Wet Preparatory Processes

Estimation of desizing effect:

Iodine test:

By this test it is possible to identify the presence of starch materials in woven fabric.

Recipe for preparation of Iodine solution:

Potassium Iodide (KI) : 0.24 gm
Iodine (I_2) : 0.13 gm
And rest amount of water to make the 100 ml solution.

If one drop of this solution falls on the tested material then following incident may occur.

a) **Deep blue** → indicates the presence of starch.
b) **Violet**→ indicates partially degraded starch (dextrin)
c) **Brown** → indicates completely degraded dextrin (absence of starch).

Estimation of Scouring Process :

The scouring effect can be estimated by carrying out one of the following tests:

- ✓ Measurement of weight loss
- ✓ Test of absorbency (Mostly used in the industries for the estimation of scouring effect)
  - Immersion test
  - Drop test
  - Wicking /Column test
- ✓ Measurement of protein content
- ✓ Measurement of wax content

Measurement of weight loss:

Since a considerable amount of impurities (oil, wax etc.) are removed in scouring process, the loss in weight of fabric can be a parameter for determining the scouring effect. The loss in weight of fabric during scouring shows that a considerable amount of impurities are removed. The weight of un-scoured and scoured samples is taken separately at the same moisture content and then the weight loss is measured in percentage. The standard range of weight loss due to scouring is 4-8% (sometimes

even 9%).

$$\text{Weight loss (\%)} = \frac{\text{(wt. before scouring - wt. after scouring) x100}}{\text{Wt. before scouring}}$$

If weight loss < 4% ⟶ *Fabric is **not well scoured** that means **unacceptable scouring**.*

If weight loss > 8% ⟶ ***More weight loss for scouring** and fibre has also been damaged. This represents **unacceptable scouring.***

Absorbency tests:

There are the following types of absorbency tests for determining scouring effect-

- Immersion test
- Drop test
- Wicking or column test.

a) Immersion test:

A fabric is more absorbent when it is scoured. So a scoured sample will take less time to be immersed than an unscoured one. This is the principle of immersion test.

Test procedure:

Sample of 1cm x 1cm size is cut and then it is left on the water surface. With the help of a stop watch the time for fabric immersion is recorded.

Result:

The standard time of immersion is **5 seconds** and immersion time up to **10 seconds** means the sample is well scoured. But if the time is **more than 10 seconds then the scouring is said to be unacceptable**.

b) Drop test:

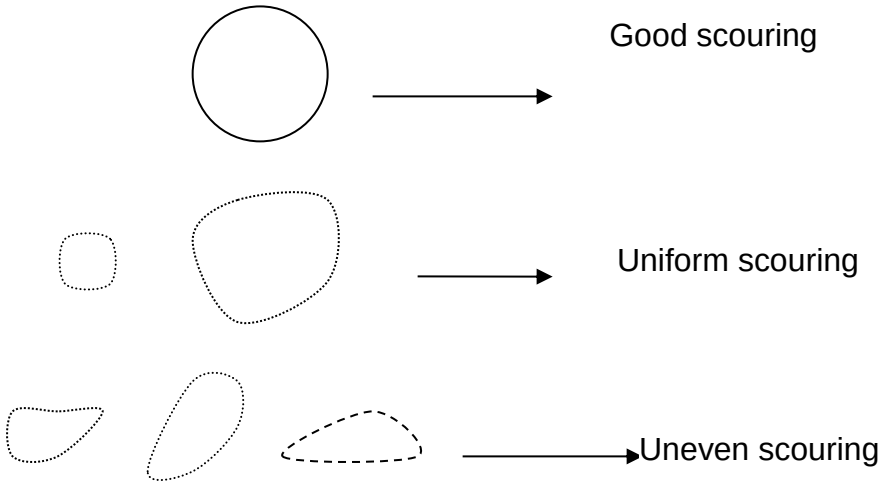
This test is very easy test and is commonly used in the industries. **It gives the result very fast.**

Test procedure:

In a pipette a **solution of 0.1% direct red or Congo red** is taken and is dropped on the fabric sample **above 5 cm**. Then the absorption of the colored drop is observed visually. Then two things are measured and taken into consideration-

Result:

The standard time for the **absorption of one drop of solution is 0.5-0.8 sec up to 1 sec**.



Wicking or Column test:

It is very good test for determining the scouring effect.

Test procedure:

Here fabric sample of 18 cm long and 5 cm width is taken. In a beaker 0.1% direct red solution is taken. After that a mark is drawn at 1cm above from the sample bottom. Now the sample is hung from a wood stick support by immersing that 1cm portion of fabric in the dye liquor for 5 minutes. Then the point up to which the colored solution is absorbed straight above way by the sample is measured.

Result:

The acceptable range of absorbing length is 30-50 mm in where 50 mm means excellent scouring effect.

Estimation of bleaching effect:

Bleaching effect can be estimated in two ways-

- By measuring reflectance by leucometer
- By measuring permanency of whiteness

By measuring reflectance by leucometer:

When a fabric is bleached, its **light reflecting capacity increases**. The reflectance of a bleached fabric is measured by leucometer. It is a light measuring meter which is able to measure total reflectance but does not give any reflectance curve.

Acceptable range of reflectance is 84-86% (very common). A range of **90-92% reflectance** is also possible in bleaching **at high temperature. (120^0C)**. In case of high temperature bleaching it is possible to get high reflectance value but high temperature bleaching is risky. Reflectance can also be measured by C.C.M system.

The degree of reflectance depends on-

- Method used for bleaching
- Extent of H_2O_2 decomposition
- The stabilized system used
- Chemical degradation of fibre

By measuring permanency of whiteness:

For a bleached fabric **permanent white effect is desired**. The re**flectance of a bleached fabric is observed for 7 days (everyday once)**. **If a more or less fixed value of reflectance is achieved in everyday, then it can be said that permanent white effect has been obtained.**

During **hypochlorite bleaching**, **chloramines retention** takes place on fabric surface which causes **yellowing.** This is prevented by **antichlor treatment** after bleaching with strong reducing agent like **hydrose ($Na_2S_2O_4$).**

Mercerization:

Conditions of Mercerization:

- Temperature (ideal temperature of mercerization **is 15-18^{0}C**)
- Tension during mercerization (**tension should be sufficient** to achieve the desire effect)
- **Caustic soda** concentration (most commonly used concentration **is 20-22%)**
- Nature and mount of wetting agent (**usually 0.5-1%** of wetting agent is used)
- Time of mercerization **(30-60 seconds** time is enough to achieve the mercerizing effect)
- Washing condition (washing under stretched condition after mercerization is very important)

Estimation of Mercerization :

The mercerization effect can be measured or estimated by performing the following tests-

- Microscopic or Deconvolution test
- Brightness test
- Dye absorbency test
- Determination of Barium Activity Number (BAN)
- Easy test method

Determination of Barium Activity Number (BAN):
This is the most effective and efficient test to measure the mercerizing effect though it is hard, complex and time consuming. BAN is defined as the ratio of $Ba(OH)_2$ absorbed by mercerized sample to that by the same amount of un-mercerized sample and expressed as a percentage.

$$\text{So, BAN} = \frac{Ba(OH)_2 \text{ absorbed by mercerized sample} \times 100}{Ba(OH)_2 \text{ absorbed by the same amount of un-mercerized sample}}$$

Result:
BAN is always greater than 100
Acceptable range of BAN =115-135
Standard range = 120-125
For highly mercerized = 140-150