Date: .....

Solutions and separation

Success criteria: Can you...	Done	Revised
Identify a solution		
Describe solutions		
Plan and carry out a fair-test investigation to test predictions, including identifying independent, dependent and control variables		
Present observations and data using tables and graphs		
Interpret observations and data, including identifying patterns to draw conclusions		
Explain what a saturated solution is		
Explain how filtration works		
Explain how evaporation works		
Explain how distillation works		
Carry out chromatography		
Explain what a pure substance is		
Explain how to identify a pure substance		
Skill: Plot a graph and draw a line of best fit		

Solutions key words match up

Match the key words to the correct definition by colouring the boxes the same colour.

Key word	Definition
Mixture	A substance that cannot dissolve
Soluble	Liquids that do mix
Insoluble	Two or more substances mixed that can be easily separated and are not bonded
Transparent	Cloudy, cannot see through
Opaque	A substance that can dissolve
Miscible	A liquid which dissolves a solid
Immiscible	A solid that dissolves
Solute	Mixture made when a solute dissolve in a solvent
Solvent	See-through
Solution	Liquids that don't mix

10/10

Investigating mixtures

No.	Experiment	Observations	Solution? (Y/N)
1	Water + sugar	Dissolved Transparent	Y
2	Water + flour	Opaque Insoluble	N
3	Water + copper sulphate	Dissolved Transparent	Y
4	Water + ethanol	miscible Transparent	Y
5	Water + oil	immiscible Opaque	N

15.10.20

Solvents

Water is the most common solvent. But not all substances will dissolve in water.
Other solvents can be used. e.g. propanone (nail varnish remover) for nail varnish
Ethanol for permenant markers.

Investigate dissolving

Aim: To find out what happens to the mass and volume when a solution is made

Method:

1. Measure 20cm3 of water into a measuring cylinder. ✓
2. Weigh and record the mass.
3. Weigh 0.5g salt into a weighing boat and record the mass.
4. Add the salt to the measuring cylinder and stir.
5. Weigh the solution and record the mass.
6. Look at the volume of the solution and record.

Prediction

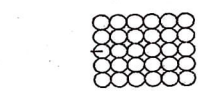
I think the mass will increase when a solution is made. ✓
I think the volume will stay the same when a solution is made ✓

Results

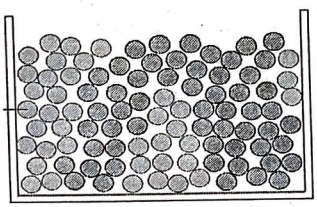
Mass water (g)	20.00
Mass salt (g)	0.5
Mass solution (g)	20.15
Volume of water (cm^3)	$20cm^3$
Volume of water + solute (cm^3)	$20 cm^3$

Conclusion

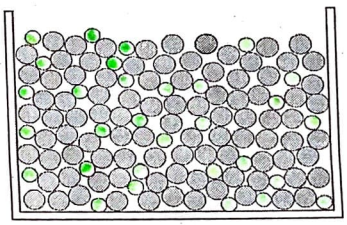
When the solution was made the mass increased this was because the salt has ~~was~~ mass so when added it increased.
The volume stayed the same because the salt can sit inside the water molecules.



Solid solute
Salt



Liquid solvent
water



Solution.

The mass of a solution is the sum of the mass of the water and salt.

The volume remains the same because the salt can sit between the water molecules.

1.55g 2.180g.

Saturated solutions and solubility

When no more solute ✓ will dissolve in a solvent a saturated ✓ solution is formed.

Solutes are more soluble ✓ at higher ✓ temperatures.

Solubility ✓ is the mass of solute that can dissolve in a given volume ✓ of solvent.

The solubility of a substance usually increases ✓ as the temperature increases.

Missing words:

