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# To adapt recipes in function of the liquor ratio.

## Overview.

Concerned Supervisor.

Level: Complex.

Content of this document

The quantities of dyestuffs must be modified following rules that are specific to each dyestuff. In this example, the adaptation depends on the liquor ratio but it can be adapted to other variables.

This document has been written at ITMProcess 2.1 time. Since ITMProcess 2.2, it is possible to add parameters to each dyestuff record and even formulas (see IP2 TN011 - Quantity related to each dye.doc). With this new feature, you can simplify the following procedure by including the dyestuff factor calculation directly in the dyestuff record.

## General.

In the dye class operation line and only in this line, it is possible to modify the dyestuffs quantities individually using the Table rule.

Be care that the rules depending on the amount of dyes, before the dye class operation line, won't reflect the modification of the amount of dyes done in the dye class operation line.

To go round this problem, you can create a parameter that will contain the new amount of dyes and modify the previous rules so that they depend on this parameter.

When doing production correction, the quantities of dyestuffs used are the quantities that are in the recipe, not the quantities after modification. In other words, concerning our example, correction calculation is done based on the liquor ratio of the recipe. The calculated correction at recipe liquor ratio should then be readapted to the liquor ratio of production.

## Rules.

1. We add a new operation 'Liquor ratio adaptation' at the beginning of the treatment.

| # | Name                    | LabOperation_ID | ProdOperation_ID |
|---|-------------------------|-----------------|------------------|
| 1 |                         |                 | Ini Reac All in  |
| 2 | Liquor ratio adaptation |                 | Reac LR adapt    |
| 3 | Scouring                |                 | Sc Co Cv         |
| 4 | Hot Rinse               |                 | Hot Rinse        |
| 5 | Cold Rinse              |                 | Cold Rinse       |
| 6 | Dyeing                  |                 | Reac All in      |
| 7 | Hot Rinse               |                 | Hot Rinse        |

2. In this operation, we calculate a factor for each dyestuff and then we recalculate the total quantity of reactive.

| General   | Control Line                 | References |
|---|------------------------------|------------|
| ID:   | Reac LR adapt                | AuxID:     |
| Name:   | Reac Liquor Ratio adaptation |            |
| <input type="checkbox"/> LabOperation<br><input checked="" type="checkbox"/> Prod operation   |                              |            |
| Note:<br>Calculation of the effect of the LR<br>For each dyestuff 'X', a factor 'X Re/P' is calculated.<br><br>Calculation of the new total quantity of reactive used in production 'SumOf Reac P'.<br>Totalization of each dyestuff quantity multiplied by its factor. |                              |            |

| General | Control Line     | References  |
|---------|------------------|---|
| 1       | Pro-B-HEXL Re    | Pro-B-HEXL Recipe liquor ratio effect <Formula>         |
| 2       | Pro-B-HEXL P     | Pro-B-HEXL Production liquor ratio effect <Formula>     |
| 3       | Pro-B-HEXL Re/P  | Pro-B-HEXL Re/P <Formula>                               |
| 4       | Pro-R-HEGXL Re   | Pro-R-HEGXL Recipe liquor ratio effect Formula...       |
| 5       | Pro-R-HEGXL P    | Pro-R-HEGXL Production liquor ratio effect <Formula>    |
| 6       | Pro-R-HEGXL Re/P | Pro-R-HEGXL Re/P <Formula>                              |
| 7       | Pro-O-HER Re/P   | Pro-O-HER Re/P 1  |
| 8       | SumOfDyes Reac P | Total quantity of Reactive used in Production <Formula> |

- 2.1. In our example, we have to calculate an 'effect' depending on the liquor ratio.

The parameter 'X Re' is the effect for the dyestuff 'X' at recipe liquor ratio.

The parameter 'X P' is the effect for the dyestuff 'X' at production liquor ratio.

The parameter 'X Re/P' is the ratio of the effects ('X Re'/'X P').

All these parameters have the following setting: Calculate without print.

Formula for  
'Pro-R-HEGXL Re':

| < or = | Then | Min | Max | Note |
|--------|------|-----|-----|------|
| 5      | 100  |     |     |      |
| 10     | 95   |     |     |      |
| 20     | 90   |     |     |      |
| 30     | 85   |     |     |      |
| 60     | 70   |     |     |      |
| Else   |      | 62  |     |      |

2.2. At the end, we calculate the value of 'SumOf Reac P'.

We list in a table all reactive dyes that may be used with this operation, even if there is no modification of their quantity.

