

INTRODUCTION

Growth of microorganisms in a food material can be inhibited by adding certain chemical substances. However the chemical substances should not be harmful to the human beings.

Such chemical substances which are added to food materials to prevent their spoilage are known as chemical preservatives.

In our country, two chemical preservatives which are permitted for use are:

1. Benzoic acid (or sodium benzoate)
2. Sulphur dioxide (or potassium bisulphite)

Benzoic acid or its sodium salt, sodium benzoate is commonly used for the preservation of food materials. For the preservation of fruits, fruit juices, squashes and jams sodium benzoate is used as preservative because it is soluble in water and hence easily mixes with the food product.

Potassium hydrogen sulfite or **potassium bisulfite** is a chemical compound with the chemical formula KHSO_3 . It is used during the production of alcoholic beverages as a sterilising agent.

It is made by the reaction of sulfur dioxide and potassium carbonate. The sulfur dioxide is passed through a solution of the potassium carbonate until no more carbon dioxide is given off. The solution is concentrated and then allowed to crystallize.

Potassium bisulphite is used for the preservation of colourless food materials such as fruit juices, squashes, apples and raw mango

chutney. This is not used for preserving coloured food materials because Sulphur dioxide produced from this chemical is a bleaching powder.

Potassium bisulphite on reaction with acid of the juice liberates Sulphur dioxide which is very effective in killing the harmful micro-organisms present in food and thus prevents it from getting spoiled.



The advantage of this method is that no harmful chemical is left in the food. The aim of this project is to study the effect of potassium bisulphite as food preservative.

- i. At different temperatures.
- ii. At different concentrations of sugar.
- iii. For different concentration of KHSO_3 .

EXPERIMENT

AIM: To study the effect of potassium bisulphite as a food preservative under various conditions (temperature, concentration and time).

APPARATUS: Beaker, pestle and mortar, glass bottles, balance and peeler.

CHEMICALS: Fresh fruits, potassium bisulphite and sugar.

THEORY: Food materials undergo changes due to time, temperature and enzymatic action. So these become unfit for use. These changes can be checked by adding small amounts of potassium bisulphite. The effectiveness of potassium

bisulphite as preservative depends upon its concentration under different conditions.

PROCEDURE: Wash the fresh fruit and peel off their outer skin. Grind it in a pestle and mortar to a paste. Mix with sugar and colouring materials. The material so formed is called fruit jam. This can be used to study the effect of concentration, temperature and time.

Effect of concentration of sugar: Take three bottles labelled as A, B and C. Put 100g of fruit jam in each bottle. Now, add 5g, 10g and 15g of sugar to bottle A, B and C. Mix the contents thoroughly and close the bottle. Keep these bottles to stand for a week. Note the changes taking place in jam daily.

Bottle number		A	B	C
Weight of jam taken		100 gm	100 gm	100 gm
Weight of sugar added		5 gm	10 gm	15 gm
Weight of KHSO_3		0.5 gm	0.5 gm	0.5 gm
Observation (Days)				
Day 1	Colour	Dark orange	Dark orange	Dark orange
	Odour	Pleasant smell	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	Fungus not formed	Fungus not formed
Day 2	Colour	Dark orange	Orange	Light Orange
	Odour	Pleasant smell	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	Fungus not formed	Fungus not formed
Day 3	Colour	Dark orange	Orange	Light Orange
	Odour	Pleasant smell	Pungent smell	Pungent smell
	Fungus	Fungus not formed	White Fungus formed	White Fungus formed is more than B
Day 4	Colour	Orange	Light Orange	Light Orange
	Odour	Pungent Smell	Pungent Smell	Pungent Smell

	Fungus	White Fungus is formed	White fungus has increased	Fungus turned greenish in colour
Bottle number		A	B	C
Weight of jam taken		100 gm	100 gm	100 gm
Weight of sugar added		5 gm	10 gm	15 gm
Weight of KHSO_3		0.5 gm	0.5 gm	0.5 gm
Observation (Days)				
Day 5	Colour	Dark orange	Light Orange	Yellow Colour
	Odour	Pungent smell	Pungent smell	Smells ethanolic
	Fungus	White fungus has increased	Fungus turned greenish in colour	Greenish colour fungus has increased
Day 6	Colour	Light Orange	Yellow colour	Yellow colour fades
	Odour	Smells Ethanolic	Smells Ethanolic	Smells Ethanolic
	Fungus	Fungus turned greenish in colour	Greenish colour fungus has increased	Fungus turned in black colour
Day 7	Colour	Yellow colour	Dark orange	Yellow colour fades
	Odour	Smells ethanolic	Smells ethanolic	Smells ethanolic
	Fungus	Greenish colour fungus has increased	No fungus is formed	Spoilt

RESULT: The increase in concentration of sugar causes deterioration of fruit jam due to growth of fungus.

