

let's talk 
science
partnership program

**Substances & Mixtures:
Separations**

Agenda

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- Introduction
- Why do we care?
- What's a Separation?
- Distillation video
- Chromatography
- Filter Paper Activity
- Solubility
- Biological Separation
- Conclusion



(a) pure substance



pure substance

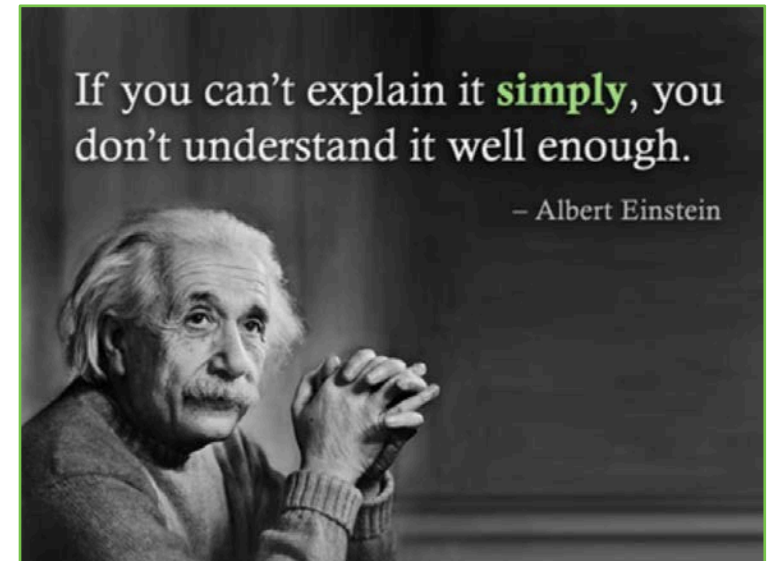


(b) mixture

Introduction

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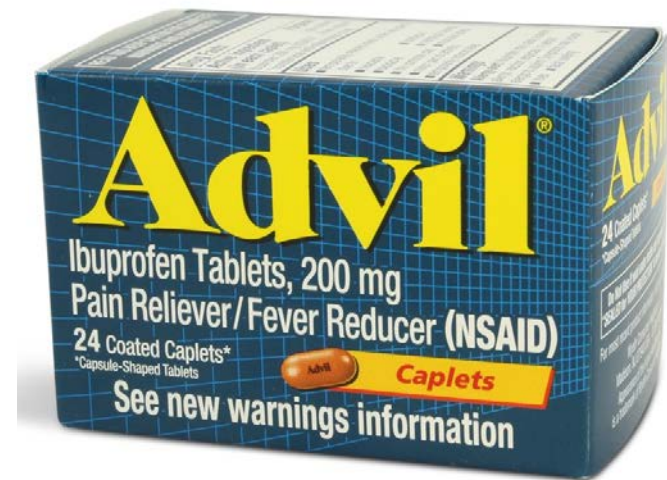
- What do scientists do?
- Where are they?
- What types of scientists are we?
- How does this type of science affect you?



Why do we care?

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- What's a pure substance?
- What's a mixture?
- How do we turn everyday things into mixtures?
- How do we undo this action?



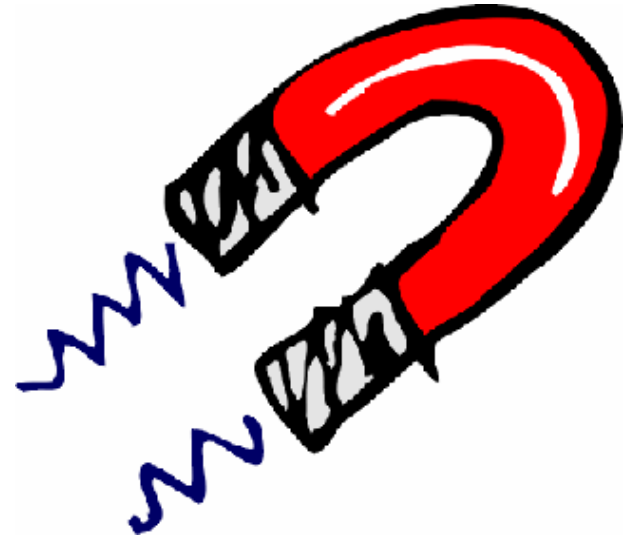
What's a Separation?

- What are some of our options for separating a mixture?
- How about the bagged mixture?
- Race time! Who can get the metal out quicker?



Why a Magnet?

- Why did you choose a magnet to get out the metal bits?
- Did it work well?
- Are there any other properties we could use to separate things?



