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General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Report on the Examination

2011 examination – June series

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Biology
Foundation Tier BLY3F

General

Particular problems which occurred quite frequently included:

- The inability to express ideas clearly and unambiguously, or giving extra, alternative answers – an examiner cannot be expected to choose between correct and incorrect information; for example, describing diffusion as movement 'along' or 'across' a gradient rather than *down* it, or choosing the appropriate alternative between words like 'accurate', 'valid', 'precise', 'reliable'.
- Excessive verbosity rather than making specific points succinctly and precisely – this merely wastes time as no marks are available for re-stating the question nor for making the same point more than once.
- Paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response – this being particularly important when confronted with an unfamiliar scenario.
- Careless reading of the question resulting in an inappropriate answer – for example, not distinguishing between the meanings of the instructions *Explain* and *Describe*
- Not reading data accurately from a graph.
- Mathematical weakness in calculations – candidates really need to consider whether their answers are actually sensible, eg '0.6' of a bacterium is a very odd concept.
- Limited ability to apply what has been learned to a novel situation.
- Poor understanding of certain topics, such as the production of biogas and the methodology involved in culturing and measuring the activity of microorganisms.

Question 1 *(Low Demand)*

Candidates experienced rather more difficulty with this opening question this year. Linking the names of the four given substances, lactose, lactic acid, hops and ethanol to the correct information proved to be problematical for many candidates, although most got at least two correct.

Question 2 *(Low Demand)*

(a) The vast majority recognised that the cells surrounding the stoma were called *guard cells*.

(b) (i) Nearly all candidates were able to read the correct value from the graph.

(b) (ii) This part involved the subtraction of two values, proved to be more challenging; one error in particular was the positioning of the decimal point.

(b) (iii) Very few candidates were able to suggest an appropriate reason for why one leaf lost water at a faster rate than the other. Many referred to the difference in the starting mass or to the two leaves having been kept in different conditions, despite information to the contrary in the stem of the question. A simple suggestion such as species Q having larger leaves or having a higher number of stomata would have sufficed.

(b) (iv) just over half the candidates were able to select the correct conditions of wind speed and temperature for causing an increased rate of water loss.

(c) The distractors proved all too tempting to many candidates – just over half knew that wilting was prevented by closure of the stomata.

Question 3 ***(Low Demand)***

(a) Nearly all candidates were able to use information from the table to relate the zero content of cholesterol and a reduced fat content in mycoprotein to a lowering of the risk of heart disease. A similarly large proportion knew that it was the higher protein content of chicken that made the chicken a more useful food for body-builders.

(b) (i) Many candidates gave a great deal of detail in their descriptions of the pattern shown in the graph, often quoting numerical values – although one common error was to read the highest value as '9.1' rather than 9.2. However, it appeared from their answers that many candidates did not understand what a fungus colony was. Some also had difficulty expressing the idea that the rate of growth decreased towards the end of the investigation.

(b) (ii) In this part it was evident to most candidates that species **A** grew faster than species **B**.

(c) Despite having been told specifically not to include *nutrients* or *temperature* in their answers, 'temperature' was one of the most common answers given for a factor in need of being controlled when growing *Fusarium* in an industrial fermenter. This section scored rather poorly.

Question 4 ***(Low Demand)***

(a) Just over half the candidates knew that glycogen was the substance stored in muscles and used during exercise, but around three-quarters knew that the process that releases energy in the muscles is respiration.

(b) It was pleasing that nearly all candidates could select the correct figures from the table and do the right sum to find the extra energy used when swimming at the higher speed. The vast majority were also able to identify oxygen as the substance supplied at a faster rate to the muscles due to the increase in heart rate. However, less than half knew that that the arteries supplying the muscles would dilate during exercise.

(c) Although most candidates appreciated that an increased breathing rate would supply a swimmer with more oxygen (or remove more carbon dioxide), it was evident that many confused breathing rate and heart rate – describing how a faster blood flow would be beneficial.

