

# Learning Objectives

- 1 Apply the principles of chromatography
- 2 Describe the methods used in the analysis of compounds
- 3 Explain the chemistry behind the methods of analysis of compounds
- 4 Identify which method is more effective for the analysis of compounds

# Analysis of Compounds

## Analysis of

- 1 Fibres → Cotton, wool, silk, polyester, nylon?
- 2 Dyes
- 3 Athletes' blood / urine → Unauthorised substances?
- 4 Suspected illegal drugs

# Analysis of Compounds

## Complication

- 1 Complex mixtures
- 2 A few or one compound(s) of interest

# Analysis of Compounds

1 How to separate out mixtures



Find compound(s) of interest

2 Identify the compound



What is it?

# Chromatography

Separate a mixture into its components

Stationary phase



Inert absorbent material

Mobile phase



Liquid or gas

# Chromatography

Separate a mixture into its components

Stationary phase



Inert absorbent material

Mobile phase



Liquid or gas

Longer experiment



Greater separation

DNA

# Types of Chromatography

1

Thin Layer Chromatography (TLC)

Fingerprints

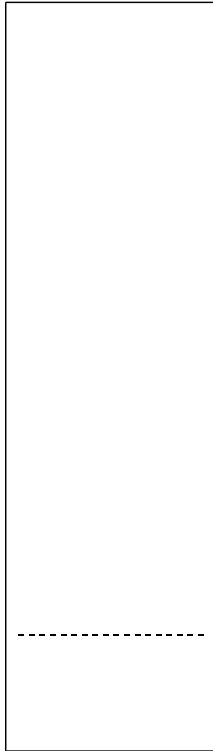
Fibre Analysis

Poison

Blood

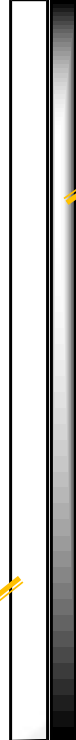
# Thin Layer Chromatography

Blank  
plate



Inert  
backing

Thin layer of  
absorbent  
material





# Thin Layer Chromatography

Coloured compounds



Inspection

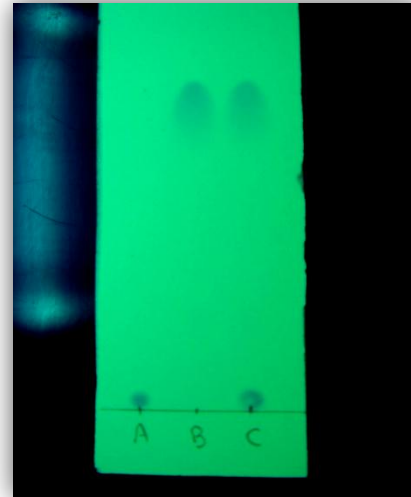
Colourless compounds



UV light



Chemical staining



**TLC plate  
under  
UV light**

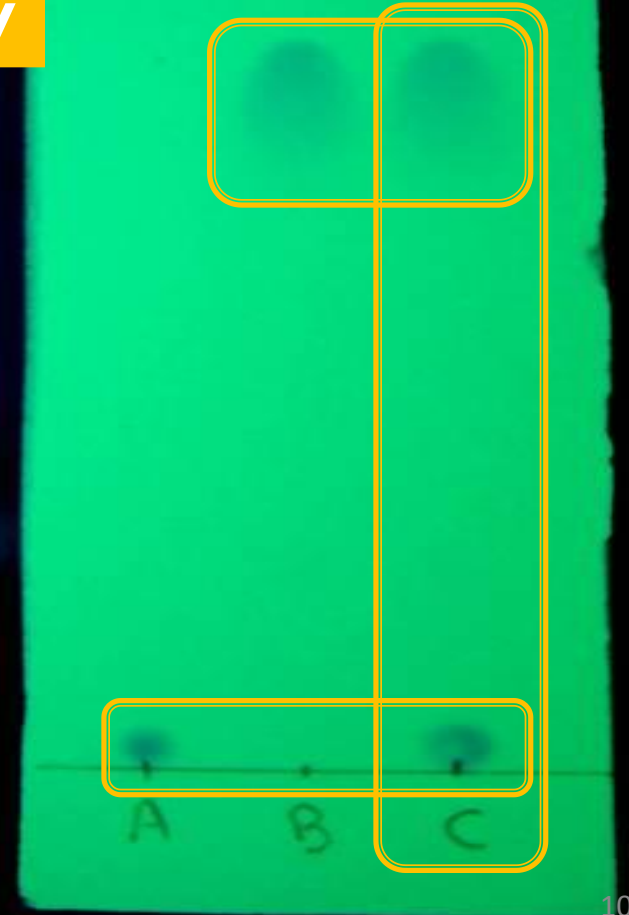
# Thin Layer Chromatography

Unknown mixture C

Standards A & B

TLC to identify compounds?

