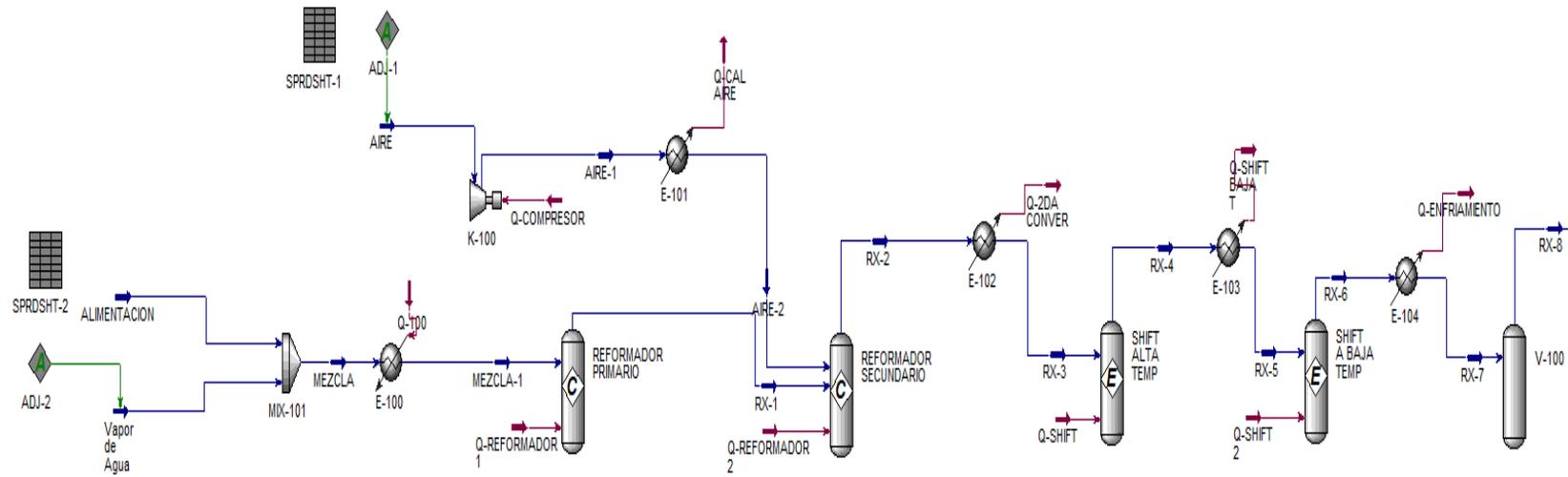


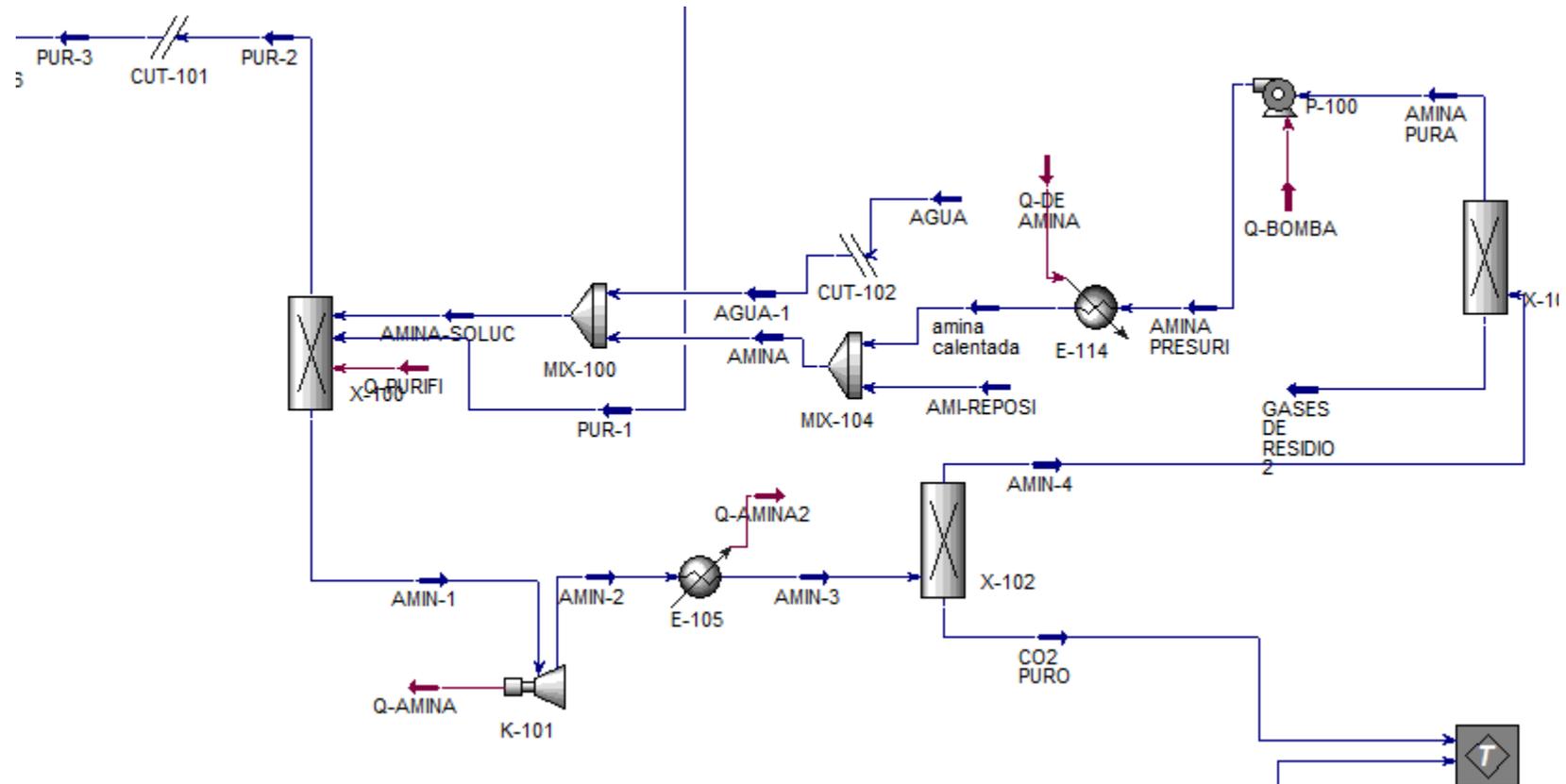
## ANEXO 1

### SIMULACIÓN DE LOS REACTORES DE OBTENCIÓN DEL GAS DE SÍNTESIS DE AMONIACO



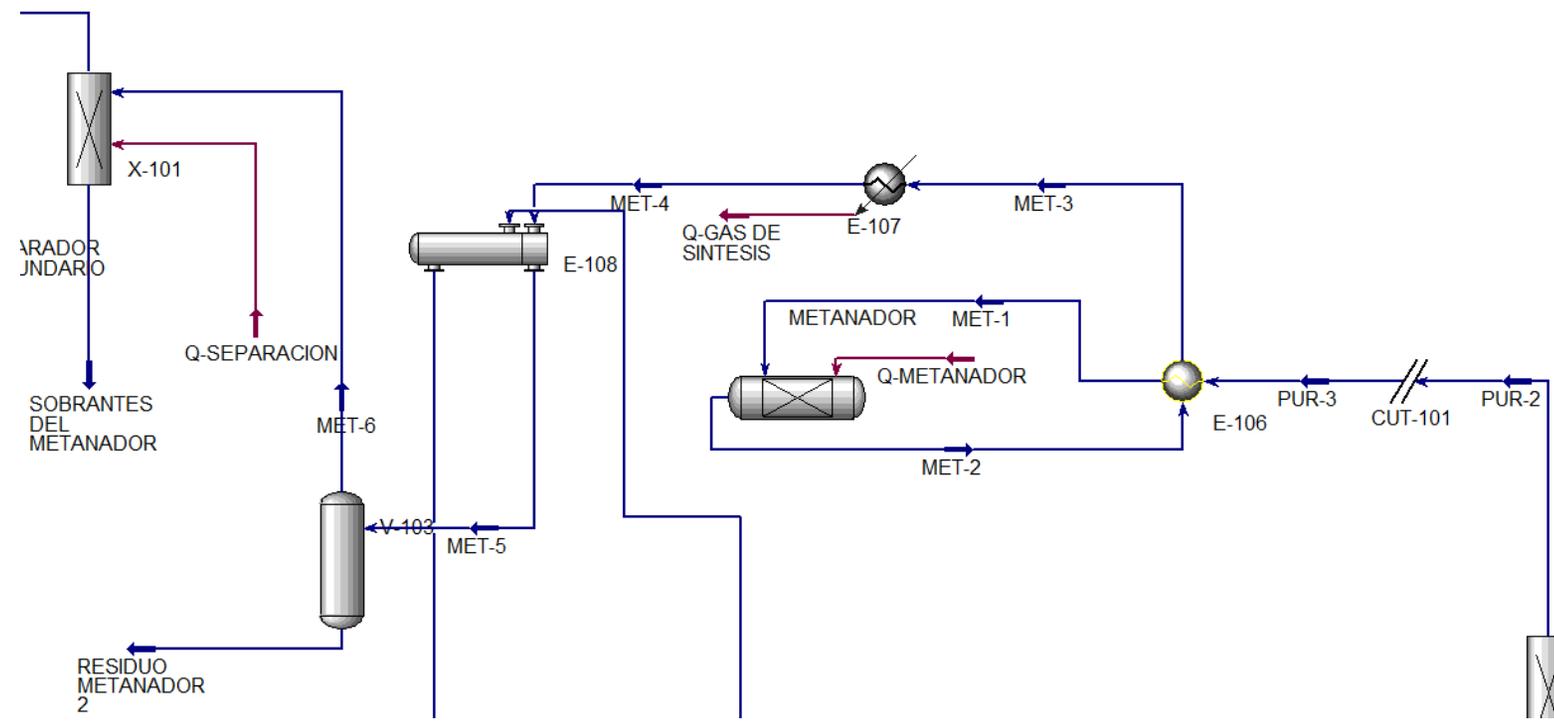
## ANEXO 2

### SECCION DE PURIFICACION DEL GAS DE SINTESIS DE AMONIACO



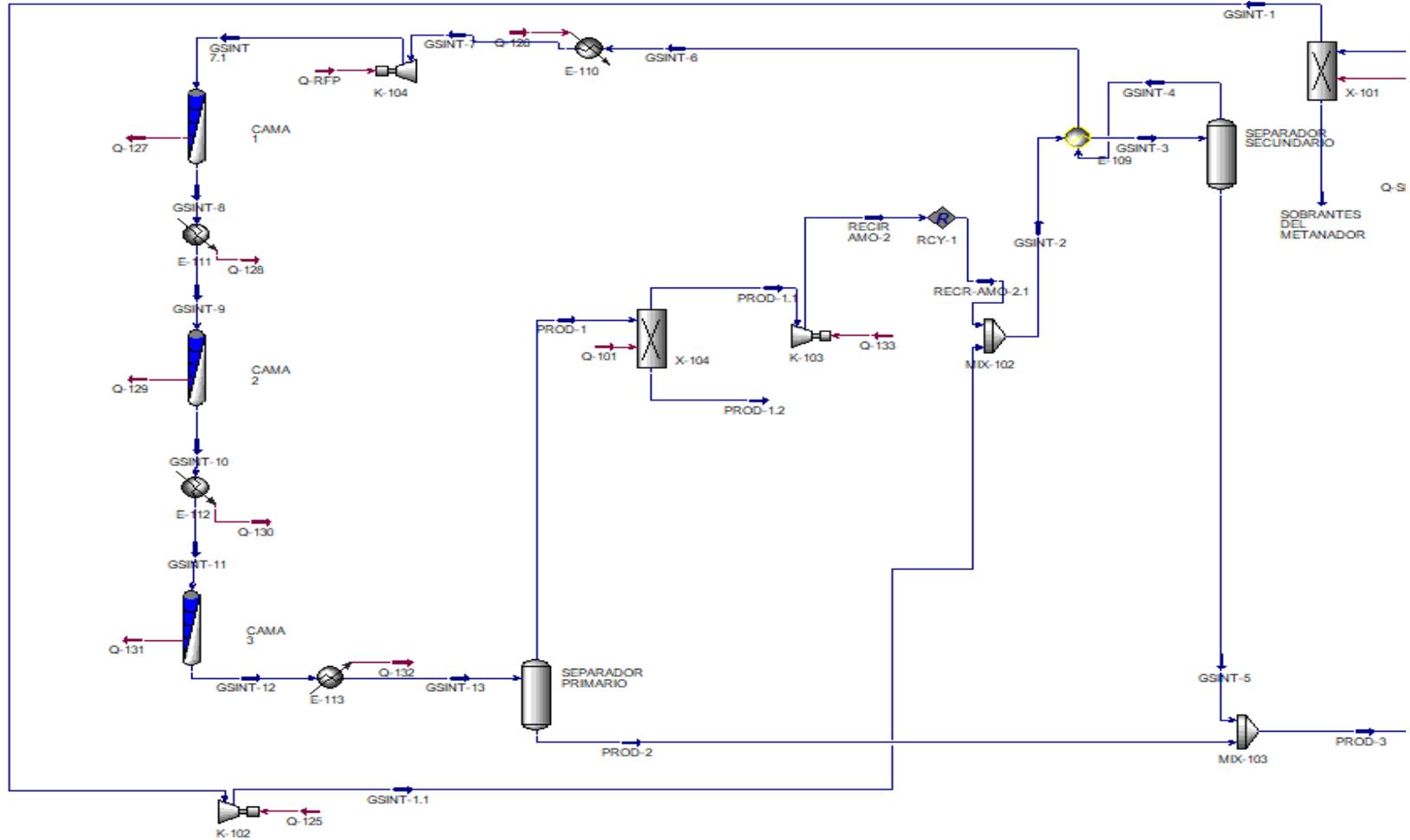
### ANEXO 3

### SECCION DE METANACIÓN



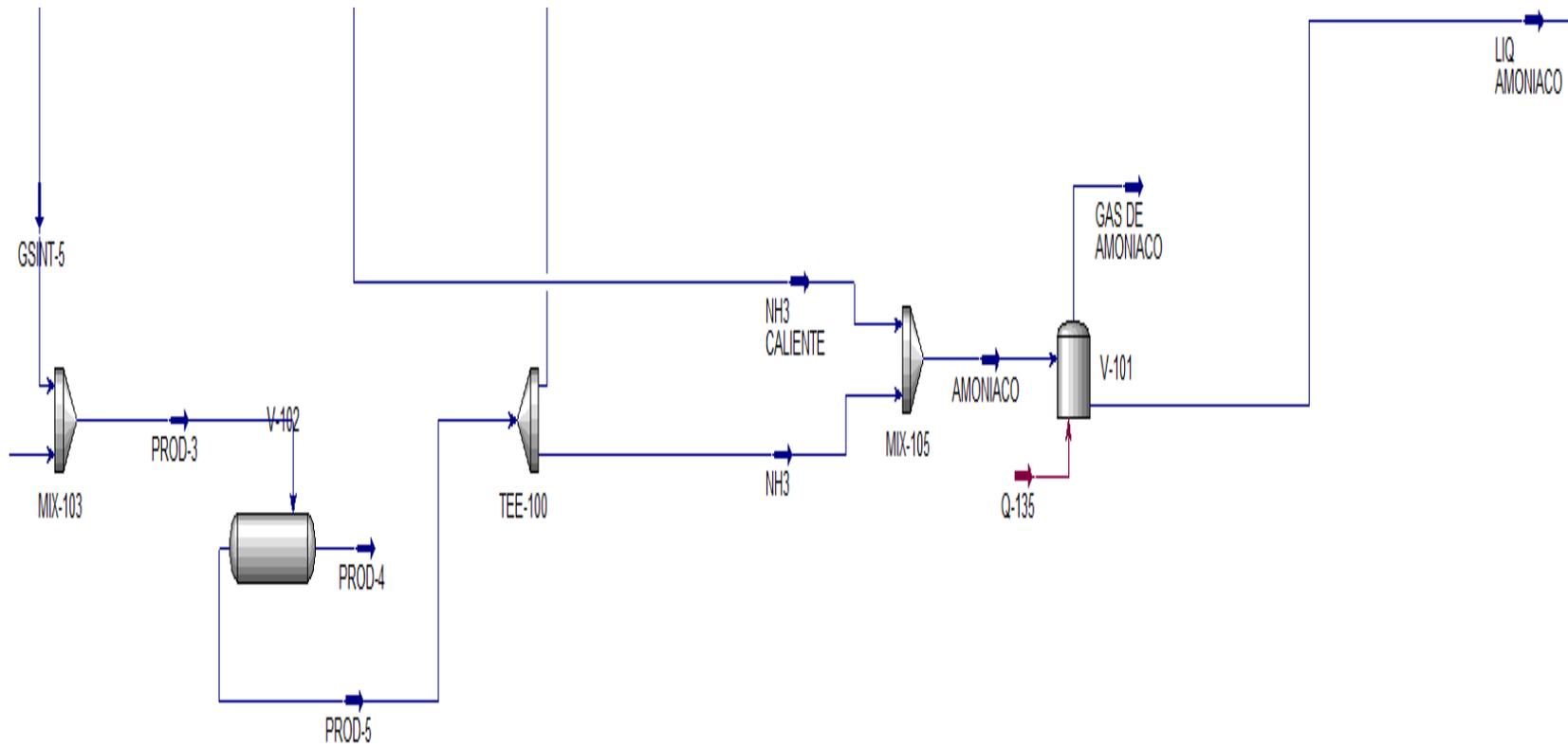
## ANEXO 4

### CIRCUITO DE PRODUCCION DE AMONIACO



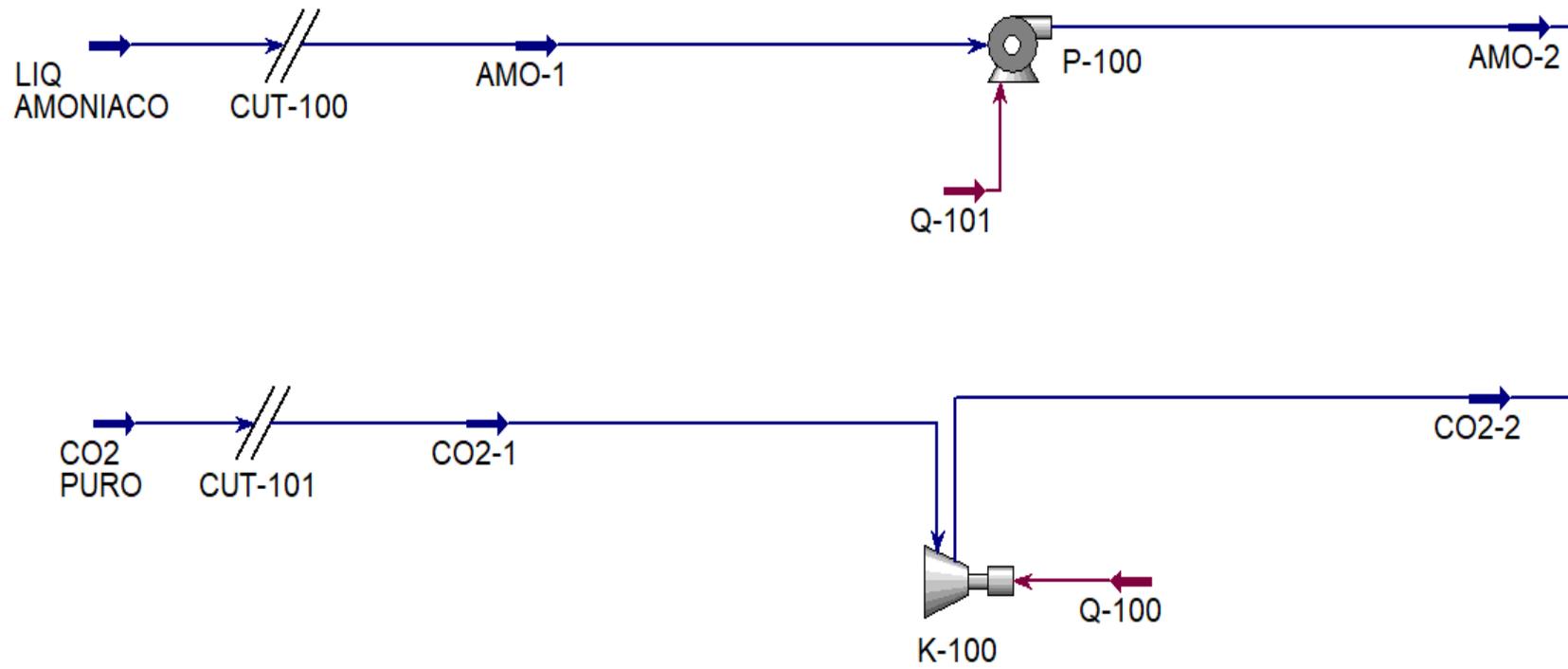
## ANEXO 5

### SECCION DE ALMACENAJE DE AMONIACO



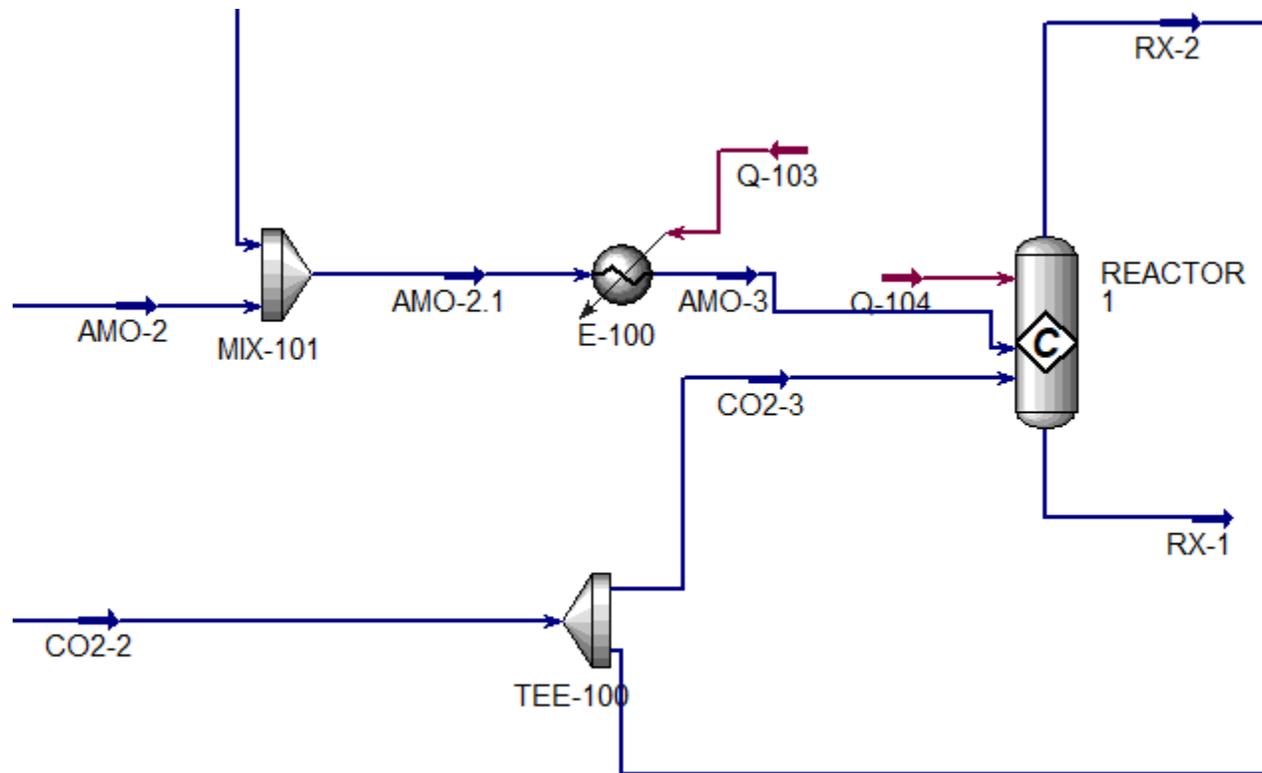
## ANEXO 6

### SECCION DE COMPRESION DE CO<sub>2</sub> Y BOMBEO DE AMONIACO

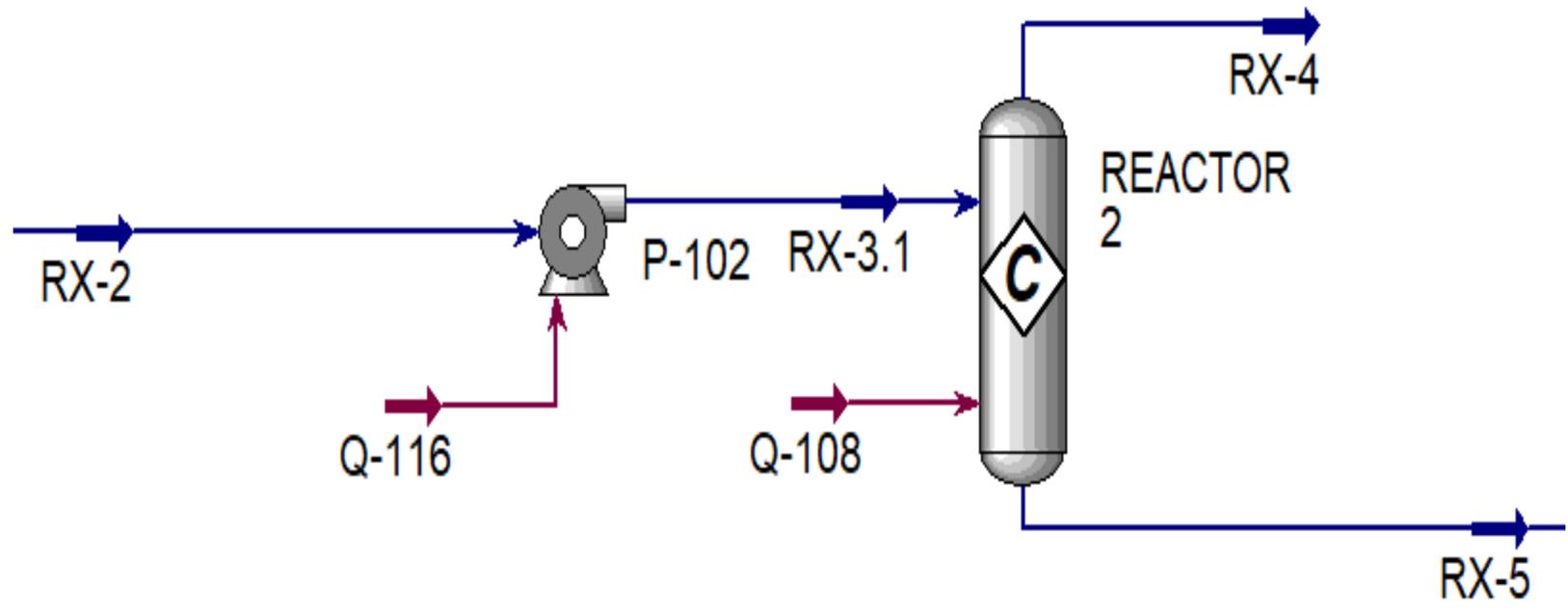


## ANEXO 7

### REACTOR DE CARBAMATO

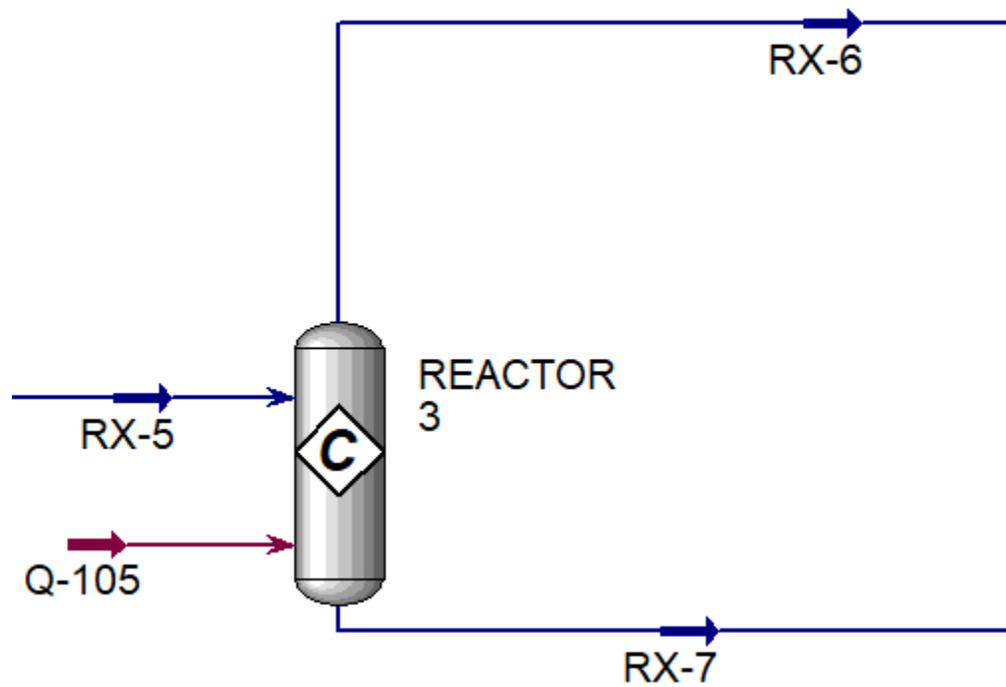


ANEXO 8  
REACTOR DE UREA



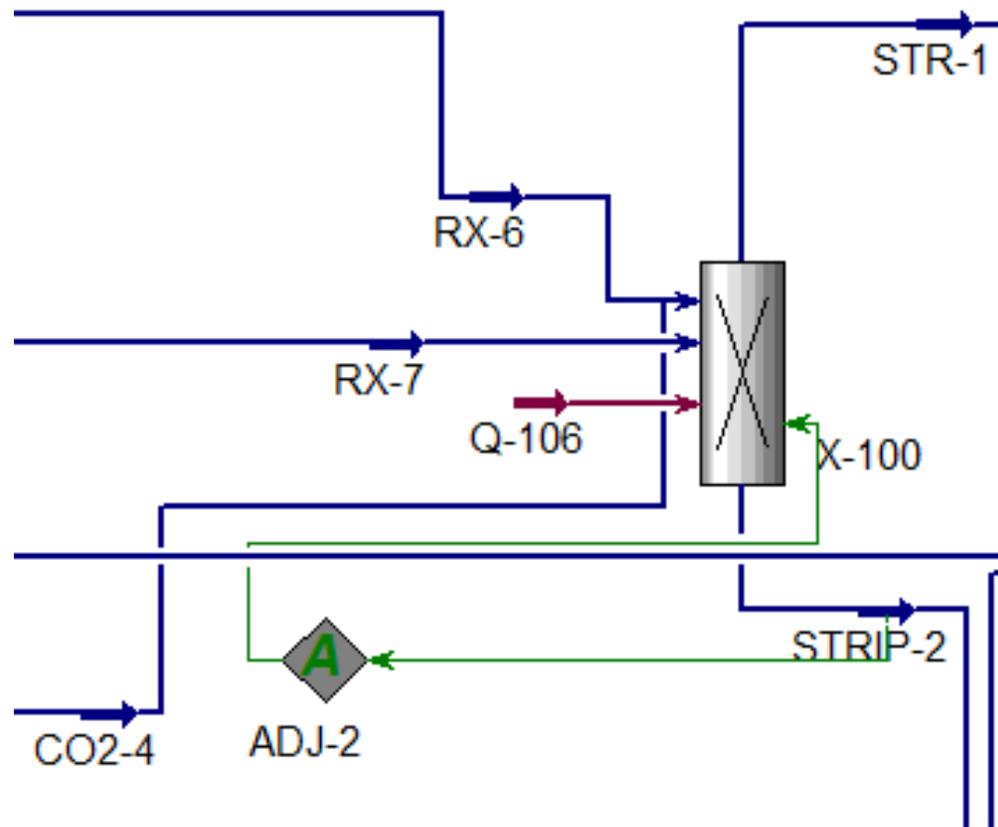
ANEXO 9

REACTOR DE DESCOMPOSICION DE CARBAMATO EN AMONIACO Y DIOXIDO DE CARBONO



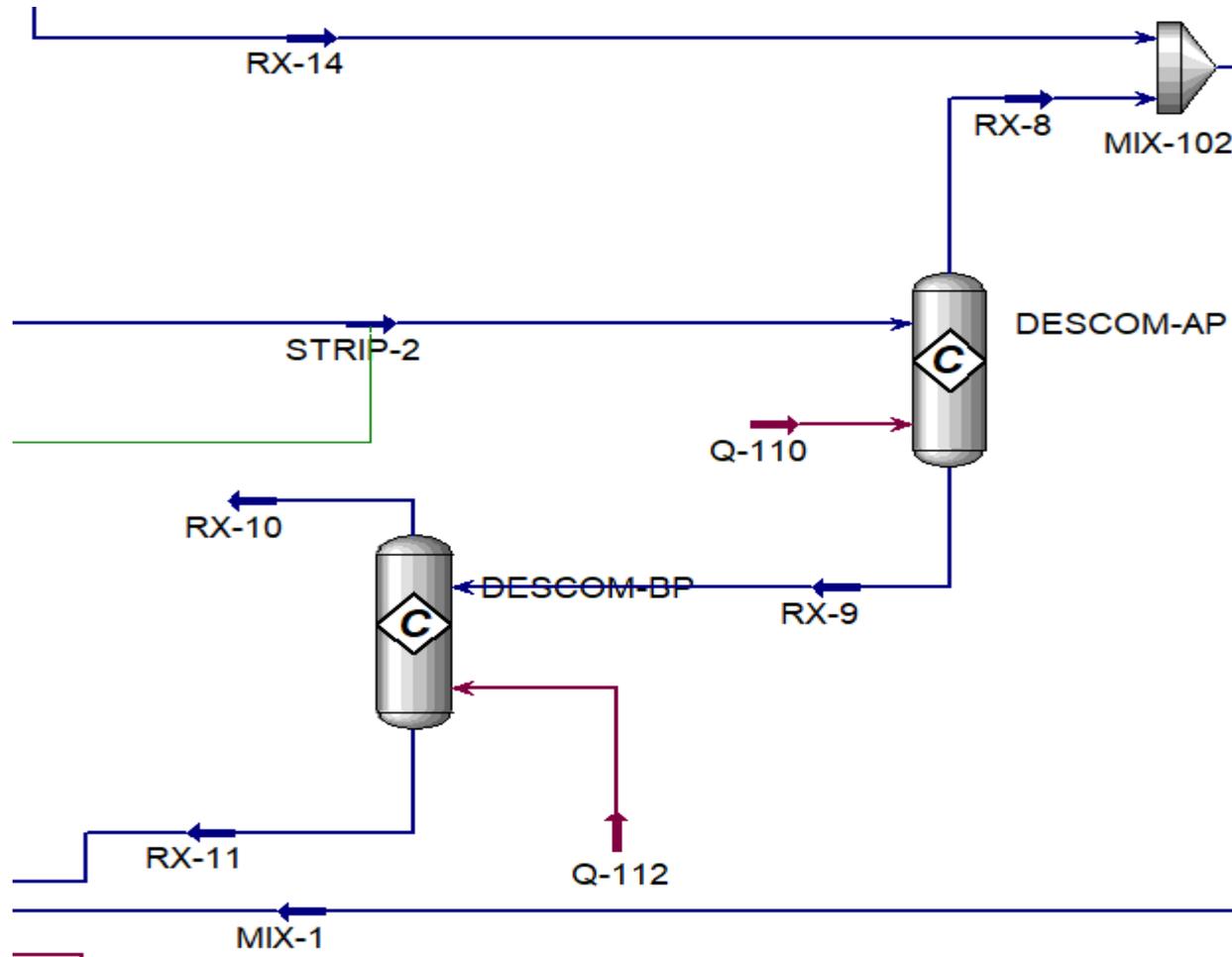
## ANEXO 10

### ABSORBEDOR DE CARBAMATO



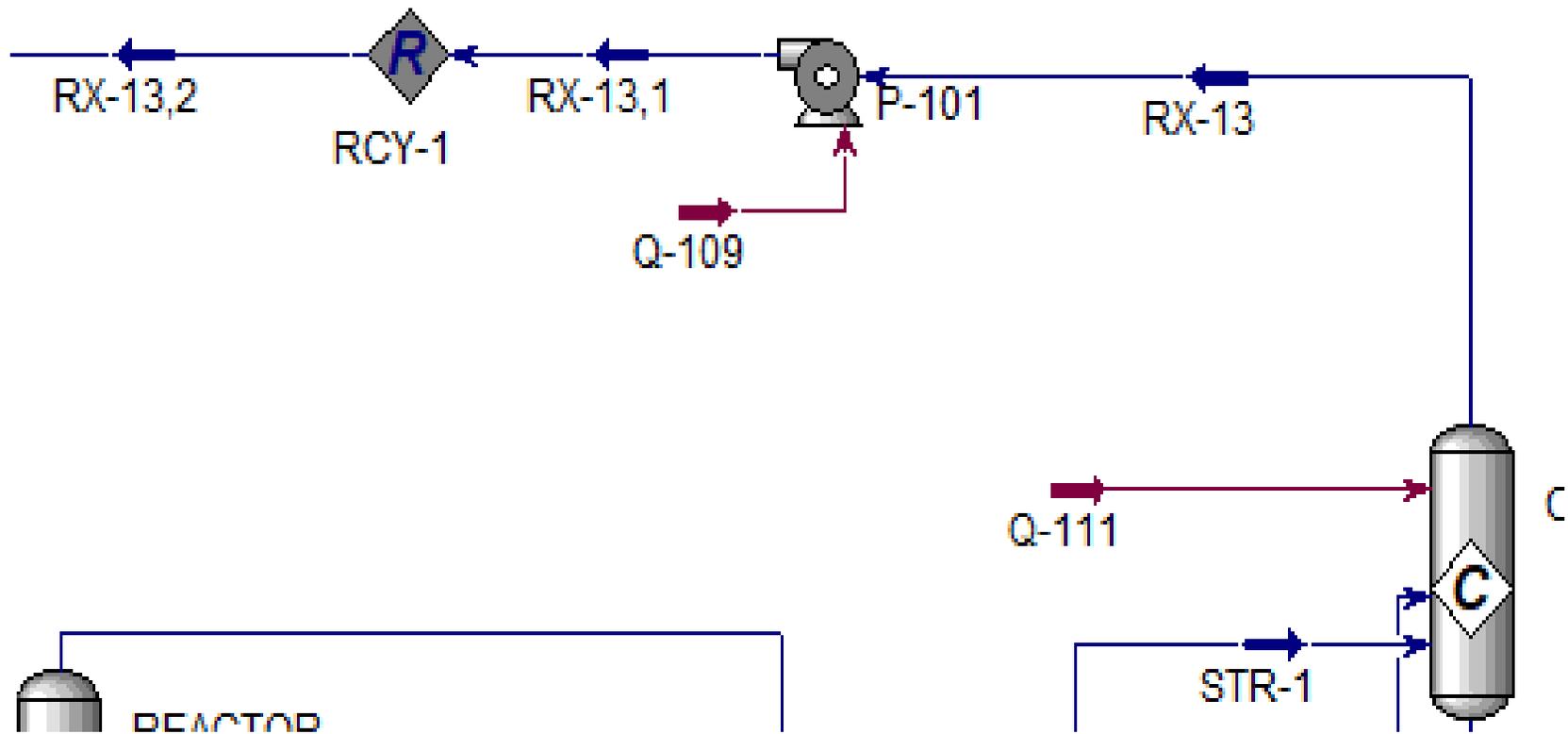
## ANEXO 11

### DESCOMONEDOR DE CARBAMATO DE ALTA Y BAJA PRESION



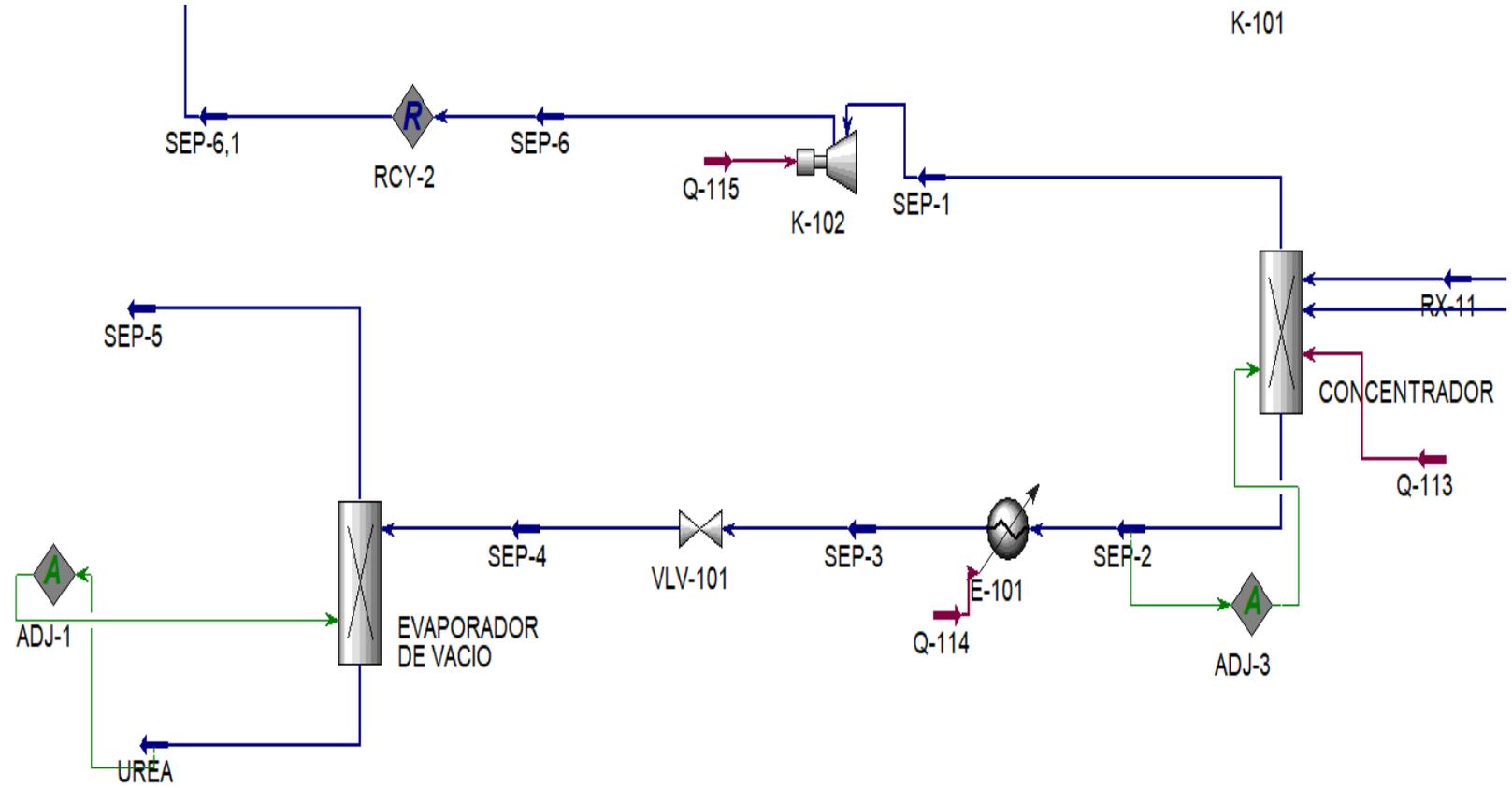
ANEXO 12

CONDENSADOR DE CARBAMATO Y RECIRCULACION



