Indicators are chemicals that help identify the composition of the unknown material. In food analysis, indicators are used to detect the presence of specific organic or inorganic compounds such as sugar, protein, starch, lipids, or salts.

Part one of this experiment is designed to familiarize you with the names, procedures and characteristic responses produced by important indicator solutions used in laboratory analysis of unknown substances.

These tests are designed to be qualitative not quantitative measures. In other words, they will reveal the types of materials that are present in a material, but not the quantity of the material present.

Part two of this experiment will allow you to apply information acquired from part one to test for the presence of specific types of molecules in an unknown mixture of nutrients.

**PART I**

TEST #1: The Benedict's test for the presence of simple sugars, such as glucose:

- Place 4 ml of water into tube #1 and add 2 ml of Benedict’s solution.
- Place 4 ml of glucose solution in tube #2 and add 2 ml of Benedict’s solution.
- Heat both test tubes in a hot water bath for 5 minutes.
- Observe the characteristic change in appearance of the test solution and record your observations in the space provided on Chart #1.

TEST #2: The Lugol’s Iodine (IKI) test for the presence of starch:

- Place 2 ml of water into tube #1 and add 10 drops of IKI.
- Place 2 ml of starch solution into tube #2 and add 10 drops of IKI.
- Observe the characteristic change in appearance of the test solution and record your observations in the space provided on Chart #1.

TEST #3: The Sudan IV test for the presence of lipids:

- Obtain a small piece of filter paper and a Petri dish.
- Place a drop of water on the piece of filter paper and allow it to dry.
- Place a drop of oil (lipid) at a distance from the water spot on the filter paper and allow it to dry.
- Submerge the filter paper for one minute in a Petri dish that contains Sudan IV.
- Hold the paper above the Petri dish and rinse away the excess Sudan IV with water.
- Observe the characteristic appearance of the lipid response and record your observations in the space provided on Chart #1.

**ATTENTION:** The chemicals used in the next two tests (Biuret and silver nitrate) may harm your skin, clothing, or the environment.

Please wear GOGGLES and GLOVES to do these procedures, and place waste chemicals into the designated DISPOSAL BEAKERS. Put gloves into the trash can when you have completed the tests.
TEST #4: The Biuret test for the presence of proteins:

- Place 4 ml of water into tube #1 and add 10 drops of Biuret solution.
- Place 4 ml of protein solution (gelatin) into tube #2 and add 10 drops of Biuret.
- Observe the characteristic change in appearance of the test solution and record your observations in the space provided on Chart #1.

TEST #5: The silver nitrate test for salt (sodium chloride - NaCl):

- Place 4 ml of water into tube #1 and add 5 drops of silver nitrate solution.
- Place 4 ml of salt solution into tube #2 and add 5 drops of silver nitrate.
- Observe the characteristic change in appearance of the test solution and record your observations on Chart #1.

<table>
<thead>
<tr>
<th>NAME OF TEST</th>
<th>OBSERVATIONS OF REAGENT + WATER</th>
<th>OBSERVATIONS OF REAGENT + &quot;KNOWN&quot;</th>
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<tbody>
<tr>
<td>BENEDICTS</td>
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<tr>
<td>LUGOL’S IODINE (IKI)</td>
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<td>SUDAN IV</td>
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<td>BIURET</td>
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<tr>
<td>SILVER NITRATE</td>
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**PART II**

Repeat each test using one unknown solution. You **DO NOT** need to use a control tube of water. Record your results in Chart #2.

<table>
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<tr>
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UNKNOWN I.D. CODE (LETTER OR NUMBER ON BOTTLE) ____________

SUBSTANCES PRESENT IN MY UNKNOWN MAY INCLUDE: