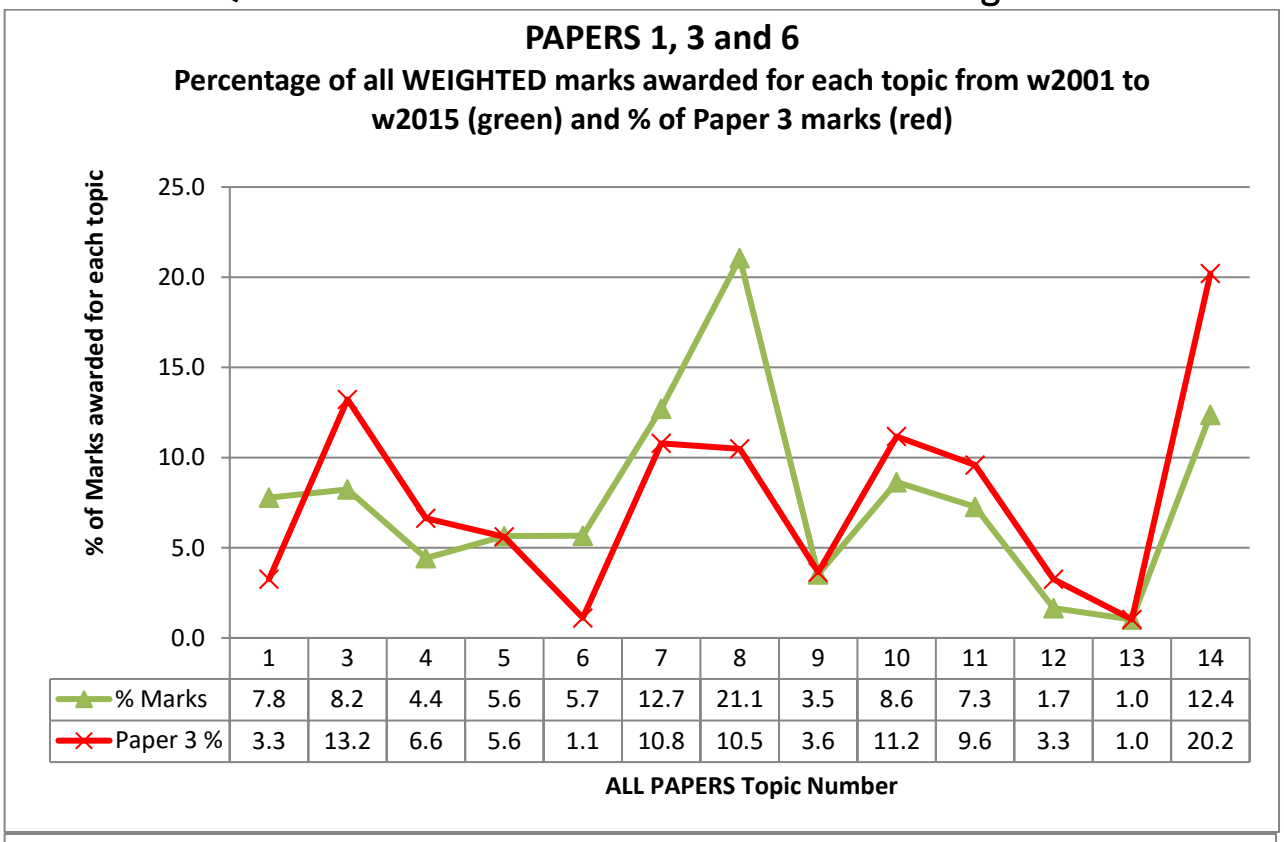
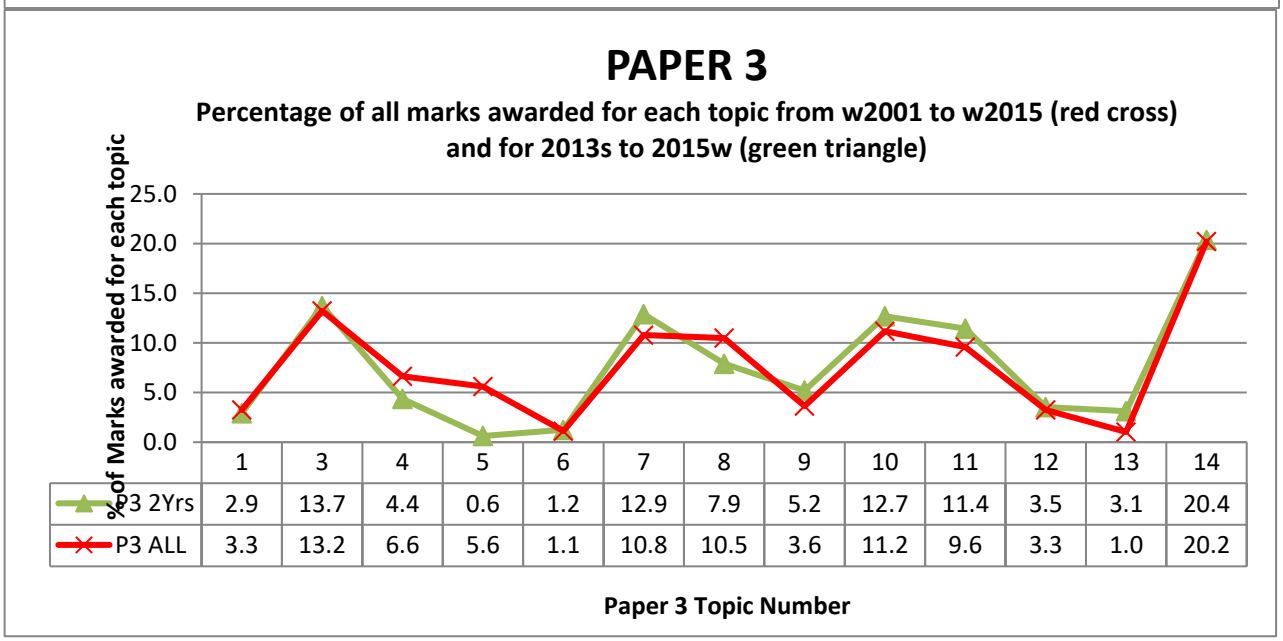
iG Chem 1 EQ P3 15w to 01s 4Students NEW 56marks 13Pgs