increases
saturated
solubility
volume
soluble
higher
solute

6.11.20 Solubility Curves

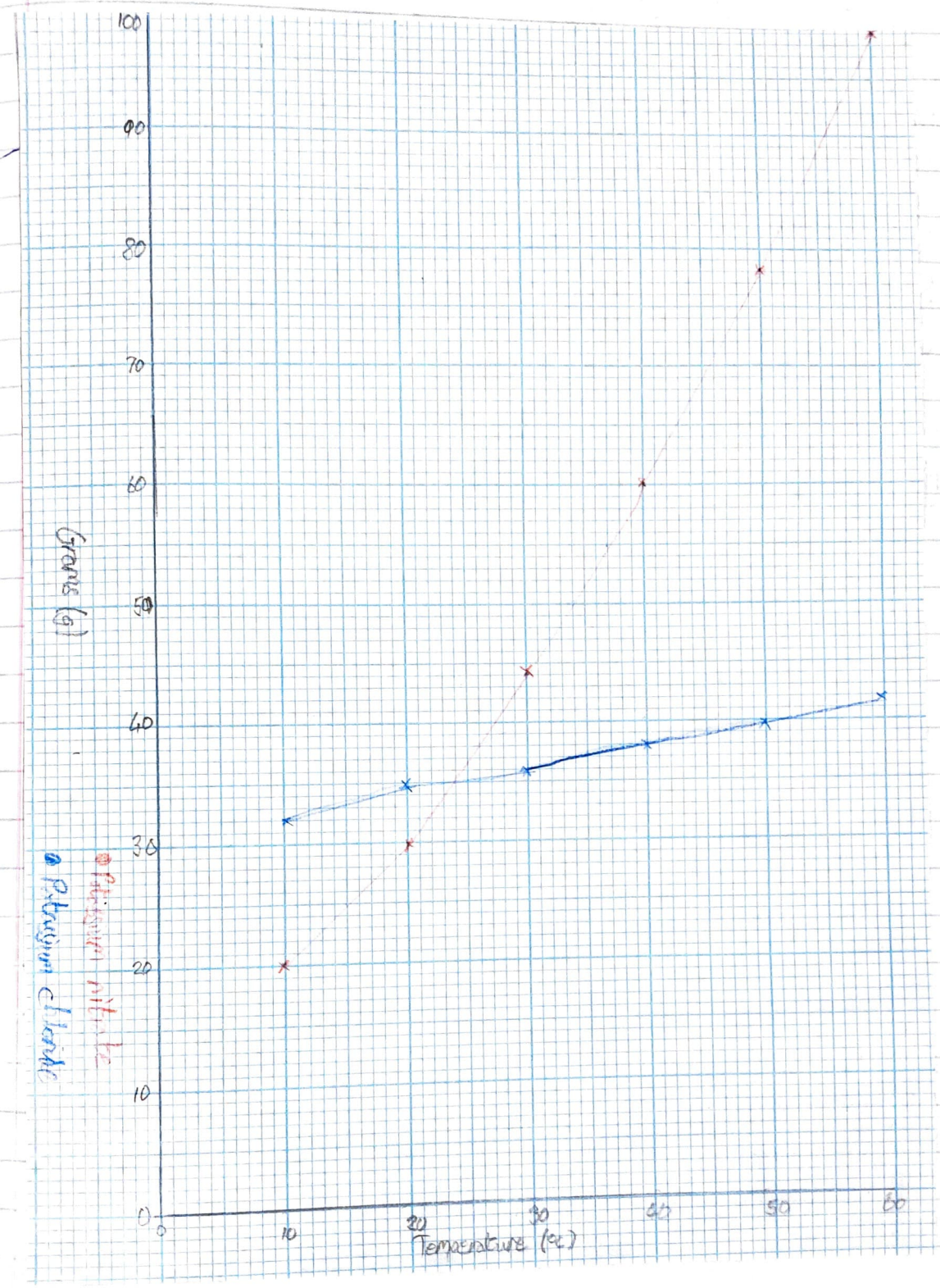
a. Potassium nitrate increases by 10, 14, 16, 18, 22. Potassium chloride increases by 2g every 10 ✓

b. Potassium chloride is the most soluble at 10°C because it can dissolve more solute at that temperature.

c. Potassium nitrate is the most soluble at 60°C because it can dissolve more solute at that temperature.

d.

Mass of chemical (g)	Temperature of water (°C)
20	10 ✓
25	15 ✓
30	20 ✓
35	24 ✓
40	27 ✓
45	31 ✓
50	36 ✓
55	39 ✓
60	40 ✓


Grams (g)
Temperature (°C)
Potassium Chloride
Potassium Nitrate
0
10
20
30
40
50
60
70
80
90
100

4. 47 g ✓

5.

