

	Total	Che m 1	Che m 3	Che m 4	Che m 5	Che m 6	Che m 7	Che m 8	Che m 9	Che m 10	Che m 11	Che m 12	Che m 13	Che m 14
Total Marks	2320	74	312	155	81	26	256	246	85	296	231	76	24	474
% of Marks	2336	3.2	13.4	6.6	3.5	1.1	11.0	10.5	3.6	12.7	9.9	3.3	1.0	20.3
# of Questions		19	59	39	18	6	47	54	19	58	48	14	5	80
Average marks per Q		3.9	5.3	4.0	4.5	4.3	5.4	4.6	4.5	5.1	4.8	5.4	4.8	5.9

Topic	14	3	10	7	8	11	4	5	9	1	12	6	13
Rank ALL Papers	2	4	5	3	1	6	9	8	11	7	12	10	13
Rank P3: A* Focus	1	2	3	4	5	6	7	8	9	10	10	12	13
All Syllabus Word Count RANK	1	2	5	3	6	4	9	7	10	8	12	11	13

CIE iGCSE Chemistry Syllabus Details

(syllabus code 0620)

The core material is examined in all three exam papers (papers 1,3 and 6) and is intended to assess understanding up to a grade C level. From 2016, the Supplement material is **examined in all three papers**, however, before 2016 papers 1 and 6 did not contain any Supplement material. If the number of marks that can be awarded above a C grade will remain the same, in practice this means that:

- Paper 3 will contain fewer Supplement marks, so more core marks so will be easier (if you can answer the Paper 3 questions from before 2016 then you will be fine)
- Papers 1 and 3 will contain Supplement marks, unlike in all papers before 2016, so will assess material they have not done before, so will be harder because of the questions and as there are no previous questions to practice on, will be harder because of the newness.



2 Experimental techniques

2.1 Measurement

Core

- Name appropriate apparatus for the measurement of time, temperature, mass and volume, including burettes, pipettes and measuring cylinders

2.2 Purity

2.2.1 Criteria of purity

Core

- Demonstrate knowledge and understanding of paper chromatography
- Interpret simple chromatograms
- Identify substances and assess their purity from melting point and boiling point information
- Understand the importance of purity in substances in everyday life, e.g. foodstuffs and drugs

Supplement

- Interpret simple chromatograms, including the use of R_f values
- Outline how chromatography techniques can be applied to colourless substances by exposing chromatograms to substances called locating agents. (Knowledge of *specific* locating agents is **not** required.)

2.2.2 Methods of purification

Core

- Describe and explain methods of purification by the use of a suitable solvent, filtration, crystallisation and distillation (including use of a fractionating column). (Refer to the fractional distillation of petroleum in section 14.2 and products of fermentation in section 14.6.)
- Suggest suitable purification techniques, given information about the substances involved

Q# 1/ iGCSE Chemistry/2014/s/Paper 31/ Q2

(b) In many regions, drinking water is obtained by the distillation of sea-water. Explain how distillation separates the water from sea-water.

.....

.....

..... [2]

Q# 2/ iGCSE Chemistry/2012/w/Paper 31/

Butane and propane are both gases, silver chloride is a salt that is insoluble in water, glucose and maltose are both sugars.

1 A list of techniques used to separate mixtures is given below.

- filtration
- diffusion
- fractional distillation
- simple distillation
- crystallisation
- chromatography



From this list, choose the most suitable technique to separate the following mixtures.
A technique may be used once, more than once or not at all.

- (a) butane from a mixture of propane and butane [1]
- (b) oxygen from liquid air [1]
- (c) water from aqueous magnesium sulfate [1]
- (d) potassium chloride from aqueous potassium chloride [1]
- (e) silver chloride from a mixture of silver chloride and water [1]
- (f) glucose from a mixture of glucose and maltose [1]

[Total: 6]

Q# 3/ iGCSE Chemistry/2011/s/Paper 31/

1 The following techniques are used to separate mixtures.

- | | | |
|------------------------------|----------------------------------|----------------------|
| A simple distillation | B fractional distillation | C evaporation |
| D chromatography | E filtration | F diffusion |

From this list, choose the most suitable technique to separate the following.

