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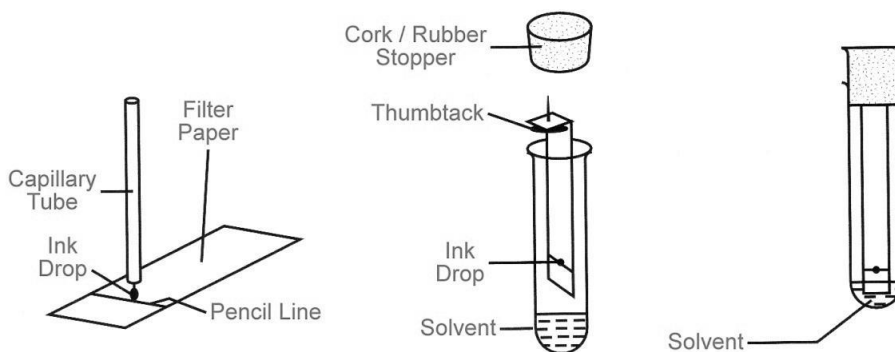
Separation Techniques: Chromatography, Distillation, Filtration, Separating Funnel and Sublimation

• Method One – Chromatography:

a) What type of mixture(s) can be separated by chromatography?

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b) One possible way to separate a mixture of chemicals that are often, but not necessarily, coloured is to use chromatography. The essential steps to perform chromatography are given below:



Give a clear and concise explanation of how chromatography works in order to separate a mixture of chemicals:

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c) Why must the starting line on the filter paper be drawn in *pencil*?

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d) Why is it essential for the ink drop be *above* the level of the solvent?

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e) How are the R_f values of the different pigments in the ink drop calculated?

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f) What additional step(s) must be taken when performing chromatography on a mixture of *colourless* chemicals?

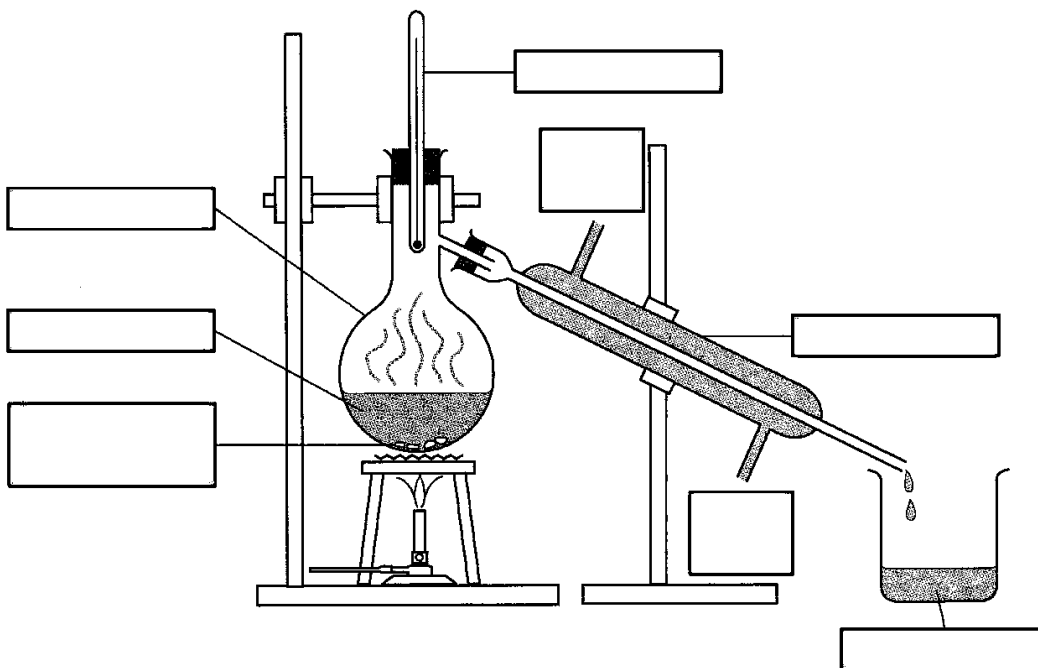
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• **Method Two – Distillation:**

a) What type of mixture(s) can be separated by distillation?

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b) A mixture of ethanol (boiling point = 78°C) and water (boiling point = 100°C) can be separated by distillation. Label the diagram of the distillation apparatus given below:



c) Give a clear and concise explanation of how the distillation apparatus works in order to separate two chemicals:

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d) What is the role of the *anti-bumping granules* in the distillation apparatus?

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e) Pay careful attention to where the *thermometer* is located in the distillation apparatus. Why is the bulb of the thermometer placed at this exact location?

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f) In which direction does the water flow through the *condenser*? Why is the direction in which the water flows through the condenser important?

