

## Food Chemistry Experiments

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### Food Chemistry Experiments Index

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#### Using Simple Chemical Indicators

We can test for the presence of these important compounds in food by using chemical reagents that react in predictable ways in the presence of these nutrients.

Work in an area appropriate for handling chemicals that may stain furniture or the floor if spilled. Wear proper safety equipment including goggles, rubber gloves and a lab apron.

Outlined below are just the basic test procedures required to use these test solutions. You may wish to expand on them and design your own food testing project.

#### Supplies needed:

- ▶ [15 x 125mm test tubes.](#) One per test sample.
- ▶ [Droppers.](#)
- ▶ [Test tube clamps.](#)
- ▶ [Small beakers or glass jars.](#)
- ▶ [Test tube rack.](#)
- ▶ Glass marking pen (Sharpie or China marker).
- ▶ [Lab Thermometer.](#)
- ▶ Hot water.
- ▶ [Mortar and Pestle.](#)
- ▶ Nutrient solutions to be tested (made from foods you wish to test for sugar, starch, protein, fat, and vitamin C content).

#### Food Test 1: Sugar test-Benedict's solution

[Benedict's solution](#) is used to test for simple sugars, such as glucose. It is a clear blue solution of sodium and copper salts. In the presence of simple sugars, the blue solution changes color to green, yellow, and brick-red, depending on the amount of sugar.

##### What to do.

1. Mix small amount of each food sample with distilled water to make a test liquid.
2. To a test tube, add 40 drops of liquid to be tested.
3. If testing more than one liquid, label each test tube with a marker.
4. Add 10 drops of Benedict's solution to each test tube. Carefully heat the test tubes by suspending in a hot water bath at about 40-50 degrees celsius for five minutes.
5. Note any color change. If sugar is present solution will turn green, yellow, or brick-red, depending on sugar concentration.

#### Food Test 2: Protein - Biuret solution

[Biuret solution](#) is used to identify the presence of protein. Biuret reagent is a blue solution that, when it reacts with protein, will change color to pink-purple.

##### What to do.

1. To a test tube, add 40 drops of liquid to be tested.
2. If testing more than one liquid, label each test tube with a marker.
3. Add 3 drops of Biuret reagent solution to each test tube. Shake gently to mix.
4. Note any color change. Proteins will turn solution pink or purple.

#### Food Test 3: Fat - Sudan III stain

[Sudan III](#) is used to identify the presence of lipids in liquids. It will stain fat cells red.

##### What to do.

1. To a test tube, add equal parts of test liquid and water to fill about half full.
2. If testing more than one liquid, label each test tube with a marker.
3. Add 3 drops of Sudan III stain to each test tube. Shake gently to mix.
4. A red-stained oil layer will separate out and float on the water surface if fat is present.

#### Food Test 4: Vitamin C

[Vitamin C Reagent](#) (dichlorophenolindophenol) indicator solution is blue. A colorless end point will be reached when a solution containing vitamin C (such as orange juice) is added to this indicator.

##### What to do.

First, prepare test solution by grinding vitamin C reagent tablet into a powder using a mortar and pestle or back of a spoon. Pour powder into dropper bottle and add 30ml (1 oz.) of distilled water.



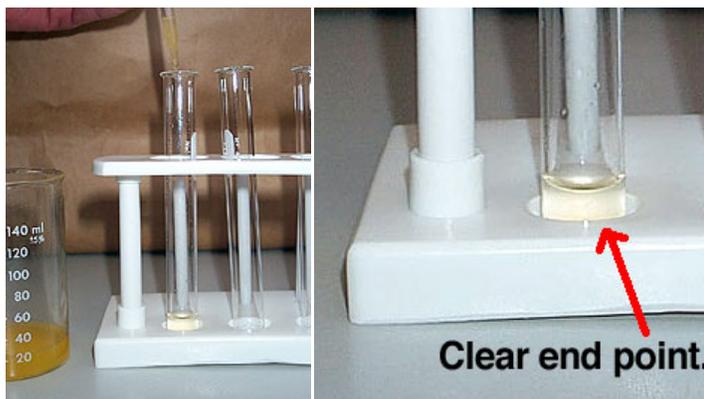
If testing more than one liquid, label each test tube with a marker. Fill each with 50 drops of blue vitamin C indicator solution.



