PROJECTS

Project 1

Title

Study the variation in the amount of oxalate ions in guava fruit at different stages of ripening.

Objective

The objective of this project is to investigate the variation in the amount of oxalate ions present in guava at different stages of its ripening (i.e. unripe, parialy ripe and fully ripe).

Brief Procedure

Collect different samples of guava fruit (green, pale-green, yellowish-white and yellowish, i.e. from unripe to fully ripe variety). Take100 grams of one of the sample of guava fruit, crush it into a mortar and transfer the paste in 100 mL of water. Boil the contents for 10-15 minutes and filter. Take the filtrate, add about 5mL of dilute sulphuric acid and titrate it against 0.001M $KMnO_4$ solution. Repeat the procedure with other samples of guava and draw conclusion.

Project 2

Title

A study to compare the quantity of caesin present in different samples of milk.

Objective

To compare the quality of different samples of milk by finding out quantity of casein present in them.

Brief Procedure

Take 200 mL of each sample of milk in separate 500 mL beakers. Heat the milk samples upto 50 – 60°C. Add a few drops of dilute hydrochloric acid slowly with constant stirring for 5-10 minutes. Casein coagulates as an amorphous substance. Filter the substance and wash the precipitate several times with tap water. Remove the fat by using a suitable organic solvent. Weigh casein so obtained after drying.

Project 3

Title

Preparation of soyabean milk and its comparison with natural milk.

Objective

To prepare soyabean milk and compare it with natural milk with respect to curd formation, effect of temperature, taste etc.

Brief Procedure

Prepare soyabean milk by first soaking soyabean seeds in warm water and keeping them overnight in water. Make a paste of seeds by crushing and finely grinding them. Mix the pasty mass with warm water to get soya milk. Filter the mixture and discard the undissolved portion. Compare soya milk with natural milk and conclude whether soya milk can be a substitute for natural milk. The comparison may be made with respect to the nutrients present, colour, smell, taste, effect of temperature, curd formation, etc.

Project 4

Title

Study the effect of potassium metabisulphite as a food preservative under various conditions.

Objective

To study the effect of concentration of potassium metabisulphite (preservative), temperature and time on preservation of food.

Brief Procedure

Collect amla fruits and wash these with water. Cut these into small pieces and dry in the sunlight for a few hours. Mix the salt and the spices to the pieces. Pour 25g of amla pieces into each of the six boiling tubes numbered as 1, 2, 3...etc. Weigh 500 mg of potassium metabisulphite and dissolve it in 20 mL of distilled water. Keep the boiling tube No. 1 without mixing preservative and oil. In boiling tube No. 2 and 3 add 1 mL of the preservative solution and 2 mL of oil and mix the mixture with the glass rod. Keep the boiling tube No. 2 at the room temperature (25-35^{0}C) and the boiling tube No. 3 at a temperature of 40^{0}C. In boiling

tube No. 4,5and 6, add 2 mL, 4 mL and 8 mL of the preservative solution respectively and 2 mL of mustard oil. Keep these boiling tubes at the room temperature. Prepare again the fresh mixtures in boiling tubes No. 4, 5 and 6 and keep them at 40°C temperature.

Keep all these boiling tubes for 3 to 5 days. Note the growth of fungi, if any, in these tubes. Record your observations and draw conclusion.

Project 5

Title

A Study of enzymatic hydrolysis of starch

Objective

Study the hydrolysis of starch by salivary amylase and the effect of pH and temperature on it.

Brief Procedure

Take about 20-30 mL of warm distilled water (30°C– 40°C) in the mouth and mix it with the saliva by gargling in the mouth. Collect the saliva mixed water in a beaker.

Digestion of Starch by Saliva Solution

Take 10 mL of the starch solution in a boiling tube and add 2 mL of 1% sodium chloride solution in it. Keep the boiling tube in a water bath, maintained at 30° – 40°C, for at least 15 minutes. Pour 2 mL of the saliva solution in the boiling tube and start the stopwatch immediately. Take out 2-3 drops of the mixture after one minute and pour it in the test tube containing iodine solution. Shake the contents of the test tube and note the colour of the solution, if any. Similarly, take out 2-3 drops of the mixture from the boiling tube after every one-minute and add to iodine solution contained in the test tubes. Record the colour of the solution in each case. Stop taking readings when there is no change in colour. Record the readings in a tabular form.

In order to study the effect of temperature on the digestion of starch by saliva, perform the above experiment at 50°C.

The effect of pH of reaction medium can also be studied by using small quantities of dilute HCl and dilute NaOH in the separate experiments carried out in the same manner as above.

Project 6

Title

A comparative study of the rate of fermentation of the following substances: (a) Wheat flour, (b) Gram flour, (c) Potato juice, (d) Carrot juice, (e) Orange juice, (f) Apple juice, and (g) Sugar-cane juice.

Objective

To determine the rate of fermentation of different substances and study the effect of concentration, time and temperature on the rate of fermentation of these substances.

Brief Procedure

Take a conical flask (100 mL) fitted with a delivery tube as shown in Fig. 12.1. Remove the delivery tube and add 10 g of wheat flour and about 80 mL of the distilled water into the flask. Stir the contents of the flask with a glass rod and add 2 g of yeast. Stir the contents again. Fit the delivery tube into the mouth of the flask. Tie a balloon with the help of a thread to the upper end of the delivery tube as shown in Fig.12.1. As the fermentation proceeds, carbon dioxide gas is evolved and the balloon inflates. The extent to which the baloon inflates in the given time is the measure of the rate of reaction. Repeat the experiment with other materials such as potato juice, orange juice, apple juice and sugar-cane juice.