- (a) methane from a mixture of the gases, methane and ethane [1]
- (b) water from aqueous magnesium sulfate [1]
- (c) glycine from a mixture of the amino acids, glycine and lysine [1]
- (d) iron filings from a mixture of iron filings and water [1]
- (e) zinc sulfate crystals from aqueous zinc sulfate [1]
- (f) hexane from a mixture of the liquids, hexane and octane [1]

[Total: 6]

Q# 4/ iGCSE Chemistry/2010/s/Paper 31/Q4 (b)

(iii) A protein can be hydrolysed to a mixture of amino acids which are colourless. Individual amino acids can be identified by chromatography. The R_f value of the amino acid glycine is 0.5. Describe how you could show that glycine was present on a chromatogram.

.....
.....
..... [3]



Q# 5/ iGCSE Chemistry/2009/w/Paper 3/

4 The distinctive smell of the seaside was thought to be caused by ozone, O₃.
Ozone is a form of the element oxygen.

(a) A mixture of oxygen and ozone is formed by passing electric sparks through oxygen.



Suggest a technique that might separate this mixture. Explain why this method separates the two forms of oxygen.

technique

explanation

.....

.....

..... [2]

Q# 6/ iGCSE Chemistry/2009/s/Paper 31/

1 Some grass is crushed and mixed with the solvent, propanone. The colour pigments are extracted to give a deep green solution.

(a) (i) Draw a labelled diagram to describe how you could show that there is more than one coloured pigment in the green solution.

[3]

(ii) Given a pure sample of chlorophyll, how could you show that the green solution from the grass contained chlorophyll?

.....

.....

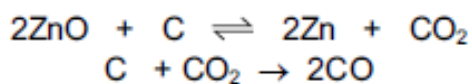
.....

..... [2]



Q# 7/ iGCSE Chemistry/2007/w/Paper 3/ Q4

(b) Some of the zinc oxide was mixed with an excess of carbon and heated to 1000 °C. Zinc distils out of the furnace.



(i) Name the **two** changes of state involved in the process of distillation.

..... [2]

Q# 8/ iGCSE Chemistry/2007/w/Paper 3/

Helium and argon are gases at room temperature.

Barium sulphate does not dissolve in water.

1 A list of techniques used to separate mixtures is given below.

fractional distillation	simple distillation	crystallization	filtration	diffusion
--------------------------------	----------------------------	------------------------	-------------------	------------------

From the list choose the most suitable technique to separate the following.

water from aqueous copper(II) sulphate

helium from a mixture of helium and argon

copper(II) sulphate from aqueous copper(II) sulphate

ethanol from aqueous ethanol

barium sulphate from a mixture of water and barium sulphate [5]

Q# 9/ iGCSE Chemistry/2007/s/Paper 3/ Q5

(iii) Suggest how you could separate the metal, titanium, from the soluble salt magnesium chloride.