Question 5 ***(Low Demand)***

(a) Most candidates appreciated that boiling the nutrient broth would sterilise it, or kill any microorganisms present. 'Getting rid of' microorganisms was considered too weak an answer.

(b) Parts (i), (ii) and (iv) were well answered. These involved either descriptions based on information contained in the diagram or a simple prediction of what would happen in one flask based on a result already obtained in the other. Candidates performed less well in part (iii), where they were required to give a reason for the difference in results between

the sealed and the open flask – for many it was the presence of air, rather than microorganisms contained in it, that caused the result.

(c) Given three options to choose from, there was more chance this year of candidates explaining the meaning of the term biogenesis. Even so, less than half selected the correct definition.

Question 6 ***(Standard Demand)***

This was the first of two standard-demand questions common to both the Foundation and Higher Tier papers.

(a) A high proportion of candidates were able to see in the diagram that the protein molecules were too large to fit through the pores in the dialysis membrane. A common error was to state that the protein could not pass through the membrane without giving the reason why.

(b) Less than half of the Foundation Tier candidates understood that urea molecules moved through the membrane by diffusion. 'Osmosis' was a common error. An even smaller proportion were able to explain, using information from the table, that the urea was moving from high to low concentration. Some answers were too vague, with the urea molecules moving 'along' or 'across' the concentration gradient.

(c) Around one-third of Foundation Tier candidates were able to suggest a suitable value for the concentration of sodium ions in the blood plasma at the end of dialysis which should, sensibly, have been somewhere between the starting plasma value and the value given for the dialysis fluid. A high proportion gave answers outside of this range.

(d) (i) Just over half of candidates were able to give at least one advantage of a kidney transplant over dialysis treatment. Most answers related to economics and convenience. These were allowed provided they were suitably elaborated: a kidney transplant is not cheaper initially, but only in the long term; and the 'convenience' point only made sense if it was qualified by reference to reduced hospital visits or time spent on dialysis. Some candidates pointed out correctly that a transplant would mean that the diet did not need such rigorous regulation. Very few made any reference to biological points such as avoiding the build-up of toxins in the blood which would otherwise have occurred between dialysis sessions.

(d) (ii) There was rather more success in this part. Most cited the problem of rejection of the transplanted kidney or the need to take immunosuppressant drugs and, if the latter were mentioned, the point that the patient would thus be rendered susceptible to other infections quite frequently followed. Some mentioned the hazards associated with a surgical procedure, albeit in very general terms, such as, 'Something could go wrong in the operation'.

Question 7 ***(Standard Demand)***

This was the second of the two common questions.

(a) Approximately half of the Foundation Tier candidates knew that the gas missing from the given ingredients of biogas (gas X) was methane. 'Hydrogen', 'oxygen' and even 'alcohol' were among suggested answers. Just over three-quarters were able to

calculate that the percentage of gas X in the biogas was 70 %; a common error was to ignore the decimal point in the values for hydrogen sulfide and ammonia, thus 0.5 % became '5 %'.

(b) (i) In order to answer this part, it was essential to stress that the bubbles of biogas passing through the reactor enabled better mixing of the organic matter with the microorganisms – hardly any Foundation Tier candidates gave a full answer here. A suitable alternative answer was that the movement of the bubbles helped to maintain the optimum temperature throughout the reactor for chemical reactions to occur – again, very few candidates went beyond 'temperature maintenance' unqualified.

(b) (ii) Very few candidates seemed to understand that anaerobic conditions were required for biogas production – hence stirring with bubbles of biogas would be suitable but with air would not be, due to the oxygen content of the latter.

(c) The ideas sought here were that 35 °C would be the *optimum temperature* for *chemical reactions / respiration / growth* of the microorganisms which would thus lead to *a high yield of biogas* (which, after all, is the main purpose of a biogas generator). Hardly any candidates commented on the yield of biogas and most who had the *optimum temperature* idea did not qualify it further in relation to any process.

Mark Ranges and Award of Grades
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