Fig. 12.1 : *Determination of rate of firmentation*

Effect of concentration of yeast

Study the effect of concentration of yeast on the rate of fermentation of any one of the above materials. For this, carry out the reaction using 2, 3 and 4 grams of yeast and note the extent of inflation of baloon in each case in a fixed time interval.

Effect of time

Carry out the reaction using the same ingredients for different intervals of time and observing the extent of inflation of balloon.

Effect of temperature

Carry out the reaction using the same ingredients for a fixed interval of time but at three different temperatures (25ºC, 30ºC, and 35°C). Note the extent of reaction by observing the inflation of baloon in the these reactions.

Project 7

Title

Extraction of essential oils present in saunf (aniseeds), Ajwain (carum) and illaichi (cardamom)

Objective

To extract essential oils from aniseeds, carum, and cardamom by using petroleum ether as a solvent.

Brief Procedure

Take 100 g of crushed aniseed in a conical flask and add 100 mL of petroleum ether (of boiling range 60°-80°) in it. Close the mouth of the flask with a rubber cork and shake it for sometime. Keep the flask for a day. Filter the solution and collect in a distillation flask. Distill off the petroleum ether at 60°C - 80°C. Petroleum ether is a highly inflammable liquid. Do not bring any flame near it. Use heating mental for heating the flask. Do not heat it directly on flame. Transfer the liquid (oil) which is left in the flask to a boiling tube and close the mouth of the boiling tube with a rubber cork. Note the colour, odour and volume of the essential oil so collected.

Similarly, extract essential oils of carum and cardamom.

Project 8

Title

Study of common food adulterants.

Objective

To identify the food adulterants in fat, oil, butter, sugar, turmeric powder, chilli powder and pepper.

Background information

Adulteration of food means substitution of the genuin food material wholly or in part with any cheaper or inferior substance or removal of any of its constituents, wholly or in part, which affects adversely the nature, substance or quality of the food. According to the Indian Preservation of Food Adultration Act (PFA) 1954, any ingredient which when present in food, is injurious to health is an adultrant.

Some of the foods commonly adultrated in India and the adultrants found in them are as follows ; corresponding form of Khesari dal (grain/bean/flour) is mixed with pulses like masoor, bengal gram dal, red gram dal, black gram, and channa. Consumption of khersari dhal for a long time results in paralysis of the lower limbs.

Sometimes seeds, barks, leaves and other matter are dressed up to look like genuine foodstuffs and are used to adultrate pure ones. For example exhausted tea leaves or coloured sawdust are mixed into fresh tea. Powdered bran and sawdust may be present in ground spices. Easily obtainable seeds are substituted for cumin, cardamom, black pepper, mustered seeds etc.

Edible oils and fats are adultrated with cheap edible and non edible oils. Seeds of Argemone maxicana resemble mustered and are used to mix with mustard seeds and oil extracted from seeds is used to adultrate oils such as coconut, mustard, sesame and groundnut. Argemone oil is poisonous and its use results in dropsy in human beings. Oils and fats are also adultrated with petroleum products which cause gastrointestinal disorders.

Talc and chalk powder are used to adultrate wheat flour, Arrowroot powder and confectionary, starch is used as a filler in milk and milk products.

Coaltar dyes and mineral pigments like lead chromate and red or yellow earth are common food adultrants used for colouring milk products, confectionary, soft drinks, beverages, tea, spices, bakery products, fruits and vegetables to give better look.

Brief procedures for testing food adultrants in some of the food materials are given below :

Brief Procedure

Vanaspati ghee in butter

Take 0.5g of butter sample in a test tube and melt it by heating gently. To this liquid add a small amount of sugar and a few drops

of HC1 and shake the mixture for 5 minutes. Appearance of pink colour indicates the presence of vanaspati ghee in the butter.

Dyes in fats and oils

Take 1 mL of fat/oil in a test tube and add 1mL of the mixture of sulphuric acid and glacial acetic acid in the ratio 1:4. Heat the mixture. Appearance of pink colour indicates the presence of dyes in fats and oils.

Chalk in sugar

Take 1 g of sugar in a test tube and add 2 mL of dilute H_2SO_4 in it. Evolution of effervescence indicates the presence of chalk in sugar.

Artificial colour in red chillies

Take a glass tumbler filled with distilled water and pour a few grams of red chilli powder in it. Stir the mixture with the glass rod and allow it to stand for a few minutes. Appearance of brick red colour in water shows the presence of artificial colour in red chilli.

Coloured chalk powder in turmeric powder

Take about 0.5g of turmeric powder in a test tube and add 1mL of dilute H_2SO_4. Evolution of effervescence shows the presence of coloured chalk powder in turmeric.

Sawdust coloured with coaltar dye in turmeric powder

Take about 1.0 g turmeric powder in a test tube add a few drops of conc. HCl. Instant appearance of violet colour which persists on dilution with distilled water indicates the presence of sawdust coloured with metanil yellow, a coaltar dye.

Pappaya seeds in black pepper

Take a beaker filled with distilled water and add one spoon full of pepper. Papaya seeds float over water while pepper settles down.