

## WOOL

**Biological Source :** Wool or wool fibres are obtained from the fleece of sheep *Ovis aries*, family: Bovidae,

**Chemical Constituents :** Chemically, wool contains sulphur containing protein known as keratin. Keratin is rich in amino-acid cystine.

### **Chemical Tests :**

1. Wool is insoluble in 66 % sulphuric acid, concentrated hydrochloric acid and caustic soda.
2. When lead acetate is added to a solution of wool in caustic soda, a black precipitate is formed owing to high sulphur content (distinction from silk).
3. Wool hairs are soluble in 1.25 M sodium hydroxide solution.
4. Wool hairs are stained with ammoniacal copper oxide solution.

### **Uses :**

Wool is used as filtering and straining medium and in the manufacture of dressings like domette and crepe bandages and flannel.

## Regenerated Fibres

### RAYON

#### **Synonyms :**

Regenerated cellulose, viscose rayon

**Source :** It is an artificial fibre, composed of regenerated cellulose in which substituents have replaced not more than 15% of hydrogens of hydroxyl groups. Now, it is produced exclusively by the viscose process.

The cellulose of coniferous wood in the form of pulp is processed to give viscose rayon. The pulp contains about 80 - 90 % of cellulose and hemicellulose. The cellulose is treated with sodium hydroxide to get sodium cellulose. It is further treated with carbon disulphide and sodium hydroxide to produce viscous solution of sodium cellulose xanthate.

After ripening, this solution is forced through the fine nozzles into the bath of sodium sulphate and sulphuric acid to give continuous filaments. The filaments are drawn together to form the yarn. The yarn is desulphurized, bleached, washed, twisted and then dried.

Rayon contains about 10% moisture and does not lose the absorbency on storage like cotton.

Uses : It is mainly used for making fabrics, preparation of surgical dressings and viscose rayon absorbent wool.

## **SUTURES**

These are the sterile threads, strings or strands specially prepared for use in surgery meant for sewing tissues together. Sutures must possess the following properties.

- (a) They must be sterile and should cause no irritation.
- (b) They should have finest possible gauge and adequate strength.
- (c) If absorbable, their time of absorption must be known.
- (d) They are intended to be used for one occasion only.

Sutures may be prepared from intestinal tissues and tendons of animals and birds; vegetable fibres; camel hair; human hair; synthetic threads or metallic wires. Depending upon their characteristic of absorption, i.e. digestion in the tissues of the body, sutures are known as absorbable or non-absorbable sutures.

Various methods are used to sterilize sutures (to make them free of pathogenic micro-organisms). A few of the important methods are :

1. Chemical sterilization
2. Sterilization by irradiation
3. Sterilization heat

Heat sterilization involves two processes and sutures are classified into two categories depending upon heat resistance.

- a) Boilable (in anhydrous liquid)
- b) Non-boilable

The sterilization should not affect the properties of sutures or their utility. In irradiation method, sterilization is carried out by electron particles or by gamma rays from cobalt 60. The recognized dose of gamma rays treatment is 2.5 megarad.

Sutures may be of the following types:

### **1) Absorbable sutures**

- a) Sterile catgut (small intestine of sheep, ox and appendix of deer)

- b) Sterile reconstituted collagen suture

## **2) Non-absorbable sutures**

- (a) Sterile non-absorbable sutures (silk and cotton)
- (b) Sterile linen suture
- (c) Sterile polyamide sutures (nylon)
- (d) Sterile polyester sutures (terylene)
- (e) Sterile braided sutures
- (f) Sterile stainless and silver sutures

## **(3) Haemostatics**

- (a) Oxidised cellulose
- (b) Absorbable gelatin sponge

## **Uses**

Depending upon the physical and chemical properties and also the desired effect, various sutures are effectively used under different conditions.

