site. The initial visual examination under the microscope and FTIR analysis did not initially reveal any identifiable information. However, IR spectral subtraction revealed peaks comparable to Arsenic(III) oxide in the NIST webbook database. SEM analysis revealed the presence of Arsenic. The XRD and Raman built-in reference libraries identified the unknown substance as Arsenic(III) oxide.	Thank you for clarifying your results.

UTIC	Webcode	How would you change the aspects of the test (i.e. scenario, test samples, question sections, report format) to improve a future version of this test? Comments and suggestions are welcome.	FTS Response
p2025535	W013	For this proficiency, a reference sample had to be purchased. Test strips, if purchased, would not have been delivered in time as an additional test to confirm arsenic.	Thank you for clarifying your results.
p2025548	W007	In my report, I would include that XRF analysis was performed at a different laboratory than the address listed on the report (specifics witheld due to confidentiality).	Thank you for clarifying your results.
p2025549	W007	I found this test sufficiently challenging.	