Waxes

***Wax****:* Wax is defined as a substance that is solid at ambient temperature and when subjected to moderate temperature, become a low viscosity.

***Classification of Waxes***:

Waxes may be divided into two categories natural and synthetic waxes. Or can be classified according to:

***A- Origin*:**

Waxes have been classified according to their origin into: mineral, plant, insect, and animal.

***B- Chemical Composition*:**

Classification of waxes by composition and physical properties is a sounder basis than classification by the source of the wax.

The two principle groups of organic compound contained in waxes are hydrocarbons and esters, though some waxes contain free alcohol and acid as well.

***C- Use and Application*:**

Wax products applied in dentistry can be broadly classified into the following categories: pattern waxes, processing waxes and impression waxes.

***Types of Waxes in Dentistry:***

***1-Processing Waxes:***

***A- Boxing and Utility waxes***:

Boxing and utility waxes are soft, pliable waxes used primarily in taking and pouring impressions. These waxes are usually dark in color and have a slight tackiness which allows them to be attached to each other or to stone models or impression trays.

***B- Carding Wax:***

This wax with a high flow value at room temperature and is easily moldable without the need of heating. It is used for attaching parts.

***C- Sticky Wax:***

Sticky wax is actually a somewhat misleading name for this wax because it is hard and brittle at room temperature. However, when heated it is sticky and will adhere tenaciously to dry stone or other dental materials. It is used commonly to assemble metallic or resin pieces temporarily in position.

2- ***Impression Waxes:***

***A- Corrective Impression Waxes:***

Although wax has been the material of choice for direct impression of a tooth cavity as the first stage in inlay construction, its use as an impression material for denture work has never been widespread. However, a wax with high rate of flow at body temperature may be useful for taking corrective impression of the saddle areas, when a free-end saddle partial lower denture is being made.

***B- Bite -Registration Wax:***

Bite – registration wax is used for accurate articulation of certain models of opposing arches. Specially formulated waxes are made from beeswax or paraffin or ceresin and oils, some products contain aluminum or copper particles.

***3-Pattern Waxes***:

***A-Casting Waxes*:**

Casting wax is used to form the wax pattern of the metallic framework of removable partial denture. It is usually supplied in the form of sheets, ready- made shapes and in bulk.

B- ***Inlay Waxes:***

Inlay waxes generally are used to fabricate wax pattern for crowns, inlays or bridges.

C- ***Modelling or Base plate Wax:***

Base plate wax is relatively hard, and slightly brittle at room temperature but becomes soft, and pliable when heated.

***Applications of Dental Modelling Waxes:***

*1- Construction of dentures:*

The modelling wax can be used as a base plate material because it is readily moldable, economic, speed and reproduce the details of most groove in gypsum cast.

*2- Construction of orthodontic appliances:*

Patterns for orthodontic appliances and prosthesis other than complete dentures, which are to be constructed of plastics, are also made of base plate wax.

*3-Interocclusal records:*

Base plate wax has been widely used in many phases of dentistry to check the various articulating relations in mouth and transfer them to mechanical articulator.

*4- Construction of extraoral prosthesis:*

*5- Spacer in different uses:*

Base plate wax is used to create a space over the cast before custom trays can be made.

*6- Impression material:*

Base plate wax can be used for taking an impression of a tooth or teeth in construction of fixed prosthodontic restoration.

*7- Duplicating material:*

The modelling wax is used as duplicating material in a procedure of duplication of maxillary complete denture and concluded that the replicas made from modelling wax .

*8-Block-out wax:*

Another use of base plate wax is for block-out undercuts on casts.

***Important Properties of Dental Waxes:***

 Waxes are characterized most readily in terms of their physical nature rather than their chemical composition***.***

***1-Melting Range:***

With complicated component, waxes have a melting range rather than a single, sharp melting temperature***,*** because these waxes contain several types of molecules, each having a range of molecular weights.

2-***Transition Temperature:***

At temperature above the melting point, the crystallites have melted and the wax is fully fluid. At temperature below the transition temperature, the wax is rigid and cannot easily be moulded. At temperature between the melting point and the transition temperature, the wax is partly fluid and partly solid, i.e. It is viscoelastic.

3- ***Flow:***

Flow is the change in shape under an applied force. Wax has a tendency to flow. It results from the slippage of wax molecules over each other. ***4-Stress Relief:***

In using dental wax, applying stress or pressure is undesirable***.*** Waxes, like other thermoplastic tend to return to their original shape after manipulation. Stress –relief in wax is usually the result of adaptation at too low a temperature. Thus, the deformation is not carried out with the wax totally fluid and consequently, a partial recovery is possible given suitable conditions. This partial recovery results in dimensional inaccuracy and is undesirable.

***5-Thermal Expansion:***

Like other materials, waxes expand when subjected to arise in temperature, and contract as the temperature is decreased This fundamental property may be altered slightly when various waxes are blended, but the response to thermal changes cannot be reduced to negligible values.

***6-Thermal Conductivity:***

The thermal conductivity of waxes is low which implies that these materials gain, and lose, heat very slowly.