External Assessment Report 2010

Subject	**Chemistry**
Level	**Standard Grade**

The statistics used in this report are pre-appeal.

This report provides information on the performance of candidates which it is hoped will be useful to teachers/lecturers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding. It would be helpful to read this report in conjunction with the published question papers and marking instructions for the Examination.

Comments on candidate performance

General comments

With the high cut-off for Credit Knowledge and Understanding and Problem Solving in recent examinations in mind, there was an attempt to increase the level of demand in the Credit paper.

Feedback points to a more testing paper but still one that is fair and accessible to all. This is reflected in the cut-offs for the examination.

Although it is encouraging to see that the majority of candidates are giving the required number of responses in grid questions, comments suggest that some candidates are still circling the incorrect number of responses or failing to circle any responses. Changes made to the assessment tool have resulted in both examinations being accessible to a large percentage of candidates with literacy difficulties as it allows them to demonstrate their chemical knowledge.

Areas in which candidates performed well

General Level

Q1 (a)	Selecting information (symbol) from data booklet
Q1 (b)	Selecting information (date of discovery) from data booklet
Q1 (c)	Identifying a noble gas
Q3 (b)	Fair testing
Q5 (b)	Selecting information (flame colour) from data booklet
Q6 (a)	Identifying a chemical reaction (photosynthesis)
Q6 (b)	Identifying a chemical reaction (corrosion)
Q9	Identifying correct statements for an atom of sodium (lose of an electron/size)
Q10 (c)	Bonding
Q11 (b) (i)	Presenting information in a bar graph
Q11 (b) (ii)	Fair testing
Q12 (a)	Writing an equation
Q13 (a)	Naming the elements in potassium carbonate
Q13 (b) (iii)	Selecting a procedure (filtration)
Q14 (a)	Presenting information in a table
Q14 (b) (i)	Substances needed for rusting
Q14 (b) (ii)	Sacrificial protection
Q14 (c)	Methods used to preventing rusting
Q15 (b)	Electrolysis
Q15 (c) (i)	Advantage of fuel cells rather than petrol
Q15 (c) (ii)	Source of oxygen for use in fuel cell
Q15 (c) (iii)	Purpose of a catalyst
Q16 (a)	Essential elements for healthy plant growth
Q17 (a)	Identify a family of hydrocarbons (alkane)
Q17 (b) (i)	Labelling diagram (cracking)
Q18 (b) (i)	Describing a relationship between temperature and solubility

Q18 (b) (ii) Predicting a value
Q19 (a) Direction of electron flow
Q19 (b) Explaining why ionic compounds conduct electricity when in solution
Q19 (c) Voltage

Credit Level

Q2 (a) Selecting information from the data booklet (density)
Q5 (a) Using zinc to galvanise iron
Q10 (a) Meaning of synthetic
Q10 (b) (i) Drawing a section of a polymer
Q10 (c) Toxic gas produced when plastic burns
Q12 (a) Test for hydrogen gas
Q12 (b) Presenting information as a line graph
Q12 (c) Predicting volume of gas produced using graph
Q14 (a) Identifying type of bonding in titanium(IV) chloride
Q14 (b) (i) Balancing an equation
Q14 (b) (ii) Predicting reactivity of element (titanium) not in electrochemical series
Q15 (a) Describing a chemical relationship from data in a table
Q15 (b) Predicting a value
Q16 (a) (ii) Percentage mass calculation
Q16 (b) (i) Identifying iron as metal produced in a blast furnace
Q17 (a) Identifying spectator ion
Q18 (a) Unfamiliar context — naming ether
Q20 (a) (i) Unfamiliar context — naming alkanol

Areas which candidates found demanding

General Level

Q2 (b) Test for glucose
Q4 (a) Sparking of air
Q4 (b) Identify oxide which dissolves in water producing an alkaline solution
Q5 (a) Identifying compounds which exist as molecules
Q6 (c) Identifying a chemical reaction (addition)
Q7 (b) Properties of covalent substances (conduction of election)
Q10 (b) Naming gas which produces acid rain (sulphur dioxide)
Q11 (a) (ii) Photosynthesis (water as reactant)
Q12 (b) (i) Property of aluminium when used as a cooking pot
Q13 (b) (i) Identifying a chemical reaction (precipitation)
Q13 (b) (ii) Naming solution formed in precipitation reaction
Q15 (a) Using the term diatomic to describe a molecule made up of two atoms
Q16 (b) Fertilisers
Q16 (c) Location of bacteria which convert nitrogen from air into nitrogen compounds
Q17 (b) (ii) Identifying product from equation (cracking)
Q17 (b) (iii) Naming polymer
Q18 (a) Identifying the term solvent to describe water in dissolving

Areas of common misunderstanding: General Level

Q2 (b) A significant number of candidates thought that iodine solution is used to test for glucose.

