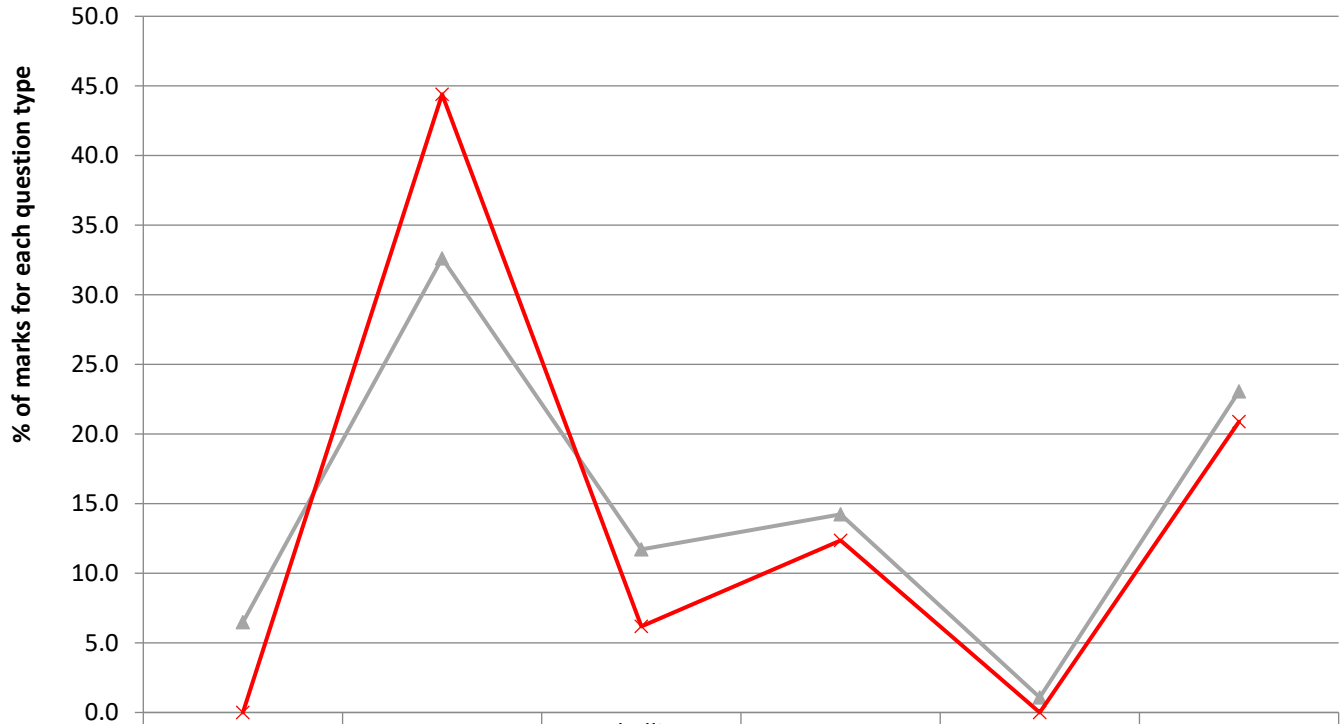
iG Chem ALL EQ P6 17w to 16m Essay questions 79marks

PAPER 6 - Question types

Percentage of all marks awarded for each question type from w2001 to w2015 (red crosses) and from m2016 to w2017 (green triangles)



	Misc	Graph	Labelling Equipment	Essay	Gas test	Ions test
2016-17	6.5	32.6	11.7	14.2	1.1	23.1
2001-15	0.0	44.4	6.2	12.4	0.0	20.9

Paper 6 Question type

AO3 Experimental skills and investigations

Candidates should be able to:

- demonstrate knowledge of how to safely use techniques, apparatus and materials (including following a sequence of instructions where appropriate)
- plan experiments and investigations
- make and record observations, measurements and estimates
- interpret and evaluate experimental observations and data
- evaluate methods and suggest possible improvements.

Weighting for assessment objectives

The approximate weightings allocated to each of the assessment objectives (AOs) are summarised below.

