External Assessment Report 2013

Subject(s)	Chemistry
Level(s)	Standard Grade General and Credit

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

Feedback points to both general and credit level examinations having good course coverage with a wide range of questions, some of which were more testing than others. Both examinations were fair and accessible to all. However, at general level an attempt was made to ease the level of demand to raise the cut off scores towards notional difficulty. This was achieved and is reflected in the cut-off scores for the General 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

Q1(a)	Selecting information from the data booklet: date of discovery
Q1(b)	Identifying the essential element for healthy plant growth
Q1(c)	Selecting information from the data booklet: flame test
Q2(a)	Selecting two experiments to compare the effect of concentration on the rate of the reaction
Q2(b)	Identifying the reaction with the fastest speed of reaction
Q3(b)	Identifying the noble gas
Q5(b)	Identifying the metal used to galvanise iron
Q10(a)	Presenting information in a table with suitable headings
Q10(c)(ii)	Describing a relationship between an independent variable and dependent variable
Q11(a)	Presenting information as a bar chart
Q11(c)	Stating the meaning of the term finite
Q12(a)	Placing metals in order of reactivity from observations
Q12(c)(i)	Naming a metal which does not react with dilute acid
Q12(c)(ii)	Stating a factor that should be kept the same to make a fair comparison
Q13(b)	Identifying carbon dioxide as a reactant in photosynthesis
Q13(c)	Predicting the solubility of oxygen at a specific temperature
Q14(a)	Identifying a process as electrolysis
Q14(b)	Identifying positive metal ions are attracted to the negative electrode during electrolysis
Q14(c)	Suggesting what would be seen at the positive electrode during the electrolysis of copper chloride
Q14(d)	Naming the non-metal element which is suitable for use as electrodes
Q15(a)	Identifying the product of cracking heptane
Q16(a)	Describing the effect of indigestion tablets on the pH of stomach acid
Q16(b)(ii)	Describing the chemical test, including the result, for carbon dioxide
Q16(c)	Writing a molecular formula from a diagram of a molecule
Q17(c)	Stating what is meant by the term exothermic
Q18(a)(ii)	Stating what would happen to voltage when a metal in a cell is replaced with a

	different metal
Q18(b)	Stating an advantage of a battery over mains electricity
Q18(c)(ii)	Calculating the voltage of a cell in a car battery with six cells and a total voltage of 12 volts
Q19(b)(ii)	Naming the technique (filtration) used to separate a solid from a solution

Credit

Q1(a)	Selecting information from the data booklet: melting point
Q1(b)	Identifying the element produced in a blast furnace
Q1(c)	Identifying the test for hydrogen gas
Q3(b)	Identifying the cells to be used to make a fair comparison
Q(5)	Identifying correct statements about the effect of diluting an acidic solution
Q6(c)	Identifying isomers
Q6(d)	Identifying monomers that produce a coploymer
Q7	Identifying statements describing a proton and a neutron
Q9(a)	Writing the formula for the iron ion which turns ferroxyl indicator blue
Q9(c)	Explaining why attaching magnesium to iron protects iron from rusting
Q10(b)	Deducing the relative atomic mass of a sample of copper using the mass number of each isotope and the relative proportions
Q11(a)(i)	Naming a compound from formula
Q11(a)(ii)	Explaining why fertilisers are added to soil
Q11(c)	Naming the organisms present in the root nodules of some plants which convert nitrogen from the atmosphere into nitrogen compounds
Q12(a)	Using the data booklet to state the boiling range of a fraction with chain length from five to eight carbons
Q12(b)	Predicting the density of an alkane with nine carbon atoms
Q14(a)	Identifying a spectator ion in a chemical reaction
Q15(a)	Suggesting a general formula for alkanols
Q15(c)	Using information given, drawing the full structural formula for butanoic acid
Q15(d)	Using examples given, naming the ester produced when pentanol reacts with butanoic acid
Q16(a)	Naming the methods of extraction of metals from ores
Q16(b)(i)	Calculating the percentage by mass of mercury in HgS
Q18(a)(i)	Drawing a line graph

Areas which candidates found demanding

General

Q3(a)	Identifying diatomic molecules
Q4(b)	Identifying the compound which dissolves in water to form an alkaline solution
Q10(c)(i)	Describing a chemical that dissolves in water as a solute
Q11(b)	Describing how coal was formed
Q11(d)	Naming the two products formed when methane burns in a plentiful supply of air
Q18(c)(i)	Naming the metal used to make the plates in a car battery
Q19(a)	Writing the formula for aluminium iodide
Q19(b)(i)	Naming the solution formed when aluminium iodide solution reacts with lead nitrate solution in a precipitation reaction

Credit

Q4(a)	Identifying starch as a condensation polymer
Q4(b)	Identifying two disaccharides
Q4(c)	Identifying carbohydrates which cannot be hydrolysed
Q8	Identifying substances which conduct electricity

