Name _____ **Per.** _____ **Date** _____

Lab- Chemicals of Life

Introduction:

Learn the chemical tests for the major macromolecules found in cells and then use them to test for the presence of the chemicals in unknown samples.

Biological Concepts

-Macromolecules- carbohydrates, proteins, lipids, nucleic acids
-Biochemistry
-Chemical nature of living cells

Background

The fundamental chemical components of cells can be grouped into four basic categories: carbohydrates, proteins, lipids, and nucleic acids. Other chemicals, such as water, salts and minerals are also present and vital to living cells. Tests have been devised by biologists for determining the presence of many key chemicals.

In this activity four key tests will be used to determine the nature of 5 unknown solutions.

Materials

Unknown A	**Iodine indicator**	**4 Foam centrifuge tube holders**
Unknown B	**Biuret indicator**	**Hot water bath**
Unknown C	**Sudan III indicator**	**Beral-ype pipets**
Unknown D	**Diphenylamine indicator**	**Labels**
Unknown E	**20 Microcentrifuge tubes**	**Marker**

Observation Note

1. **Iodine mixed with a carbohydrate will turn the solution from a yellowish brown to a dark purple.**

2. **Biuret mixed with a protein will turn the solution from a light blue to a purple.**

3. **Sudan III mixed with a lipid will create 2 layers in the solution. The top layer containing the lipid will be pale pink-orange.**

4. **Diphenylamine mixed with a nucleic acid and placed in a hot water bath will turn the solution purple if DNA is present and green if RNA is present.**

5. **Indicator - a substance, when added to an unknown, will cause a color change.**

6. **Unknown- a substance that you are trying to determine its composition.**

7. **Solution- is the indicator mixed with the unknown.**

Procedure

Each student in the group will perform one test. (ie.- Student 1 will only test for carbohydrates)

For the procedure for the test you will be performing refer to the chart below.

Step #	Test #1- Carbohydrates	Step #	Test #2- Proteins	Step #	Test #3- Lipids	Step #	Test #4- Nucleic Acids
1	Using your marker, label your microcentrifuge tubes A1, B1, C1, D1, and E1	1	Using your marker, label your microcentrifuge tubes A2, B2, C2, D2, and E2	1	Using your marker, label your microcentrifuge tubes A3, B3, C3, D3, and E3	1	Using your marker, label your microcentrifuge tubes A4, B4, C4, D4, and E4
2	Add 12 drops of Unknown A into microcentrifuge tube A.	2	Add 12 drops of Unknown A into microcentrifuge tube A.	2	Add 12 drops of Unknown A into microcentrifuge tube A.	2	Add 12 drops of Unknown A into microcentrifuge tube A.
3	Add 12 drops of Unknown B into microcentrifuge tube B.	3	Add 12 drops of Unknown B into microcentrifuge tube B.	3	Add 12 drops of Unknown B into microcentrifuge tube B.	3	Add 12 drops of Unknown B into microcentrifuge tube B.
4	Add 12 drops of Unknown C into microcentrifuge tube C.	4	Add 12 drops of Unknown C into microcentrifuge tube C.	4	Add 12 drops of Unknown C into microcentrifuge tube C.	4	Add 12 drops of Unknown C into microcentrifuge tube C.
5	Add 12 drops of Unknown D into microcentrifuge tube D.	5	Add 12 drops of Unknown D into microcentrifuge tube D.	5	Add 12 drops of Unknown D into microcentrifuge tube D.	5	Add 12 drops of Unknown D into microcentrifuge tube D.
6	Add 6 drops of Unknown E into microcentrifuge tube E.	6	Add 6 drops of Unknown E into microcentrifuge tube E.	6	Add 6 drops of Unknown E into microcentrifuge tube E.	6	Add 6 drops of Unknown E into microcentrifuge tube E.
7	Add 2-4 drops of Iodine indicator to each microcentrifuge tube.	7	Add 5-10 drops of Biuret indicator to each microcentrifuge tube.	7	Add 10 drops of Sudan III indicator to each microcentrifuge tube.	7	Add 14 drops of Diphenylamine indicator to each microcentrifuge tube.
8	Observe color change of your solution.	8	Observe color change of your solution.	8	Shake the microcentifuge tubes vigorously.	7	Place microcentrifuge tube in hot water bath for 10-20 minutes.
9	Use a "+" to indicate a positive test and a "-" to indicate a negative test. Record your results on the Testing Unknowns Table.	9	Use a "+" to indicate a positive test and a "-" to indicate a negative test. Record your results on the Testing Unknowns Table.	9	Observe the formation of two layers or globules of lipid suspended in solution. Also, observe the color change of your solution.	8	Observe color change of your solution.
				10	Use a "+" to indicate a positive test and a "-" to indicate a negative test. Record your results on the Testing Unknowns Table.	9	Use a "+" to indicate a positive test and a "-" to indicate a negative test. Record your results on the Testing Unknowns Table.

Testing Unknowns Table

Unknown	Carbohydrate	Protein	Lipid	Nucleic Acid
A				
B				
C				
D				
E				

Analysis Questions

1 For each macromolecule, write the name of the monomer and polymer.

Carbohydrates monmer: _____

polymer: _____

Proteins monmer: _____

polymer: _____

Lipids monmer: _____

polymer: _____

Nucleic Acids monmer: _____

polymer: _____

2 For each test, which microcentrifuge tubes did you determine contained carbohydrates, proteins, lipids, and nucleic acids?

3 How did you determine the identity of each unknown?

4 What do you think Unknown A was? What was the purpose of having an Unknown A?

5 In the real world, when would performing these analysis tests for macromolecules be beneficial to you and others?