



General Certificate of Education

Environmental Science 5441

**ESC1 Energy, Atmosphere and
Hydrosphere**

Report on the Examination

2007 examination - January series

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General

Most candidates were well prepared for this examination, with many scoring highly on many questions. The majority of candidates attempted almost all sections of all questions. Question 5 proved to be the most difficult question with few candidates gaining full marks.

Question 1

Many candidates gained full marks.

The majority correctly identified the process of sedimentation.

The principles of flocculation were described by many, but others lost marks by using the word flocculation or floc in the answer with no additional clarification.

Many candidates could not distinguish between the purpose and principles of chlorination. This was not penalised as long as the correct answers were included and adequately phrased.

Fluoridation was not well understood. Water softening was the most common incorrect answer.

Question 2

- (a) (i) Almost all candidates correctly identified the stratosphere as the layer which absorbs ultraviolet light. 'Ozone layer' was also awarded a mark.
- (ii) Most candidates correctly named ozone. Named CFCs were also given credit. The most common incorrect answer was carbon dioxide.
- (b) Many candidates gave full descriptions of ozone depletion and increased UV levels reaching the Earth, including details of chemical reactions. Some candidates gave confused answers, including details of global climate change.
- (c) Almost all candidates correctly named the troposphere.
- (d) The concept of a balance was recognised by most candidates and many correctly named photosynthesis as a key process. Fewer named the counterbalancing process, with some ignoring the term 'natural' in the stem, giving processes such as fossil fuel combustion.
- (e) Some candidates clearly understood the concept of 'greenhouse neutral' with descriptions of the counterbalancing processes and the timescales involved. Many gave vague answers related to biofuels being 'more eco-friendly' or 'releasing fewer emissions'.

Question 3

- (a) Most candidates completed the calculation correctly.
- (b) Most candidates correctly recognised that buses are less energy efficient when they are carrying few passengers.
- (c) The mark scheme allowed for a wide range of answers. Many gave good answers, gaining full marks. Aerodynamics was the most common design feature quoted. Many gave light weight or smaller engine but could not explain why fuel consumption was reduced. Some candidates misinterpreted the question and described driving styles rather than design features.

- (d) Most candidates named a suitable fuel, but fewer could explain the reduced environmental impact. Some answers referred to electricity, but without giving the way in which it was generated.

Question 4

- (a) More candidates could explain why global climate change may increase rainfall than cause a reduction. The likely changes in wind patterns and therefore the distribution of water vapour was not well understood.
- (b) (i)and(ii) Many correct answers were given, but only better answers gave specific descriptions of changed conditions or examples.
- (iii) Some good answers were given, usually related to thermal expansion or melting of land ice. Many candidates who probably understood the correct answer failed to gain a mark by referring to 'melting ice' or 'melting ice caps' rather than a named source of ice on land, such as glaciers or ice on Antarctica or Greenland.

Question 5

- (a) (i) Some candidates correctly drew winds converging over the city and then rising above the city. Either gained credit. Some candidates drew arrows on the wrong diagram, but the mark was awarded if they converged in the city centre.
- (ii) Few candidates gave correct answers stating how pollutant dispersal is reduced. Some had clearly misunderstood the question and explained strategies that could be used to reduce pollution.
- (iii) Many candidates gave answers which included appropriate terminology but confused low and high albedo. Many failed to appreciate the importance of reflection/absorption and heat capacity.
- (b) (i)and(ii) Very few candidates could draw a graph to represent a temperature inversion or explain the role of topography in establishing them.
- (c) Better answers referred to changed infiltration and runoff rates while others referred to abstraction affecting flow. Poorer answers gave any affect on downstream flow such as pollution, clearly failing to recognise that 'river channel discharge' is a technical term with a precise meaning.

Question 6

- (a) Many candidates failed to recognise a trend or failed to qualify the description.
- (b) (i) Many candidates gave correct answers related to the increasing costs of waste disposal or decommissioning. Many poor answers stated that an increase in demand would increase costs.
- (ii) Many answers referred to the costs of running a single wind farm rather than the general costs of wind power. Better answers referred to improvements in wind turbine efficiency or economies of scale allowing lower manufacturing costs.

- (c) This was generally well answered with good descriptions of secondary or tertiary recovery. A few confused low and high viscosity.
- (d) Most candidates scored well on this question, although few gained 2/2 for Quality of Written Communication by using clear scientific terminology. Many superficial descriptions were given for factors related to named energy resources. Answers relating to the need for 'windy conditions' for wind power or 'on the coast' for tidal power were not sufficiently precise to gain marks for locational factors.

Mark Ranges and Award of Grades

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