This parameter has the following settings: Calculate without print and Totalize.

| Table of Dyestuff |   |     |     |      |  |
|-------------------|---|-----|-----|------|--|
| Value             | Do  | Min | Max | Note |  |
| Pro-B-HEXL        | RecipeAmount("Pro-B-HEXL")*ValueOf("Pro-B-HEXL Re/P")   |     |     |      |  |
| Pro-O-HER         | RecipeAmount("Pro-O-HER")*ValueOf("Pro-O-HER Re/P")     |     |     |      |  |
| Pro-R-HEGXL       | RecipeAmount("Pro-R-HEGXL")*ValueOf("Pro-R-HEGXL Re/P") |     |     |      |  |
| Else 0            |   |     |     |      |  |

3. In all operations of the treatment, we replace SumOfDyes('Reac') by ValueOf('SumOfDyes Reac P').

| General | Control Line      | References           |           |        |
|---------|-------------------|----------------------|-----------|--------|
| 1       | ST                | Starting temperature | 25        | °C     |
| 2       |                   |                      |           |        |
| 3       | NaCl              | Sodium chloride      | <Formula> | g/l    |
| 4       | Soda ash          | Soda ash             | <Formula> | g/l    |
| 5       | Caustic Soda 38Bé | Caustic Soda 38Bé    | <Formula> | g/l    |
| 6       | Matexil PA-L      | Matexil PA-L         | 3         | g/l    |
| 7       | Ti                | Time                 | 15        | min    |
| 8       |                   |                      |           |        |
| 9       | Reac              | Reactive             | <Formula> |        |
| 10      | Ti                | Time                 | <Formula> | min    |
| 11      | Ti                | Time                 | 15        | min    |
| 12      | HS                | Heating speed        | 1.2       | °C/min |
| 13      | DT                | Dyeing temperature   | 80        | °C     |
| 14      | DTi               | Dyeing time          | <Formula> | min    |
| 15      |                   | Dye bath             |           |        |

| If ValueOf("SumOfDyes Reac P") |      |     |     |      | <input checked="" type="checkbox"/> Interpolate between each step |
|--------------------------------|------|-----|-----|------|---|
| < or =                         | Then | Min | Max | Note |   |
| 0                              | 10   |     |     |      |   |
| 4                              | 90   |     |     |      |   |
| Else 90                        |      |     |     |      |   |

4. We insert a formula in the dye class operation line that recalculates the quantity of each dyestuff.

| Table of Dyestuff |                                  |     |     |      |  |
|-------------------|----------------------------------|-----|-----|------|--|
| Value             | Do                               | Min | Max | Note |  |
| Pro-B-HEXL        | self*ValueOf("Pro-B-HEXL Re/P")  |     |     |      |  |
| Pro-O-HER         | self*ValueOf("Pro-O-HER Re/P")   |     |     |      |  |
| Pro-R-HEGXL       | self*ValueOf("Pro-R-HEGXL Re/P") |     |     |      |  |
| Else self         |                                  |     |     |      |  |

## Result.

Here is a recipe at liquor ratio 1/20.

| Dy... | Dye process      | Part | DyeFiberGroup | Colorant set |
|-------|------------------|------|---------------|--------------|
| ▶     | Reactive Exhaust | 100% | Co            | 1/20         |

  

| # | Product ID | Product Name | Conc  | Old |
|---|------------|--------------|-------|-----|
| ▶ | 1          | Pro-B-HEXL   | 0,001 |     |
|   | 2          | Pro-R-HEGXL  | 0,031 |     |
|   | 3          | Pro-O-HER    | 0,002 |     |

Here is a dyelot using the previous recipe with a liquor ratio of 1/5.

|                                    |          |  | Volume <b>1000 l</b>    |
|------------------------------------|----------|--|-------------------------|
|                                    |          |  | Liquor ratio <b>1/5</b> |
| <b>Procion Blue HEXL</b>           | 0,001 %  |  | <b>1,96 g</b>           |
| <b>Procion Brilliant Red HEGXL</b> | 0,0279 % |  | <b>55,8 g</b>           |
| <b>Procion Orange HER</b>          | 0,002 %  |  | <b>4 g</b>              |