ANSWERS: Amino acids and peptides

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2017** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (a) (i)  (ii) | Second dipeptide the same structure above, with the CH2SH swapped with  CH2OH.  Amide linkage group circled on one of the dipeptides. | ONE correct dipeptide.  OR  Correct section of protein  (a continuing structure)  OR  Both essentially correct, but includes careless errors.  Amide linkage group circled. | BOTH dipeptides correct. |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2016** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (i)  (ii) | Glycine.  It does NOT have a chiral C, i.e. it needs four different groups around the central C atom, glycine only has three. | * Attempts to draw two 3-D structures but with careless error   OR  ONE correct 3-D structure.   * Glycine plus one relevant statement. | * TWO correct 3-D images. * Glycine plus explanation of chiral / asymmetric carbon. |  |
| (iii)  (iv)  (v) | Dipeptides:    Condensation.  Two larger molecules are joined together with the elimination of a smaller molecule.  Acidic hydrolysis leaves COOH group intact and NH2 group becomes protonated to form NH3+.  H3N+CH(CH3)COOH H3N+CH2COOH | * Correct peptide linkage shown, but the structure is incorrect. * Correct reaction type OR explanation. * Recognises COOH forms, but incorrect structure   OR   * Recognises NH3+ formed. | * One correct dipeptide. * Correct reaction type AND explanation. * Correct structure for one amino acid AND a partial explanation   OR   * Correct hydrolysis products given. | * Both dipeptides are correctly shown.   • Correct hydrolysis products given, with explanation. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2015** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (i) | http://www.4college.co.uk/a/ep/stereo5.gif | * One correct 3-D image.   OR  BOTH isomers drawn but an error in the way the groups are connected to asymmetric carbon. | • Both enantiomers correct. |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2013** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (i) and (ii) | TWO correct structures drawn and amide linkages identified with circles. | * ONE correct dipeptide structure. * Amide linkage correctly circled on ONE structure. | * ALL correct. |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2013 Sample Exam** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
| (a) (i)  (ii) | Dipeptides contain the CO–NH (peptide / amide) linkage. This forms when the amine group of one molecule reacts with the carboxylic acid group of the other molecule. Two dipeptides are possible as either the COOH from glycine can react with the NH2 from serine, or the NH2 from glycine can react with the COOH from serine. | ONE dipeptide drawn correctly  OR  peptide link | An explanation of the TWO dipeptides formed, linked to the structures of the amino acids. |  |
| (d) | The amide link is hydrolysed in both acid and basic conditions.  In acid conditions the product is:  The acid will form a salt with the amine group, NH2.  In basic conditions the product is: | ONE product of hydrolysis drawn. (Products drawn but does not recognize salt formation.) | Product of hydrolysis drawn with acid OR base, with limited reasons. | Structures of BOTH hydrolysis products are justified in terms of the reaction of the molecule with acid and with base. |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2008**  **(a)** | or | Amide linkage correctly drawn. | One complete dipeptide structure. |  |
| (b) | The amide linkage is hydrolysed with both acidic and basic hydrolysis.  (i) Under acidic conditions the products would be:   |  |  |  |  | | --- | --- | --- | --- | | **A.** |  | **B.** |  |   (ii) Under alkaline conditions, the products would be:   |  |  |  |  | | --- | --- | --- | --- | | **C.** |  | **D.** |  | | Identifies amide linkage as bond hydrolysed.  ONE correct hydrolysis product drawn under either acidic, basic or alternately the product under neutral conditions, ie accept COO– (or COONa) or COOH and NH3+ or NH2. | Any TWO structures correct showing NH3+ on products of acidic hydrolysis and COONa or COO– on products for alkaline hydrolysis. | Identifies both structures of acidic hydrolysis  AND  alkaline hydrolysis  (with COONa or COO–). |

© 2018 <http://www.chemical-minds.com>

NCEA questions and answers reproduced with permission from NZQA