**CHEMISTRY UNIT 3 & 4 – SEMESTER 2 EXTENDED RESPONSES**

On the day of the extended response (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_), you will be asked to answer **two** of the following questions.

Each question is worth **15 marks**. Five marks will also be awarded for your general writing quality.

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| Enzymes are protein molecules which are biological catalysts. The action of an enzyme is highly dependent on shape, which in turn is dependent on the primary, secondary and tertiary structure of the protein. Using an enzyme in industrial synthesis can have economic benefits, but care must be taken to ensure that pH and temperature do not result in the denaturation of enzymes.   * Explain what is meant by ‘primary’, ‘secondary’ and ‘tertiary structure’ including examples where appropriate. * Explain how pH and temperature can lead to denaturation of enzymes, and why this would be disadvantageous in chemical synthesis |
| Discuss the chemistry of soaps and detergents, including their structure, manufacture, ability to act as an emulsifier and effectiveness in hard water. |
| Using examples, describe ‘addition polymers’ and ‘condensation polymers’ (including polyesters and polyamides).  Your answer should include:   * an explanation of the term ‘polymer’ * the structure and name of an example of type of polymer (including polyesters and polyamides) * structures of starting materials for each example of a polymer type * polymerisation reactions |
| The uses of polymers are directly related to their properties. These properties are determined by structure, which can in turn be influenced by:   1. Changing operating conditions during synthesis (i.e. temperature and pressure) 2. Changing the types of monomers (i.e. producing different types of polymers)   Discuss the production, structure, properties and uses of low density polyethene (LDPE), high density polyethene (HDPE) and another (non-polyethene) polymer of your choice. As part of your answer you should demonstrate the link between structure, properties and uses for each polymer. |
| Most of the world’s ethanol is produced from one of the following two methods: the hydrolysis of ethene or fermentation.  Compare these two methods for producing ethanol, including:   * the source of feedstock for each process * the reaction conditions used * the catalyst used in each reaction * the environmental effects of using each type of ethanol as a fuel source |
| Discuss the production of biodiesel as an alternative fuel source.  Include in your answer:   * a description of biodiesel * how biodiesel is produced and isolated * the role of catalysts in the production of biodiesel, including a comparison of base-catalysed and lipase-catalysed reactions |