10.11.20

Separating rock salt

Salt is sodium chloride

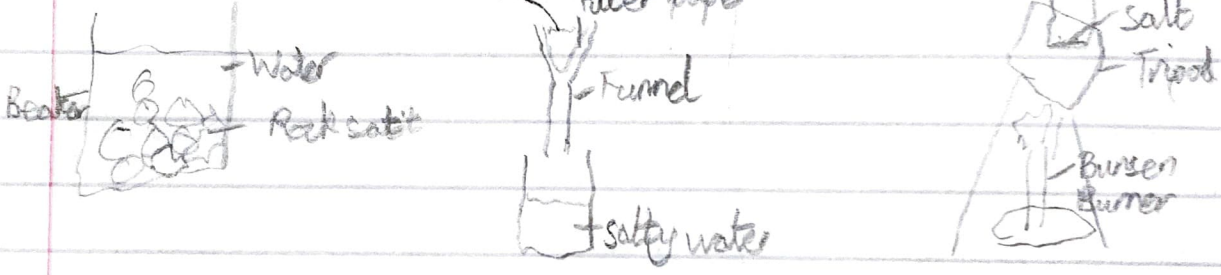
Challenge is to separate the salt from the rock salt. Rock salt is rock and salt mixed together.

Rock is insoluble it will not dissolve.

Salt is soluble it will dissolve.

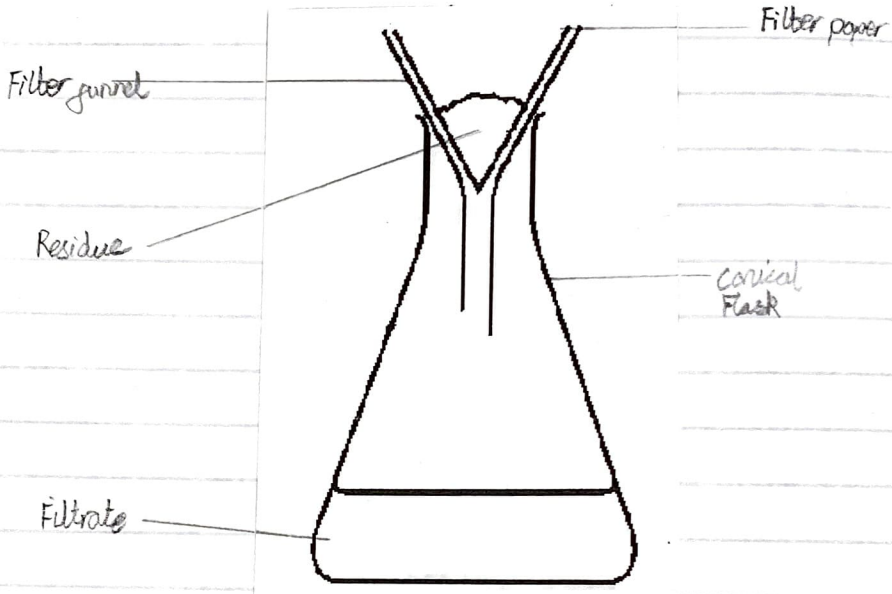
Salt solution is called saline or brine

1. Put the rock salt in water and wait for the salt to dissolve.
2. Filter the rock salt to get rid of the rock.
3. Finally place over bunsen burner and evaporate the water and you will be left with the



17.11.20 Filteration

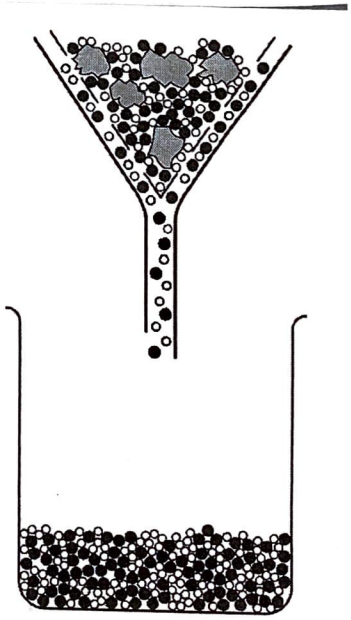
Seperates an insoluble solid from a liquid.