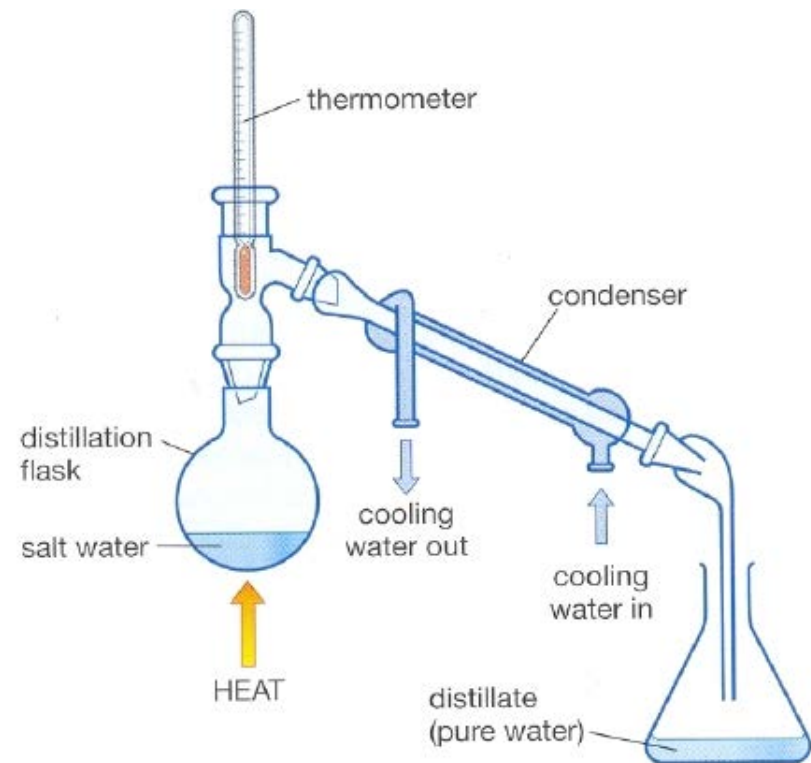
What about liquids?

- How can we separate two liquids? Or something that has been dissolved in a liquid?
- Some liquids have different boiling points. (Vinegar – 118C)



Distillation

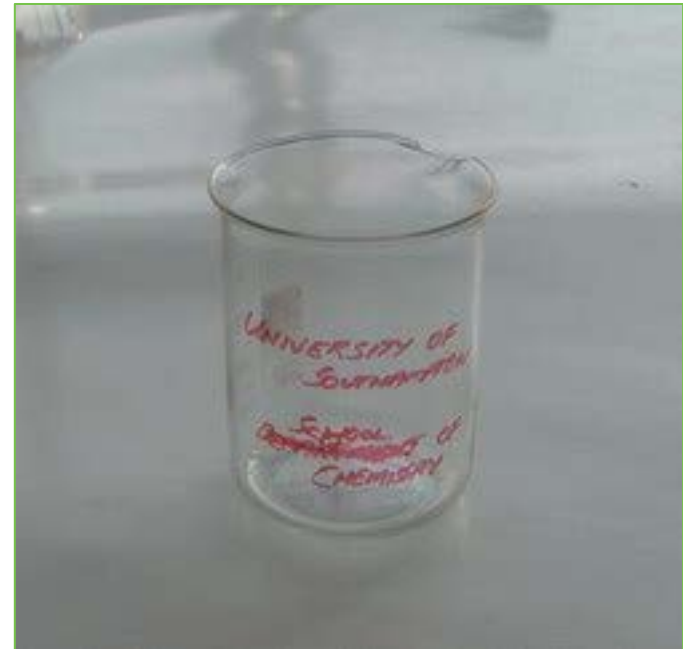
- Video
- Distillation is used for separating metals and other chemicals from a liquid.
- Based on volatility.



Water and Oil...

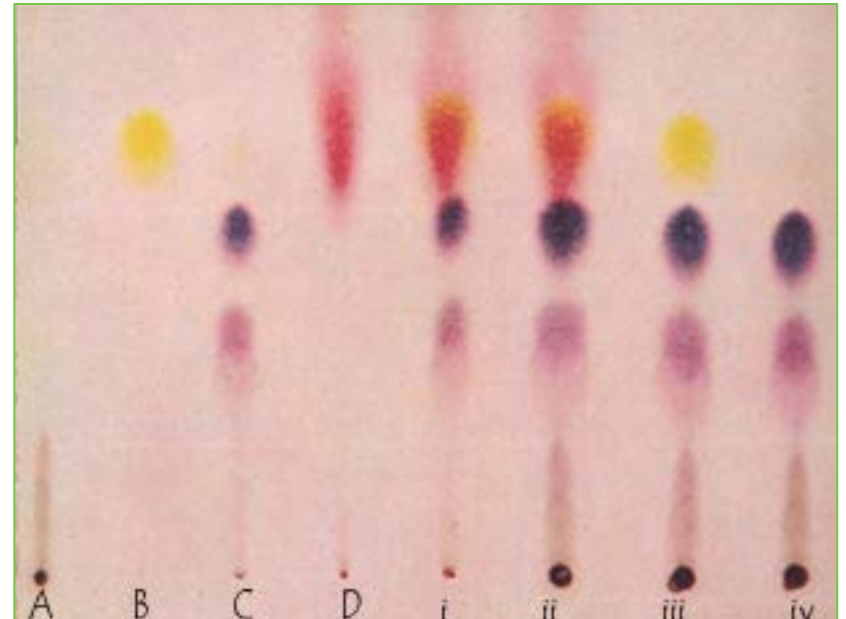
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- Don't mix!
 - Water is polar, and oil is non-polar.
 - Like dissolves like!
- What happens if we try to use water on permanent marker?
- What about ethanol?