	Total	Chem 1	Chem 3	Chem 4	Chem 5	Chem 6	Chem 7	Chem 8	Chem 9	Chem 10	Chem 11	Chem 12	Chem 13	Chem 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**

	1st Paper	1st P rank	Last Paper	Last P rank	Total # Papers	Marks/ paper	Theor. All Papers	Actual All Marks	Difference	Weight per paper	Weight per mark
Paper 1	**2002s**	**5**	**2012w**	**26**	**22**	**40**	**880**	**869**	**-11**	**30**	**0.75**
Paper 3	**2001w**	**4**	**2015w**	**32**	**29**	**80**	**2320**	**2336**	**16**	**50**	**0.625**
Paper 6	**2001w**	**4**	**2015w**	**32**	**29**	**60**	**1740**	**1890**	**150**	**20**	**0.625**

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 – Changes from 2016 onwards

(syllabus code 0620)

Before 2016:

For the highest grades students had to sit three different papers (P1, P3 & P6):

Paper 1 (multiple choice) was easier (didn't contain supplement material)

Paper 3 was the extension paper, needed to get grades higher than a C

2016 and later:

Still need to sit three papers (**P2, P4 & P6**), but:

Paper 2 is a new multiple choice paper which also contains supplement material (is harder)

Paper 4 is the new name for the extension paper. So **if you are looking for the types of questions that you will be asked on Paper 4 from 2015 and earlier they will be found in paper 3 revision packs.**

Material that is new or changed in 2016 is highlighted with BLACK LINES next to it.

1. The particulate nature of matter	
Core	**Supplement**
• State the distinguishing properties of solids, liquids and gases	
• Describe the structure of solids, liquids and gases in terms of particle separation, arrangement and types of motion	
• Describe changes of state in terms of melting, boiling, evaporation, freezing, condensation and sublimation	• Explain changes of state in terms of the kinetic theory
• Describe qualitatively the pressure and temperature of a gas in terms of the motion of its particles	
• Show an understanding of the random motion of particles in a suspension (sometimes known as Brownian motion) as evidence for the kinetic particle (atoms, molecules or ions) model of matter	• Describe and explain Brownian motion in terms of random molecular bombardment
• Describe and explain diffusion	• State evidence for Brownian motion • Describe and explain dependence of rate of diffusion on molecular mass
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	

2.2.1 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 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# 6/ 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]

Q# 7/ 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# 8/ iGCSE Chemistry/2010/s/Paper 31/

2 Ozone is a form of oxygen. Ozone is present in the upper atmosphere and it prevents dangerous solar radiation from reaching the Earth's surface. Some of the chemicals that diffuse into the upper atmosphere decompose ozone. Chemicals that have this effect are methane (CH_4), chloromethane (CH_3Cl) and an oxide of nitrogen (NO_2).