Liquids such as water or solutions can pass through the filter paper but large substances can't pass through

Key

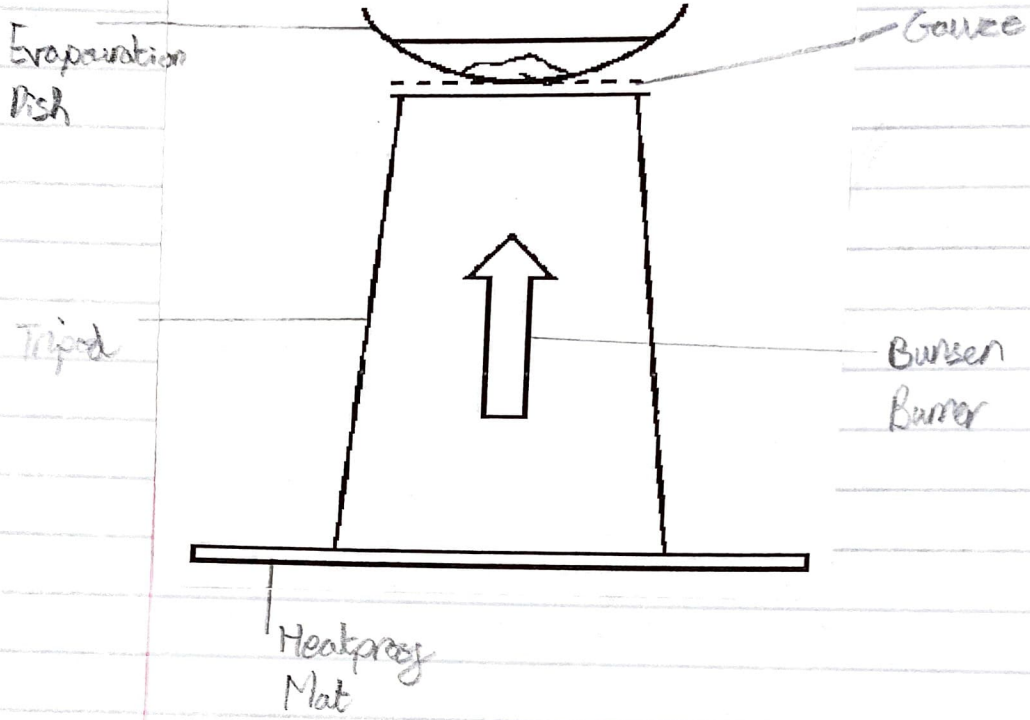
- ○ = Salt
- ● = water
- = Sand



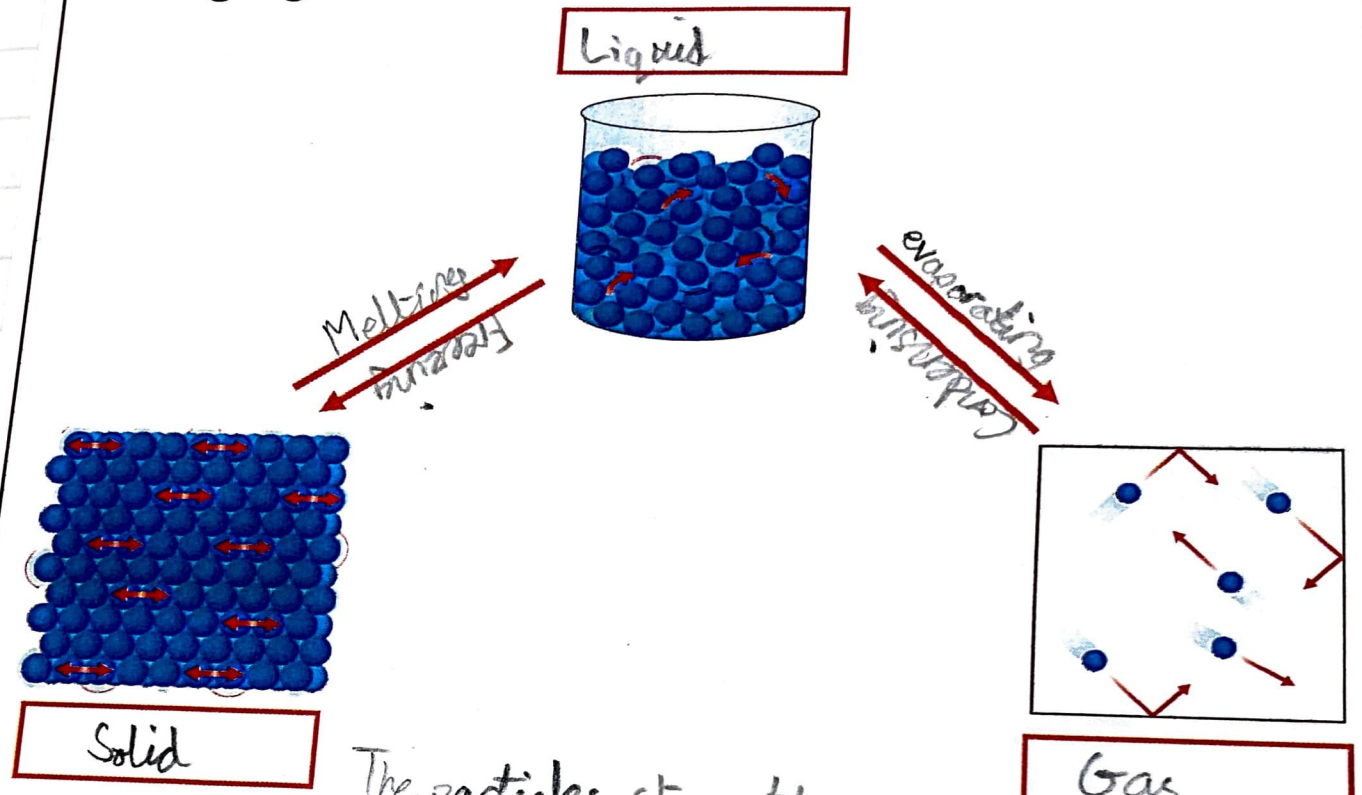
The filter allows you to seperate an insoluble substance from a soluble substance. The solvent dissolves the salt because it is soluble. The particles pass through to holes in the filter paper leaving the insoluble substance behind. They are now separated.