Presumptive test



# Thin Layer Chromatography

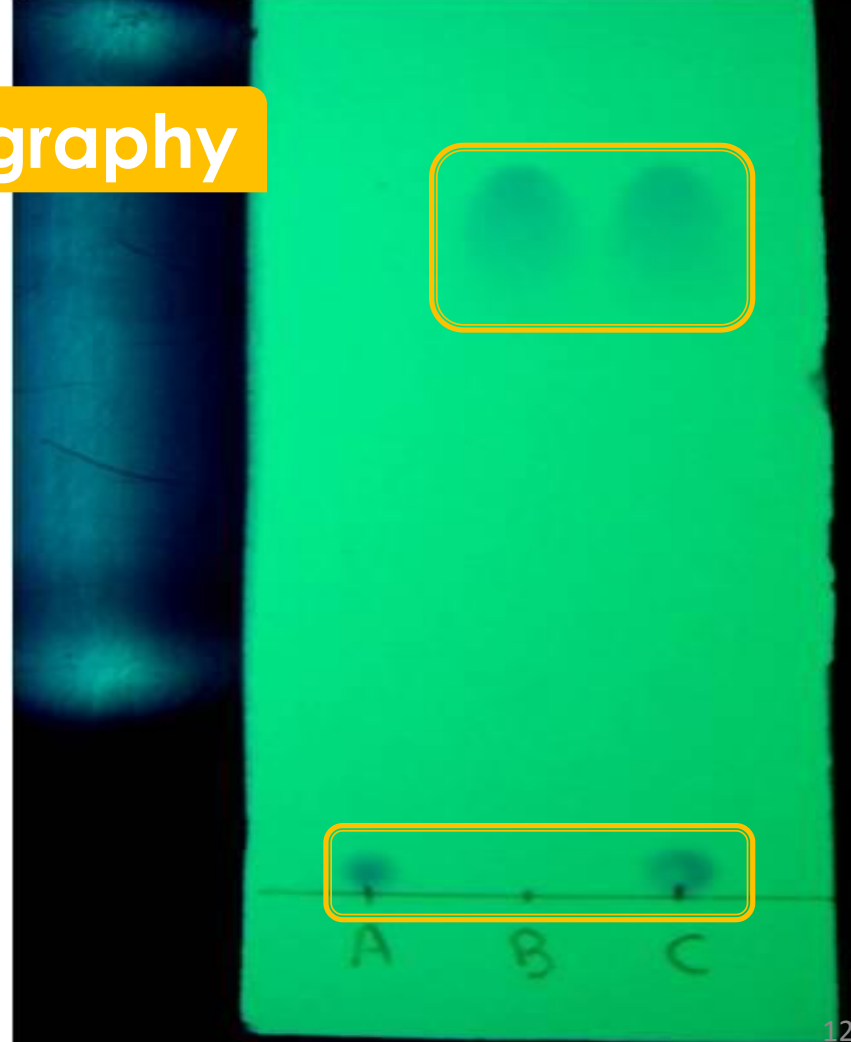
Too many organic compounds



TLC plate too small

# Thin Layer Chromatography

Unknown spot  
corresponding  
to standard



# Thin Layer Chromatography

Too many organic compounds



TLC plate too small

Unknown spot corresponding to standard

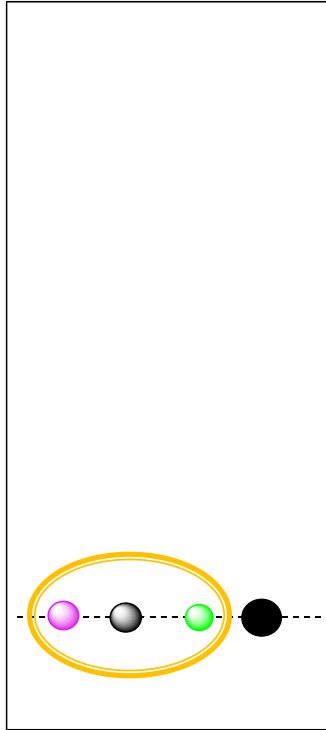


Compound **is** present



Compound **may be** present

# Thin Layer Chromatography



Standards

