

A toothpaste or dentifrice is a substance used with a toothbrush for the purpose of cleaning the accessible the teeth.

Purposes:

- a) Cleaning the teeth.
- b) Polishing the teeth.
- c) Removal of stains from teeth.
- d) Reduce incidence of tooth decay.
- e) Reduction of oral malodors.

Requirements of a toothpaste:

- When used properly, with an efficient toothbrush, toothpaste should clean the teeth adequately, that is, remove food debris, plaque and stains.
- It should leave the mouth with a fresh, clean sensation.
- Its cost should be such as to encourage regular and frequent use by all.
- It should be harmless, pleasant and convenient to use.

Types of toothpaste:

1. Anti-Caries/ Cavity Protection toothpastes	Sodium fluoride and sodium monofluorophosphate. (Antibacterial agent)	Contain fluoride to stop tooth enamel decalcification and protect teeth from tooth decay and cavities.	Eg. Colgate cavity protection
2. Plaque & Gingivitis Prevention toothpastes	Sodium Lauryl Sulphate, (Surfactant) Triclosane, Zinc(Antibacterial) and Stannous ions(Antimicrobial)	Contain antibacterial agent prevent the formation of dental plaque.	Eg. Crest-pro- health clinical gum protection
3. Tooth Whitening toothpastes	Papain (Antibacterial), Dimethicone (thickening agent)	Have either higher abrasion value than normal toothpastes to mechanically remove food, smoking and other stains from teeth.	Eg. Colgate Optical White and Colgate Pro-clinical White.
4. Sensitivity toothpastes	Potassium nitrate, strontium chloride, potassium citrate (Desensitizing)	Contain de- sensitising agents to relief those with tooth sensitivity by closing the dentinal tubules.	Eg. Colgate sensitive, Sensodyne
5. Tartar Control toothpastes	Pyrophosphates	Reduce new tartar build-up (but they can't remove the existing tartar).	Eg. Colgate tartar protection with whitening
6. Fresh Breath toothpastes	Peppermint, spearmint, menthol	Enhance flavoring agents along with antibacterials to fight halitosis.	Eg. Colgate Max- fresh

Ingredients

1) Cleaning and polishing agents:

The main purpose of the cleaning and polishing agent is to remove any adherent layer on the teeth.

Calcium carbonate:

Calcium carbonate is probably one of the most commonly used dental cream abrasives. Precipitated calcium carbonate (chalk) is available with a white or off-white colour and both particle size and crystalline form can be varied, depending upon its conditions of manufacture.

Sodium bicarbonate:

It is a very mild abrasive, usually used at a 5-30% level, in combination with other abrasives such as silica or calcium carbonate to achieve the required cleaning action.

2) Surfactants:

Surfactants are used in the toothpaste to aid in the penetration of the surface film on the tooth by lowering the surface tension. They also provide the secondary benefits of providing foam to suspend and remove the debris, and the subjective perception of toothpaste performance.

Sodium lauryl sulphate:

Sodium lauryl sulphate is currently the most widely used detergent in toothpaste because it satisfies almost all the requirements. It is a foaming & solubilizing agent that is derived from coconut and palm oil. SLS emulsifies fats, has a high affinity for proteins, and has mild antibacterial activity.

3) Humectants:

Humectants are used to prevent the paste from drying out and at the same time they give shine and some plasticity to the paste. Generally only two major humectants are considered for use in toothpaste.

Glycerin:

Glycerin is still the humectant used in greatest bulk quantity in toothpaste. It is one of the best humectants, producing a shiny, glossy product. It is stable, non-toxic, available from both synthetic and natural sources, and provides a useful sweetening function to the paste.

Sorbitol:

Sorbitol syrup is also extensively used throughout the industry and is sometimes considered superior to glycerin depending upon the formulation. It also imparts sweetness, and is a stable humectant.