(i) Which of these three chemicals diffuses the most slowly? Give a reason for your choice.

.....

.....

..... [2]

Q# 9/ iGCSE Chemistry/2009/w/Paper 3/

4 The distinctive smell of the seaside was thought to be caused by ozone, O_3.
Ozone is a form of the element oxygen.

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

$$3O_2 \rightleftharpoons 2O_3$$

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

technique .....

explanation .....

.....

.....

..... [2]

Q# 10/ 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# 11/ 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.

$$2ZnO + C \rightleftharpoons 2Zn + CO_2$$
$$C + CO_2 \rightarrow 2CO$$

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

..... [2]

Q# 12/ iGCSE Chemistry/2007/w/Paper 3/

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# 13/ iGCSE Chemistry/2007/s/Paper 3/ Q5

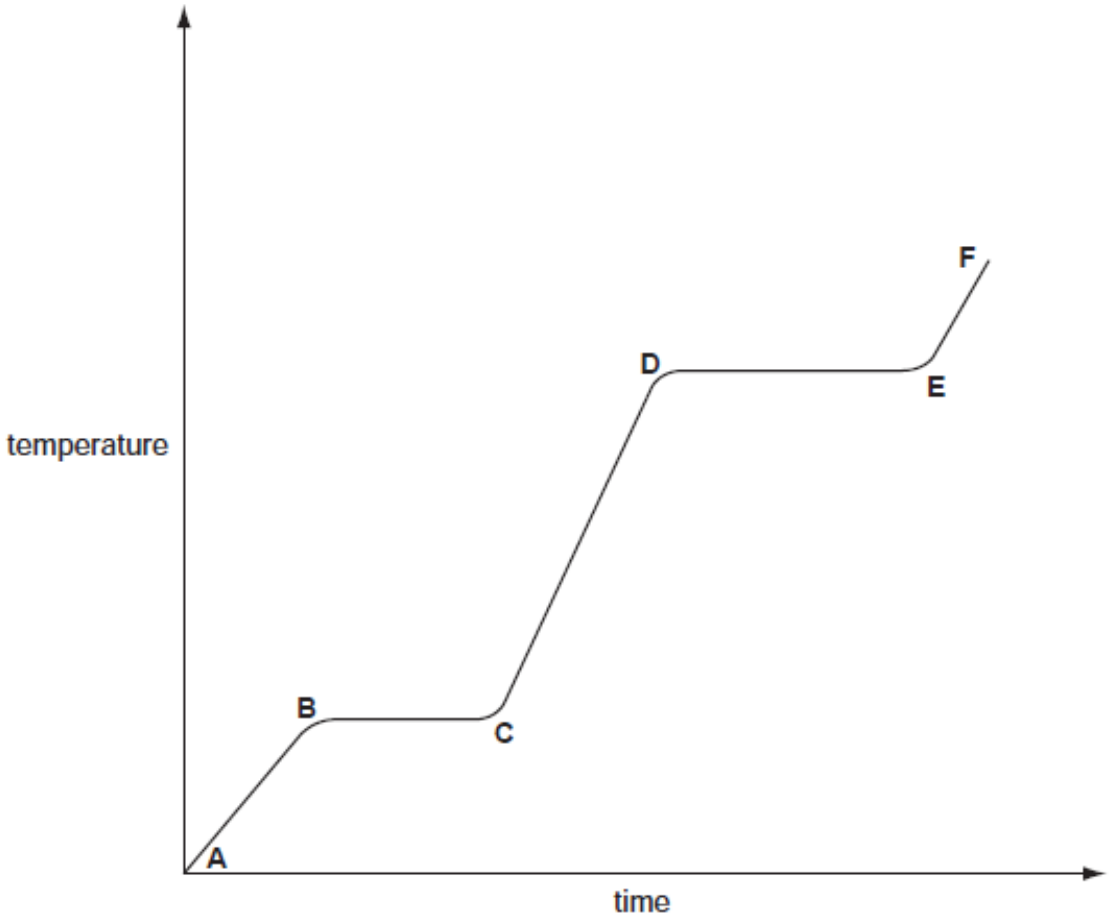
(iii) Suggest how you could separate the metal, titanium, from the soluble salt magnesium chloride.