Assessment objectives as a percentage of the qualification

Assessment objective	Weighting in IGCSE %
AO1 Knowledge with understanding	50
AO2 Handling information and problem solving	30
AO3 Experimental skills and investigations	20

Assessment objectives as a percentage of each component

Assessment objective	Weighting in components %		
	Papers 1 and 2	Papers 3 and 4	Papers 5 and 6
AO1 Knowledge with understanding	63	63	0
AO2 Handling information and problem solving	37	37	0
AO3 Experimental skills and investigations	0	0	100

Topic **Chem 1 Q# 1/** iGCSE Chemistry/Paper 6/2017/s/ Time Zone 1/

4 A sample of furniture cleaner contains aqueous sodium chloride, aqueous ammonia and sand.

(b) Plan an investigation to obtain a sample of

(i) pure water from the mixture, ...

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(ii) pure sand from the mixture. .....

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4 A liquid cleaner is a mixture of three substances. These substances are shown in the table.

name of substance	properties of substance
water	liquid, boiling point 100 °C
sodium carbonate	solid, soluble in water
silica	solid, insoluble in water

Plan an experiment to obtain separate pure samples of each substance from the mixture in the liquid cleaner. You are provided with common laboratory apparatus.

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4 The label on a bottle of orange drink stated 'contains no artificial colours'. A scientist thought that the orange colour in the drink was a mixture of two artificial colours:

- Sunset Yellow E110
- Allura Red E129

Plan an investigation to show that the orange colour in the drink did **not** contain these two artificial colours.
You are provided with samples of E110, E129 and the orange colouring from the drink. You are also provided with common laboratory apparatus.
You may draw a diagram to help answer the question.

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Topic **Chem 4 Q# 4/** iGCSE Chemistry/Paper 6/2017/w/ Time Zone 3/

4 Washing soda crystals are crystals of hydrated sodium carbonate, $Na_2CO_3.10H_2O$. When exposed to the air, some of the water is lost from the crystals and a new substance is formed. This process occurs faster in hotter climates.

Plan an experiment to determine the percentage of water by mass present in the new substance.

You are provided with common laboratory apparatus.

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Topic **Chem 4 Q# 5/** iGCSE Chemistry/Paper 6/2017/s/ Time Zone 2/

4 Calcium carbonate and kaolinite are both white solids found in sedimentary rocks.

Calcium carbonate reacts with dilute hydrochloric acid to form aqueous calcium chloride. Kaolinite does **not** react with dilute acids.

You are provided with a mixture of calcium carbonate and kaolinite and access to dilute hydrochloric acid.

Plan an experiment to determine the percentage by mass of calcium carbonate in the mixture.

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Topic **Chem 4 Q# 6/** iGCSE Chemistry/Paper 6/2016/s/ Time Zone 1/

4 Calcium burns in air to form calcium oxide. The reaction is vigorous and some of the calcium oxide can be lost as smoke.
Plan an investigation to determine the maximum mass of oxygen that combines to form calcium oxide when 2 g of calcium granules are burnt in air.
You are provided with common laboratory apparatus and calcium granules.

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Topic **Chem 5 Q# 7/** iGCSE Chemistry/Paper 6/2016/w/ Time Zone 2/

4 Metal rings can be coated with a layer of copper using electricity.
Plan an experiment to electroplate a small metal ring with copper.
You are provided with common laboratory apparatus, a copper rod, copper(II) sulfate crystals, water and a small metal ring.
Include a labelled diagram in your answer.

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Topic **Chem 6 Q# 8/** iGCSE Chemistry/Paper 6/2017/m/ Time Zone 2/

4 When solid barium hydroxide is added to solid ammonium chloride a reaction takes place.

(a) Describe an experiment to show that this reaction is endothermic.

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Topic **Chem 7 Q# 9/** iGCSE Chemistry/Paper 6/2016/s/ Time Zone 3/

4 Nickel sulfate-6-water, $NiSO_4.6H_2O$, is a blue crystalline salt.

Plan an experiment to obtain a sample of pure water from this salt. Your answer should include a diagram of the apparatus, any expected observations and a test to show the presence of pure water.
You are provided with common laboratory apparatus.

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Topic **Chem 8 Q# 10/** iGCSE Chemistry/Paper 6/2016/w/ Time Zone 1/

4 Agri Limes are mixtures of calcium carbonate and calcium oxide. Farmers use Agri Limes on fields to neutralise acidity.