### ANEXO 13

### CONCENTRADOR Y EVAPORADOR DE VACIO



## ANEXO 14

### REPORTE DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS

| Company Name Not Available<br>Bedford, MA<br>USA |              | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |               |             |                |
|--|--------------|---|---------------|-------------|----------------|
|  |              | Unit Set: AMONIACO                                  |               |             |                |
|  |              | Date/Time: Wed Nov 22 15:54:09 2023                 |               |             |                |
| Workbook: Case (Main)                            |              |   |               |             |                |
| Material Streams                                 |              |   |               |             | Fluid Pkg: All |
| Name   | ALIMENTACION | MEZCLA-1  | Vapor de Agua | MEZCLA      | RX-1           |
| Vapour Fraction                                  | 1.0000       | 1.0000  | 1.0000        | 0.8899      | 1.0000         |
| Temperature (C)                                  | 25.00        | 540.0   | 274.3         | 224.6       | 713.0          |
| Pressure (bar)                                   | 57.57        | 57.57   | 57.57         | 57.57       | 40.70          |
| Molar Flow (kgmole/h)                            | 2.600e+007   | 5.600e+007  | 3.000e+007    | 5.600e+007  | 7.421e+007     |
| Mass Flow (kg/h)                                 | 4.277e+008   | 9.682e+008  | 5.405e+008    | 9.682e+008  | 9.682e+008     |
| Liquid Volume Flow (m3/h)                        | 1.373e+006   | 1.915e+006  | 5.415e+005    | 1.915e+006  | 2.556e+006     |
| Heat Flow (kJ/h)                                 | -2.069e+012  | -8.107e+012   | -7.076e+012   | -9.145e+012 | -5.756e+012    |
| Name   | RESIDUO 1    | AIRE  | AIRE-1        | AIRE-2      | RX-2           |
| Vapour Fraction                                  | 0.0000       | 1.0000  | 1.0000        | 1.0000      | 1.0000         |
| Temperature (C)                                  | 713.0        | 25.00   | 731.4         | 500.0       | 896.0          |
| Pressure (bar)                                   | 40.70        | 1.000   | 43.74         | 43.74       | 40.70          |
| Molar Flow (kgmole/h)                            | 0.0000       | 3.189e+007  | 3.189e+007    | 3.189e+007  | 1.289e+008     |
| Mass Flow (kg/h)                                 | 0.0000       | 9.200e+008  | 9.200e+008    | 9.200e+008  | 1.888e+009     |
| Liquid Volume Flow (m3/h)                        | 0.0000       | 1.064e+006  | 1.064e+006    | 1.064e+006  | 4.226e+006     |