.....

..... [2]

2 Ethanoic acid is a colourless liquid at room temperature. It has the typical acid properties and forms compounds called ethanoates.

(a) A pure sample of ethanoic acid is slowly heated from 0°C to 150°C and its temperature is measured every minute. The results are represented on the graph below.



(i) Name the change that occurs in the region **D** to **E**.

..... [1]

(ii) What would be the difference in the region **B** to **C** if an impure sample had been used?

..... [1]

(iii) Sketch on the graph how the line would continue if the acid was heated to a higher temperature. [1]

(iv) Complete the following table that compares the separation and movement of the molecules in regions **C** to **D** with those in **E** to **F**.

	C to **D**	**E** to **F**
separation (distance between particles)	.....	.....
movement of particles	random and slow	....
Can particles move apart to fill any volume?	.....	.....

[5]

Q# 15/ iGCSE Chemistry/2005/s/Paper 3/ QiGCSE Chemistry/201

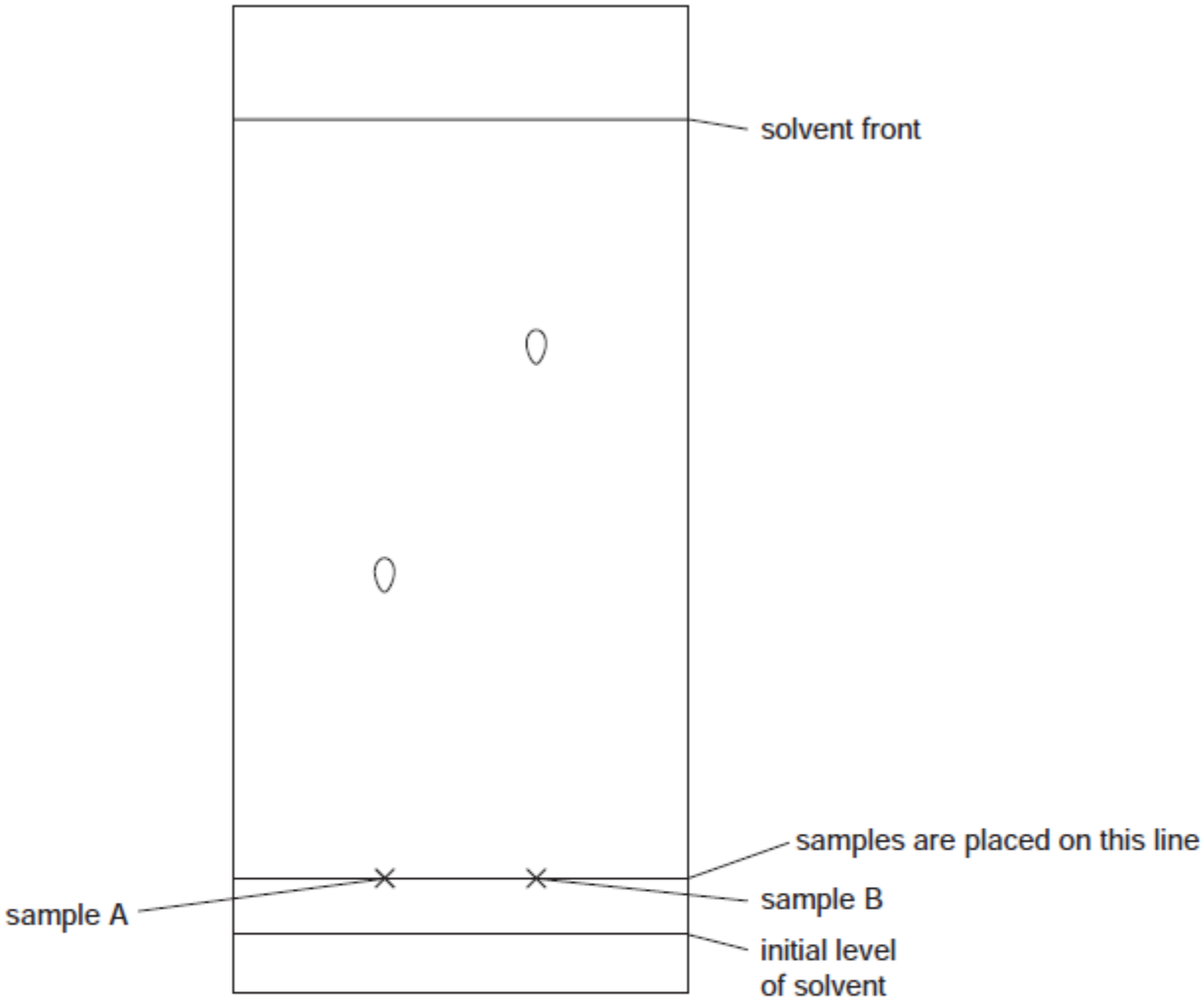
(d) Traces of chlorine can be separated from bromine vapour by diffusion.
Which gas would diffuse the faster and why?