Plan an investigation to find out which of **two** different Agri Limes, **Q** or **R**, will neutralise more acid.
You are provided with common laboratory apparatus and chemicals, including dilute nitric acid.

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Topic **Chem 8 Q# 11/** iGCSE Chemistry/Paper 6/2016/s/ Time Zone 2/

4 Potassium sulfate is the salt produced when sulfuric acid is neutralised by potassium hydroxide solution.
The correct amount of potassium hydroxide solution must be added to neutralise all of the sulfuric acid.
Plan an experiment to obtain pure crystals of potassium sulfate from sulfuric acid and potassium hydroxide solution.
You are provided with common laboratory apparatus.

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Topic **Chem 10** **Q# 12/** iGCSE Chemistry/Paper 6/2017/w/ Time Zone 1/

4 Iron, tin and zinc all react with dilute hydrochloric acid to produce hydrogen.
Plan an experiment to determine the order of reactivity of iron, tin and zinc.
You are provided with powdered samples of the metals and common laboratory apparatus.

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4 Cassiterite is a naturally occurring form of tin oxide.

Describe how you would

- obtain a sample of tin from a large lump of cassiterite in the laboratory,
- determine the percentage by mass of tin present in cassiterite.

Tin is similar in reactivity to iron.

Your answer should include any apparatus and chemicals used and the conditions required.

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4 When iron nails rust, the mass of the nails increases.
Plan an experiment to investigate if iron nails rust more quickly in tap water or in distilled water.
You are provided with new iron nails and common laboratory apparatus.

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Mark Scheme iG Chem ALL EQ P6 17w to 16m Essay questions

Q# 1/ iGCSE Chemistry/Paper 6/2017/s/ Time Zone 1/

4(b)	heat / boil the mixture	1
	condense the vapour	1
4(c)	filter / decant	1
	wash residue (with water)	1
	dry	1

Q# 2/ iGCSE Chemistry/Paper 6/2016/w/ Time Zone 3/

4	**silica** filter (the cleaner) wash the residue dry the residue **water** heat (the filtrate / cleaner) condense the vapour **sodium carbonate** heat to dryness / no liquid left (then solid) sodium carbonate is left **OR** heat until saturated then cool to crystallise / leave to crystallise	6

Q# 3/ iGCSE Chemistry/Paper 6/2016/m/ Time Zone 2/

4	any **6** from: chromatography; (pencil) baseline / origin; apply orange colour to paper; and samples of both E110 and E129; solvent / named solvent; check heights of spots of E colours against orange drink; conclusion / allow comparison to known R_f values;	6

Q# 4/ iGCSE Chemistry/Paper 6/2017/w/ Time Zone 3/

4	*heating to dryness method* max [6]: **M1** weigh (any) sample of washing soda **M2** heat (to remove water of crystallisation) **M3** in named container **M4** cool **M5** reweigh **M6** repeat heating **M7** to constant mass **M8** appropriate calculation suggested for the percentage of water *mass of water method* max [6]: **M1** weigh (any) sample of washing soda **M2** heat to remove water of crystallisation **M3** in named container **M4** using apparatus capable of collecting water (vapour) **M5** cool / condense (water vapour) **M6** continue until no more collects **M7** weigh water **M8** appropriate calculation suggested for the percentage of water	6

Q# 5/ iGCSE Chemistry/Paper 6/2017/s/ Time Zone 2/

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	the filtration method any 6 from: • weigh mixture (of calcium carbonate and kaolinite) • add (dilute) hydrochloric acid • in excess / continue adding until there is no more fizzing / add until no more gas is evolved • filter • wash residue / kaolinite • dry • weigh residue / kaolinite • (change in mass / initial mass) × 100 (%)	

	the gas collection / loss of mass method any 6 from: • weigh mixture (of calcium carbonate and kaolinite) • add (dilute) hydrochloric acid • in excess / continue adding until there is no more fizzing / add until no more gas is evolved • collect gas in a syringe / measure final total mass • measure volume of gas / mass loss • calculate moles of $CaCO_3$ / CO_2 • calculate mass of $CaCO_3$ • (mass of $CaCO_3$ / initial mass) × 100 (%)	
	the calcium chloride method any 4 from: • weigh mixture (of calcium carbonate and kaolinite) • add (dilute) hydrochloric acid • in excess / continue adding until there is no more fizzing / add until no more gas is evolved • filter	1

