

SI Forensics - Full Discipline Demo

Fire Investigation and Explosives

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Forensics - Full Discipline Demo
Course	SI Forensics - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Order the following steps for identifying accelerants at the scene of a fire with the first step at the top and the last step at the bottom.

≡ The results for the burned sample are compared to the unburned sample and a known database of accelerants.

1 **Correct answer:** A trained dog or hydrocarbon sniffer is used to detect the presence of accelerants.

≡ A trained dog or hydrocarbon sniffer is used to detect the presence of accelerants.

2 **Correct answer:** A burned sample and an unburned sample are collected from the crime scene.

≡ A burned sample and an unburned sample are collected from the crime scene.

3 **Correct answer:** Gas chromatography and mass spectrometry are performed on both the burned sample and the unburned sample.

≡ Gas chromatography and mass spectrometry are performed on both the burned sample and the unburned sample.

4 **Correct answer:** The results for the burned sample are compared to the unburned sample and a known database of accelerants.

Classify each of the following statements as true or false.

⚡ A Griess test produces an orange coloration when in the presence of nitrites.	
⚡ As large a sample as possible should always be used when performing thin layer chromatography.	
⚡ Many explosives produce nitrites when they burn.	
⚡ Two steps are required to perform a Griess test using two different reagents.	
⚡ Thin layer chromatography is a common technique used to separate gaseous components of a mixture	
True	False
1	2

Correct answers:

1

A Griess test produces an orange coloration when in the presence of nitrites.

Many explosives produce nitrites when they burn.

Two steps are required to perform a Griess test using two different reagents.

2

As large a sample as possible should always be used when performing thin layer chromatography.

Thin layer chromatography is a common technique used to separate gaseous components of a mixture

Exploration

The detection of hydrocarbons indicates that an accelerant is likely present at the scene.

☒ True



☐ False

_____ is used to separate the components of a sample.

☐ Griess test

☐ Explosion

☒ Thin layer chromatography



Exercise 1

Did the gas chromatograms from any of the samples recovered from the suspects' homes match the sample recovered from the warehouse?

Does a positive match of gas chromatograms between the sample from the crime scene and a sample owned by a suspect definitively prove guilt?

Data Table 1: Chromatogram Analysis Results
(SAMPLE ANSWER BELOW)

Accelerant Source	Accelerant Identified
Crime Scene Sample	Ace Charcoal Lighter
Owner's Home Sample	Sunnyside Lacquer Thinner
Manager's Home Sample #1	Ace Charcoal Lighter
Manager's Home Sample #2	Lamplight Farms Lamp Oil

Worker's Home Sample	Premium Charcoal Lighter
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Exercise 2

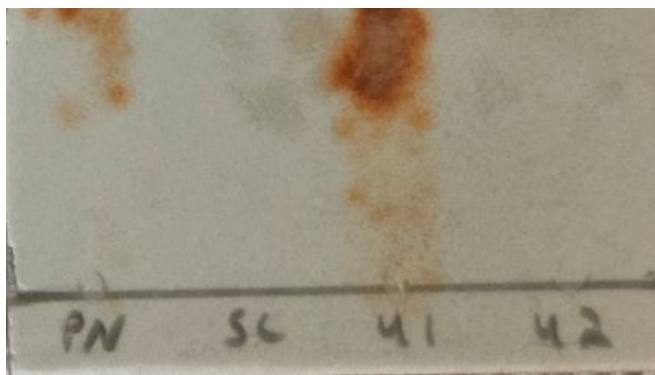
Based on your results, does the Unknown Sample 1 contain nitrites? How do you know?

Based on your results, does the Unknown Sample 2 contain nitrites? How do you know?

What effect did the thin layer chromatography have on the solutions tested?

Photo 1: Developed chromatography plate
(SAMPLE ANSWER BELOW)





Competency Review

A gas chromatogram uses which of the following characteristics to identify individual compounds?

- ☒ Retention time ✓
 - ☐ Molecular weight
 - ☐ Solubility
 - ☐ Volatility
-

When setting a fire, an arsonist may use _____ to make fire burn hotter and spread quicker than usual.

- ☐ heat
- ☐ a hydrocarbon sniffer
- ☒ an accelerant ✓
- ☐ gas chromatography

When performing thin layer chromatography, always make sure the spots are above the solvent line when the plate is placed in the development chamber.

- ☒ True ✓
- ☐ False

The first Griess reagent contains _____ that then interacts with the second Griess reagent.

- ☐ nitrite
- ☐ nitrate
- ☐ a base
- ☒ an acid ✓

In Exercise 1, what was the most specific identification you were able to make using the provided gas chromatograms?

- ☐ The accelerant batch
- ☒ The accelerant brand ✓
- ☐ The accelerant type
- ☐ The accelerant purchase date

The volatile components of the accelerant are identified as the peaks with the highest abundance on the gas chromatogram.

☐ True

☒ False



Sodium chloride tests negative for nitrites.

☐ True

☒ False



When performing thin layer chromatography, the solutions were spotted onto the _____.

☐ filter paper

☒ chromatography plate

☐ watch glass

☐ solvent



Extension Questions

If a gasoline container is found in a building damaged by fire, would you immediately conclude the fire resulted from arson? Why or why not? What would your next steps be? (SAMPLE ANSWER BELOW)

A determination of arson cannot be made based on the presence of a gasoline container alone, as the container's presence could be coincidental. The student's next steps should be to analyze the scene for traces of accelerants by using a hydrocarbon detector and gas chromatography.