| Heat Flow (kJ/h)                                 | 0.0000       | -2.575e+008   | 7.056e+011    | 4.643e+011  | -1.727e+012    |
| Name   | RESIDUO 2    | RX-3  | RX-4          | RESIDUO 3   | RX-5           |
| Vapour Fraction                                  | 0.0000       | 1.0000  | 1.0000        | 0.0000      | 1.0000         |
| Temperature (C)                                  | 896.0        | 370.0   | 480.0         | 480.0       | 210.0          |
| Pressure (bar)                                   | 40.70        | 40.70   | 40.70         | 40.70       | 40.70          |
| Molar Flow (kgmole/h)                            | 0.0000       | 1.289e+008  | 1.289e+008    | 0.0000      | 1.289e+008     |
| Mass Flow (kg/h)                                 | 0.0000       | 1.888e+009  | 1.888e+009    | 0.0000      | 1.888e+009     |
| Liquid Volume Flow (m3/h)                        | 0.0000       | 4.226e+006  | 4.157e+006    | 0.0000      | 4.157e+006     |
| Heat Flow (kJ/h)                                 | 0.0000       | -4.022e+012   | -3.471e+012   | 0.0000      | -4.583e+012    |
| Name   | RX-6         | RESIDUO 4   | RX-7          | RX-8        | AGUA RESIDUO   |
| Vapour Fraction                                  | 1.0000       | 0.0000  | 1.0000        | 1.0000      | 0.0000         |
