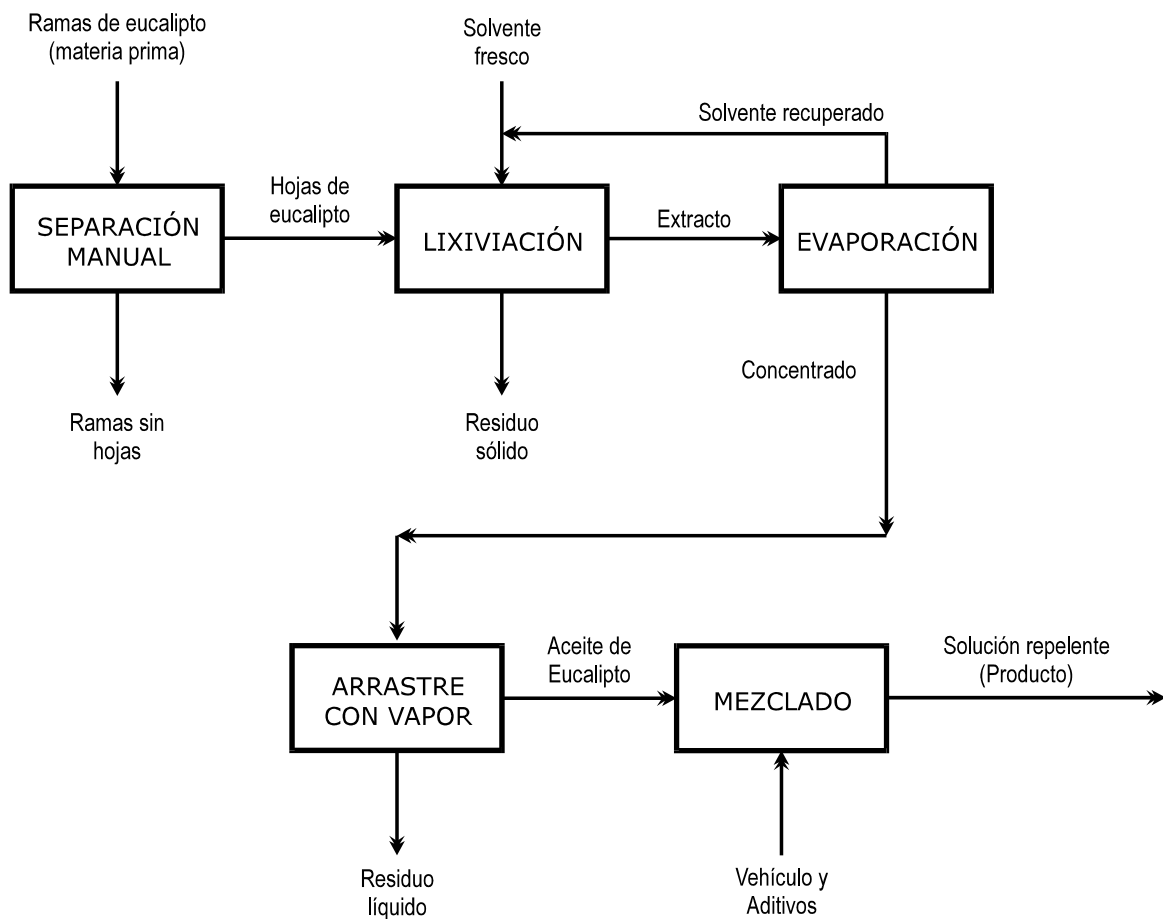




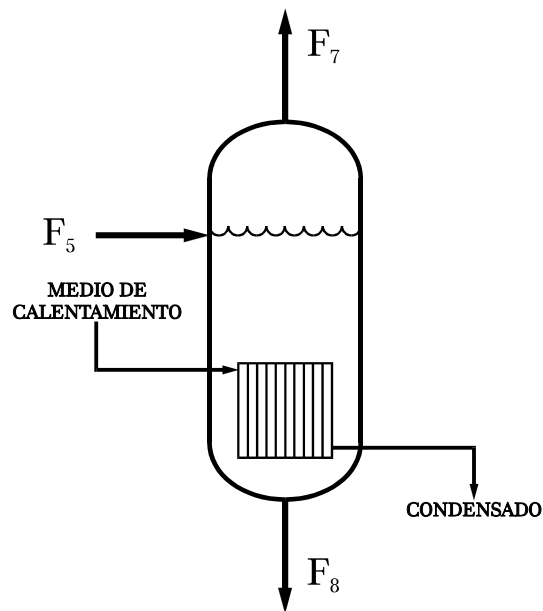
# INGENIERÍA DEL PROYECTO

## DIAGRAMA DE BLOQUES DEL PROCESO





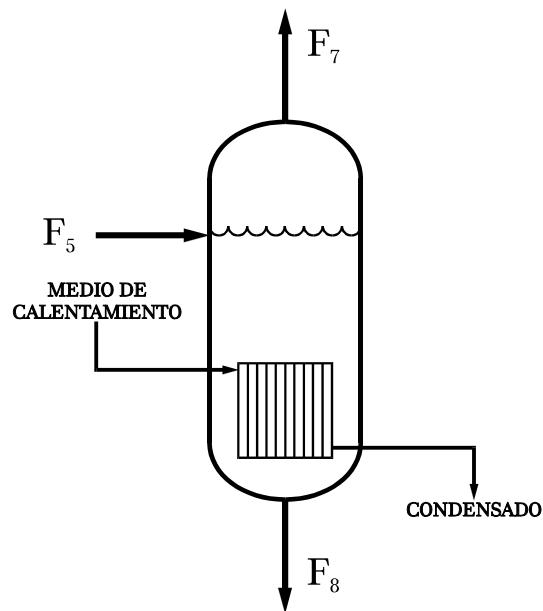
## V-130 EVAPORADOR



| SUSTANCIA               | ENTRADA           | SALIDA            |
|-------------------------|-------------------|-------------------|
| F <sub>5</sub> : Etanol | 28.5705           |                   |
| Agua                    | 4.1976            |                   |
| Solutos indeseados      | 0.2859            |                   |
| Aceite de eucalipto     | 0.0643            |                   |
| F <sub>7</sub> : Etanol |                   | 27.3698           |
| Agua                    |                   | 2.3912            |
| F <sub>8</sub> : Agua   |                   | 1.8064            |
| Etanol                  |                   | 1.2007            |
| Solutos indeseados      |                   | 0.2859            |
| Aceite de eucalipto     |                   | 0.0643            |
| <b>TOTAL</b>            | <b>33.1183 kg</b> | <b>33.1183 kg</b> |



