

Mark Scheme

Combined Science GCSE

States of Matter and Mixtures Test

(Levels 4-9)

	Answer	Marks
1. (a)	Pencil will not be separated by the chromatography method, but ink would.	(1)
1. (b)	The soluble ink is taken up the paper by the water/solvent and different substances will move at different rates.	(1) (1)
1. (c)	$15.3/16.1 = 0.95031056$ $= 0.95$	(1) (1)
1. (d) (i)	Mixture 2	(1)
1. (d) (ii)	Use a different solvent	(1)
1. (d) (iii)	Mixture 1 as it gives the most spots/three spots.	(1) (1)

(Total for Question 1 = 9 marks)

	Answer	Marks
2	Plan will include some of the following: • Suitable compound: magnesium oxide/magnesium carbonate/magnesium hydroxide/magnesium • Suitable acid: sulphuric acid • Reaction: $\text{MgO} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O}$ $\text{Mg}(\text{OH})_2 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + 2\text{H}_2\text{O}$ $\text{MgCO}_3 + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2\text{O} + \text{CO}_2$ $\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2$ • Add substance to warm acid until in excess • Filter off excess solid, pour remaining solution into evaporating dish • Heat/leave to evaporate • Pure crystals will form • Dry with absorbent paper/leave to dry 1-2 marks: simple/incomplete plan that tries to link procedure and technique OR equipment and substances named 3-4 marks: plan partially complete plan and some equipment or substances; equations correct, not balanced 5-6 marks: well supported plan with suitable equipment and substances named; equations correct and balanced	(1)

(Total for Question 2 = 6 marks)

	Answer	Marks						
3. (a) (i)	To make it liquid	(1)						
3. (a) (ii)	Three points from the following: • Liquid air goes into the fractionating column • Liquid air warms/heats/boils • Top of the column has nitrogen/ lower boiling point • Bottom of the column has oxygen/higher boiling point	(3)						
3. (b)	Middle row should be shaded: <table border="1"> <tr> <th>Boiling Point</th><th>Viscosity</th><th>Ease of Ignition</th></tr> <tr> <td>Lower than A</td><td>Lower than A</td><td>Easier than A</td></tr> </table>	Boiling Point	Viscosity	Ease of Ignition	Lower than A	Lower than A	Easier than A	(1)
Boiling Point	Viscosity	Ease of Ignition						
Lower than A	Lower than A	Easier than A						
3. (c) (i)	Diesel oil	(1)						
3. (c) (ii)	Fuel oil	(1)						
3. (c) (iii)	Gases/gas	(1)						

(Total for Question 3 = 8 marks)

	Answer	Marks																				
4. (a)	Separating funnel	(1)																				
4. (b)	Sodium chloride solution	(1)																				
4. (c)	<table><tr><th></th><th>Fractional distillation</th><th>Simple distillation</th><th>Filtration</th><th>crystallisation</th></tr><tr><td>Separate ethanol from water</td><td></td><td>✓</td><td></td><td></td></tr><tr><td>Separate sand from a mixture of sodium chloride solution</td><td></td><td></td><td>✓</td><td></td></tr><tr><td>Copper sulphate crystals from copper sulphate solution</td><td></td><td></td><td></td><td>✓</td></tr></table>		Fractional distillation	Simple distillation	Filtration	crystallisation	Separate ethanol from water		✓			Separate sand from a mixture of sodium chloride solution			✓		Copper sulphate crystals from copper sulphate solution				✓	(3)
	Fractional distillation	Simple distillation	Filtration	crystallisation																		
Separate ethanol from water		✓																				
Separate sand from a mixture of sodium chloride solution			✓																			
Copper sulphate crystals from copper sulphate solution				✓																		

(Total for Question 4 = 5 marks)

	Answer	Marks
5. (i)	Gaseous state/gas	(1)
5. (ii)	Reversible reaction	(1)

(Total for Question 5 = 2 marks)

	Answer	Marks
6. (a)	Solid, liquid and gas correctly identified. (1 mark each)	(3)
6. (b)	Physical (Also accept temporary/non-permanent.)	(1)
6. (c) (i)	Melting	(1)
6. (c) (ii)	Evaporating	(1)
6. (c) (iii)	Condensing	(1)

(Total for Question 6 = 7 marks)

	Answer	Marks
7. (a)	Safe to drink	(1)
7. (b)	To remove undissolved solids	(1)
7. (c) (i)	Chlorine	(1)
7. (c) (ii)	Bleach on litmus paper	(1)
7. (c) (iii)	It sterilises the water	(1)
7. (d) (i)	Any four from the following: Icebergs are solid ice (1) When they melt, the ice turns to liquid/water (1) This water adds to the water in the lake (1) Water evaporates from the sea (1) so water turns into air (1) Air rises and cools (1) Water condenses (1) Drops fall as rain/snow into lake (1)	(4)
7. (d) (ii)	Solid materials are removed by filtration. Microbes are removed by sterilisation.	(4)

(Total for Question 7 = 13 marks)