Q4 (a) A significant number of candidates circled hydrogen oxide as gas produced by the sparking of air.

Q4 (b) It was evident that candidates had failed to learn the rules for identifying which type of oxide dissolve in water to produce either an alkaline solution or acidic solution.

Q5 (a) Candidates were poorly prepared in this area, ie connecting the term ‘molecule’ to non-metal atoms.

Q6 (c) Many candidates seemed to think that the equation was representing polymerisation rather than an addition reaction.

Q10 (b) It would appear that a significant number of candidates read the first sentence only and answered carbon dioxide.

Q11(a) (i) Although this question was not demanding for the majority of candidates there are still too many candidates describing the test for oxygen as relighting a splint/burning splint.

Q11 (a) (ii) Many candidates successfully identified X as carbon dioxide, however a significant number identified Y as nutrients rather than water.

Q12 (b) (i) Few candidates correctly identified the property as conductor of heat. A significant number of candidates’ answers, although correct properties of aluminium, did not relate to its use as a cooking pot.

Q13 (b) (ii) A significant number of candidates named the solid (copper carbonate) formed in the reaction rather than the solution.

Q16 (b) A significant number of candidates responded to this question in terms of the compound (fertiliser) being too soluble rather than insoluble.

Q16 (c) A large number of candidates said that the bacteria are found in the leaf.

Q17 (b) (ii) Despite needing to use basic arithmetic to identify X a large number of candidates were unable to answer this question correctly. Indeed, many candidates gave answers which did not contain carbon and hydrogen, eg oxygen.

Q18 (a) A significant number of candidates thought that the term was ‘solute’ rather than ‘solvent’.

Q19 (b) Some candidates are still referring to electrons rather than ions, however there has been a significant improvement in this areas from previous years.

Credit Level

Q1 (b)	Use of crude oil fraction (camping gas)
Q2 (b)	Shape of a molecule
Q2 (c)	Formula of type X_2Y_3
Q4 (a)	Identifying starch as a condensation polymer
Q4 (b)	Identifying monosaccharides
Q6 (a)	Identifying cycloalkanes as having general formula C_nH_{2n} / do not decolourise bromine solution
Q7 (a)	Identifying hydrogen as reactant in Haber Process
Q9	Chemical reactions producing a gas
Q10 (b) (ii)	Identifying the type of polymerisation
Q11 (a) (ii)	Identifying carbon dioxide as the gas produced during fermentation
Q11 (b)	Effect of temperature on rate of reaction using enzyme
Q12 (e)	Calculation from an equation
Q13 (a)	Use of a DC supply in identifying products of electrolysis
Q13 (c)	Writing an ionic formula
Q16 (a) (i)	Charge of lead ion
Q17 (c)	Writing an ion-electron equation
Q17 (d)	Labelling a cell
Q18 (b)	Relating formula mass to boiling point — unfamiliar context
Q19 (a)	Calculating average titre volume
Q19 (b)	Titration calculation
Q20 (a) (ii)	Drawing structural formula for unfamiliar molecule
Q20 (b)	Products of combustion

Areas of common misunderstanding: Credit Level

Q1 (b) A significant number of candidates thought that fraction B (4–10 carbon atoms) is used for camping gas rather than fraction A (1–4 carbon atoms). In previous years, candidates were much more successful in this question.

Q4 (a) It is evident that candidates were not prepared in this area.

Q4 (b) As with Q4 (a) candidates were poorly prepared for questions on carbohydrates.

Q5 (b) Although this question did not pose problems for many candidates it was evident that some candidates thought that paint was the correct answer.

Q6 (a) Unlike previous years, candidates were less successful in this area of the Course.

Q7 (a) A significant number of candidates thought that iron was a reactant in the Haber Process.

Q9 Many candidates were successful in answering option A (carbonate and acid), however few candidates recognised an ammonium compound and alkali as also producing a gas (option F). Many candidates thought that an acid and alkali (option C) produced a gas.

Q10 (b) (ii) Many candidates answered this question in terms of condensation polymerisation.

