Scenario: An advertisement used the phrase "High in polysaturated, low in saturated" to describe saturated oils. It is stated that the excess saturated fat in the diet can cause cholesterol. Plan and design an experiment to compare the degree of unsaturation present in vegetable oils.

Title: Comparing the degree of unsaturation of vegetable oils

Hypothesis: The amount of iodine reacting (to overcome the C-C double bonds) is called the iodine number. The higher the iodine number, the greater the degree of unsaturation.

Aims: To determine the iodine number of both vegetable oils.

To compare both iodine numbers.

Diagram:

Materials: 250ml iodine flasks, 1ml micro beaker, 50ml burette, 250ml beakers, de ionized water, carbon tetrachloride [solvent for the oils], iodine monochloride (Wij’s solution) [iodine attaches to C-C bond in oil], potassium iodide solution [forms I2 from the iodines attached to oil], starch solution [indicates iodine], aqueous sodium thiosulfate standard solution [reacts with iodine], samples of vegetable oils.

Variables: independent variable - weight (in g) of substance, volumes of sodium thiosulfate solution

Dependent variable - iodine number

Method:

1. Label one of the iodine flasks as “V0” and the other as “V”.
2. Collect a sample of oil in a 50ml beaker of known weight and measure the weight of the oil on a balance.
3. Subsequently, add 20ml of carbon tetrachloride to the beaker; stir and transfer this solution to an iodine flask labelled “V”.
4. Transfer 5ml of Wij’s solution to the iodine flask using a micro beaker.
5. Cover the iodine flask with an airtight lid and keep away in the dark for 45 minutes.
6. After 45 minutes, pour 10ml of potassium iodide solution onto the lid of the iodine flask.
7. Slowly raise the lid allowing a minimum air gap to prevent any iodine vapours formed as a result of the previous reactions, and allow the potassium iodide to drip slowly into the iodine flask.
8. Add 100ml of water in a similar way and stir to dissolve the excess iodine.
9. Titrate the solution with sodium thiosulfate solution until it turns a straw color. Add approximately 5ml of starch solution (this should make the solution turn blue-black).
10. Resume the titration drop by drop until the solution turns colorless.
11. Note the volume of sodium thiosulfate solution (both in the beginning of the titration and at the end of the titration).
12. Repeat the above procedure without the oil using using the iodine flask labelled “V0”.
13. Repeat experiment thrice with the same oil.
14. Repeat procedure with the other oil(s).

Results:

Interpretation of results:

Use this formula to calculate the iodine value.

Iodine value =[Volume of Na2S2O3 x Normality of Na2S2O3 /1000] / [Wt. of oil /100]

Where Equivalent Wt. Of Iodine = 127,

Normality of sodium thiosulfate = 0.1,

And Volume of sodium thiosulfate = [V0-V] ml

Precautions:

Disturbances, noise

Errors in transferring oil

Excess sodium thiosulfate used to make solution turn colorless

Parallax error in measuring starch and other solutions

Conclusion:

It can be concluded that vegetable oil x1 which has an iodine value of y1 which is greater than vegetable oil x2 which has an iodine value of y2, meaning it has a greater degree of unsaturation.