Assessment in IGCSE Chemistry 0620

Session 2: Handout 2.3

Which assessment objectives?

The parts of two questions are shown below in summary form.

- *For each part of each question, identify the relevant assessment objectives.*
- *Use the list on p3 of your syllabus to remind you what the objectives are.*

1(a) Describe three things you would see when a small piece of sodium reacts with water.

1(b) Lithium, sodium and potassium are in the same group of the Periodic Table. The following table compares the properties and electronic structure of these elements. Complete the table by filling in the *three* blank spaces.

Element	Boiling point (^oC)	Reaction with water	Electronic structure
Lithium	1342	steady reaction	2.1
Sodium		rapid reaction	
potassium	760		2.8.81

1(c) When potassium burns in chlorine, potassium chloride is formed.

(i) Write a balanced equation for this reaction. Including state symbols.

(ii) Describe a test for chloride ions and give the result.

(iii) Explain why solid potassium chloride does not conduct electricity but when dissolved in water, the solution conducts.

2.(a) The two non metals, sulphur and selenium are on group VI of the Periodic Table.

Sulphuric acid is made from sulphur.
Sulphuric acid is used to make detergents called sulphonates. A hydrocarbon is made to react with oleum (fuming sulphuric acid) to form sulphonic acids. These form salts called sulphonates.

(i) complete the following word equation:

magnesium + sulphonic acid → magnesium sulphonate +

(ii) Sulphonate ions are of the type RSO_3^-, where R is an organic group. What is the formula of magnesium sulphonate?

(iii) How is oleum made in the Contact Process?

1(b) Insoluble and soluble sulphates can each be made from dilute sulphuric acid. Describe how a pure sample of the insoluble salt, lead (II) sulphate, can be made.

1(c) Predict two chemical properties of the non-metal selenium.

1(d) Selenium is used to make a device that can change light energy into electrical energy.

(i) Name the process used in green plants to change light energy into chemical energy.

(ii) Explain how a liquid fuel can be obtained from plant material.

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Session 2: Handout 2.8

Command words - What answer do you expect?

- Command words may require either concise answers or extended answers
- Command words may require either recall or making logical connections between pieces of information
- Some command words require only single word or single figure answers

Use the Glossary of terms in the syllabus to do the following exercise:

1. Which command words require only one word or one figure answers?

2. Which command words definitely require brief answers?

3. Which command words may have more than one meaning?

4. What is the difference between the command words ‘explain’ and describe?

5. What is the difference between the phrase ‘what do you understand by….’ and the command word ‘explain’?

6. What is the difference between the command word ‘suggest’ and the command word‘ explain?

7. Do your students understand these command words? If not, how would you make sure that they do?

Take a copy of a recent 0620 Paper 2 or 3 and analyse it for command words. Which of the command words are most commonly used?

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Session 2: Handout 2.13(a)

Marking equations

Look at the following examples and discuss how many marks you would give each.

(a) Complete the following equation for the synthesis of ammonia from hydrogen and nitrogen.

.... H_2 + N_2 ↔ **....** NH_3 [2]

Candidate A answer: *$2H_2$ + N_2 ↔ $2NH_3$*

Candidate B answer: *three H_2 + N_2 ↔ two NH_3*

(b) Write an equation for the synthesis of ammonia from hydrogen and nitrogen. [2]

Candidate C answer: *3H + 2N ↔ $2NH_3$*

Candidate D answer: *$3H_2$ + N_2 ↔ NH_3*

Candidate E answer: *$4H_2$ + N_2 ↔ $2NH_4$*

(c) Write a word equation for the reaction between chlorine and potassium bromide. [2]

Candidate F answer:
chlorine + potassium bromide → potassium + bromine + chloride

Candidate G answer:
chlorine + potassium bromide → potassium chlorine + bromine

Candidate H answer:
chlorine + sodium bromide → sodium chloride + bromine

Candidate I answer:
C*l*$_2$ + KBr → Br_2 + KC*l*

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Session 2: Handout 2.13(b)

Marking equations: suggested answers

The following are some suggested ways of marking these examples. There is no absolutely correct way of doing this – it will depend on what the examiners agree on when they meet.