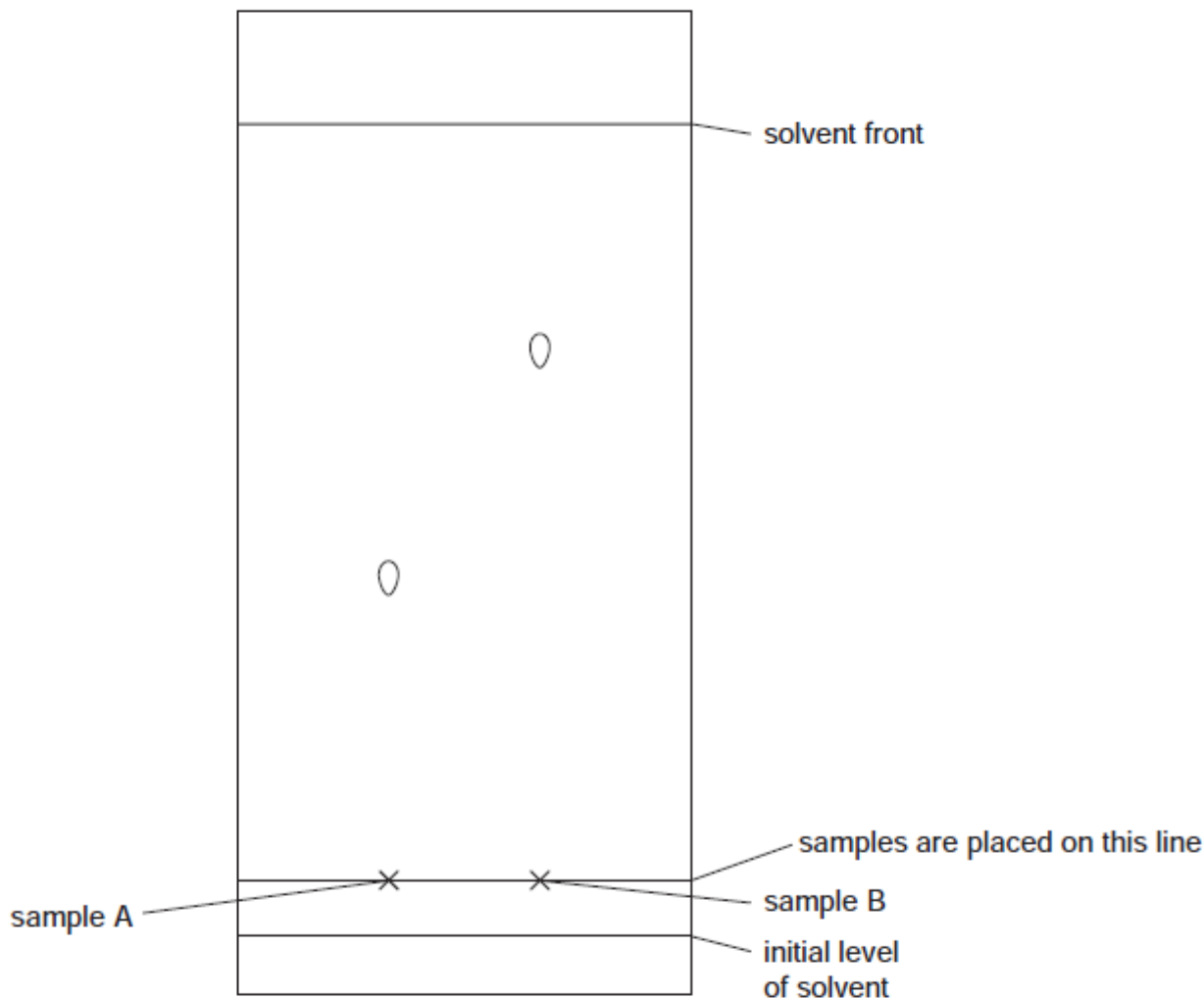
..... [2]

Q# 10/ iGCSE Chemistry/2005/s/Paper 3/

5 Enzymes are biological catalysts. They are used both in research laboratories and in industry.

(a) Enzymes called proteases can hydrolyse proteins to amino acids. The amino acids can be separated and identified by chromatography. The diagram below shows a typical chromatogram.





- (i) The R_f value of a sample = $\frac{\text{distance travelled by sample}}{\text{distance travelled by solvent front}}$

Some R_f values for amino acids are:

glutamic acid = 0.4 glycine = 0.5 alanine = 0.7 leucine = 0.9

Identify the two amino acids on the chromatogram.

A is B is [2]

- (ii) Explain why the chromatogram must be exposed to a locating agent before R_f values can be measured.

