



GENERAL CERTIFICATE OF SECONDARY EDUCATION
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EXAMINERS' REPORTS

CHEMISTRY

SUMMER 2007

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Statistical Information

GCSE

The Examiners' Report may refer in general terms to statistical outcomes. Statistical information on candidates' performances in all examination components (whether internally or externally assessed) is provided when results are issued. As well as the marks achieved by individual candidates, the following information can be obtained from these printouts:

For each component: the maximum mark, aggregation factor, mean mark and standard deviation of marks obtained by *all* candidates entered for the examination.

For the subject or option: the total entry and the lowest mark needed for the award of each grade.

Annual Statistical Report

Other information on a centre basis is provided when results are issued. The annual *Statistical Report* (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

CHEMISTRY

General Certificate of Secondary Education 2007

Principal Examiners: D.E. Reeves - Foundation Tier
R. Ennion - Higher Tier

Principal Coursework Moderators: A. Schmit
K. Hewison

REPORT OF THE PRINCIPAL COURSEWORK MODERATORS FOR SCIENCE 2007

In the final year of this specification, as for the last few years, there was little change in either the quality of the work submitted or the quality of the marking applied to it. Both teachers and pupils are now very familiar with the format and content of the coursework and it is perhaps not surprising that the standard has stabilised. There has to be some concern that the areas that have given rise to comment in the last couple of years still remain, having shown little improvement. However, it should be said that the standard of marking in the centres is generally of good quality, though there is still a tendency towards generosity at the higher end of the mark range.

The coursework grade boundaries in 2007 were the same as in 2006, and are given below:

Specification	Grade boundaries / 60		
	A	C	F
Double Award	47	36	20
Single award and separate sciences	24	19	10

The Coursework submissions

I. The tasks

Year after year, the same tasks are submitted for coursework. There are certain exercises that are straightforward to carry out and match the criteria (which, of course, not all practical work does) and centres cannot be criticised for using tasks which they are used to. However, each passing year see even less and less variety. The vast majority of biology tasks submitted are 'osmosis in potatoes' exercises. Enzyme and photosynthesis exercises, which appear to be the main alternatives, are more rarely seen these days. In chemistry the tasks have always revolved around reaction rates, and now the sodium thiosulphate reaction has greatly outstripped the magnesium and marble chip experiments. Electrolysis (which can also be submitted for physics) and burning alcohols also occur but are very rare. In physics, virtually every centre submits the effect of length on resistance in a wire.

Whilst understandable, the severely limited variety of experiments has been a cause for concern. It indicates that few candidates have done more than one coursework exercise in each subject, whereas the original intention was that they should do several over the course of the two years, thus giving them the chance to learn about experimental science and improve their marks over several attempts at different exercises. Candidates are also apparently trained in the methodology and analysis of just one or two experiments in each subject, and do not therefore develop the generic skills that the coursework was intended to deliver.

II. Problem areas

Preliminary experiments

Candidates still do not, in the main, understand why scientists do preliminary experiments. These are not a 'practice run', but a means of informing the plan (not the prediction). When a practice run *is* done, if successful, it becomes the first set of results, rather than a preliminary experiment! There has always been a tendency for centres to award P8b simply for doing some sort of preliminary test, irrespective of its quality or to what extent it helps with experimental design, and this was seen again this year. It is also a concern that in a number of centres every candidate did exactly the same preliminary test. It should be remembered that pupils are expected to design their own preliminary tests, and therefore some variety within any class would be expected.

Anomalous results

Candidates judgement of anomalous results is often weak, based on a lack of appreciation of the concept of experimental error. They do not appreciate that the experimental error inherent in the methodology feeds into a judgement of how much variation you would expect, and therefore what sort of result is 'anomalous'.

Matching the conclusion with the prediction (A8b)

This is an area which continues to be over-marked in many centres. It requires the candidate to do more than just comment upon *whether* their results support their prediction or not, but to consider the *extent* to which the results back up the prediction. In doing this, alternative explanations of the results might be considered. A problem is that in some experiments, notably the resistance of a wire, the results support the prediction absolutely, making A8b easier to achieve than in some other exercises.

Evaluation

This year, teacher marking of evaluation, though still tending to be generous, was improved, although unfortunately, pupils' ability to evaluate was not! There was still a common tendency to evaluate themselves rather than the design of the experiment, but underserved credit for this was given less often than in the past.

III. Annotation

The quality of the annotation was good in nearly all centres.

