

## Peroxide stage P

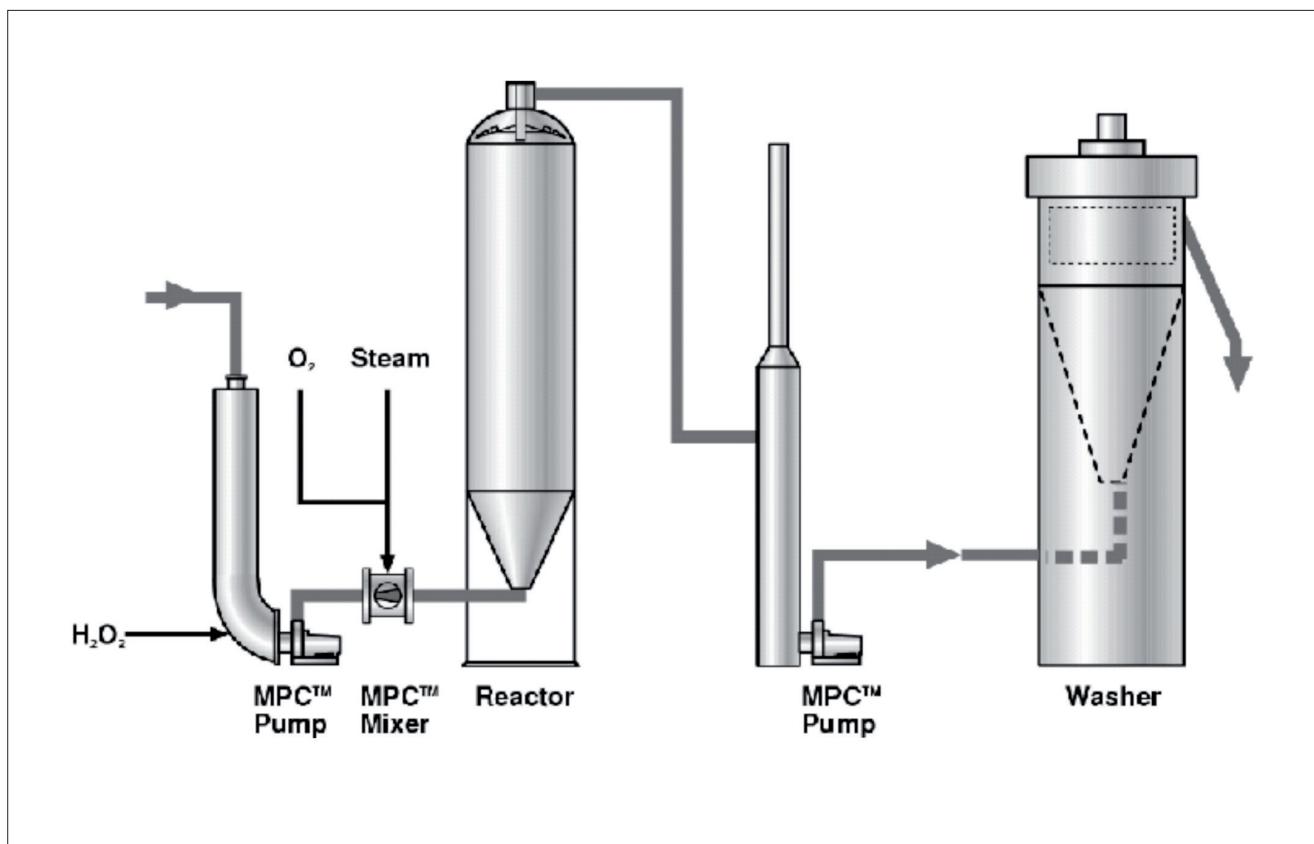


Fig. 1. Pressurized peroxide bleaching stage.

### Introduction

Alkaline hydrogen peroxide is not effective as a remover of lignin but it has a property that most other pulp bleaching agents lack: It reacts with the coloured groups in lignin. Peroxide stage is usually the final stage in the bleaching sequence. Chlorine and peroxide bleaching equipment are almost identical and that is why the  $D_2$  stage has often been modified into a P stage. Peroxide bleaching stage significantly improves pulp brightness stability.

### The process

Peroxide stage is a quite slow bleaching process. Bleaching time is usually 30 – 180 minutes. Longer bleaching time means brighter pulp and better brightness stability.

Nowadays peroxide stages are pressurized. Figure 1 shows a pressurized peroxide stage. Under pressurized conditions, hydrogen peroxide use is more efficient and higher brightness can be achieved with the same peroxide charge and consumption. Also, unlike with atmospheric peroxide bleaching, the temperature can be a variable for controlling the process.