Chromatography

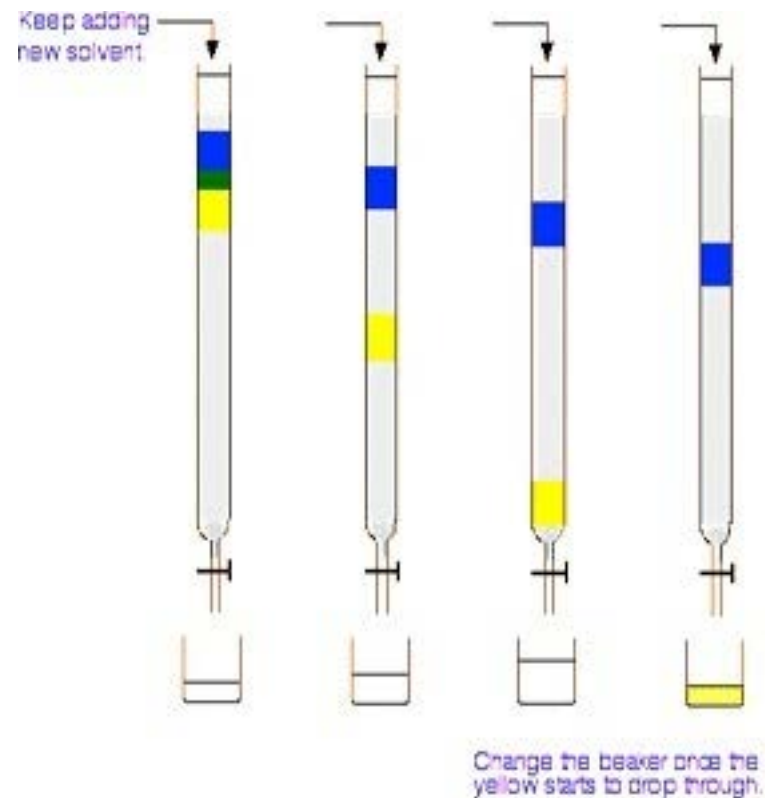
- Everyone should receive a strip with 4 coloured dots on it.
- Make a group of 3, and spread out around the room.
- We will circulate with glasses of ethanol for this test.
- Which is the **stationary phase**, and which is the **mobile phase**?



Chromatography

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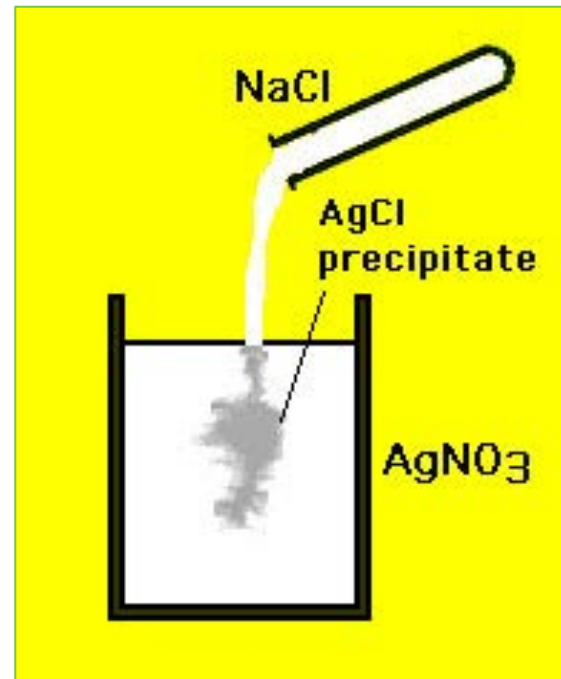
- Can be done with special tubes for liquids and gasses.



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Solubility Separation

- What if it's hard to boil off things to separate them?
- Sometimes we can make chemical reactions happen in our mixtures that form **precipitates** which are easier to collect.



Biological Separation

- Time to separate your own DNA!
- Materials:
 - Bottled water
 - Clear dish soap
 - Food dye
 - Table salt
 - Isopropyl Alcohol



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Biological Separation

1. Mix 500 mL drinking water with 1 tbsp of salt.
2. Take 3 tbsp of mixture to another cup.
3. Gargle the 3 tbsp salt water. Time for 1 minute.
4. Spit back into cup.
5. Stir with 1 drop of soap.
6. Mix 100mL isopropyl alcohol and 3 drops of food dye.
7. Tilt salt cup and gently pour a 2cm layer on top.
8. Wait 2.5 mins!

Separations

- What types of separations have we seen?
 1. Using magnets/manual means
 2. Distillation
 3. Chromatography
 4. Solubility
 5. Biological



Relevant Fields

- Chemist
- Pharmacist
- Jeweler
- Water test analyst
- Chef/Cook
- Brewer

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Thanks for having us!