

## PROMINENT FEATURES TO INCREASE THE SHELF LIFE OF A PRODUCT LINE

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### I. INTRODUCTION

Shelf life:-Shelf life is a guide for the consumer of the period of time that food can be kept before it starts to deteriorate, provided any stated storage conditions have been followed. The shelf life of a product begins from the time the food is prepared or manufactured. Its length is dependent on many factors including the types of ingredients, manufacturing process, type of packaging and how the food is stored. It is indicated by labelling the product with a date mark. Shelf life describes how long a food will retain its quality during storage. During the shelf life of a food it should:

- Remain safe to eat
- Keep its appearance, odour, texture and flavour
- Meet any nutritional claims provided on the label.

The shelf life of any packaged food requires a date mark. It is used in those products which have less than two years of shelf life. Date mark can be "use by", "Best before", or "Baked on" must be followed by a date. Each one can be defined as:-

- A "Use by" date. This is used for highly perishable foods that will present a safety risk if consumed after this date. A food must neither be sold nor be consumed if it is past its "Use by" date.
- A "Best before" date. This is used for non-perishable foods. It is not illegal to sell food that has reached its "Best before" date.
- "Baked on" date marks. It can be used on bread products with a shelf life of less than 7 days.

#### *Factors influencing the shelf life of a product*

As all foods spoil with time, but there is considerable variation in spoilage rates. Some of the factors involved in loss of quality are explained below.

a) Microbial growth:-The growth of some bacteria, yeasts and moulds in food may lead to either food spoilage or food poisoning. The time taken for microorganisms to affect foods will depend on their levels in the food when it is produced, as well as during packing, storage and other handling. The temperature and time of storage, as well as the type of food, are also important factors. Moist foods will usually spoil faster than dry foods.

b) Non-microbial spoilage:-There are many other ways in which quality and nutrients of food products can be lost. They may not necessarily result in the product being harmful but can no longer of an acceptable standard. These are as follows-

a) Moisture gain/loss:-It can result in loss of nutrients and rancidity. Dry foods can become vulnerable to microbial spoilage if they take on moisture.

b) Chemical change:-It can result in off flavours, colour changes, and loss of nutrients.

c) Light induced change:-It can cause rancidity, vitamin loss and fading of natural colours.

d) Temperature changes:-It can increase or decrease the speed of other forms of spoilage.

e) Physical damage:-It means food can result in spoilage, for example bruising of fruit and vegetables.

Damage to food packaging can make the food vulnerable to both microbial and non-microbial spoilage. For example, pin holes in cans or tears in plastic bags allow microorganisms to enter the food and moisture to be lost from the food. Other damages are Spoilage by rodents and insects, Flavours and odours from storing food near other strongly smelling products and Product tampering.

### II. RESEARCH OBJECTIVES

1) To study the factors affecting shelf life of various products of a product line of a particular food industry.

2) To suggest the ways by which shelf life can be lengthen.

#### *Data analysis:-*

As there are many factors which are discussed during study of shelf life of biscuits. On the basis of these factors data is recorded and charts are created. These are shown below with their values. These charts will show how the shelf life of biscuits affected by these factors and changes in values will extend shelf life or retard it. For all this analysis data is plotted in charts and shown to realize values to check shelf life of biscuits. These factors are firstly discussed and then, charts are plotted to show them literally.

1) Moisture content.

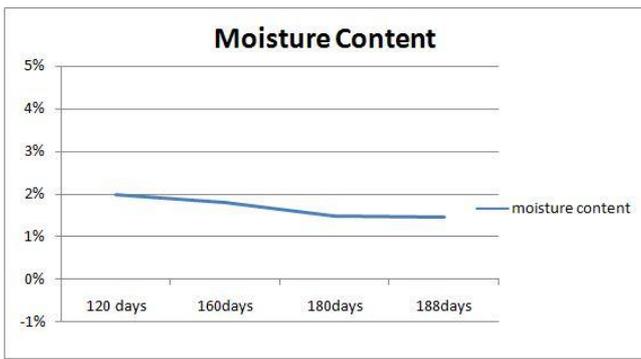
2) Water Vapour Transmission Rate.

3) Oxygen Transmission Rate.

4) Packaging material.

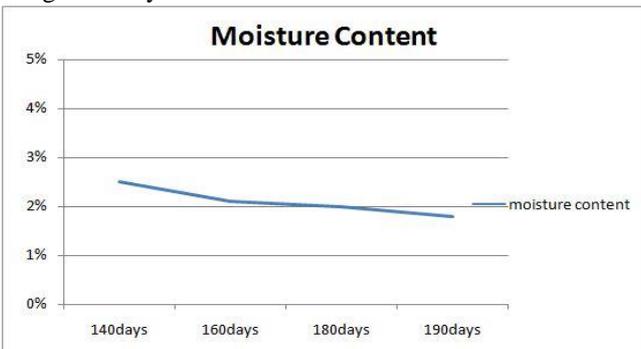
5) Water activity.