IV. Standardisation

It is sometimes difficult to be certain that this has been done by looking at the coursework sample. From the evidence, which shows consistency within centres, it would seem that it is being done, and is effective.

V. Administration

Very few problems of any sort were encountered with coursework administration this year.

In summary, at the end of this specification, much has improved over the years it has been in operation, although certain inherent and apparently intractable problems have also arisen. The scheme has evolved so that the vast majority of pupils can perform competently, if sometimes a little mechanically. This has tended to compress the mark range so that coursework does not discriminate very effectively between candidates. It is hoped that the internal assessment in the new specification will encourage the use of a much wider variety of experimental tasks which are used for assessment purposes and, by extension, lead to an increase in the extent of meaningful practical work undertaken by key stage 4 students..

SCIENCE: CHEMISTRY

General Certificate of Secondary Education 2006

Foundation Tier

Principal Examiner: Mr. David E. Reeves

A very well answered paper with the majority of candidates scoring more than 60% of the available marks.

- Q.1 Part (a) very well answered but part (b) caused problems for the weaker candidates.
- Q.2 Well answered overall. However, a significant number of candidates believed iron ore to be the fuel. Weaker candidates also found (iii) difficult due to lack of understanding of the terms reactant and product.
- Q.3 Very well answered, with the majority of candidates scoring full marks. However, once again, some candidates used information not in the box and therefore lost marks.
- Q.4 Very disappointing. Many candidates showed little or no knowledge of the halogens.
- Q.5 Generally well answered, with candidates clearly benefitting from rates of reactions coursework. However, weaker candidates still have difficulty drawing smooth curves. Part (iv) was poor, with only stronger candidates gaining both marks. Candidates clearly have difficulty differentiating between reaction time and rate.
- Q.6 Candidates have a good knowledge of the properties of plastics. However, they have difficulty relating properties to the uses given in the question. References to "take a long time to biodegrade" were often made rather than "do not biodegrade".
- Q.7 Very well answered, with the majority of candidates gaining full marks. The only weakness was a confusion between what is an element and a compound in (v).
- Q.8 Overall, very well answered. However, in (a), weaker candidates had difficulty identifying the correct raw materials. (b) caused problems, with candidates failing to identify sulphuric acid as being corrosive. References to "burn" were not awarded a mark.
- Q.9 A standard question which was well answered. Weaker candidates found (c) difficult and were unable to correctly calculate the numbers of protons, neutrons and electrons found in the isotopes. A common error was to give the numbers 35 and 37 as number of neutrons.
- Q.10 Only the better candidates gained full marks on this question. Common errors included :
- (a) (ii) identifying the property but failing to explain their choice. Responses such as low density were only awarded 1 mark.
 - (a) (iii) most were able to give a correct melting point. However, reasoning was poor, e.g., it is below potassium was a common error. Only the better candidates correctly identified the relationship between melting point and position in the group.
 - (b) (ii) only a minority of candidates were able to give a correct symbol equation.
 - (b) (iii) references to "keep away from air" were common as were "coat in oil".

- Q.11 Very disappointing. In (a), answers were very vague, with candidates failing to recognise the need for sediment. A common error was to use the phrase "heat and pressure" which suggests confusion with metamorphic rocks. In (b), the conditions were generally well understood. However, candidates rarely identified sandstone as permeable and shale as impermeable. Incomplete combustion is generally well understood.
- Q.12 Most candidates scored no more than 3 marks on this question. The symbol equation was not well understood, despite the formula for sodium carbonate being given. The definition of exothermic is well known.
- Q.13 Well answered. However, a significant number failed to give a correct curve for (a) (ii). Vague references to food (rather than dairy or bread) as a use of enzymes were also seen.
- Q.14 Candidates generally have a good understanding of the fire triangle. When marks were lost, it was usually for giving the same fire fighting method for a house fire and a forest fire, i.e., water. Unfortunately, a significant number would still use water on a chip pan fire.
- Q.15 In part (i), correct experimental methods were rarely seen, suggesting that this is not carried out in schools. References to bits of soap and washing hands with the water were common. Also, references to scum being formed were not allowed a mark. The remainder of the question provided mixed responses, with most candidates correctly identifying the ions and the group to which they belong.
- Q.16 Only the better candidates gained more than 1 mark here. Most could identify iron in I., with approximately 25% recognising hydrogen in II.. The remainder of the question was not well answered.

Higher Tier

Chief Examiner: Mrs. Rebecca Ennion

The report identifies subject specific misconceptions demonstrated on the papers and those questions where candidates lost marks due to poor examination technique, poor literacy and/or numeracy skills.