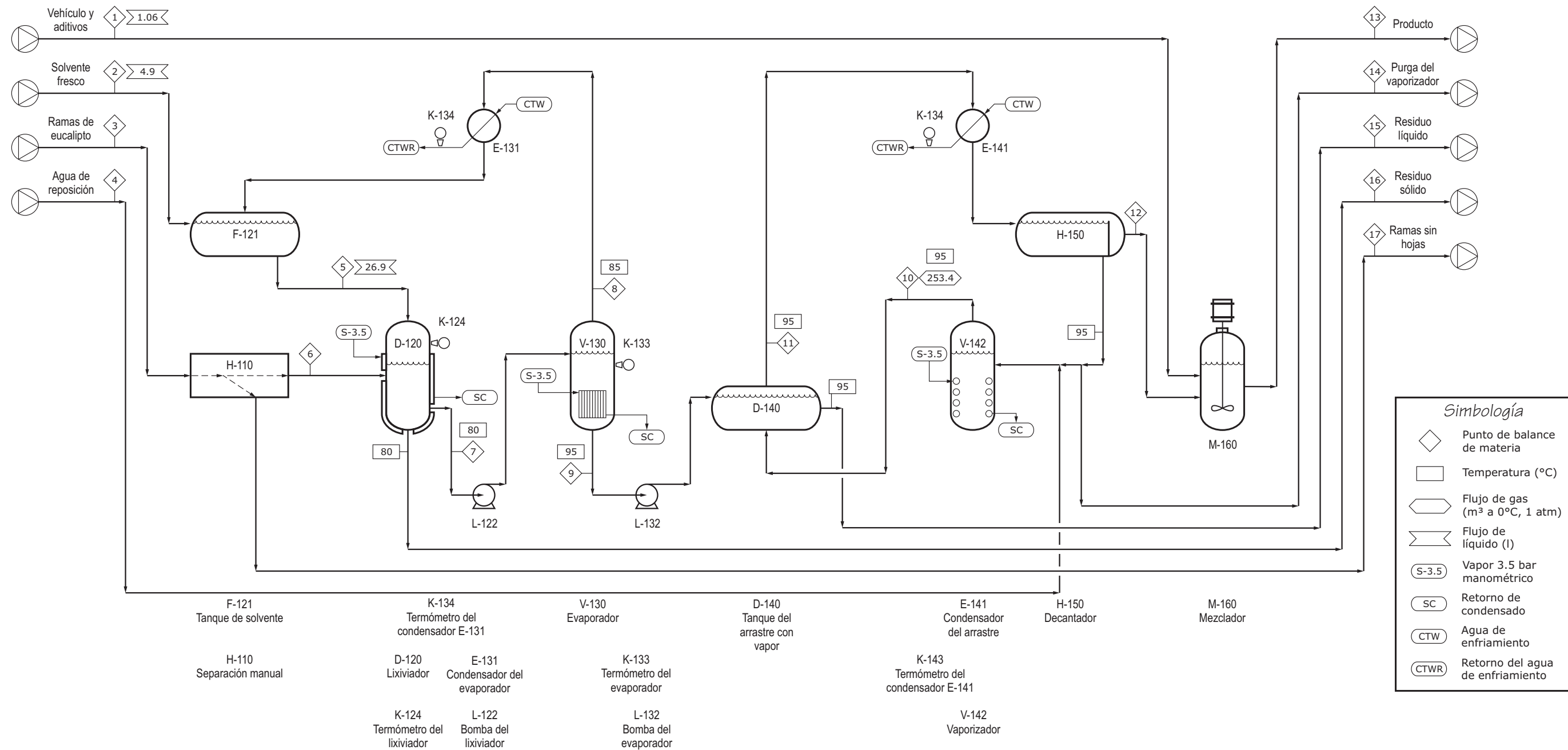
## V-130 EVAPORADOR



| SUSTANCIA                                  | ENTRADA             | SALIDA              |
|--|---------------------|---------------------|
| F <sub>5</sub> : Etanol (l, 80°C)          | 1,424.0             |                     |
| Agua (l, 80°C)                             | 335.8               |                     |
| Solutos indeseados (aq, 80°C)              | (*)                 |                     |
| Aceite de eucalipto (l, 80°C)              | (*)                 |                     |
| F <sub>7</sub> : Etanol (v, 85°C promedio) |                     | 7,039.9             |
| Agua (v, 85°C promedio)                    |                     | 1,514.5             |
| F <sub>8</sub> : Etanol (l, 91.5°C)        |                     | 68.4                |
| Agua (l, 91.5°C)                           |                     | 165.3               |
| Solutos indeseados (aq, 91.5°C)            |                     | (*)                 |
| Aceite de eucalipto (l, 91.5°C)            |                     | (*)                 |
| <b>TOTAL</b>                               | <b>1,759.8 kcal</b> | <b>8,788.1 kcal</b> |

