Biologically important molecules essay

Organic molecules are those primarily made up of carbon, hydrogen and oxygen.

The common organic compounds of living organisms are carbohydrates, proteins, lipids, and nucleic acids. Each of these macromolecules (polymers) are made of smaller subunits (monomers). The bonds between these subunits are formed by dehydration synthesis. This process requires energy; a molecule of water is removed (dehydration) and a covalent bond is formed between the subunits . Breaking this bond is called hydrolysis; it requires the addition of a water molecule and releases energy. Each class of these macromolecules has different structures and properties. For example, lipids (composed of fatty acids) have many C-H bonds and relatively little oxygen, while proteins (composed of amino acids) have amino groups (-NH3+) and carboxyl (-COOH) groups.

These characteristic subunits and chemical groups impart different properties to the macromolecules. For example, monosaccharides such as glucose are polar and soluble in water, whereas lipids are non-polar and insoluble in water. There are several chemical tests available for the identification of the major types of organic compounds in living organisms. Typically these tests are used to determine the make up of an unknown material. During the experiment the detective compares the unknown’s response to the experimental procedure with the control’s response to that same procedure. Controls are important because they reveal the specificity of a particular test . A positive control contains the variable for which you are testing. It produces a positive reaction and demonstrates the test’s ability to detect what you expect.

A positive reaction to a positive control demonstrates that your test reacts correctly. A negative control does not contain the variable for which you are searching. It contains only the solvent and does not react in the test. A negative control demonstrates what a negative result looks like. Materials and Methods There are literally hundreds of tests available for biological molecules. We used some of the more common methods to look for the reducing sugars , starch and protein . Benedict’s test for reducing sugar; reducing sugars are simple sugars and include all monosaccharides and most disaccarides. Some examples of monosaccharides are glucose, fructose and galactose.

Examples of reducing disaccharides are lactose and maltose Benedict’s reagent contains cupric (copper) ion complexes with citrate in alkaline solution. Benedict’s test identifies reducing sugars based on their ability to reduce the cupric (Cu2+) ions to cuprous oxide at basic (high) pH. Cuprous oxide is green to reddish orange. In this test , no colour change (mixture remains blue) means no reducing sugar present ; green means race amounts of reducing sugar present ; yellow means low amounts of reducing sugar present ; red means Large amounts of reducing sugar present. Materials is used for test : 6 test tubes ; 10 drops onion juice, potato juice, sucrose solution, glucose solution, distilled water, starch solution ; 2 ml Benedict’s solution ; water bath. 0 drops of some solution was added in each tube. 2 ml Benedict’s solution was added in each tube. These tubes were boiled water bath at 3 minutes and color change was observed during this time.

After 3 minutes these tubes were took water bath. Iodine test for starch; starch is a polysaccharide, consisting of glucose units joined together by glycosidic bonds. The basis for this test is that starch is a coiled polymer of glucose; iodine interacts with these coiled molecules and becomes bluish black. Iodine does not react with carbohydrates that are not coiled and remains yellowish brown. Therefore, a bluish-black color is a positive test for starch, and a yellowish-brown color (no color change) is a negative test for starch. Materials is used for test ; 6 test tubes , 10 drops onion juice, potato juice, sucrose solution, glucose solution, distilled water, starch solution , 3-5 drops iodine .

10 drops of some solution was added in each tube . 3-5 drops Iodine solution was added in each tube and color change was observed during this time . Buiret test for protein : Proteins are composed of amino acids , each of which has an amino group (NH3+) and a carboxyl group. The amino group on one amino acid is linked to the carboxyl group on an adjacent amino acid by a peptide bond.

The peptide bond forms through dehydration synthesis . This bond is the site of action for the Biuret test for protein. Biuret reagent is a 1% solution of CuS04 (copper sulfate).

In this test, Cu2+ complexes with the peptide bond producing a violet color. The violet color is a positive test for the presence of protein; the intensity of color relates to the number of peptide bonds that react. A Cu2+ must complex with at least four to six peptide bonds to produce a color; therefore, free amino acids and very short chains do not react positively.

However, free amino acids and very short chains may result in a pinkish color. Long-chain polypeptides (proteins) have many peptide bonds and produce a positive reaction. Materials is used for test 3 tubes , 2 ml egg albumin, distilled water and protein solution , 2 ml of 2. 5% sodium hydroxide (NaOH) , 3 drops of Biuret reagent. 2 ml of some solution was added in each tube , 2 ml NaOH and 3 drops Biuret reagent were added and mixed in each tube.

Color change was observed during this time.