1) Moisture content:-The normal moisture content of a processed food should be maintained during storage. This is a main function of packaging for some foods. If the moisture content falls below an acceptable level in moist foods, the food dries out, shrivels and is seen as spoiled by consumers. The moisture content of a dry food is allowed to rise above an acceptable level it will first lose its crispness and become unacceptable to consumers



Line chart (shelf life and moisture content of Parle G biscuits)

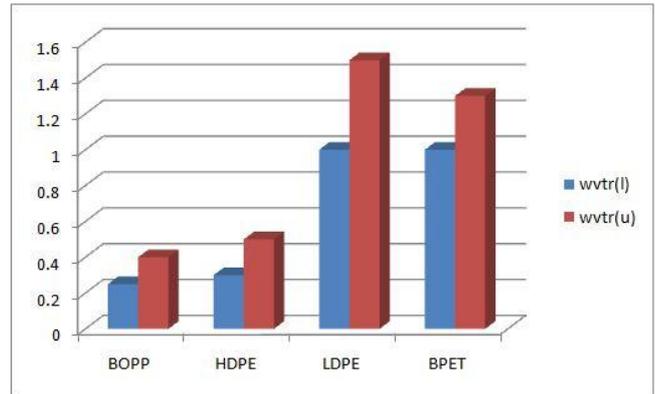
Above line chart show moisture content in Parle G biscuits will affect shelf life readily. As, the values of moisture content is 2.0%, shelf life is 120 days. As moisture content increase, shelf life will decrease. But moisture content should not be less than 1.4% otherwise it will affect shelf life again in negative way.



Line chart (shelf life and moisture content of Krack Jack and Monaco biscuits)

Above line chart show moisture content in Krack Jack and Monaco biscuits will affect shelf life readily. As, the values of moisture content is 2.1%, shelf life is 160 days. As moisture content increase, shelf life will decrease. But moisture content should not be less than 1.6% otherwise it will affect shelf life again in negative way.

2) Water vapor transmission rate:-It is the standard measurement by which films are compared for their ability to resist moisture transmission. Lower values indicate better moisture protection. Only values reported at the same temperature and humidity can be compared, because transmission rates are affected by both of these parameters. In order for film moisture barrier to contribute its full product protection value, package seal integrity must be satisfactory. Poor quality seals can negate a film's good barrier by allowing vapor transmission through channel leakers and imperfections. As ranges shown in chart values for different packaging materials concluded that BOPP shows most effective values which maintain water vapour transmission rate. It regards that required amount of water is transmit from packaging material BOPP. Other materials shows high transmission rate. This reason concluded that BOPP is used for given reasons. Bar chart shown below will become recorded.

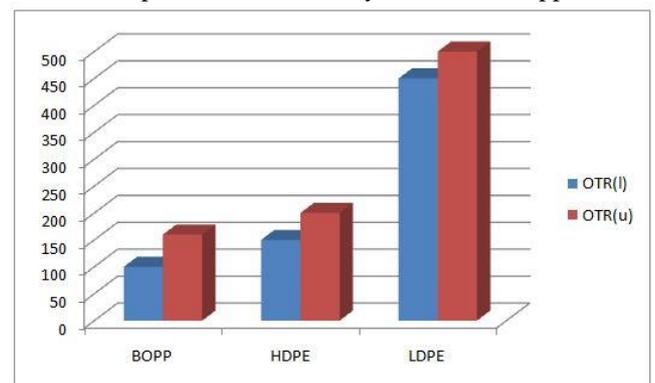


Wvtr (l)-lower value of wvtr.

Wvtr (u)-upper value of wvtr.

3) Oxygen Transmission Rate:-It is steady rate at which oxygen gas permeates through a film at specified conditions of temperature and relative humidity. Values are expressed in cc/100 in 2/24 hr in US standard units. Standard test conditions are 73f and 0% RH.

As ranges shown in chart values for different packaging materials concluded that BOPP shows most effective values which maintain Oxygen transmission rate. It regards that required amount of water is transmit from packaging material BOPP. Other materials shows high transmission rate of oxygen. This reason concluded that BOPP is used for given reasons. Bar chart shown below will become recorded. Chart show barrier layer and surface compatibility. There is a range of values at a particular temperature and relative humidity. These values are considered only on the given values. Otherwise these are useless. If small changes in values are used above all values are affected. So, keep these considered in kind these values are plotted in charts. On all values of temperature and humidity these are not applicable.



Otr (l)-lower values of otr.

Otr (u)-upper values of otr.

4)Packaging material:-Biaxially-Oriented Polypropylene (BOPP) films have become a popular, high growth film in the food packaging world because of a unique combination of properties such as better shrinkage, stiffness, transparency, seal-ability, twist retention and barrier. In a world of fast-changing lifestyles, consumers expect products to be lightweight, shatter-proof, aesthetically appealing, and easy to handle and offer good protection. The only answer to all these demands is plastics. They have become part and parcel

in every walk of life.

Flexible packaging materials like polyethylene, polyvinyl chloride, polypropylene and polyester films play a major role in almost all the industries, especially the food-packaging sector. Biaxially oriented polypropylene (BOPP) film is among the most favored packaging material across the industrial spectrum. The BOPP film suitable for the food packaging industry is generally a co-extruded, heat-sealable film. The sector also uses non-heat sealable films. Co-extruded, heat-sealable films are used as a single web for packaging of products unlike polyester films which cannot be heat-sealed on its own and warrants a second web to be laminated.

5) Water activity:-Water activity is an important means of predicting and controlling the shelf life of food products. Shelf life is the time during which a product will remain safe, maintain desired sensory, chemical, physical and microbiological properties, and comply with nutritional labelling. Many factors influence shelf life such as; water activity, pH, redox potential, oxygen, use of preservatives, and processing/ storage conditions. By measuring and controlling the water activity of foodstuffs, it is possible to;

- a) Control the activity of enzymes,
- b) Prolong nutrients and vitamins in food, and
- c) Optimize the physical properties of foods.

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### III. CONCLUSION

The entire analysis shows that shelf life of food products (biscuits) can be maintained and extended only by maintaining a particular temperature and humidity. As regard to extension of shelf life of food products as much as moisture content and water activity can be lowest, more will be the shelf life of food products. But the only condition is that all processes should be conducted at particular or specific temperature.

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