**Q = 7,028.3 kcal**

(\*) Despreciable en comparación con los otros valores



| Balance de masa (kg)              | 1                   | 2               | 3                  | 4                  | 5              | 6                  | 7             | 8                   | 9              | 10                  | 11                | 12                  | 13            | 14                    | 15              | 16             | 17              |               |
|-----------------------------------|---------------------|-----------------|--------------------|--------------------|----------------|--------------------|---------------|---------------------|----------------|---------------------|-------------------|---------------------|---------------|-----------------------|-----------------|----------------|-----------------|---------------|
| COMPONENTE                        | Vehículo y aditivos | Solvente fresco | Ramas de eucalipto | Agua de reposición | Solvente       | Hojas de eucalipto | Extracto      | Solvente recuperado | Concentrado    | Vapor para arrastre | Vapor enriquecido | Aceite de eucalipto | Producto      | Purga del vaporizador | Residuo líquido | Residuo sólido | Ramas sin hojas |               |
| Ramas de eucalipto                |                     |                 | 4.4899             |                    |                |                    |               |                     |                |                     |                   |                     |               |                       |                 |                |                 |               |
| Ramas deshojadas                  |                     |                 |                    |                    |                |                    |               |                     |                |                     |                   |                     |               |                       |                 |                | 0.8862          |               |
| Hojas de eucalipto                |                     |                 |                    |                    |                | 3.6037             |               |                     |                |                     |                   |                     |               |                       |                 |                |                 |               |
| Agua                              | 0.4999              | 0.1568          |                    | 11.5359            | 2.5480         |                    | 2.0258        | 4.1976              | 2.3912         | 1.8064              | 200.0466          | 199.6069            | 0.4999        | 11.0962               | 2.2461          | 0.3762         |                 |               |
| Aceite de eucalipto               |                     |                 |                    |                    |                |                    | 0.0702        | 0.0643              |                | 0.0643              | 0.6826            | 0.7437              | 0.0251        | 0.0251                | 0.0360          | 0.0032         | 0.0059          |               |
| Inertes                           |                     |                 |                    |                    |                |                    | 1.1962        |                     |                |                     |                   |                     |               |                       |                 |                | 1.1962          |               |
| Otros solutos                     |                     |                 |                    |                    |                |                    | 0.3115        | 0.2859              |                | 0.2859              |                   |                     |               |                       | 0.2859          | 0.0256         |                 |               |
| Etanol                            |                     | 3.7635          |                    |                    |                | 31.1333            |               | 28.5705             | 27.3698        | 1.2007              | 9.1636            | 10.3343             |               | 1.1707                | 0.0300          | 2.5628         |                 |               |
| Isopropanol                       | 0.4408              |                 |                    |                    |                |                    |               |                     |                |                     |                   |                     | 0.4408        |                       |                 |                |                 |               |
| Glicerina                         | 0.0069              |                 |                    |                    |                |                    |               |                     |                |                     |                   |                     | 0.0069        |                       |                 |                |                 |               |
| Solución colorante verde (0.124%) | 0.0273              |                 |                    |                    |                |                    |               |                     |                |                     |                   |                     | 0.0273        |                       |                 |                |                 |               |
| <b>TOTAL</b>                      | <b>0.9749</b>       | <b>3.9203</b>   | <b>4.4899</b>      | <b>11.5359</b>     | <b>33.6813</b> | <b>3.6037</b>      | <b>3.6037</b> | <b>33.1183</b>      | <b>29.7610</b> | <b>3.3573</b>       | <b>209.8928</b>   | <b>210.6849</b>     | <b>0.0251</b> | <b>1.0000</b>         | <b>12.3029</b>  | <b>2.5652</b>  | <b>4.1667</b>   | <b>0.8862</b> |

*Diagrama de Flujo del Proceso*

**Producción de repelente de mosquitos a base de aceite de eucalipto**

Preparado por:

**Ortiz Muñoz Gabriel**  
**Salas Pérez Juan Antonio**

Diciembre 1998