

YEAR 8 TERM 3: FORENSICS

Key Words

Chromatography – The process whereby small amounts of dissolved substances are separated by running a solvent along a material such as absorbent paper (chromatography paper).

Rf value (retention factor) – distance moved by a solute divided by the distance moved by the solvent.

Mobile phase – the solvent used in chromatography.

Stationary phase – the chromatography paper.

Solute – A substance that is dissolved in a solution.

Solvent – A liquid that dissolves a solute.

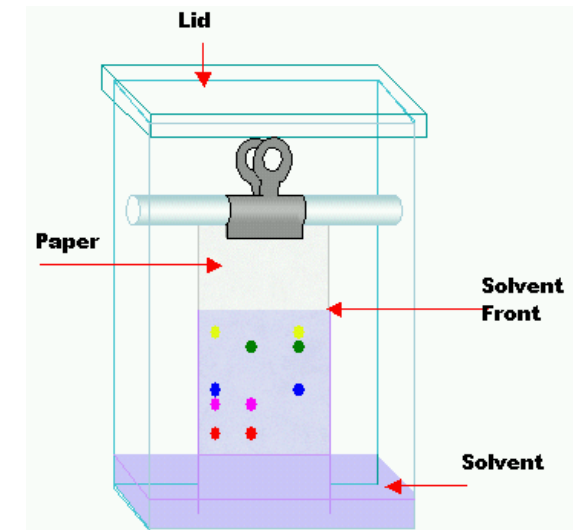
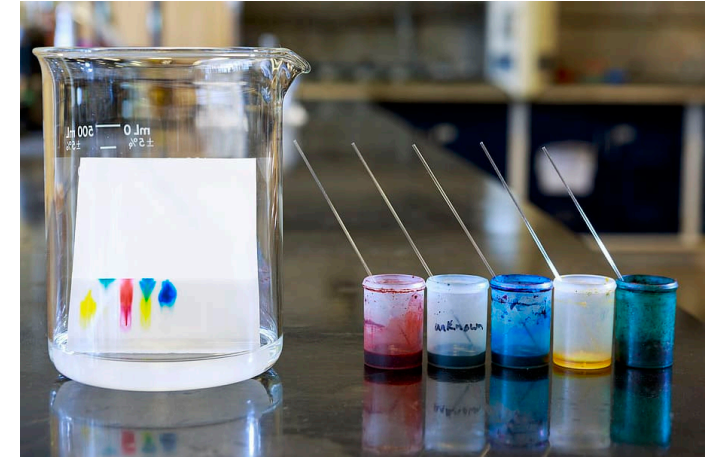
Control variable – a factor in an investigation that we must keep the same to prevent errors in our results.

Independent variable – a factor in an investigation that we change i.e. temperature.

Dependent variable – a factor that we observe/ measure in an investigation.

Red blood cell - A type of blood cell that is made in the bone marrow and found in the blood. Red blood cells contain a protein called haemoglobin, which carries oxygen from the lungs to all parts of the body

White blood cell - White blood cells are part of the overall immune system, defending against infection by pathogenic microorganisms There are two main types, lymphocytes and phagocytes.

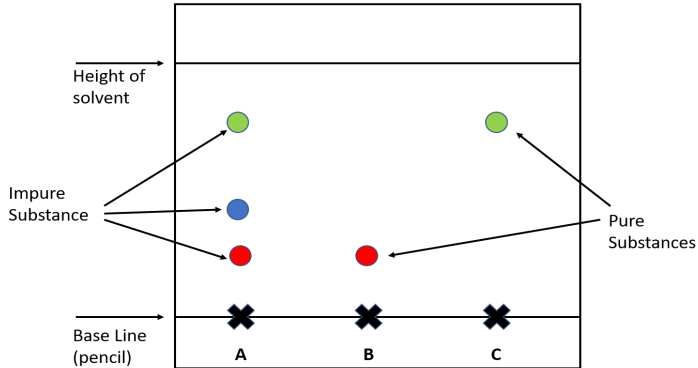


CHEMICAL ANALYSIS – PAPER CHROMATOGRAPHY RPA

Use paper chromatography to distinguish between Pure substances and Impure substances. It always involves a mobile phase and stationary phase. Measure the R_f (retention factor) and using the equation below compare your results with a data book to determine the unknown substance

$$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$$

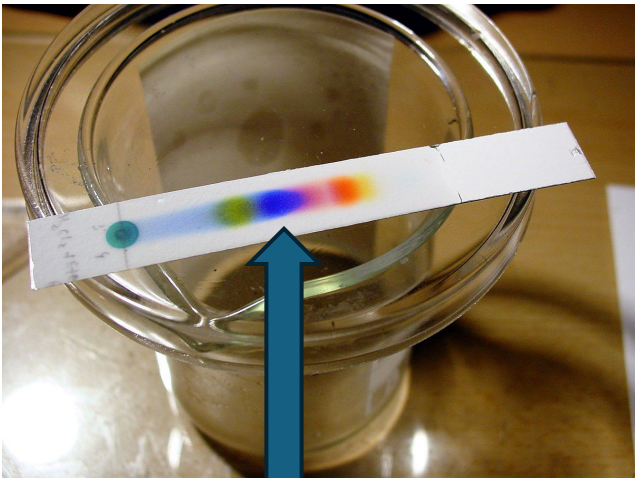
This chromatogram shows that A is a mixture of three substances, B and C plus one other unknown substance



Scan the QR code with your mobile phone to access a 10-minute video on how to complete the Chromatography RPA.