| Temperature (C)                                  | 240.0        | 240.0   | 70.00         | 70.00       | 70.00          |
| Pressure (bar)                                   | 40.70        | 40.70   | 40.70         | 40.70       | 40.70          |
| Molar Flow (kgmole/h)                            | 1.289e+008   | 0.0000  | 1.289e+008    | 1.289e+008  | 0.0000         |
| Mass Flow (kg/h)                                 | 1.888e+009   | 0.0000  | 1.888e+009    | 1.888e+009  | 0.0000         |
| Liquid Volume Flow (m3/h)                        | 4.264e+006   | 0.0000  | 4.264e+006    | 4.264e+006  | 0.0000         |
| Heat Flow (kJ/h)                                 | -4.606e+012  | 0.0000  | -5.287e+012   | -5.287e+012 | 0.0000         |
| Name   | PUR-1        | AMINA   | PUR-2         | AMIN-1      | PUR-3          |
| Vapour Fraction                                  | 1.0000       | 0.0000  | 1.0000        | 1.0000      | 1.0000         |
| Temperature (C)                                  | 70.00        | 85.30   | 85.30         | 277.3       | 85.30          |
| Pressure (bar)                                   | 40.70        | 40.70   | 36.87         | 36.87       | 36.87          |
| Molar Flow (kgmole/h)                            | 1.289e+008   | 2.000e+006  | 1.070e+008    | 2.683e+007  | 1.070e+008     |
