



General Certificate of Education

Applied Science

8771/8773/8776/8779

SC11 Controlling Chemical Processes

Report on the Examination

2007 examination - January series

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Set and published by the Assessment and Qualifications Alliance.

General comments

This was the first examination of this Unit, although many centres had previously entered candidates for a similar unit in the AVCE examination.

In general the candidates were well prepared for the examination and some very good scripts were seen. As might be expected candidates often performed better on questions requiring recall of knowledge compared to questions requiring understanding. Most of the questions were accessible to the full range of candidates. The most difficult questions concerned oxidation states, Maxwell-Boltzmann distribution curves, interpreting reaction rate curves and explaining changes in equilibrium positions.

Question 1

- (a) Most of the candidates gained this mark. Wrong answers included homozygous and homeostasis.
- (b) The correct numerical value was often seen but marks were often lost by omitting the negative sign or the correct units.
- (c) Candidates often lost marks by the use of vague responses. In a batch process all of the reactants are added and when the reaction is over, the process is stopped and the products are removed. The whole process is then repeated.
- (d) Nearly all of the candidates could calculate the correct relative formula masses but some candidates were unable to use their answers to perform the reacting mass calculation correctly.
- (e) Most candidates stated that the rate of reaction would increase. Many candidates then explained their answer in terms of frequency of collisions rather than in terms of activation energy and the increase in the percentage of collisions that are successful.
- (f) Very few candidates were aware of the possibility of by-products or incomplete reactions. Incorrect answers included incomplete combustion and energy losses.
- (g) This proved to be more difficult than expected with the majority of answers ignoring the theoretical yield.

Question 2

- (a) This was well answered by many of the candidates. One of the marks was often lost by quoting 2 moles of oxygen rather than the correct answer of 3 moles.
- (b) It was quite clear that some of the candidates had not carried out or seen this simple practical investigation. For those that had carried out the experiment many gained 5 or 6 marks.
- (c) Very few candidates gained any marks in this section. Those candidates who correctly stated the heat energy equation were unable to correctly explain the terms. Many candidates thought that the term related to the mass of ethanol rather than the mass of water. Very few candidates could explain how the answer would be used to find a value for the combustion of one mole of ethanol.

- (d) Well answered by most candidates although it was disappointing to see references to human error.

Question 3

- (a) Well answered although some candidates attempted to give an explanation rather than a definition.
- (b) Very few candidates could give the correct answers and many answered in terms of a reaction profile.
- (c) This was well answered but some candidates lost a mark by failing to use the term minimum energy.
- (d) Most candidates stated that the activation energy would be lower but did not explain how this would affect the rate. Few candidates used the energy distribution in their answer.
- (e) Most candidates appreciated that the surface areas would increase but failed to realise the effect on cost.
- (f) Few candidates realised that this increased amount of surface area of the catalyst exposed to the gases. It does not increase the surface area of the catalyst.
- (g) Well done by most of the candidates.
- (h) Well answered by most candidates.
- (i) Although this was well answered some candidates lost a mark by failing to mention the term equilibrium.
- (j) This proved to be a good discriminator. Incorrect answers included an explanation in terms of the effect of pressure on the rate of reaction or the effect of pressure on an exothermic reaction.
- (k) Marks were often lost by vague or unqualified answers. Correct answers gave a qualified capital cost (pressure pumps or reaction vessel) and a qualified direct cost (energy).
- (l) Many candidates gave the correct effect on the yield but were unable to give a clear explanation other than the reverse reaction would be favoured.

Question 4

- (a) This produced disappointing answers. Few candidates stated that the gas should be collected or stated a correct method of collection.
- (b) This proved to be a difficult question. Few candidates realised that the gradient of the curve was required.
- (c) Most candidates gained at least one mark.
- (d) This was well answered by many candidates with clear reasons given.

- (e) Well answered by most candidates.

Question 5

- (a) Very few candidates seemed to be aware of oxidation states and answered in terms of physical states or charges on ions.
- (b) Most candidates realised that concentrated sodium hydroxide is corrosive but many candidates stated that chlorine gas was an irritant rather than toxic.
- (c) Well answered by most candidates.
- (d) Well answered by nearly all candidates.
- (e) As in the batch process in Question 1, many candidates lost marks by giving vague answers. Correct answers should concentrate on when the reactants are added and when the products are removed.
- (f) Well answered by most candidates. Incorrect answers referred to bulk and yield.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.