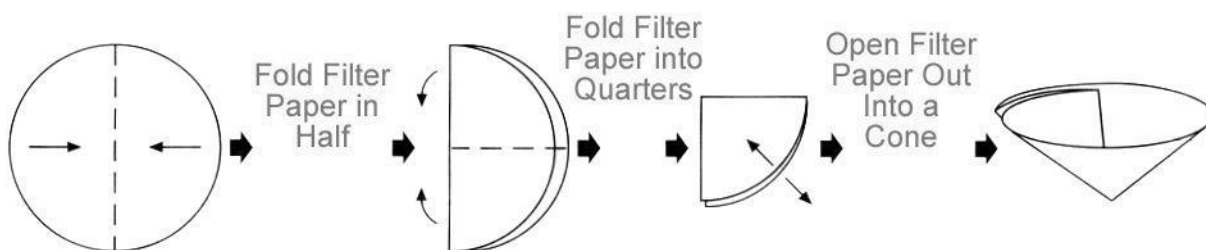
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• **Method Three – Filtration and Crystallisation:**

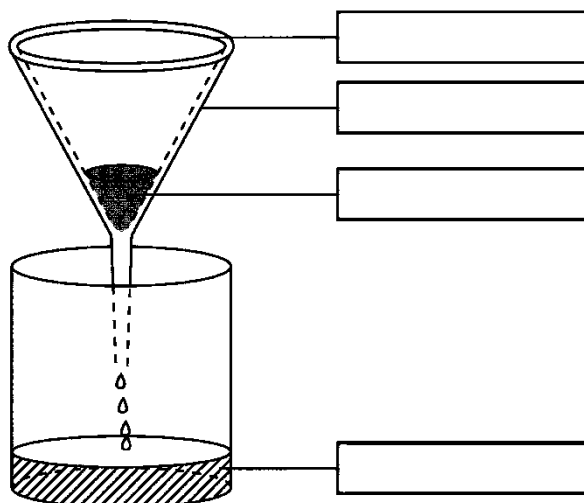
a) What type of mixture(s) can be separated by filtration?

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b) A mixture of copper(II) sulfate and sand can be separated by filtration and crystallisation. A brief summary of the procedure is given in the diagram below.



Label the diagram of the filtration apparatus given below:



c) Give a clear and concise explanation of how the filtration apparatus works in order to separate the mixture of copper(II) sulfate and sand:

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d) After the filtration is complete, what additional steps need to be taken in order to obtain a sample of *pure, dry* sand?

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e) What additional steps need to be taken in order to obtain *crystals* of copper(II) sulfate from the *solution* of copper(II) sulfate?

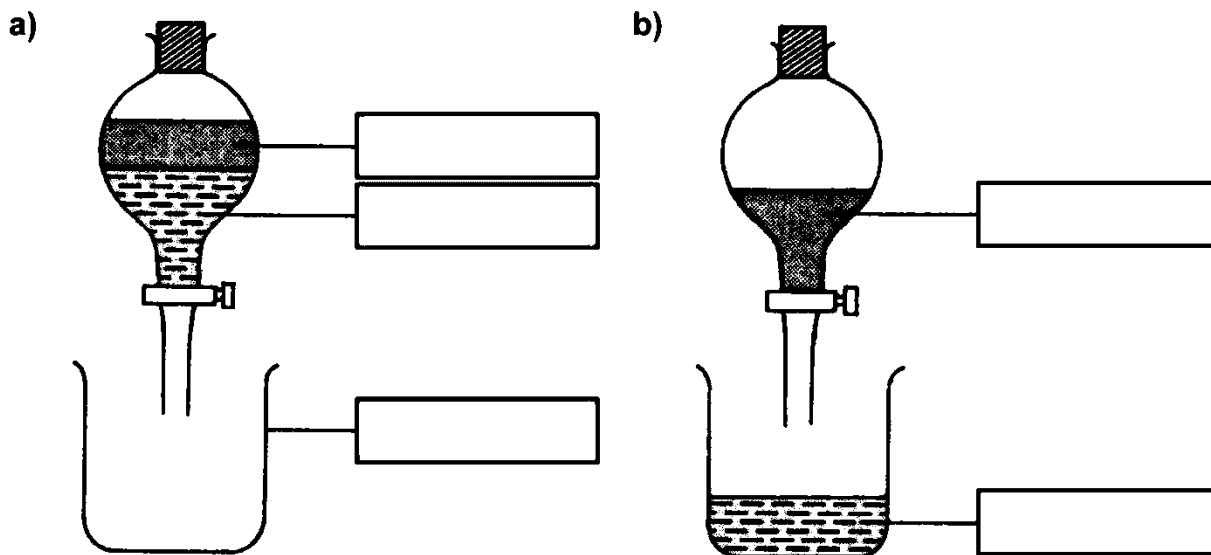
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• **Method Four – Separation Funnel:**

a) What type of mixture(s) can be separated using a separating funnel?
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b) A mixture of oil and water can be separated by using a separating funnel. A brief description of the procedure is given in the diagram below:

Label the diagram below of the separating funnel experiment:



d) Give a clear and concise explanation of how the separating funnel works in order to separate the mixture of oil and water:

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• **Method Five – Sublimation:**

a) What type of mixture(s) can be separated by sublimation?
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b) Give a clear and concise explanation of how sublimation works in order to separate a mixture of ammonium chloride and sodium chloride:

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- Scan the QR code below for the answers to this assignment.



http://www.chemist.sg/purification/purification_worksheet_ans.pdf