| Mass Flow (kg/h)                                 | 1.888e+009   | 2.383e+008  | 1.132e+009    | 1.048e+009  | 1.132e+009     |
| Liquid Volume Flow (m3/h)                        | 6.883e+006   | 2.300e+005  | 5.733e+006    | 1.434e+006  | 3.335e+006     |
| Heat Flow (kJ/h)                                 | -5.277e+012  | -8.781e+011   | -1.241e+011   | -6.281e+012 | -1.302e+011    |
| Name   | AMIN-2       | AMIN-3  | MET-1         | MET-2       | RESIDUO 5      |
| Vapour Fraction                                  | 0.9730       | 0.7972  | 1.0000        | 1.0000      | 0.0000         |
| Temperature (C)                                  | 209.4        | 50.00   | 316.0         | 310.0       | 310.0          |
| Pressure (bar)                                   | 7.355        | 7.355   | 36.87         | 36.87       | 36.87          |
| Molar Flow (kgmole/h)                            | 2.683e+007   | 2.683e+007  | 1.070e+008    | 1.070e+008  | 0.0000         |
| Mass Flow (kg/h)                                 | 1.048e+009   | 1.048e+009  | 1.132e+009    | 1.132e+009  | 0.0000         |
| Liquid Volume Flow (m3/h)                        | 1.434e+006   | 1.434e+006  | 3.335e+006    | 3.334e+006  | 0.0000         |
| Heat Flow (kJ/h)                                 | -6.414e+012  | -6.893e+012   | 6.141e+011    | 5.902e+011  | 0.0000         |