20.11.20 8a Evaporation

Separate a soluble solid from a liquid



Changing state

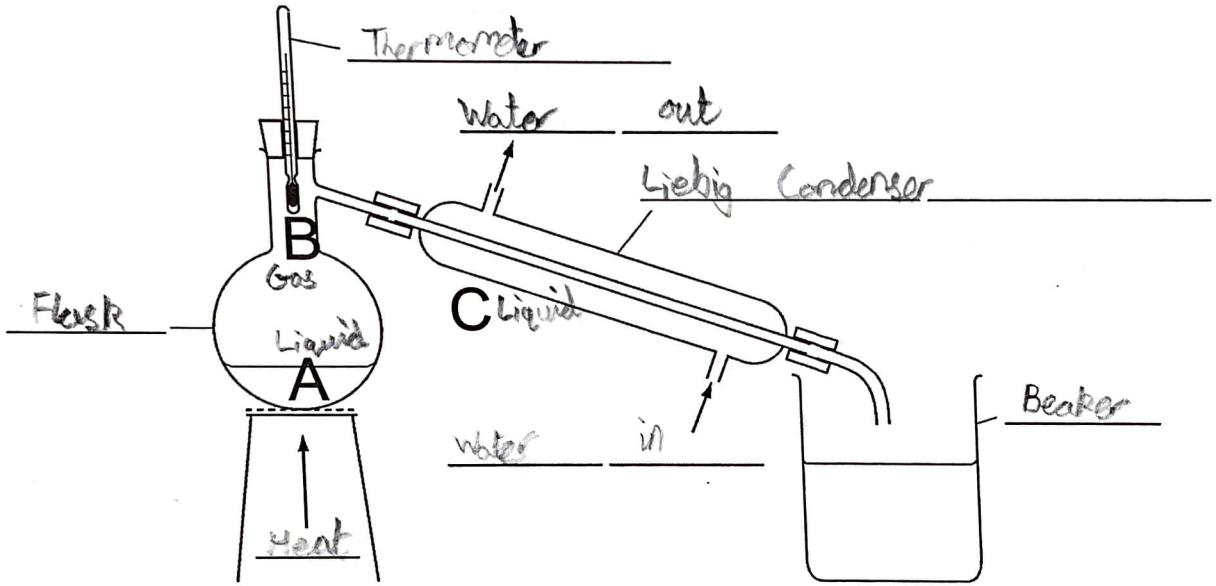


The particles stay the same size.

Distillation

Name Jamie Cooper **Class** L4G

1. Label the parts of the distillation apparatus shown below, using words from the box.



beaker	flask	heat	Liebig condenser	thermometer	water in	water out

2. Write the state the water is in at the point s marked A, B and C.

States: **solid** **liquid** **gas**

Distillation

Water and ethanol can be separated because they have different boiling points ✓. The ethanol ✓ will evaporate first, turn back into a liquid ✓ in the condenser and collect in the beaker ✓. The water remains in the round flask, as long as the temperature ✓ does not exceed 100°C.

