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2025 Custom Chemical Unknown (Bank Dye) Proficiency Test
FTS-25-CHEM5 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 5 of 6 tests distributed (83% response rate). Of the 5 respondents:

5 of 5 (100%) reported that the red discoloration on Item 1 could have originated from a dye pack similar in composition to Item 3.
5 of 5 (100%) reported that the red discoloration on Item 2 could have originated from a dye pack similar in composition to Item 3.

Manufacturer's Information

All items were prepared at different times in the same laboratory area.

Approximately 0.1 gram 1-(Methylamino)anthraquinone (Lot#STBD0804V, M28200-100g) was weighed using a calibrated Mettler PB1502 balance. The material was transferred to a Qorpak 4-dram glass vial (Lot# 01092025144, GLC-00993). Approximately 7mL of acetone (Lot M27C751, 43053-4L) was added to the same vial and mixed thoroughly. This mixture was utilized for Items 1 and 2.

Item 1 was produced by adding approximately 10 drops of the 1-(Methylamino)anthraquinone/Acetone mixture onto a work glove (G&F Products, Item# 1511, Batch#42330-1), using a pipette, and allowed to dry. The work glove was packaged into a 6" x 9" manila envelope, sealed and labeled per FTS guidelines.

Item 2 was produced by adding approximately 10 drops of the 1-(Methylamino)anthraquinone/Acetone mixture onto a piece of jean fabric, using a pipette, and allowed to dry. The jean fabric was packaged into a 6" x 9" manila envelope, sealed and labeled per FTS guidelines.

Item 3 was produced by weighing ~0.1g 1-(Methylamino)anthraquinone (Lot STBD0804V, M28200-100g), from the same container used for Items 1 and 2, using a calibrated Mettler PB1502 balance and sealing it within a labeled Qorpak 1-dram glass vial (Lot# 02022022144, GLC-05185). The vial was heatsealed in an AMPAC envelope, sealed and labeled per FTS guidelines.

The three items with matching UTICs were packaged in a large 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: The red discoloration on Item 1 could have originated from a dye pack similar in composition to Item 3.
Item 2: The red discoloration on Item 2 could have originated from a dye pack similar in composition to Item 3.

Please examine the following items to determine if the red discoloration from either questioned item could have originated from the known dye pack of Item 3.

Items Submitted

Item 1: Work glove with questioned red discoloration.
Item 2: Fabric with questioned red discoloration.
Item 3: Known sample of dye from dye pack.

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)
p20251551	W061	GC/MS; IR/FTIR Analysis
p20251552	W009	GC/MS
p20251553	W153	HPLC/MS
p20251554	W053	Macro/Microscopic Examinations; HPLC/MS
p20251556	W004	GC/FID/TEA/ECD; GC/MS; Macro/Microscopic Examinations

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

UTIC	Webcode	Other methods used
p20251551	W061	Alternative light source
p20251554	W053	Crimelight ML Pro (visible/UV/IR lightsources and filters).

5) **Item 1**

Could the red discoloration on Item 1 have originated from a dye pack similar in composition to Item 3?

A) ☐ Yes

B) ☐ No

C) ☐ Inconclusive

6) **Item 2**

Could the red discoloration on Item 2 have originated from a dye pack similar in composition to Item 3?

A) ☐ Yes

B) ☐ No

C) ☐ Inconclusive

UTIC	Webcode	**Item 1** Could the red discoloration on Item 1 have originated from a dye pack similar in composition to Item 3?	**Item 2** Could the red discoloration on Item 2 have originated from a dye pack similar in composition to Item 3?
p20251551	W061	Yes	Yes
p20251552	W009	Yes	Yes
p20251553	W153	Yes	Yes
p20251554	W053	Yes	Yes
p20251556	W004	Yes	Yes

7) 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.

<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>p20251551</td><td>W061</td><td>Visual observation revealed that:
Red discolouration was present on the glove in Item 1
Purple/red discolouration was observed on the fabric piece in Item 2
Item 3 consisted of bright red/orange crystals
Samples from the stained areas of Items 1 and 2 were extracted with solvent, and soluble components were analysed by the techniques of Gas Chromatography with Mass Spectrometric Detection (GC-MS),and Fourier Transform Infrared Spectroscopy (FTIR). The dye in Item 3 was analysed by the same techniques.

Chemical analysis revealed that 1-(Methylamino)anthraquinone was present in Item 3 (dye from dye pack), and in the discoloured areas of each of Items 1 (work glove) and 2 (fabric).

On the basis of the testing conducted:
I am unable to exclude that the dye in Item 3 was present on each of Items 1 and 2.
I am also unable to exclude that the 1-(Methylamino)anthraquinone found on both of Items 1 and 2 originated from another source containing the same dye as Item 3.</td></tr>
<tr><td>p20251552</td><td>W009</td><td>PURPOSE
The items were examined to determine whether 1-methylaminoanthraquinone (MAAQ) could be identified.

<table><tr><td>ITEM</td><td>DESCRIPTION</td><td>RESULTS</td></tr><tr><td>1</td><td>Work glove with red staining.</td><td>MAAQ identified.</td></tr><tr><td>2</td><td>Fabric with red staining.</td><td>MAAQ identified.</td></tr><tr><td>3</td><td>Known sample of dye pack dye.</td><td>MAAQ identified.</td></tr></table>
NOTES
MAAQ is the red dye used in dye-pack security devices.</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).
p20251553	W153	The red stain of items 1 and 2 is due to the presence of the red dye " disperse red 9 ". No other specific compounds to staining dye formulations have been found on items 1 and 2. In particularly, no accredited inks in Country XX have been found. Item 3 is a red powder made of the red dye " disperse red 9 ". The chemical profile is indistinguishable from the item 1's and 2's. No other specific coumpounds to staining dye formulations have been found on item 3. This lead us to support the dye pack of item 3 as a compatible source for the staining of items 1 and 2. Nevertheless, no restriction to a unique common origin could be affirmed as the discoloration on items 1 and 2 either came from item 3 or another product indistinguishable in chemical composition.
p20251554	W053	In the dye pack (item 3) the red dye 1-(methylamino)anthraquinone (MAAQ) is found. No other dyes have been found in the dye pack. MAAQ is found in the stain on the glove (item 1). No other dyes have been found which could belong to the dye pack. The red discoloration on item 1 could have originated from a dye pack similar in composition to item 3. MAAQ is also found in the stain on the textile (item 2). No other dyes have been found which could belong to the dye pack. The red discoloration on item 2 could have originated from a dye pack similar in composition to item 3.
p20251556	W004	The Item 1, 2, and 3 extracts each contained 1-methylaminoanthraquinone, a red dye.

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

9) 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?
p20251551	W061	4.5 hours	Yes
p20251552	W009	3	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?
p20251553	W153	2h	Yes
p20251554	W053	16	Yes
p20251556	W004	16	Yes

10) 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
p20251554	W053	The dye pack (item 3) is not very representative compared to the bank dyes we normally encounter in casework.	Thank you for the comment. Please reach out to rsmith@forsci.com with suggestions for alternate bank dyes.
p20251556	W004	This type of examination is not completed as a comparison examination at our laboratory. It is a qualitative examination for the presence of MAAQ and CS. The results are not reported as a comparison, even when a dye pack is submitted.	Thank you for clarifying your results.