## ANEXO 14

### REPORTE DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS(CONTINUACION)

| Company Name Not Available<br>Bedford, MA<br>USA |                 | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |             |                    |                   |                |
|--|-----------------|---|-------------|--------------------|-------------------|----------------|
|  |                 | Unit Set: AMONIACO                                  |             |                    |                   |                |
|  |                 | Date/Time: Wed Nov 22 15:54:09 2023                 |             |                    |                   |                |
| Workbook: Case (Main) (continued)                |                 |   |             |                    |                   |                |
| Material Streams (continued)                     |                 |   |             |                    |                   | Fluid Pkg: All |
| Name   | MET-3           | MET-4   | MET-5       | MET-6              | RESIDUO METANADCO |                |
| Vapour Fraction                                  | 1.0000          | 1.0000  | 1.0000      | 1.0000             | 0.0000            |                |
| Temperature (C)                                  | 79.04           | 37.00 *   | 4.000 *     | 4.000              | 4.000             |                |
| Pressure (bar)                                   | 36.87           | 36.87   | 36.87       | 36.87              | 36.87             |                |
| Molar Flow (kgmole/h)                            | 1.070e+008      | 1.070e+008  | 1.070e+008  | 1.070e+008         | 0.0000            |                |
| Mass Flow (kg/h)                                 | 1.132e+009      | 1.132e+009  | 1.132e+009  | 1.132e+009         | 0.0000            |                |
| Liquid Volume Flow (m3/h)                        | 3.334e+006      | 3.334e+006  | 3.334e+006  | 3.334e+006         | 0.0000            |                |
| Heat Flow (kJ/h)                                 | -1.541e+011     | -2.874e+011   | -3.919e+011 | -3.919e+011        | 0.0000            |                |
| Name   | GSINT-1         | SOBRANTES DEL ME                                    | AGUA        | AMINA-SOLUC        | AGUA-1            |                |
| Vapour Fraction                                  | 1.0000          | 1.0000  | 0.0000      | 0.0000             | 0.0000            |                |
| Temperature (C)                                  | 65.00 *         | 65.00 *   | 85.30 *     | 96.03              | 85.30             |                |
| Pressure (bar)                                   | 150.0 *         | 150.0 *   | 40.70 *     | 40.70              | 40.70             |                |
| Molar Flow (kgmole/h)                            | 9.612e+007      | 1.087e+007  | 3.000e+006  | 5.000e+006         | 3.000e+006        |                |
| Mass Flow (kg/h)                                 | 8.509e+008      | 2.814e+008  | 5.405e+007  | 2.924e+008         | 5.405e+007        |                |
| Liquid Volume Flow (m3/h)                        | 2.923e+006      | 4.111e+005  | 5.415e+004  | 2.842e+005         | 5.415e+004        |                |
| Heat Flow (kJ/h)                                 | 1.037e+011      | -3.179e+011   | -8.444e+011 | -1.722e+012        | -8.434e+011       |                |
| Name   | AMIN-4          | AMINA PRESURI                                       | CO2 PURO    | GASES DE RESIDUO 2 | AMINA PURA        |                |
| Vapour Fraction                                  | 0.6883          | 0.0000  | 1.0000      | 0.7671             | 0.0000            |                |
| Temperature (C)                                  | 50.31           | 50.78   | 50.00 *     | 38.59              | 50.00 *           |                |
| Pressure (bar)                                   | 7.350 *         | 40.70 *   | 7.355 *     | 7.350 *            | 7.350 *           |                |
| Molar Flow (kgmole/h)                            | 1.735e+007      | 1.800e+006  | 9.483e+006  | 1.555e+007         | 1.800e+006        |                |
| Mass Flow (kg/h)                                 | 6.312e+008      | 2.145e+008  | 4.171e+008  | 4.167e+008         | 2.145e+008        |                |
| Liquid Volume Flow (m3/h)                        | 9.266e+005      | 2.070e+005  | 5.079e+005  | 7.196e+005         | 2.070e+005        |                |
| Heat Flow (kJ/h)                                 | -3.170e+012     | -8.087e+011   | -3.723e+012 | -2.361e+012        | -8.097e+011       |                |
| Name   | amina calentada | AMI-REPOSI  | GSINT-2     | GSINT-3            | GSINT-1.1         |                |
| Vapour Fraction                                  | 0.0000          | 0.0178  | 1.0000      | 0.9950             | 1.0000            |                |
| Temperature (C)                                  | 85.00 *         | 85.00 *   | 8.463       | -33.00 *           | 69.29             |                |
| Pressure (bar)                                   | 40.70           | 1.189e-003  | 154.9       | 154.9              | 154.9 *           |                |
| Molar Flow (kgmole/h)                            | 1.800e+006      | 2.000e+005  | 2.860e+008  | 2.860e+008         | 9.612e+007        |                |
| Mass Flow (kg/h)                                 | 2.145e+008      | 2.383e+007  | 5.291e+009  | 5.291e+009         | 8.509e+008        |                |
| Liquid Volume Flow (m3/h)                        | 2.070e+005      | 2.300e+004  | 9.291e+006  | 9.291e+006         | 2.923e+006        |                |
| Heat Flow (kJ/h)                                 | -7.905e+011     | -8.765e+010   | -5.840e+011 | -1.020e+012        | 1.161e+011        |                |
| Name   | GSINT-4         | GSINT-5   | GSINT-6     | GSINT-7            | GSINT-8           |                |
| Vapour Fraction                                  | 1.0000          | 0.0000  | 1.0000      | 1.0000             | 1.0000            |                |
| Temperature (C)                                  | -33.00          | -33.00  | 210.0 *     | 360.0 *            | 510.0 *           |                |
| Pressure (bar)                                   | 154.9           | 154.9   | 154.9       | 154.9              | 153.0 *           |                |
| Molar Flow (kgmole/h)                            | 2.845e+008      | 1.428e+006  | 2.845e+008  | 2.845e+008         | 2.459e+008        |                |
| Mass Flow (kg/h)                                 | 5.266e+009      | 2.430e+007  | 5.266e+009  | 5.266e+009         | 5.266e+009        |                |
| Liquid Volume Flow (m3/h)                        | 9.251e+006      | 3.951e+004  | 9.251e+006  | 9.251e+006         | 7.977e+006        |                |
| Heat Flow (kJ/h)                                 | -9.184e+011     | -1.012e+011   | 1.315e+012  | 2.647e+012         | 1.893e+012        |                |
| Name   | GSINT-9         | GSINT-10  | GSINT-11    | GSINT-12           | GSINT-13          |                |
| Vapour Fraction                                  | 1.0000          | 1.0000  | 1.0000      | 1.0000             | 0.8068            |                |
| Temperature (C)                                  | 388.0 *         | 468.0 *   | 395.0 *     | 436.0 *            | -17.80 *          |                |
| Pressure (bar)                                   | 153.0           | 152.0 *   | 152.0       | 151.0 *            | 151.0             |                |
| Molar Flow (kgmole/h)                            | 2.459e+008      | 2.399e+008  | 2.399e+008  | 2.375e+008         | 2.375e+008        |                |
| Mass Flow (kg/h)                                 | 5.266e+009      | 5.266e+009  | 5.266e+009  | 5.266e+009         | 5.266e+009        |                |
| Liquid Volume Flow (m3/h)                        | 7.977e+006      | 7.777e+006  | 7.777e+006  | 7.697e+006         | 7.697e+006        |                |
| Heat Flow (kJ/h)                                 | 8.418e+011      | 1.199e+012  | 5.762e+011  | 7.945e+011         | -3.914e+012       |                |