.....

..... [2]

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# 17/ 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]

Q# 18/ iGCSE Chemistry/2003/w/Paper 3/

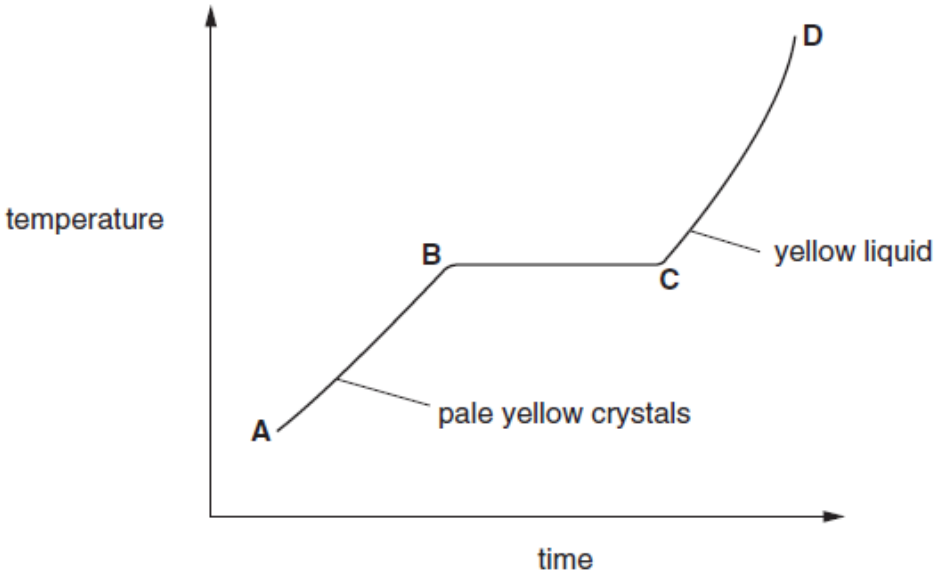
4 Esters occur naturally in plants and animals. They are manufactured from petroleum. Ethyl ethanoate and butyl ethanoate are industrially important as solvents.

(a) (i) Explain the term *solvent*.

.....[1]

Q# 19/ iGCSE Chemistry/2003/s/Paper 3/ Q4

(b) When nitrogen dioxide is cooled, it forms a yellow liquid and then pale yellow crystals. These crystals are heated and the temperature is measured every minute. The following graph can be drawn.



(i) Describe the arrangement and movement of the molecules in the region **A–B**.

.....

.....

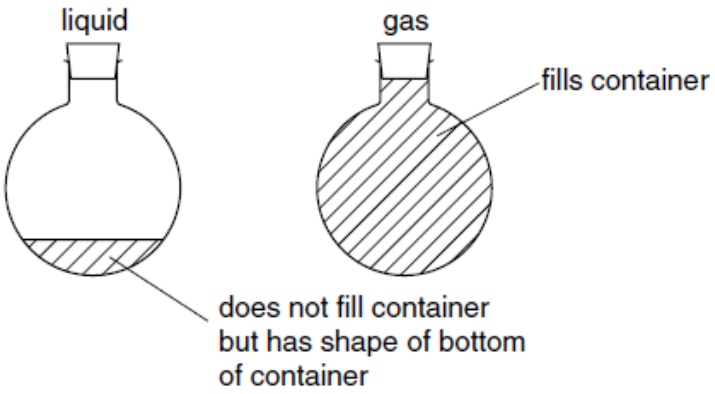
(ii) Name the change that occurs in the region **B–C**

.....[4]

Q# 20/ iGCSE Chemistry/2002/s/Paper 3/

5 (a) The Kinetic Theory explains the properties of solids, liquids and gases in terms of the movement of particles.

Liquids and gases both take up the shape of the container but a gas always fills the container. Explain this, using the ideas of the Kinetic Theory.