Now add juice one drop at a time to the indicator solution in the test tube.

Count drops until dark blue color turns clear. This is your end point.

Compare different juices. Those that require more drops to reach the clear end point are LOWER in vitamin C.



### Food Test 5: How Much Sugar Is In My Soda?

To measure the amount of sugar in a solution, be it juice, Coca Cola, etc., you use a Brix hydrometer, called Brix as the food industry uses the term to designate the sugar percentage contained in a liquid. The hydrometer is placed to float in a solution, and the point at which the liquid's surface touches the stem of the inserted hydrometer indicates the percentage of sugar in the liquid.

#### What you need.

- ▶ BRIX hydrometer, range 0-35 degrees
- ▶ Graduated cylinder, 500ml, to contain the liquid

#### Reading the Brix Scale.

The Brix scale gives a direct reading of grams of sugar per 100 grams of pure water. So, for example, say a 20oz (591ml) bottle of root beer gives a measurement of 12 Brix. How much sugar in the entire bottle? Here is the equation:  $12\text{g}/100\text{ml} = \text{Xg}/591\text{ml}$ . Solving for X gives  $\text{X}=70.92\text{g}$  sugar.

#### Tips on using the Hydrometer.

Soda should be degassed before making a measurement. The tiny bubbles in carbonated beverages tend to stick to the hydrometer and add unwanted buoyancy. You can degas your soda sample with gentle heating or just leaving the soda out until it goes "flat". Be sure the soda is at room temperature before taking a reading. Hydrometers are most accurate when used at the calibrated temperature marked on the scale. Most hydrometers sold by the Science Company are for use at 20°C (68°F).



[Watch Our How-To Video.](#)

## How to use an hydrometer to test sugar content

[Feedback](#)

There are many variations of the basic steps outlined above. Let us know what you tested and how your experiment turned out. We'd be delighted to hear from you! [Click here and use our Contact Us form.](#)

Food Chemistry Testing Supplies		
Solution Name	Cat. No.	
<a href="#">Benedict's Solution</a> Qualitative for detection of sugar.	NC-2082	<a href="#">+ Product Info</a>
<a href="#">Biuret Reagent Solution</a> Protein Determination	NC-2083	<a href="#">+ Product Info</a>
<a href="#">Sudan III</a> Fat Stain	NC-3391	<a href="#">+ Product Info</a>
<a href="#">Vitamin C Reagent</a> (dichlorophenolindophenol) One tablet in a dropper bottle. Just add 30ml distilled water. Good for many tests.	NC-9723	<a href="#">+ Product Info</a>
<a href="#">15 x 125mm Test Tube</a>	NC-0994	<a href="#">+ Product Info</a>
<a href="#">Test Tube Rack, 6 place.</a>	NC-0769	<a href="#">+ Product Info</a>
<a href="#">Test Tube Clamp.</a>	NC-0231	<a href="#">+ Product Info</a>
<a href="#">Lab Thermometer, -10/110C</a>	NC-3016	<a href="#">+ Product Info</a>
<a href="#">Glass Droppers</a>	NC-0363-PK	<a href="#">+ Product Info</a>
<a href="#">Mortar and Pistle.</a>	NC-10776	<a href="#">+ Product Info</a>
<a href="#">50ml Pyrex Beaker.</a>	NC-0071	<a href="#">+ Product Info</a>
<a href="#">BRX hydrometer, range 0-35 degrees.</a>	NC-2187	<a href="#">+ Product Info</a>
<a href="#">500ml Graduated Cylinder.</a>	NC-8069	<a href="#">+ Product Info</a>