Silk sutures are strong, smooth, inactive and also available in various diameters. The braided form is compact one and has a special advantage of not getting twisted when drawn through the body tissues. Nylon sutures are strong enough and enjoy the merit of their utility in skin and plastic surgery. Cotton sutures due to their low order of tissue reactivity are preferred, but suffer from poor tensile strength. Linen, though very much economical and quite effective, lacks in uniform diameter for practical purposes. Kangaroo tendons are specially used in hernia, while metallic sutures are used in surgery in general.

## **SURGICAL DRESSINGS**

The word surgical dressing is used to include all the materials either used one of in combination to cover the wound. The purpose of application of dressing is to protect the wound and favour its proper healing, A material which holds the dressing in desired position is known as bandage. Fibres are used for the preparation of surgical dressings.

Dressings are meant for the following functions,

- (1) To reduce or prevent infections
- (2) To offer protection to healing wound.
- (3) To offer mechanical support to the tissues,

Surgical dressings should comply the following requirements as mentioned in Pharmacopoeia

- (1) They should be sterilised before use.
- (2) They should be stored in dry well ventilated place at a temperature not exceeding 25°C
- (3) They should be used with permitted antiseptics in prescribed concentrations only
- (4) They should not be dyed unless mentioned in the monograph
- (5) Adhesive products should not be allowed to freeze.
- (6) There should not be any loose threads, fibre-ends in dressings,

**Surgical dressings are classified as:**

**A) Fibres:**

- (a) Non medicated fibres: Absorbent cotton, wool, rayon, silk etc
- b) Medicated fibres: Boric acid wool, Capsicum wool

**(B) Fabric:**

These are woven materials and may be

- a) Medicated and
- b) Non-medicated

Gauzes, bandages and plasters are various forms of fabrics

**(C)Bandages :**

These are the products used to retain dressings in place to provide support for application of medicaments to the skin. They are water proof, and offer mechanical support and may be fastenable. They may be elastic, or non-elastic, adhesive or non-adhesive.

- (a) Non-medicated bandages: Crepe bandage, Domette bandage, Calico bandage, Cotton and rubber elastic bandage.

(b) Medicated bandages: Plaster of Paris bandage, Zinc paste bandage, Zinc paste Ichthamol bandage

Absorbent lint Absorbent ribbon gauze, Boric acid lint, Absorbent gauze, X-ray detectable are the examples of bandages.

**(D) Rubber and Oil Impregnated Materials:**

Belladonna self-adhesive plaster, Zinc oxide self-adhesive plaster etc. British Pharmacopoeia recognizes the following types of surgical dressings.

- (1) Fibres and related materials: i.e. Viscose, wood cellulose wadding
- (2) Carded products: Absorbent cotton, viscose wadding etc.
- (3) Non-extensible, non-adhesive woven products: ie. Absorbent musling Damette bandage etc.
- (4) Non-extensible adhesive woven products: Belladonna adhesive plaster, Zinc oxide surgical adhesive tape.
- (5) Extensible non-adhesive woven products: Cotton bandage, elastic web bandage etc
- (6) Extensible adhesive woven products: Elastic adhesive bandage, extension plaster
- (7) Non-woven products: Impermeable plastic surgical adhesive tape, permeable plastic surgical adhesive tape etc.

Surgical dressings are also classified as woven dressings and non-woven dressings. Cotton, silk and wool are used to prepare a number of woven dressings. They should also comply the pharmacopoeial requirements. Few of them are described below.

Following are the few woven-dressings available in the market.

1. Absorbent Lint: It is cotton cloth of plain weave from the warp yarn of which a nap has been raised.
2. Flannel Bandage : It consists of a raised fabric of plain weave and is made up of entirely wool.
3. Domette Bandage : It consists of a combination of fabric of plain weave, where the warp yarn are of cotton and weft yarns are entirely of wool.
4. Crepe Bandage : It consists of fabric of plain weave, wherein warp threads are of cotton and wool, whereas the weft threads are entirely of cotton only.

Gauge and cellulose wadding tissue : Cellulose tissue consists of thick layer of cellulose wadding enclosed in tubular absorbent gauze