..... [1]

- (iii) Measuring R_f values is one way of identifying amino acids on a chromatogram. Suggest another.

..... [1]

Q# 11/ iGCSE Chemistry/2003/w/Paper 3/ Q3 (d)



(iii) Explain why the chromatogram must be sprayed with a locating agent before the amino acids can be identified.

.....
.....[1]

(iv) Explain how it is possible to identify the amino acids from the chromatogram.

.....
.....[2]

Mark Scheme iG Chem 2 EQ P3 15w to 01s 4Teachers NEW 40marks

Q# 1/ iGCSE Chemistry/2014/s/Paper 31/ Q2

(b) boiling or turning to steam (1)

then condensing / condensation (1)

[2]

Q# 2/ iGCSE Chemistry/2012/w/Paper 31/

1 (a) diffusion or fractional distillation;

(b) fractional distillation;

(c) simple distillation;

(d) crystallisation;

(e) filtration;

(f) chromatography;

Q# 3/ iGCSE Chemistry/2011/s/Paper 31/

1 (a) F or B diffusion / fractional distillation [1]

(b) A simple distillation [1]

(c) D chromatography [1]

(d) E filtration [1]

(e) C evaporation [1]

(f) B fractional distillation [1]

Q# 4/ iGCSE Chemistry/2010/s/Paper 31/ Q4 (b)

(iii) use locating agent [1]
measure distance travelled by sample / travelled by solvent front [1]
cond this is $R_f = 0.5$ [1]
for mark 3, either mark 1 or mark 2 must be awarded

accept run a chromatogram of glycine [1]
compare with sample
same position [1] max [2]



Q# 5/ iGCSE Chemistry/2009/w/Paper 3/

- 4 (a) diffusion [1]
different M_r or ozone molecules heavier than oxygen molecules
or different densities or oxygen molecules move faster than ozone molecules [1]
NOT oxygen is lighter or ozone heavier
- OR** fractional distillation [1]
they have different boiling points [1]

Q# 6/ iGCSE Chemistry/2009/s/Paper 31/

- 1 (a) (i) basic set up – container and chromatography paper [1]
sample clearly above level of solvent [1]
(original mark must be shown and not just the line)
- indication that more than one “spot” either on diagram or as comment [1]
- Allow MAX [2] for round filter paper with green spot at centre
two or more rings
- (ii) run chromatogram of pure chlorophyll can be implied [1]
same position of green spot or same R_f [1]
NOT just a green spot

Q# 7/ iGCSE Chemistry/2007/w/Paper 3/ Q4

- (b) (i) vapourisation or boiling or evaporation [1]
condensation or liquefaction [1]
NOTE order in which changes are given is not important
NOT liquid => gas => liquid

Q# 8/ iGCSE Chemistry/2007/w/Paper 3/

- 1 simple distillation [1]
diffusion or fractional distillation [1]
crystallisation [1]
fractional distillation [1]
filtration [1]
NOTE As the candidate are selecting from a list, the above are the only acceptable responses. [Total: 5]

Q# 9/ iGCSE Chemistry/2008/s/Paper 31/ Q5

- (iii) add water (to dissolve salt) [1]
filter or centrifuge [1]

Q# 10/ iGCSE Chemistry/2005/s/Paper 3/

- 5 (a) (i) A is glutamic acid [1]
B is alanine [1]
Accept names only, **NOT** R_f values
- (ii) because acids are colourless or to make them visible [1]
or to show positions of the samples or distance travelled
- (iii) compare with known acids or reference samples or standards [1]
Accept from colours of samples

Q# 11/ iGCSE Chemistry/2003/w/Paper 3/ Q3 (d)

- (iii) amino acids are colourless or become visible/coloured [1]
or to develop it [1]
- (iv) using colour or from position **ONLY** [1]
OR discussion of R_f [2]
OR compare with known amino acids [2]