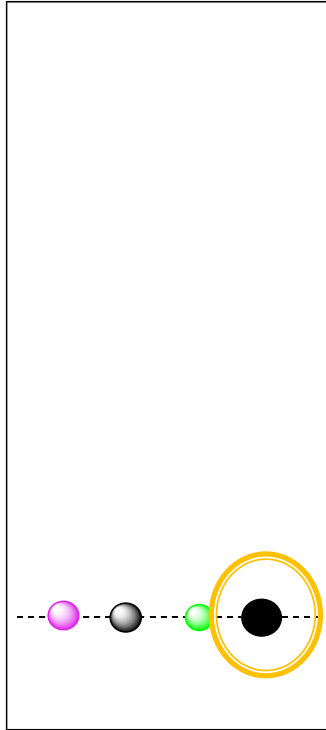
Fingerprints

Fibre Analysis

Poison

Blood

# Thin Layer Chromatography



Unknown

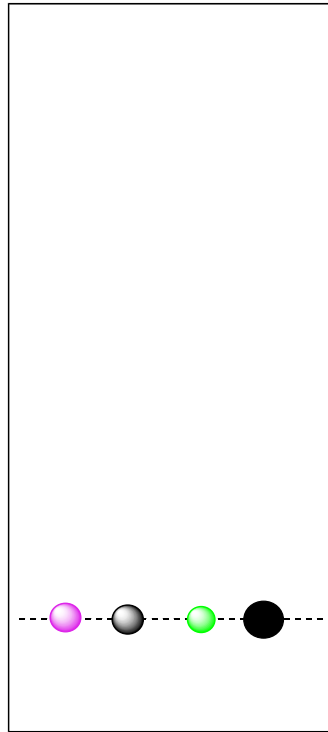
Fingerprints

Fibre Analysis

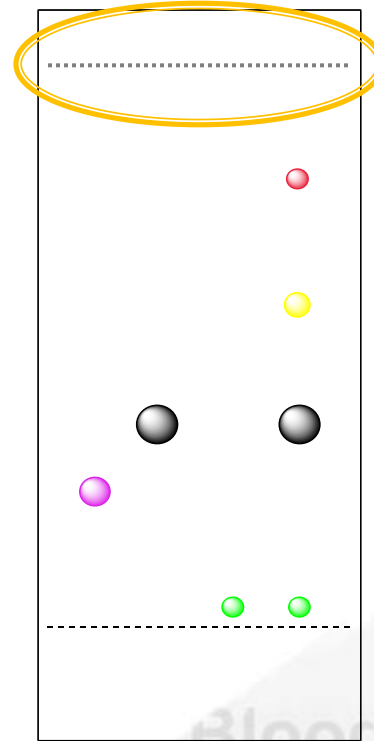
Poison

Blood

# Thin Layer Chromatography



Run TLC



Solvent front

Fingerprints

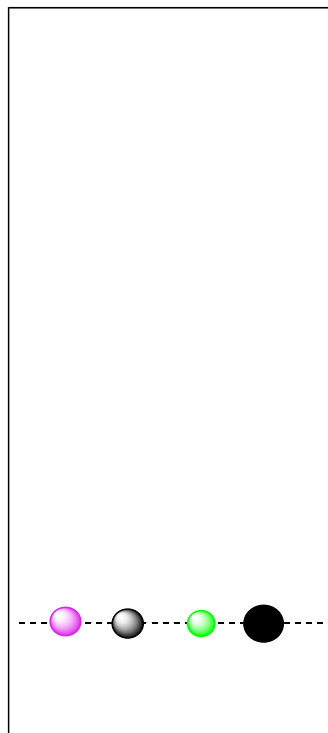
Fibre Analysis

Poison

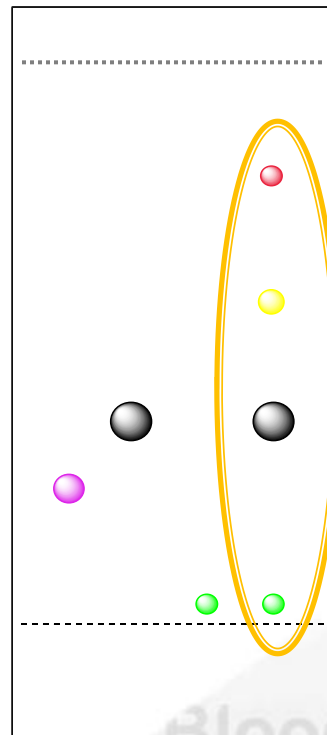
Blood



# Thin Layer Chromatography



Run TLC