Peroxide bleaching occurs in two stages. Initial peroxide stage lasts only 5-30 minutes, but it consumes 50 – 80 % of the peroxide. Postbleaching stage may last for several hours and it consumes the remainder of the peroxide. Most of the kappa reduction occurs in first five minutes. After that brightness rise is very fast. Figure 2 shows the phenomenon and table 1 shows typical conditions in a pressurized peroxide bleaching.

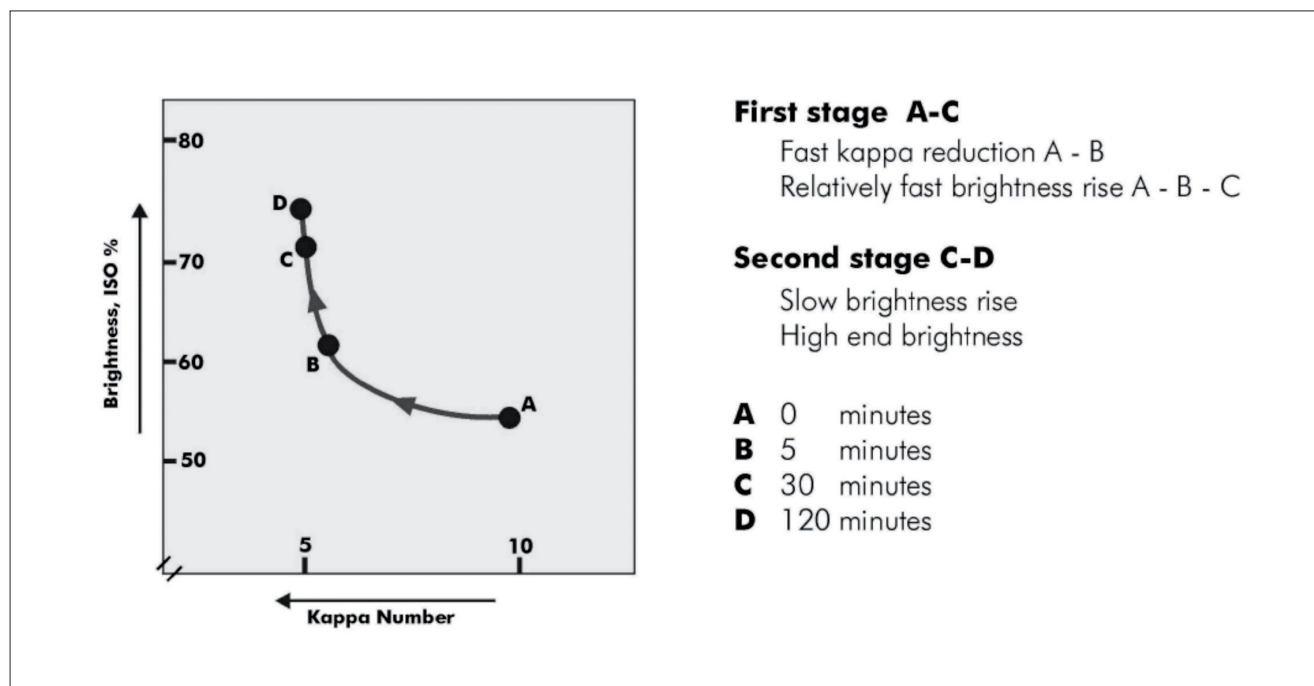


Fig. 2. Kappa reduction and brightness rise in peroxide bleaching.

Harmful metal ions (e.g. iron and manganese) have to be removed before peroxide stage, because they decompose peroxide into ineffective oxygen. These reactions generate also compounds that react with carbohydrates, weakening the quality of the pulp. Oxygen removal between reactors is therefore essential.

Table 1. Conditions in pressurized peroxide bleaching.

|             |              |
|-------------|--------------|
| final pH    | 10.5 - 11    |
| temperature | 80 - 110 °C  |
| consistency | 10 - 15 %    |
| time        | 30 - 180 min |