Words

temperature

boiling points

ethanol

beaker

liquid

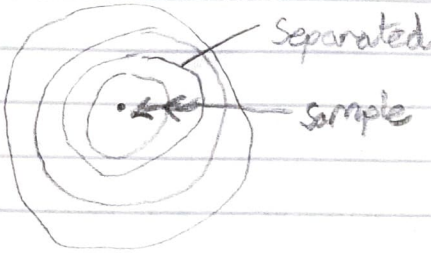
3.12.20 Chromatography

Separates mixture of dyes

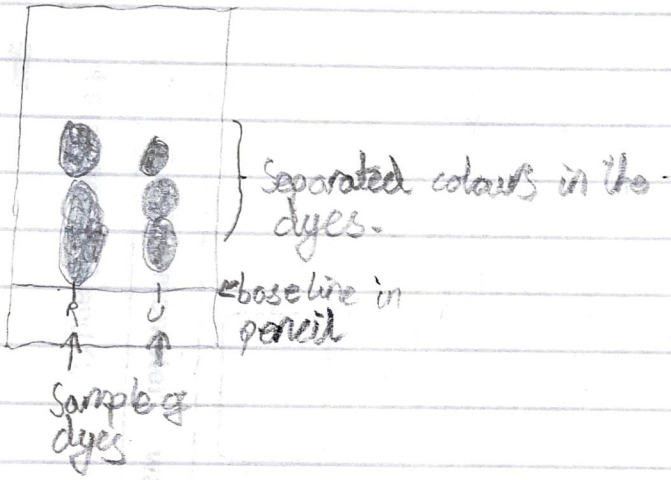
Chromatography is useful in forensic science and drug analysis such as sports events.

Two methods

add drops of water.



Another method allows 2 or more dyes to be compared.



Where the spots end up on the paper allows them to be compared and if they are in the same position they must be the same dye.

10

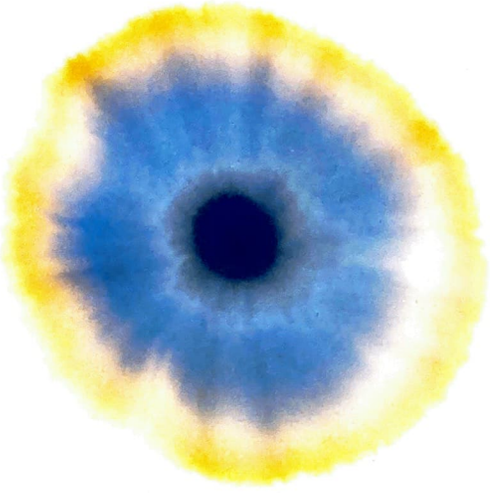
MP

Solutions key words – Test

Name: Jamie Cooper **Date:** 3/12/20

Key word	Definition
Mixture	Two or more substances mixed that can be easily separated and are not bonded
Soluble	A substance that can dissolve
Insoluble	A substance that ~~cannot~~ can't dissolve
Transparent	seethrough
Opaque	Cloudy, cannot see through
miscible	Liquids that do mix
immiscible	Liquids that don't mix
Solute	A solid that dissolves.
Solvent	A Liquid ~~wh~~ that dissolves a solid
Substance	Mixture made when a solute dissolve in a solvent

Chromatograms



The substances must dissolve in the solvent. If it doesn't it won't move from the baseline.

Friday 11th December 2020
Pure Substances

A pure substance contains only one type of substance. For ex
water is 100% pure water.

Finding out if water pure.

Evaporation test
Take a sample of water and leave it to evaporate. Taking the mass at
and end will identify if there is anything dissolved in it.

Water	Mass of Solids in water (g)
Pure	0.00g
Salty	10.10g

Testing purity

Melting or boiling point is used to test for a pure substance. If
pure they have a precise melting or boiling point. A mixture will
boil over a range of temperatures.

Test for pure water: Boiling point
Result: 100°C

Pure substances

- If something is pure it only contains ___one___ type of substance.
- Pure substances have a ___precise___ boiling point.
- This can be used to test the ___purity___ of substances.
- The ___boiling___ ___point___ will change if something is mixed with a pure substance.
- Pure water ___boils___ at ___exactly___ 100°C.

Words

exactly

one

boiling point

boils

precise

purity