Q9(b)	Naming the ion formed from water and oxygen when they accept electrons during rusting
Q10(a)(i)	Writing nuclide notation
Q12(c)(i)	Identifying the elements which must be present in a fuel which produced carbon dioxide and water when burned
Q13(b)	Describing the relationship between temperature and rate of reaction
Q14(b)	Writing an ion -electron equation
Q14(c)(i)	Labelling a diagram of a cell for zinc displacing copper from copper sulphate
Q17(a)	Drawing a diagram showing all outer electrons in a molecule of nitrogen trifluoride
Q17(c)	Calculating the mass of a product from a chemical equation
Q18(b)(i)	Calculating number of moles of acid using information in a titration experiment
Q18(b)(ii)	Calculating the concentration of a solution used in a titration experiment
Q18(c)	Naming the salt produced when dilute sulphuric acid reacts with sodium carbonate

Advice to centres for preparation of future candidates

- Centres should stress to candidates that if they write a formulae equation when a word equation is asked for they will be penalised if any of the formulae is incorrect
- Centres should stress to candidates that an arrow is required to separate reactants and products in an equation and that an equal sign is not acceptable
- Centres should stress to candidates that when writing a word equation all reactants should be on the left hand side of the arrow and all the products should be on the right hand side of the arrow.
- In describing the effect of temperature on the rate of reaction candidates should be encouraged to describe the effect on rate even when the data is given for time.
- Centres should stress to pupils that when asked for the formula for an ion they should show this as Fe^{2+} and not FeII or Fe(II).
- Centres should also stress that the charge on an ion should be written at the top right of the symbol.
- Centres should stress to candidates that when calculating number of moles the volume given in cm^3 needs to be converted to litres.
- Centres should stress to candidates that when asked to describe the effect of a substance on pH then this is referring to a value and not acidity/alkalinity.
- Centres should stress to candidates that the mass of 2NF3 is (2 x 14)+ (6 x 19) and not (2 x 14) + (3 x 19).
- Candidates should stress to candidates that when drawing a diagram showing all outer electrons in a molecule of NF_3 the diagram should show all outer non bonding electrons in both nitrogen and fluorine and not just shared/bonding electrons.
- Centres should stress to candidates that when writing molecular formulae or general formulae the number should be written at the right hand side of the symbol it refers to and the numbers should be smaller than the symbol e.g C2H4 is incorrect, C_2H_4 is correct.
- Centres should highlight to candidates the ion electron equation in page 7 of the data booklet which represents water and oxygen gaining electrons during rusting to form the hydroxide ion.
- Centres should stress to candidates that the **size** and **type** of charge is required when asked for the charge on an ion e.g. charge on the mercury ion in HgS is 2+ or Hg^{2+} and not positive on its own.
- Candidates should be encouraged to balance the equation printed on their exam paper rather than rewrite the equation and then balance it as a transcription error negates correct balancing numbers
- Candidates should be encouraged to draw the arrow showing the direction of electron flow **on the wire** rather than in the space between the wire/voltmeter and ion bridge

Statistical information: update on Courses

STANDARD GRADE

Number of resulted entries in 2012	18747

Number of resulted entries in 2013	18785

Statistical Information: Performance of candidates

Distribution of overall awards

Grade 1	34.4%
Grade 2	28.4%
Grade 3	25.7%
Grade 4	5.0%
Grade 5	5.2%
Grade 6	0.8%
Grade 7	0.0%
No award	0.5%

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	24	19	30	20	15	30	13	-
PS	30	25	16	30	21	15	30	12	-

General commentary on grade boundaries

- While SQA aims to set examinations and create marking instructions which will allow a competent candidate to score a minimum of 50% of the available marks (the notional C boundary) and a well prepared, very competent candidate to score at least 70% of the available marks (the notional A boundary), it is very challenging to get the standard on target every year, in every subject at every level.

- Each year, SQA therefore holds a grade boundary meeting for each subject at each level where it brings together all the information available (statistical and judgemental). The Principal Assessor and SQA Qualifications Manager meet with the relevant SQA Business Manager and Statistician to discuss the evidence and make decisions. The meetings are chaired by members of the management team at SQA.

- The grade boundaries can be adjusted downwards if there is evidence that the exam is more challenging than usual, allowing the pass rate to be unaffected by this circumstance.

- The grade boundaries can be adjusted upwards if there is evidence that the exam is less challenging than usual, allowing the pass rate to be unaffected by this circumstance.

- Where standards are comparable to previous years, similar grade boundaries are maintained.

- An exam paper at a particular level in a subject in one year tends to have a marginally different set of grade boundaries from exam papers in that subject at that level in other years. This is because the particular questions, and the mix of questions, are different. This is also the case for exams set in centres. If SQA has already altered a boundary in a particular year in, say, Higher Chemistry, this does not mean that centres should necessarily alter boundaries in their prelim exam in Higher Chemistry. The two are not that closely related, as they do not contain identical questions.

- SQA's main aim is to be fair to candidates across all subjects and all levels and maintain comparable standards across the years, even as arrangements evolve and change.