Fingerprints

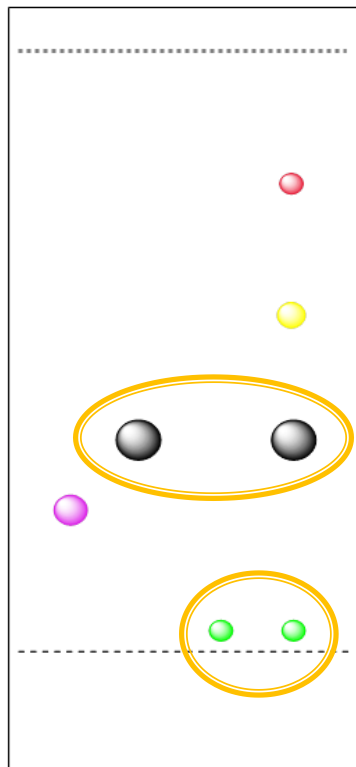
Fibre Analysis

Poison

Blood

# Thin Layer Chromatography

Solvent front



Compounds present

1

Green

2

Black

Fingerprints

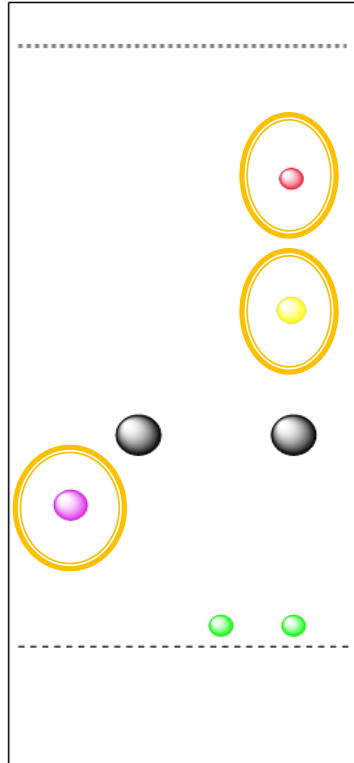
Fibre Analysis

Poison

Blood

# Thin Layer Chromatography

Solvent front



Compounds present

1 Green

2 Black

3 Yellow

4 Red

Unknown

# Thin Layer Chromatography

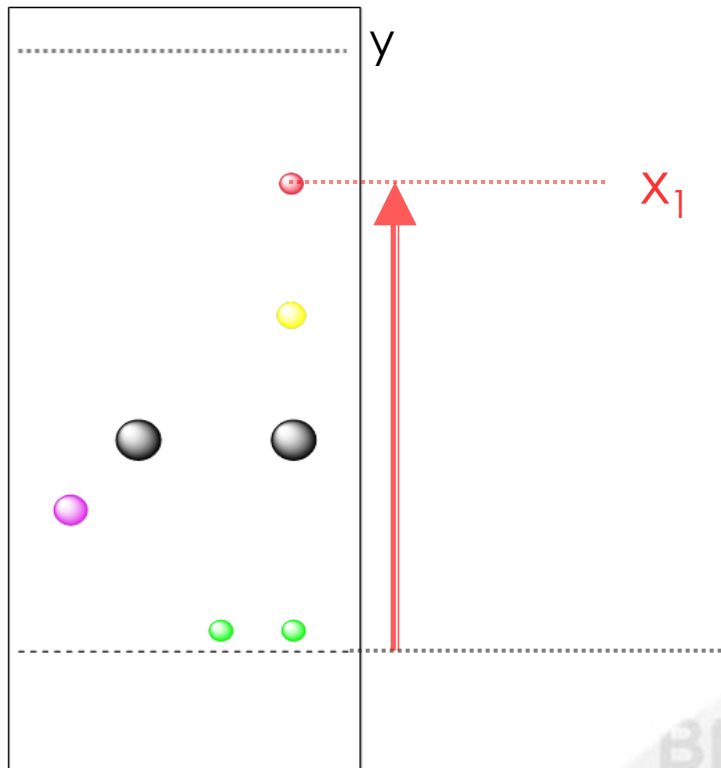
Retention factor ( $R_f$ )



