

1: Experimental techniques – Topic questions

Paper 4

The questions in this document have been compiled from a number of past papers, as indicated in the table below.

Use these questions to formatively assess your learners' understanding of this topic.

Question	Year	Series	Paper number
7	2016	November	42

The mark scheme for each question is provided at the end of the document.

You can find the complete question papers and the complete mark schemes (with additional notes where available) on the School Support Hub at www.cambridgeinternational.org/support

7 Proteins are a major constituent of food.

Proteins are polymers.

(a) What is a polymer?

.....
.....
..... [2]

(b) Proteins can be converted into amino acids.

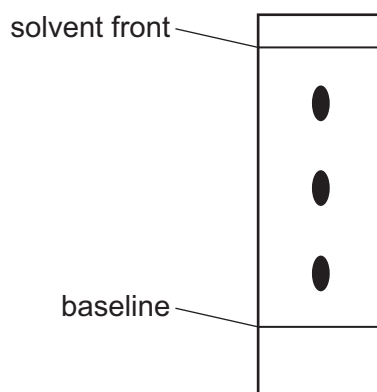
(i) Name the type of chemical reaction which occurs when proteins are converted into amino acids.

..... [1]

(ii) Suggest a condition needed to convert proteins into amino acids.

..... [1]

(c) A colourless mixture of amino acids was separated by chromatography.
Amino acid **X** has an R_f value of 0.8.
The chromatogram of the mixture after treatment with a locating agent is shown.



(i) How is an R_f value calculated?

$$R_f =$$

[1]

(ii) On the diagram put a ring around the spot caused by amino acid **X**.

[1]

- (iii) Describe how you would perform a chromatography experiment to produce the chromatogram shown in (c). Assume you have been given the mixture of amino acids and a suitable locating agent. You are provided with common laboratory apparatus.

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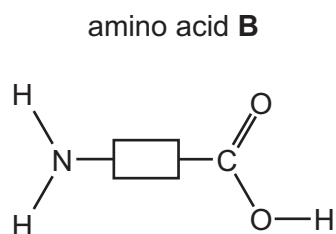
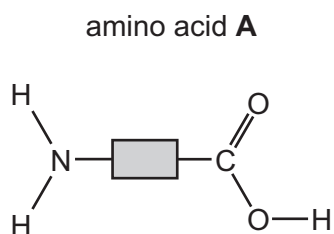
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..... [3]

- (d) When one molecule of an amino acid **A** combines with one molecule of another amino acid **B**, two different dipeptide molecules could be formed.

Draw the structures of the **two** different dipeptide molecules.
Show all of the atoms and all of the bonds in the linkages.



[3]

[Total: 12]

Question	Answer	Marks
7 (a)	large / big molecule made from (many) monomers (joined together)	2
7 (b) (i)	hydrolysis	1
7 (b) (ii)	acid (conditions) / enzyme	1
7 (c) (i)	$\frac{\text{distance moved by substance}}{\text{distance moved by solvent (front)}}$	1
7 (c) (ii)	circle around top spot	1
7 (c) (iii)	mixture of amino acids is placed as a spot onto a (pencil) baseline placed into a (suitable) solvent / water a locating agent is added to the (finished) chromatogram (to reveal spots)	3
7 (d)	fully displayed amide link between any two 'blocks' dipeptide 1: amino acid A on left-hand side and amino acid B on right-hand side AND dipeptide 2: amino acid B on left-hand side and amino acid A on right-hand side correct terminal amine and carboxylic acid group on both correct dipeptides	3
		Total: 12