EFFECT OF CONCENTRATION OF SUGAR



Effect of concentration of KHSO_3 : Take three bottles

labeled as A, B and C. Put 100g of jam in each bottle. Put 5g of sugar in each bottle. Now, add 1g, 2g and 3g of KHSO_3 to bottle no. A, B and C respectively. Mix the contents thoroughly. Keep these bottles at room temperature for seven days. Observe the changes daily.

Bottle number		A	B	C
Weight of jam taken		100 gm	100 gm	100 gm
Weight of sugar added		5 gm	5 gm	5 gm
Weight of KHSO_3		1 gm	2 gm	3 gm
Observation (Days)				
Day 1	Colour	Dark orange	Dark orange	Dark orange
	Odour	Pleasant smell	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	Fungus not formed	Fungus not formed
Day 2	Colour	Orange	Orange	Dark Orange
	Odour	No Pleasant smell	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	Fungus not formed	Fungus not formed
Day 3	Colour	Orange	Orange	Dark Orange
	Odour	Pleasant smell	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	Fungus not formed	Fungus not formed
Day 4	Colour	Orange	Orange	Orange
	Odour	Pleasant smell	Pleasant smell	Pleasant smell

	Fungus	Fungus not formed	Fungus not formed	Fungus not formed
Bottle number		A	B	C
Weight of jam taken		100 gm	100 gm	100 gm
Weight of sugar added		5 gm	5 gm	5 gm
Weight of KHSO_3		1 gm	2 gm	3 gm
Observation (Days)				
Day 5	Colour	Light orange	Orange	Dark Orange
	Odour	Pungent smell	Pleasant smell	Pleasant smell
	Fungus	White fungus is formed	No fungus is formed	No fungus is formed
Day 6	Colour	Light Orange	Light Orange	Dark Orange
	Odour	Pungent smell	Pungent smell	Pleasant smell
	Fungus	White Fungus increased	White Fungus is formed	No fungus is formed
Day 7	Colour	Light orange	Light orange	Dark Orange
	Odour	Pungent smell	Pungent smell	Pungent smell
	Fungus	Fungus turns green in colour	White Fungus increased	White Fungus formed

RESULT: The increase in concentration of KHSO_3 causes decrease in growth of fungus

Effect of potassium bisulphite



Effect of temperature: Take 100g of jam in three bottles labelled as A, B and C. Add 10g of sugar and 1g KHSO₃ to each bottle. Mix the contents thoroughly. Place bottle A in the refrigerator at 273 K, bottle B at room temperature 298 K and bottle C in a thermostat at 323. Observe the changes taking place in the jam everyday.

Bottle number		A	B
Weight of jam taken		100 gm	100 gm
Weight of sugar added		10 gm	10 gm
Weight of KHSO ₃		1 gm	2 gm
Observation (Days)		273 K	298 K
Day 1	Colour	Dark orange	Dark orange
	Odour	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	Fungus not formed
Day 2	Colour	Dark orange	Dark orange
	Odour	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	Fungus not formed
Day 3	Colour	Dark orange	Orange
	Odour	Pleasant smell	Pleasant smell
	Fungus	Fungus not formed	White Fungus formed
Day 4	Colour	Dark orange	Orange
	Odour	Pleasant smell	Pungentt smell
	Fungus	Fungus not formed	Fungus not formed
Bottle number		A	B
Weight of jam taken		100 gm	100 gm
Weight of sugar added		5 gm	5 gm
Weight of KHSO ₃		1 gm	2 gm

Observation (Days)		273 K	298 K
Day 5	Colour	Dark orange	Dark orange
	Odour	Pleasant smell	Pungent smell
	Fungus	White fungus not formed	Fungus turned greenish in colour
Day 6	Colour	Dark orange	Dark orange
	Odour	Pleasant smell	Pungent smell
	Fungus	White fungus not formed	Green colour Fungus increase
Day 7	Colour	Dark orange	Orange
	Odour	Pleasant smell	Pungent smell
	Fungus	White fungus not formed	Fungus turned black in colour

RESULT: With increase of temperature, fruit jam deteriorates.

Effect of temperature



Temperature 273 K



Temperature 298 K

CONCLUSION

Food containing more amount of sugar is not favorable to keep for a long time

Potassium bisulphite is a good preservative.

Uses

There are a number of uses for potassium bisulfite as a food preservative. The Manitoba Agriculture, Food and Rural Initiatives reports this product works to prevent the growth of mold, yeast and bacteria in foods. It is also an additive for homemade wine.

Potassium bisulfate is found in some cold drinks and fruit juice concentrates. Sulfites are common preservatives in smoked or processed meats and dried fruits. In spray form, it may help prevent foods from discoloring or browning.

Availability

Potassium bisulfite is primarily a commercial product. You might find this chemical compound at meat processing plants. Manufacturers of juice drinks and concentrate will use potassium bisulfite to increase the shelf life of their products. The preservative is also available for home use.

Allergies

Sulphites such as potassium bisulfite can trigger an attack for those with asthma. potassium bisulfite may cause lung irritation.

BIBLIOGRAPHY

The necessary information for the project is collected from the references stated below:

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