Numerical method to describe position of spots

# Thin Layer Chromatography

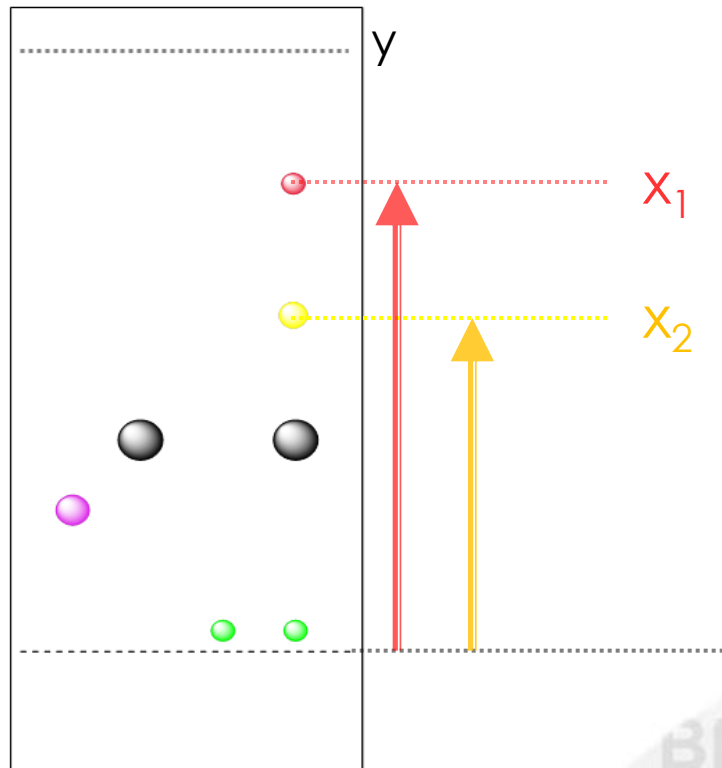
Solvent front



$$R_f = x_1 / y$$

# Thin Layer Chromatography

Solvent front



$$R_f = x_1 / y$$

$$R_f = x_2 / y$$

Fingerprints

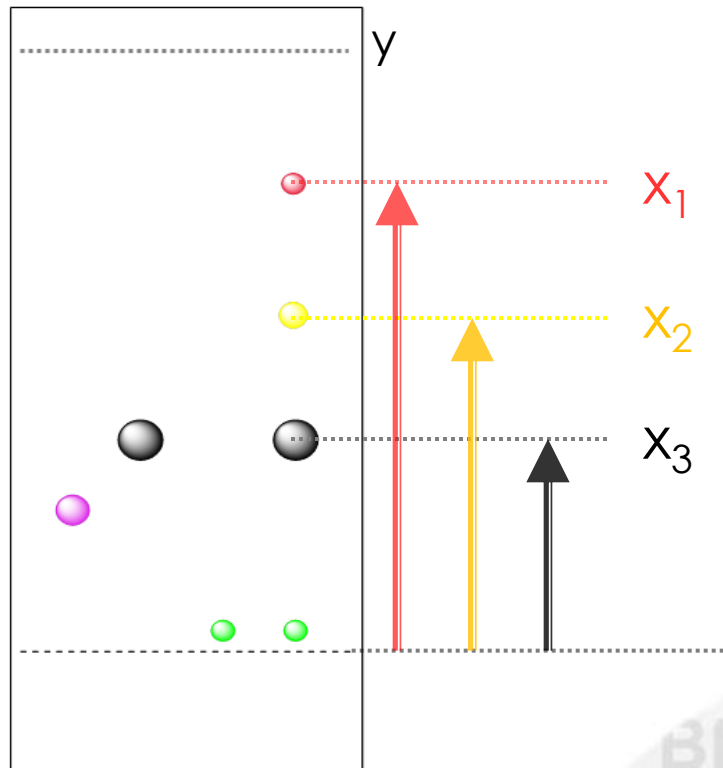