Q11 (a) (ii) A significant number of candidates were not able to state that carbon dioxide was the gas produced. Many candidates gave hydrogen or helium as an answer.

Q11 (b) A large number of candidates failed to realise the significance of the effect of temperature on the rate of a reaction involving an enzyme. Even those candidates who did make the connection answered in terms of the reaction slowing down rather than linking their answer to the effect this would have on how much the balloon inflates.

Q12 (e) Despite being assessed on a fairly regular basis this was answered more poorly than in previous years. Many candidates had working involving the wrong reactant and product.

Q13 (a) A significant number of candidates described what a DC supply is rather than why it must be used, ie allow products to be identified.

Q13 (c) Many candidates had written both a formula and ionic formula for nickel(II) chromate indicating they are unsure of which type was being assessed. Other candidates had written the roman numeral (II) in their ionic formula.

Q16 (a) (i) A significant number of candidates answered in terms of the lead ion being positively charged rather than indicating the size and charge, ie two positive.

Q16 (a (ii) Although the percentage mass question was very well attempted it was unusual to see a number of candidates who tried to write their own formula despite always being given this in the question.

Q17 (b) Although many candidates were able to give ferroxyl as the indicator, a significant number said this would turn pink. Although this can happen it is not the chemical test for Fe^{2+} ions and is not covered in the Standard Grade Arrangements.

Q19 (a) Despite nearly 90% of candidates achieving a Grade 1 for practical abilities, they were unsuccessful at calculating the average titre in the examination. The majority of candidates averaged all three volumes.

Q19 (b) Unlike previous years, the titration calculation was poorly attempted.

Q20 (b) Many candidates answered in terms of the elements present rather than the products of the reaction. A significant number of those who answered carbon dioxide were unable to give water as the second answer and vice versa.

Advice to centres for preparation of future candidates

- Centres should note that in line with the marking of investigations the term ‘amount’ is not acceptable when describing a quantity of liquid. The correct term is ‘volume’.

- Centres should stress to candidates that they should read the entire introduction to a question before attempting the question as many candidates gave carbon dioxide as a poisonous gas without going on to read the second sentence which linked this to acid rain (Q10 (b) General).

- Centres should stress to candidates that in stating the test for oxygen they must mention relighting a glowing splint and not ‘relighting a burning splint’ or ‘relighting splint’.

- Centres should stress to candidates that when asked for a property of a metal it should be specific to the use given in the question.

- Centres should stress to candidates that although a compound contains essential elements for healthy plant growth it cannot be used as fertiliser if it is insoluble.

- Candidates should be encouraged to draw/write the type of formula asked for in the question.

- Centres should stress to pupils that they should use the headings in a table when labelling their graph.

- Centres should stress to pupils that when a question asks for the charge on an ion they should answer in terms of size and charge (Credit Q16 (a)).

- Centres should stress to pupils that when asked for a chemical test they are required to give test and result, eg ferroxyl indicator turns blue, bromine solution decolourised etc.

- The performance of candidates in calculations, ie calculation from an equation, average titre and titration were extremely disappointing. Centres are asked to stress to candidates that they should continue to make every effort to learn basic ‘routines’ for the different types of calculations in the Course. Due to partial marking, a significant number of part-marks can be picked up. There is also the opportunity for ‘follow through’ without further loss of marks once a mistake has been made.

- Centres should continue to help candidates with exam technique. Firstly, some candidates do not read the information in the question carefully and as a result they do not answer the question that is asked. Secondly, some candidates give answers that go beyond the question that is asked, eg in Q11 (b) Credit, some candidates correctly answered the question then went on to explain why this happened. In doing so some of these candidates incorrectly said that the enzyme was killed, this negated their correct answer.

Statistical information: update on Courses

Number of resulted entries in 2009	19473
Number of resulted entries in 2010	18905

Statistical information: performance of candidates

Distribution of overall awards

Grade 1	33.6%
Grade 2	29.2%
Grade 3	24.2%
Grade 4	6.7%
Grade 5	4.0%
Grade 6	1.4%
Grade 7	0.2%
No award	0.7%

Grade boundaries for each assessable element in the subject included in the report

Assessable Element	**Credit Max Mark**	**Grade Boundaries**		**General Max Mark**	**Grade Boundaries**		**Foundation Max Mark**	**Grade Boundaries**	
		1	**2**		**3**	**4**		**5**	**6**
KU	30	22	17	30	20	15	30	12	n/a
PS	30	23	15	30	19	13	30	11	n/a