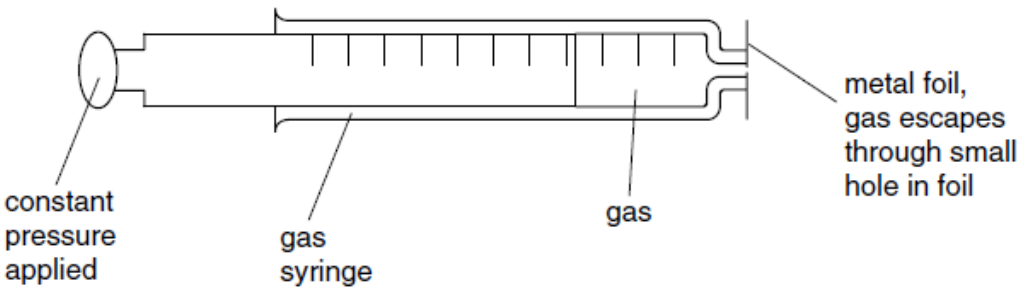
.....

.....

.....

.....[4]

(b) The following apparatus can be used to measure the rate of diffusion of a gas.



(i) What measurements would need to be taken to calculate the rate of diffusion of a gas?

.....[2]

(ii) Which gas, carbon dioxide or sulphur dioxide, would diffuse faster?
Explain your choice.

.....

.....

.....[3]

Mark Scheme

Q# 6/ iGCSE Chemistry/2011/s/Paper 31/

1	(a) F **or** B	diffusion / <u>fractional</u> distillation	[1]
	(b) A	simple distillation	[1]
	(c) D	chromatography	[1]
	(d) E	filtration	[1]
	(e) C	evaporation	[1]
	(f) B	<u>fractional</u> distillation	[1]

Q# 7/ 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# 8/ iGCSE Chemistry/2010/s/Paper 31/

2 **(i)** chloromethane [1]
cond biggest molecular mass / biggest mass of one mole / its molecules
move slowest / heaviest molecule / highest density [1]
accept atomic mass if correct numerical value given
ignore it is the heaviest (gas) / biggest molecule
accept particles or molecules
not atoms

Q# 9/ 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# 10/ 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 Rf [1]
NOT just a green spot

Q# 11/ iGCSE Chemistry/2007/w/Paper 3/ Q4

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

Q# 12/ 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# 13/ iGCSE Chemistry/2008/s/Paper 31/ Q5

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

Q# 14/

Question 2

(a)(i) boiling **[1]**

(ii) lower temperature **or**
over temperature range or no plateau **[1]**

(iii) direct continuation of E to F **[1]**

(iv) close **or** touching far apart **[2]**
fast and random **[1]**
cannot move apart can move apart **[2]**

(b)(i) calcium ethanoate + hydrogen **[1]**

(ii) zinc oxide **or** hydroxide **[1]**

Q# 15/ iGCSE Chemistry/2005/s/Paper 3/ QiGCSE Chemistry/201

(d) chlorine **[1]**
COND lower M_r **or** lower density **or** lighter molecules **or** molecules move faster **[2]**

OR lighter **or** based on A_r MAX [1]
smaller with no additional comment **or** sieve idea [0]
N.B. a total of [3] not [2]

Q# 16/ 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# 17/ iGCSE Chemistry/2003/w/Paper 3/ Q3 (d)

(iii) amino acids are colourless **or** become visible/coloured
or to develop it [1]

(iv) using colour **or** from position **ONLY** [1]
OR discussion of Rf [2]
OR compare with known amino acids [2]

Q# 18/ iGCSE Chemistry/2003/w/Paper 3/

4 (a) (i) in which something dissolves [1]

Q# 19/ iGCSE Chemistry/2003/s/Paper 3/ Q4

(b) (i) close **or** tightly packed **[1]**
ordered **or** lattice **[1]**
vibrational **[1]**
NOT forces

(ii) melting **or** freezing **or** fusion **or** solidification **[1]**

Q# 20/ iGCSE Chemistry/2002/s/Paper 3/Q5 (a)

Particles are free to move in both liquids and gases,
so they can change their shape;
In a gas, there are no bonds between particles, so they are free to assume the volume of the container
In a liquid the particles are connected together by bonds, so can only change their shape, not their volume
Total 4 marks

5 (b) (i)
Time taken
For volume to decrease 2 marks

(ii) Carbon dioxide
Because it has a Mr of 44, SO_2 has an Mr of 64
Molecules with smaller mass diffuse more quickly
3 marks