Fibre Analysis

Poison

Blood

# Thin Layer Chromatography

Solvent front



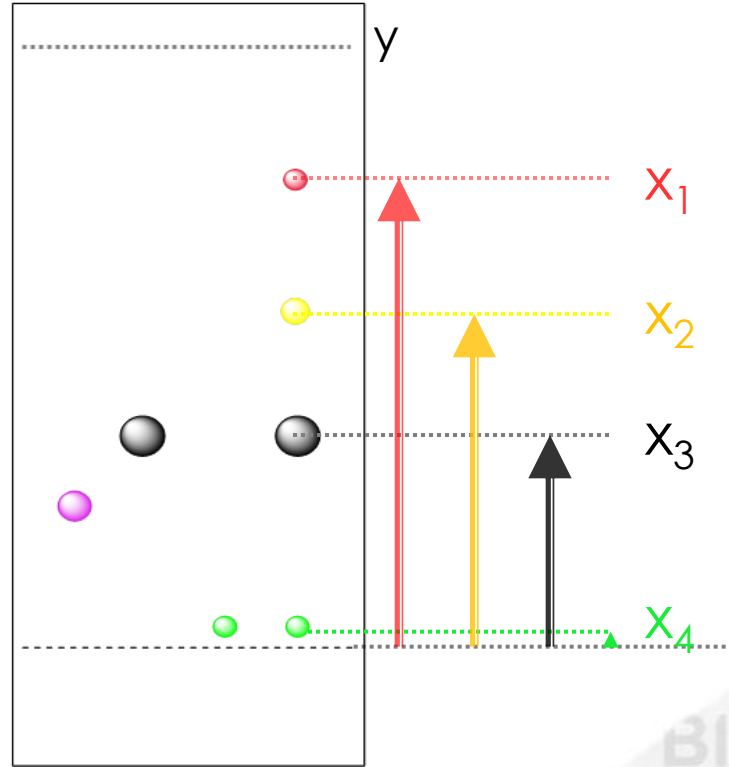
$$R_f = x_1 / y$$

$$R_f = x_2 / y$$

$$R_f = x_3 / y$$

# Thin Layer Chromatography

Solvent front



$$R_f = x_1 / y$$

$$R_f = x_2 / y$$

$$R_f = x_3 / y$$

$$R_f = x_4 / y$$