METHOD FOR RPA CHROMATOGRAPHY

1. Draw a pencil line across the bottom of the chromatography paper 2 cm from the bottom using a ruler.
2. Evenly place dots along the pencil line using the solutes given (i.e., ink)
3. Carefully place 5cm³ of the solvent into a beaker.
4. Carefully lower the chromatography paper in the solvent ensuring that the solvent does not go above the pencil baseline.
5. The solvent will begin to move up the chromatography paper taking the solutes with them. These will be seen as different colours on the paper.
6. When the solvent has stopped moving up the paper, this is your solvent front, draw a pencil line across the paper where this has finished.
7. Then calculate the R_f values (to do this, measure the distance moved by the solute and divide this by the distance moved by the solvent).



Chromatography paper that has been used and shows solutes moved up including the solvent front is known as a chromatogram.

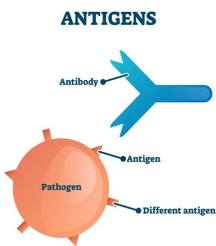
COMPONENTS OF BLOOD

Red blood cells

Red blood cells deliver oxygen to the tissues in your body. Your red blood cells also transport carbon dioxide to your lungs for you to exhale.

White blood cells

Part of the immune response.
Engulfing pathogens.
Produce anti-toxins that neutralise the poisons made by microorganisms.
Produce antibodies so identify and neutralize foreign objects such as pathogenic bacteria and viruses.



Platelets

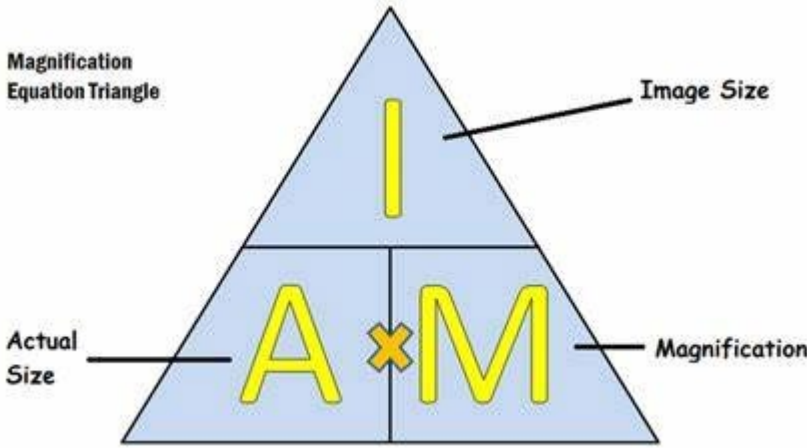
Stops bleeding by clotting.
Have no nucleus

Plasma

Liquid portion of the blood.
To take nutrients, hormones, and proteins to the parts of the body that need it.



Magnification Equation Triangle



PRACTICE KNOWLEDGE QUIZ QUESTIONS

1. Name parts of the microscope.
2. Where in the cell can we find DNA?
3. What is chromatography?
4. What does the I in the IAM triangle stand for?
5. What colour flame will barium and strontium go when introduced to a roaring flame?
6. How are red blood cells adapted for their function?
7. What are the functions of white blood cells?

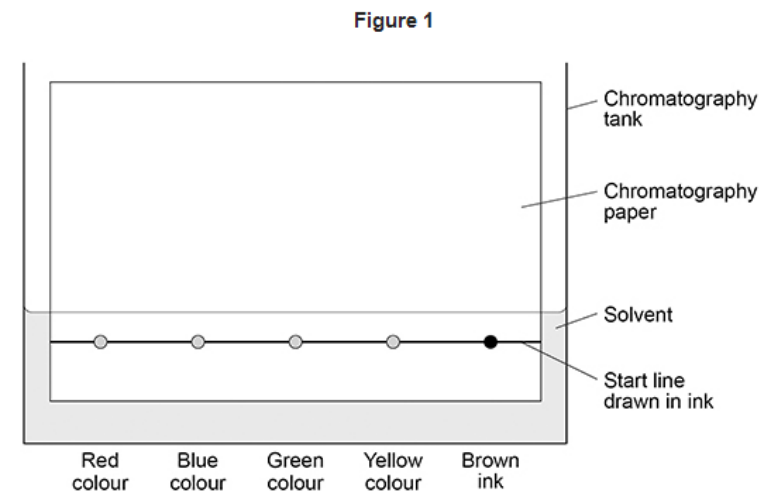
Tasks

1. Write a method on how to tell the difference between ibuprofen and paracetamol using chromatography.
2. Find and fix the following statements
 - A baseline on chromatography paper is drawn at the top of the paper.
 - A baseline on chromatography is drawn in pen.
 - The stationary phase is the solvent.
 - The mobile phase is the ink.
 - To calculate the R_f value you must divide the distance moved by the solvent by the distance moved by the solid.

Maths: the distance moved by a solvent is 12cm. The distance moved by solute A is 8cm and the distance moved by solute B is 3 cm. Calculate the R_f values for each of the solutes on the chromatogram.

A student investigated the colours in a brown ink using chromatography.

(a) **Figure 1** shows the apparatus used.



Give **two** errors made by the student.

Describe the problem each error would cause.

Error 1 _____

Problem 1 _____

Error 2 _____

Problem 2 _____