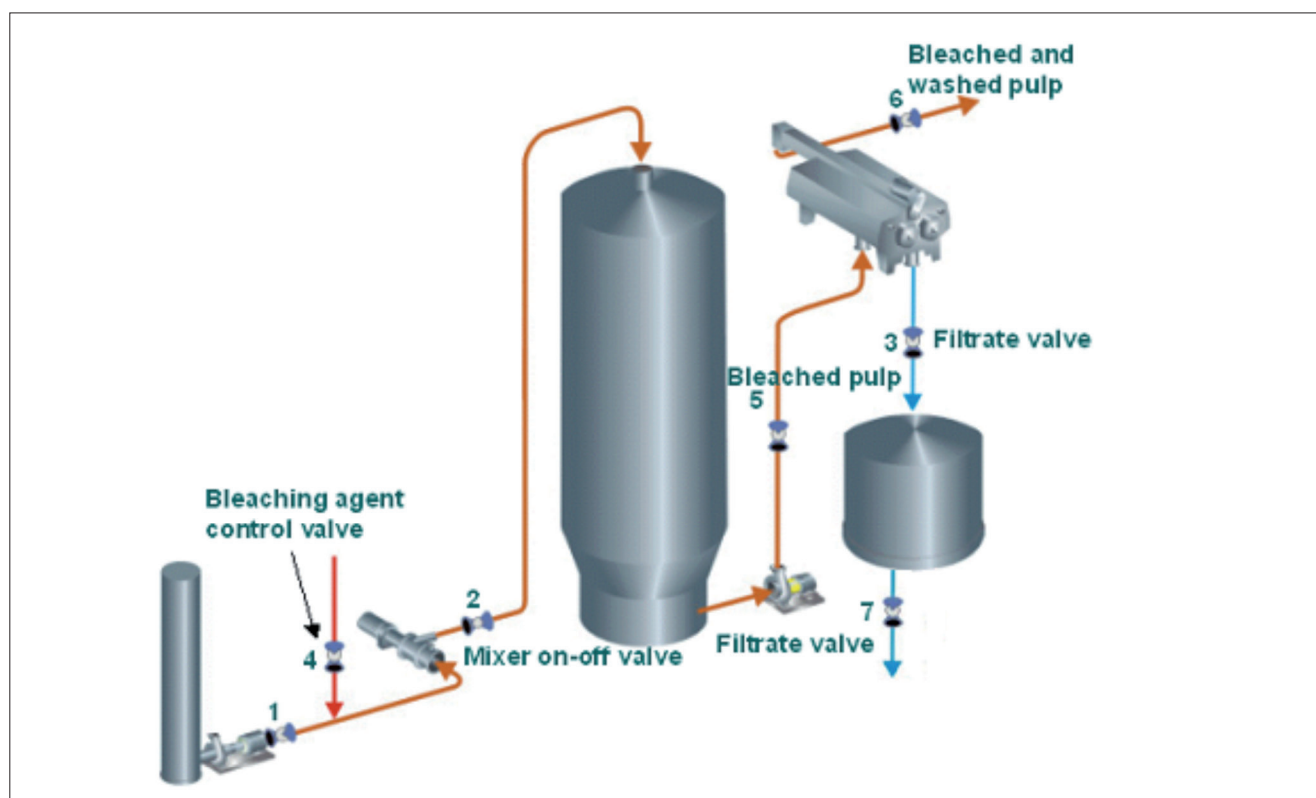


Fig. 3. Valves in peroxide bleaching.

## Valves

Standard CF8M valvematerial is used in a peroxide bleaching. However CG8M is used in MC control segment valve, because it tolerates corrosion better than CF8M. Figure 3 shows valves in a peroxide bleaching process.

The flow of screened pulp is controlled by MC control segment valve. Peroxide is added to the process before mixer. Pulp and chemicals are mixed in the mixer as a homogenous compound. That compound is fed to a bleaching tower through mixer on-off valve.

Bleached chemical pulp is fed to the final washing system where chemical left over and water soluble reaction products are removed. After pulp washing it is conducted to the next bleaching stage. Filtrate valves give out used chemicals to treatment. Depending on the process, valves 3, 5 and 6 are not always used.

Table 2 gives valve types and materials (example materials are in brackets). Pressure ratings are sized by pump sizes.

Table 2. Valve types and materials in peroxide bleaching.

| Valve | Name                          | Type                 | Material      | E.g.           |
|-------|-------------------------------|----------------------|---------------|----------------|
| 1     | MC control valve              | Segment              | CG8M (317 SS) | R2_S...CJJK    |
| 2     | Mixer on-off valve            | Ball                 | CF8M (316 SS) | M1_B...AP      |
| 3     | Filtrate valve                | Segment or butterfly | CF8M          | LW7_BA...AAJAT |
| 4     | Bleaching agent control valve | Ball or Segment      | CF8M          | RE_A...AJJST   |
| 5     | Bleached pulp                 | Ball or segment      | CF8M          | RE_A...AJJST   |
| 6     | Bleached and washed pulp      | Segment or butterfly | CF8M          | RAA...AS       |
| 7     | Filtrate valve                | Segment or butterfly | CF8M          | LW7_BA...AAJAT |

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