Teachers are advised to use this report in conjunction with the examination paper and a copy of the published mark scheme.

The published mark scheme gives those responses which gained credit and those which did not.

- Q.1 (a)&(b) Well answered.
- (c) Weaker candidates did not know the meaning of the term 'isotopes'.
- Q.2 Generally well answered. Common errors included:
- (a) (i) stating a property not in the table;
- (ii) not comparing 'chosen property' to metals in general, i.e., all other metals;
- (iii) not making reference to the trend in the Group.

- Q.3 Both parts (a) and (b) were extremely poorly answered.
- (a) Most candidates confused the formation of sedimentary rocks with that of crude oil.
- (b) I. The conditions needed to form crude oil were not known.
 II. Candidates confused how crude oil becomes 'trapped' with how it is formed.
- Q.4 Only the more able candidates achieved full marks for the part (b) (i) symbol equation. Many candidates failed to use the given formula for sodium carbonate and the prompts given in the question with respect to the products .
- Q.5 Part (b) was poorly done. Candidates failed to read the question carefully. A use of enzymes in an industrial production was asked for, not any use of enzymes.
- Q.6 Generally well answered. Some candidates failed to read the stem of the question stating that '*different*' fire-fighting methods for each situation were needed.
- Q.7 (i) This was extremely poorly done. Many candidates failed to recognise the importance of making the procedure a fair test, e.g., same volume of water, same volume of soap solution and 'shaking' each mixture. Some candidates gave methods which did not use soap solution and gained no credit.
- Q.8 Generally well answered. Very many candidates simply gave 'copper', which gained no credit.
- Q.9 (a) (ii) Weaker candidates failed to recognise the need for two chlorine atoms. Unfortunately this also resulted in many candidates losing the mark for part (iii).
- Q.10 The main error with this question was the failure by candidates to identify the anomalous result. Consequential marking ensured only one mark was lost.
- Q.11 Well answered, apart from parts :
- (iii) II. Only the more able candidates achieved credit on this question.
 III. Vague answers referring to 'pollution' or 'water pollution' gained no credit. Specific reference to the 'pollution of *drinking* water or water *supplies*' was needed. The full range of acceptable answers can be found in the published mark scheme.
- Q.12 This question was poorly attempted.
- (a) (i) Many candidates failed to include the double bond between the carbon atoms in ethene, and/or put a double bond in ethane.
 (ii) The terms 'alkenes' and 'alkanes' were unknown by most candidates. Most candidates gave the chemical names for each structure.
 (iii) II. Many candidates referred to 'addition polymerisation' which gained no credit.
 (iv) Only the most able candidates gained the balancing mark.
- (b) A simple reference to 'carbon dioxide' gained no credit. Very few candidates stated 'carbon dioxide traps heat'.

- Q.13 Generally well answered.
- (ii) II. Many candidates chose to use the term 'cathode', which obviously gained credit. Some gave the incorrect term 'anode'.
- Q.14 Well answered. A few candidates chose to explain part (ii) in words and gave confusing and ambiguous answers. The full range of acceptable answers can be found in the published mark scheme.
- Q.15 Generally well answered. Main errors included:
- (i) not explaining the change in appearance, i.e., they stated magnesium gained oxygen, or that the magnesium is being oxidised;
- (ii) some candidates failed to use the assistance given in the question; both the reactants and products were given, as well as the formula H_2 .
- Q.16 Generally well answered.
- Q.17 This question was extremely poorly answered.
- (i) I. Candidates gave the full range of 'acid' colours for universal indicator, which gained no credit.
- II. The test for sulphate ions was unknown by most candidates.
- (ii) Both parts I. and II. were unknown by most candidates.
- Q.18 Generally well answered.
- (ii) I. Many candidates gave the answer 'fermentation' which obviously gained no credit.
- Q.19 Generally, the standard of written communication was poor. However, marks are not lost in this question for poor writing skills.
- (a) Surprisingly, many candidates did not know the generic properties of plastics. Many candidates gave uses of plastics which were not asked for. Some candidates gave descriptions of thermoplastic and thermosetting polymers which also were not asked for.
- (b) Only the most able candidates gained more than three marks for this question. Most candidates demonstrated little knowledge of the extraction of iron. Symbol equations were seldom attempted.
- (c) Poorly attempted. Most candidates mis-read the question and compared properties with uses. Only the most able candidates could relate the structures of diamond and graphite to the properties they gave in their answers.



WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk/exams.html