

Activity 11

Scheme of work extract for 9700

Learning objectives	Suggested teaching activities	Learning resources
<p>2.2.f describe the molecular structure of a triglyceride with reference to the formation of ester bonds and relate the structure of triglycerides to their functions in living organisms</p> <p>Key concepts Cells as the units of life, Biochemical processes</p>	<ul style="list-style-type: none"> Draw the general formula for a fatty acid. <ul style="list-style-type: none"> Explain that it is a carboxylic acid and outline -COOH as the carboxyl group. Explain R is a hydrocarbon chain, and extend this to explain saturated or unsaturated fatty acids. (W) (Basic) Draw the molecular structure of glycerol and state that a triglyceride is produced with the attachment of three fatty acids in condensation reactions. (W) (Basic) <ul style="list-style-type: none"> With prompting, learners work out how ester bonds form and add the name of the bond to their table of 2.2.b. (I) (Challenging) Learners make simple paper cut-out models of triglycerides to illustrate the absence of polar groups and show the non-polar exposed fatty acids (so not soluble when in contact with watery liquids). (W) (Basic) Learners describe evidence that makes triglycerides good energy stores (many C-C bonds; highly reduced so energy can be released by oxidation; insoluble in water so can be localised in the organism). (G) (P) (I) (Challenging) 	<p>Online http://www.biotopics.co.uk/as/lipidcondensation.html http://www.chemguide.co.uk/organicprope/esters/background.html</p> <p>Textbooks/Publications <i>Bio Factsheet 42</i>: The structure and function of lipids. <i>Bio Factsheet 74</i>: The structure and biological functions of lipids. <i>Bio Factsheet 78</i>: Chemical bonding in biological molecules</p> <p>Past Papers Paper 21, June 2011, Q5 Paper 22, June 2011, Q5 (a)(b)(i) Paper 22, Nov 2011, Q4 (b)</p>
<p>2.2.g describe the structure of a phospholipid and relate the structure of phospholipids to their functions in living organisms</p> <p>Key concepts Cells as the units of life, Biochemical processes</p>	<ul style="list-style-type: none"> Learners label a printed diagram showing the structure of a phospholipid molecule and discuss how the presence of polar groups relates to phospholipid behaviour when in contact with watery liquids. (W) (Basic) Discuss the function of phospholipids in forming the bulk of structure of cell membranes, forming bilayers (link to Unit 2). (W) (Basic) Learners do research to find out that: there are many different fatty acids and phospholipids; some phospholipids have a nitrogen-containing (choline) portion. (H) (Basic) (Challenging) 	<p>Textbooks/Publications <i>Bio Factsheet 152</i>: Phospholipids</p> <p>Past Papers Paper 21, June 2011, Q5 Paper 22, June 2011, Q5 (a)(b)(i)(ii)(c)(d) Paper 22, Nov 2011, Q4 (b)</p>
<p>2.1.a (ii) carry out tests for reducing sugars and non-reducing sugars, the iodine in potassium iodide solution test for starch, the emulsion test for lipids and the biuret test for proteins to identify the contents of solutions</p>	<p>Only the second part of this learning objective is included here: carry out tests emulsion test for lipids to identify the contents of solutions</p> <ul style="list-style-type: none"> Practical work, testing for lipids using the (ethanol) emulsion test. <ul style="list-style-type: none"> Test vegetable oil and yellow-dyed water. (I) (Basic) Test crushed fruits and seeds. (I) (Basic) Practical booklet 2 is designed to be carried out after learners have used the emulsion test as described above. 	<p>Practical booklet 2</p> <p>Online http://www.mrothery.co.uk/bio_web_prac/practicals/2Food%20Tests.doc http://www.mrothery.co.uk/module1/Mod%201%20techniques.htm http://www.biotopics.co.uk/nutrition/fo</p>

Learning objectives	Suggested teaching activities	Learning resources
<p>Key concepts Biochemical processes, Observation and experiment</p>	<p>Note</p> <ul style="list-style-type: none"> Ensure learners understand that lipids include triglycerides (fats and oils). 	<p>otes.html</p> <p>Textbooks/Publications King p.19-22 Siddiqui p.56-60 <i>Bio Factsheet 173</i>: How to identify foods: Food Tests and Chromatography</p>
<p>2.1.a (iii) carry out tests for reducing sugars and non-reducing sugars, the iodine in potassium iodide solution test for starch, the emulsion test for lipids and the biuret test for proteins to identify the contents of solutions</p> <p>Key concepts Biochemical processes, Observation and experiment</p>	<p>Only the third part of this learning objective is included here: carry out tests biuret test for proteins to identify the contents of solutions.</p> <ul style="list-style-type: none"> Practical work, testing for proteins using the biuret test on a solution of egg white, skimmed milk, chicken or tofu and water. (I) (Basic) Extension practical using a semi-quantitative biuret test: learners prepare a set of standard solutions and compare the intensity of colour obtained of an unknown with the standards (control variables). (P) (I) (Challenging) Practical booklet 2 is designed to be carried out after learners have used the biuret test as described above. 	<p>Practical booklet 2</p> <p>Online http://www.mrothery.co.uk/bio_web_prac/practicals/2Food%20Tests.doc http://www.mrothery.co.uk/module1/Mod%201%20techniques.htm http://www.biotopics.co.uk/nutrition/footes.html</p> <p>Textbooks/Publications King p.19-22 Siddiqui p.56-60 <i>Bio Factsheet 173</i>: How to identify foods: Food Tests and Chromatography</p>
<p>2.3.a describe the structure of an amino acid and the formation and breakage of a peptide bond</p> <p>Key concepts Biochemical processes</p>	<ul style="list-style-type: none"> Familiarise learners with the names of the 20 amino acids (encoded by the genetic code – see Unit 3) and their three-letter shortened version from labelled diagrams. Learners write out the general formula of an amino acid, and on the diagrams use a colour code to identify the: R group; part common to them all; amine group; carboxylic acid group. (W) (I) (Challenging) <ul style="list-style-type: none"> Learners make notes to show understanding that the 'side-chain' or R (residual) group can take different forms and that the amino acids can be grouped according to the properties of their R-group. (I) (Basic) Learners draw simple diagrams of: peptide bond formation (choose two amino acids from their diagram sheet) by condensation (add the name of the bond to 	<p>Online http://www.biotopics.co.uk/as/aa.html http://www.worldofmolecules.com/life/</p> <p>Textbooks/Publications <i>Bio Factsheet 78</i>: Chemical bonding in biological molecules <i>Bio Factsheet 80</i>: Structure and biological functions of proteins</p>