4) Sweetening agents:

These are important for product acceptance, since the final product must be neither too sweet nor too bitter. These ingredients must always be considered in partnership with the flavour because of their combined impact.

Sodium saccharin:

This is the sweetening agent in widest commercial use, and is generally used at a level between 0.05% and 0.5% by weight.

5) Flavours:

Flavours are probably the most crucial part of toothpaste because of consumer preferences. They are also the most proprietary part of the formulation. Exotic flavours, although available, are generally not well liked under longterm usage conditions, since one of the primary consumer requirements of toothpaste is the perception of freshness and cleanliness after brushing conventionally, therefore, mint flavours tend to predominate.

6) Minor ingredients:

This section is intended to cover all additional ingredients added to the paste to form either a functional or cosmetic aspect.

Titanium Dioxide:

Titanium dioxide may be added to give additional whiteness and brilliance to the paste.

7) Colours:

Colours can be an integral part of the aspect of any toothpaste that may influence consumer preference and purchase intent. A small amount of colour may be added to the paste as a whole to give it a pastel shade. Equally if a translucent gel had been formulated then colour would be added to give it a different visual appearance.

8) pH regulators:

Occasionally buffering systems need to be added to the dental cream to adjust the pH of the final finished product.

Formulation of Toothpaste:

Ingredients	Formula% (by weight)	Examples
Surfactant	1.0-2.0	Sodium lauryl sulphate
Humectant	10-30	Glycerin, Sorbitol
Gelling Agent	0.5-1.5	Hydroxy ethyl cellulose, carboxy methyl cellulose
Sweetener	0.05-0.5	Sodium Saccharin
Flavour	1.0-3.0	Spearmint, Menthol
Colour	<1.0	Titanium Dioxide
water	to 100	

Procedure for preparati

- Take half the quantity of water, add tragacanth powder & heat it in a water bath to get a gel.
- To the remaining quantity of water, add glycerine, sodium lauryl sulphate, preservative & mix it thoroughly to get a clear solution.
- Weigh the required quantity of saccharin and calcium carbonate solution & mix it with the help of mortar and pestle.
- To this powder, add gum tragacanth & mix well.
- Add glycerine, preservative & sodium lauryl mixture to it and triturate uniformly to get a paste. Finally add flavouring agent & triturate well.
- Transfer to a narrow mouthed plastic tube, seal & label.

Different toothpaste formulation

FORMULA:-

Sorbitol (70%)	-	54.1%w/w
Silica (Abrasive)	-	18%w/w
Xylitol	-	10%w/w
Silica (Thickener)	-	5.5%w/w 3%w/w
Polyethylene glycol 600	-	3%w/w
Sodium lauryl sulphate	-	1.2%w/w
Flavour	-	0.9%w/w
Tetrasodium pyrophosphate	-	0.5%w/w
Titanium dioxide	-	0.5%w/w
Sodium benzoate	-	0.5%w/w
Carboxymethyl cellulose	-	0.35%w/w
Sodium fluoride	-	0.243%w/w
Sodium saccharin	-	0.2%w/w
Colour water	-	100%w/w

2) Toothpaste offering whitening: Formula :-

Glycerin	-	25%w/w
Silica abrasive	-	20%w/w
Propylene glycol	-	17.6%w/w
Sodium bicarbonate	-	12%w/w
Water	-	6%w/w
Propylene glycol 600	-	3%w/w
Sodium carbonate	-	2%w/w
Silica thickener	-	2%w/w
Sodium lauryl sulphate	-	1.7%w/w
Colour	-	100%w/w

3) Toothpaste for sensitivity
FORMULA

POTASSIUM NITRATE - 10%W/W

GLYCERIN - 25%W/W

Polyoxyethylene sorbitan monolaurate - 2%W/W

SILICA - 24%W/W

FLAVOUR - 1%W/W

SODIUM SACCHARIN - 0.2%W/W

WATER - 100%W/W



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