Candidate	Mark	Comment
A	1	(lower grade question) only one mistake has been made.
B	1	Even though this is a lower grade question, this IS a symbol equation and therefore numbers and not words are required. It might be argued that 1 mark should be given, since the balance is correct and the candidate has clearly got the right ratio.
C	0	The formulae for nitrogen and hydrogen are not correct, neither is the balancing, even if the symbols are wrong.
D	1	The formulae are all correct so this is worth a mark. The second mark is not gained since the balance is incorrect.
E	1	Although the formula for ammonia is incorrect, this sort of mistake is commonly seen as candidates often confuse ammonia and ammonium. The formula of ammonia has not been given in the question and so the 1 mark could be given for the balance. The mark would not be given for any other formula replacing ammonia e.g. NH, since this would open the possibilities of candidates getting a mark for balance for any incorrect product.
F	0	Although one of the products (bromine) is correct (+1), there are two incorrect products (-2). The marks would be for each of the correct products: one correct + one incorrect would give 1 mark, so two incorrect must be 0.
G	1	There is only one mistake, the substitution of the word ‘chlorine’ for the word ‘chloride’.
H	1	The candidate has made one mistake here, substituting the word ‘sodium’, for the word ‘potassium’. Since the mistake is consistent throughout the equation, it would not be fair to penalise this twice.
I	0	This will depend on how the examiners view the writing of symbol equations in place of word equations. There are basically two mistakes here: (1) not following instructions to write a word equation (2) incorrect balancing of the equation. Even if the symbol equation were correct, some examiners might not be prepared to give the candidate any credit because they have not shown that they understand what a word equation is and they have to prove that they know the names of products.

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Session 2: Handout 2.16(a)

Questions involving longer explanations

Question:
Sodium and chlorine react with each other.
Potassium and fluorine react with each other in a similar way.
Explain why you would expect this. *(3 marks)*

Mark scheme:
Sodium and potassium are in group I/ are in the same group/ potassium and sodium both have one electron in their outer shell

Chlorine and fluorine are in group VII / are in the same group / fluorine and chlorine both have 7 outer electrons in their outer shell

Elements in the same group/ with the same number of outer electrons have similar properties/ reactions

Answer – Candidate A:

Because potassium is in group I so is sodium and fluorine is in group 7 so is chlorine, so they are similar in reactivity due to their extra or missing electron in their outer shell.

Answer – Candidate B:

Sodium and chlorine need to react together because sodium needs to lose and electron for a full outer shell and chlorine needs an electron for a full outer shell. The same goes for potassium and fluorine.

Answer – Candidate C:

They are at opposite ends of the periodic table which means that sodium and potassium are desperate to lose an electron and ions and chlorine and fluorine are desperate to gain one so they would react together.

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Session 2: Handout 2.16(b)

Marks and comments

The question could be marked leniently as is done here or more strictly in terms of electronic structure only. Which route is taken by the Examiner depends on: (1) the grade aimed at (2) the range of candidate answers seen.

Comments:

Candidate A: 2 marks

The candidate has accessed the two marks for similar groups:

potassium is in group I so is sodium and fluorine is in group 7 so is chlorine

The word 'their' is however too vague – it is not certain what the extra or missing electrons refers to. The candidate has failed to reach the conclusion that elements in the same group have the same number of electrons.

Candidate B: 2 marks

The last sentence is important in the candidates thinking here if it is read as potassium and fluorine respectively. Benefit of the doubt was given here because the answer was well expressed. This is a case where the Examiner has to use his or her judgement and not follow the mark scheme slavishly. The marks are related to the points in the mark scheme as follows:

sodium needs to lose and electron --- The same goes for potassium : (an electron = 1 electron)
chlorine needs an electron for a full outer shell ------ The same goes for fluorine: (an electron = 1 electron)

The third mark was not given because there was no mention of groups/ relating similar groups to reactivity or number of electrons.

Candidate C: 0 marks

It is not clear which elements are at opposite ends of the table. Candidates should be discouraged from using vague words like 'it' and 'they' unless the context is clear.

Although the candidate has got the idea that both sodium and potassium lose a (single) electron, the candidate has then 'hedged' his or her bet by the words 'desperate to lose an ion'.

This has negated the mark which would have been given. It is not clear what fluorine and chlorine are gaining – it could be an ion!

The third mark is not given because it is not clear what is being reacted together.