Q# 6/ iGCSE Chemistry/Paper 6/2016/s/ Time Zone 1/

4	any 6 from: weigh calcium; with lid / cover; heat / burn; allow air to enter / lift lid; cool; reweigh CaO; reheat to constant mass; calculate / find the difference;	6

Q# 7/ iGCSE Chemistry/Paper 6/2016/w/ Time Zone 2/

4	 clean / sandpaper the metal ring dissolve copper(II) sulfate in water / copper(II) sulfate solution set up circuit / switch on electricity / complete circuit copper rod anode(+ ve electrode) metal ring cathode(– ve electrode) rotate the metal ring / agitate remove the metal ring, wash and dry	6

Q# 8/ iGCSE Chemistry/Paper 6/2017/m/ Time Zone 2/

4(a)	any 4 from: **M1** measure initial temperature of (solid) ammonium chloride / barium hydroxide **M2** add barium hydroxide / ammonium chloride / other solid **AND** mix / stir **M3** use a thermometer **M4** measure the temperature of the mixture / final temperature **M5** temperature decreases / test-tube feels cold	4

Q# 9/ iGCSE Chemistry/Paper 6/2016/s/ Time Zone 3/

4	**method** heat the salt; condenser shown on diagram; drops of water / condensation; colour change / blue solid becomes paler; **test pure water** boiling point; 100 °C;	6

Q# 10/ iGCSE Chemistry/Paper 6/2016/w/ Time Zone 1/

4	**method adding Agri Lime to acid** add weighed amount / known mass of Agri Lime **Q** to a known volume of acid with a named indicator added to the acid until the indicator changes colour note the mass of Agri Lime **Q** added repeat with Agri Lime **R** conclusion, e.g. 'the experiment using the smaller amount of Agri Lime is better' **OR** **method adding acid to Agri Lime** use weighed amount / known mass of Agri Lime **Q** add acid to it gradually / from a burette with a named indicator added to the acid until the indicator changes colour note volume of acid added repeat with Agri Lime **R** conclusion, e.g. 'the experiment using the larger volume of acid is better'	6

Q# 11/ iGCSE Chemistry/Paper 6/2016/s/ Time Zone 2/

4	**making the salt** any 4 from: • known volume sulfuric acid; • add named indicator; • add potassium hydroxide solution to the acid until the indicator changes colour / is neutralised; • note / measure the volume of potassium hydroxide solution added; • repeat without indicator **OR** add (decolourising) charcoal; **obtaining crystals** any 2 from: • heat / evaporate solution to crystallising point until half evaporated **OR** until crystals (start to) form **OR** until saturated; • leave to cool; • filter to get crystals; • dry crystals (on filter paper) / leave to dry;	6

Q# 12/ iGCSE Chemistry/Paper 6/2017/w/ Time Zone 1/

4	*reaction with acid method* max [6]: **M1** fixed volume of acid **M2** to fixed mass of metal **M3** measure volume of gas / temperature change **M4** named apparatus for the measurement **M5** after time **M6** repeat with other metals **M7** compare / conclude *displacement method* **M1** add each metal to named tin salt solution **M2** observe if deposit is formed **M3** results, e.g. Zn and Fe positive **M4** repeat with named iron salt **M5** results, e.g. Zn positive **M6** conclude	6

Q# 13/ iGCSE Chemistry/Paper 6/2017/s/ Time Zone 3/

4	any 6 from: • crush lumps • pestle and mortar • weigh cassiterite • heat / reduce • with carbon / CO / more reactive metal, e.g. Zn • weigh tin • (mass of tin / initial mass) × 100 (%)	6

Q# 14/ iGCSE Chemistry/Paper 6/2017/w/ Time Zone 2/

4	*max [6]:* **M1** weigh specified number of nail(s) / specified number of nails **M2** immerse in same volume **M3** samples of tap water and distilled water (in two test-tubes) **M4** for suitable time **M5** dry (in oven) **M6** reweigh nails **M7** compare / conclusion	6