## ANEXO 14

### REPORTE DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS(CONTINUACION)

|  |              |   |              |             |                 |
|--|--------------|---|--------------|-------------|-----------------|
|  Company Name Not Available<br>Bedford, MA<br>USA |              | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |              |             |                 |
|  |              | Unit Set: AMONIACO                                  |              |             |                 |
|  |              | Date/Time: Wed Nov 22 15:54:09 2023                 |              |             |                 |
| <b>Workbook: Case (Main) (continued)</b>   |              |   |              |             |                 |
| <b>Material Streams (continued)</b>  |              |   |              |             | Fluid Pkg: All  |
| Name   | PROD-1       | PROD-2  | RECIR AMO-1  | RECIR AMO-2 | PROD-3          |
| Vapour Fraction  | 1.0000       | 0.0000  | 1.0000       | 1.0000      | 0.0000          |
| Temperature (C)  | -17.80       | -17.80  | -17.80 *     | -15.44      | -18.25          |
| Pressure (bar)   | 151.0        | 151.0   | 151.0 *      | 154.9 *     | 151.0           |
| Molar Flow (kgmole/h)  | 1.916e+008   | 4.588e+007  | 1.898e+008 * | 1.898e+008  | 4.730e+007      |
| Mass Flow (kg/h)   | 4.484e+009   | 7.824e+008  | 4.440e+009   | 4.440e+009  | 8.067e+008      |
| Liquid Volume Flow (m3/h)  | 6.427e+006   | 1.270e+006  | 6.368e+006   | 6.368e+006  | 1.309e+006      |
| Heat Flow (kJ/h)   | -7.203e+011  | -3.194e+012   | -7.134e+011  | -7.001e+011 | -3.295e+012     |
| Name   | NH3 FRIO     | NH3   | NH3 CALIENTE | AMONIACO    | GAS DE AMONIACO |
| Vapour Fraction  | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 1.0000          |
| Temperature (C)  | -14.94       | -14.94  | 13.49        | 12.94       | 38.00           |
| Pressure (bar)   | 18.63        | 18.63   | 18.63        | 18.63       | 18.63           |
| Molar Flow (kgmole/h)  | 4.608e+007   | 9.404e+005  | 4.608e+007   | 4.702e+007  | 7.111e+004      |
| Mass Flow (kg/h)   | 7.848e+008   | 1.602e+007  | 7.848e+008   | 8.008e+008  | 1.250e+006      |
| Liquid Volume Flow (m3/h)  | 1.274e+006   | 2.600e+004  | 1.274e+006   | 1.300e+006  | 2037            |
| Heat Flow (kJ/h)   | -3.227e+012  | -6.586e+010   | -3.122e+012  | -3.188e+012 | -2.656e+009     |
| Name   | LIQ AMONIACO | PROD-4  | PROD-5       | GSINT 7.1   |                 |
| Vapour Fraction  | 0.0000       | 1.0000  | 0.0000       | 1.0000      |                 |
| Temperature (C)  | 38.00 *      | -14.94  | -14.94       | 360.0       |                 |
| Pressure (bar)   | 18.63        | 18.63   | 18.63 *      | 154.9 *     |                 |
| Molar Flow (kgmole/h)  | 4.695e+007   | 2.853e+005  | 4.702e+007   | 2.845e+008  |                 |
| Mass Flow (kg/h)   | 7.996e+008   | 5.847e+006  | 8.008e+008   | 5.266e+009  |                 |
| Liquid Volume Flow (m3/h)  | 1.298e+006   | 9241  | 1.300e+006   | 9.251e+006  |                 |
| Heat Flow (kJ/h)   | -3.084e+012  | -2.228e+009   | -3.293e+012  | 2.647e+012  |                 |

## ANEXO 15

### REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS

|  |   |           |               |           |                |
|--|---|-----------|---------------|-----------|----------------|
|  Company Name Not Available<br>Bedford, MA<br>USA | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |           |               |           |                |
|  | Unit Set: AMONIACO                                  |           |               |           |                |
|  | Date/Time: Wed Nov 22 16:06:51 2023                 |           |               |           |                |
| <b>Workbook: Case (Main)</b>   |   |           |               |           |                |
| <b>Compositions</b>  |   |           |               |           |                |
|  |   |           |               |           | Fluid Pkg: All |
| Name   | ALIMENTACION  | MEZCLA-1  | Vapor de Agua | MEZCLA    | RX-1           |
| Comp Mole Frac (Methane)   | 0.9467 *  | 0.4395    | 0.0000 *      | 0.4395    | 0.2089         |
| Comp Mole Frac (H2O)   | 0.0000 *  | 0.5357    | 1.0000 *      | 0.5357    | 0.1953         |
| Comp Mole Frac (CO)  | 0.0000 *  | 0.0000    | 0.0000 *      | 0.0000    | 0.0365         |
| Comp Mole Frac (CARBAMATO*)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Hydrogen)  | 0.0208 *  | 0.0097    | 0.0000 *      | 0.0097    | 0.4617         |
| Comp Mole Frac (CO2)   | 0.0195 *  | 0.0090    | 0.0000 *      | 0.0090    | 0.0930         |
| Comp Mole Frac (Oxygen)  | 0.0000 *  | 0.0000    | 0.0000 *      | 0.0000    | 0.0000         |
| Comp Mole Frac (Nitrogen)  | 0.0130 *  | 0.0061    | 0.0000 *      | 0.0061    | 0.0046         |
| Comp Mole Frac (Ammonia)   | 0.0000 *  | 0.0000    | 0.0000 *      | 0.0000    | 0.0000         |
| Comp Mole Frac (MDEthnlAmine)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (H2S)   | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Urea)  | ***   | ***       | ***           | ***       | ***            |
| Name   | RESIDUO 1   | AIRE      | AIRE-1        | AIRE-2    | RX-2           |
| Comp Mole Frac (Methane)   | 0.2100  | 0.0000 *  | 0.0000        | 0.0000    | 0.0320         |
| Comp Mole Frac (H2O)   | 0.1912  | 0.0000 *  | 0.0000        | 0.0000    | 0.0140         |
| Comp Mole Frac (CO)  | 0.0367  | 0.0000 *  | 0.0000        | 0.0000    | 0.0992         |
| Comp Mole Frac (CARBAMATO*)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Hydrogen)  | 0.4646  | 0.0000 *  | 0.0000        | 0.0000    | 0.5409         |
| Comp Mole Frac (CO2)   | 0.0929  | 0.0000 *  | 0.0000        | 0.0000    | 0.0637         |
| Comp Mole Frac (Oxygen)  | 0.0000  | 0.2100 *  | 0.2100        | 0.2100    | 0.0520         |
| Comp Mole Frac (Nitrogen)  | 0.0046  | 0.7900 *  | 0.7900        | 0.7900    | 0.1981         |
| Comp Mole Frac (Ammonia)   | 0.0000  | 0.0000 *  | 0.0000        | 0.0000    | 0.0000         |
| Comp Mole Frac (MDEthnlAmine)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (H2S)   | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Urea)  | ***   | ***       | ***           | ***       | ***            |
| Name   | RESIDUO 2   | RX-3      | RX-4          | RESIDUO 3 | RX-5           |
| Comp Mole Frac (Methane)   | 0.0320  | 0.0320    | 0.0320        | 0.0320    | 0.0320         |
| Comp Mole Frac (H2O)   | 0.0140  | 0.0140    | 0.0325        | 0.0325    | 0.0325         |
| Comp Mole Frac (CO)  | 0.0992  | 0.0992    | 0.1176        | 0.1176    | 0.1176         |
| Comp Mole Frac (CARBAMATO*)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Hydrogen)  | 0.5409  | 0.5409    | 0.5225        | 0.5225    | 0.5225         |
| Comp Mole Frac (CO2)   | 0.0637  | 0.0637    | 0.0453        | 0.0453    | 0.0453         |
| Comp Mole Frac (Oxygen)  | 0.0520  | 0.0520    | 0.0520        | 0.0520    | 0.0520         |
| Comp Mole Frac (Nitrogen)  | 0.1981  | 0.1981    | 0.1981        | 0.1981    | 0.1981         |
| Comp Mole Frac (Ammonia)   | 0.0000  | 0.0000    | 0.0000        | 0.0000    | 0.0000         |
| Comp Mole Frac (MDEthnlAmine)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (H2S)   | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Urea)  | ***   | ***       | ***           | ***       | ***            |
| Name   | RX-6  | RESIDUO 4 | RX-7          | RX-8      | AGUA RESIDUO   |
| Comp Mole Frac (Methane)   | 0.0320  | 0.0320    | 0.0320        | 0.0320    | 0.0000         |
| Comp Mole Frac (H2O)   | 0.0041  | 0.0041    | 0.0041        | 0.0041    | 0.9981         |
| Comp Mole Frac (CO)  | 0.0893  | 0.0893    | 0.0893        | 0.0893    | 0.0000         |
| Comp Mole Frac (CARBAMATO*)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Hydrogen)  | 0.5509  | 0.5509    | 0.5509        | 0.5509    | 0.0002         |
| Comp Mole Frac (CO2)   | 0.0736  | 0.0736    | 0.0736        | 0.0736    | 0.0014         |
| Comp Mole Frac (Oxygen)  | 0.0520  | 0.0520    | 0.0520        | 0.0520    | 0.0000         |
| Comp Mole Frac (Nitrogen)  | 0.1981  | 0.1981    | 0.1981        | 0.1981    | 0.0002         |
| Comp Mole Frac (Ammonia)   | 0.0000  | 0.0000    | 0.0000        | 0.0000    | 0.0000         |
| Comp Mole Frac (MDEthnlAmine)  | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (H2S)   | ***   | ***       | ***           | ***       | ***            |
| Comp Mole Frac (Urea)  | ***   | ***       | ***           | ***       | ***            |
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## ANEXO 15

### REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS (CONTINUACION)

|  Company Name Not Available<br>Bedford, MA<br>USA |         | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |          |             |                  |                |
|--|---------|---|----------|-------------|------------------|----------------|
|  |         | Unit Set: AMONIACO                                  |          |             |                  |                |
|  |         | Date/Time: Wed Nov 22 15:06:51 2023                 |          |             |                  |                |
| <b>Workbook: Case (Main) (continued)</b>   |         |   |          |             |                  |                |
| Compositions (continued)   |         |   |          |             |                  |                |
|  |         |   |          |             |                  | Fluid Pkg: All |
| Name   | PUR-1   | AMINA   | PUR-2    | AMIN-1      | PUR-3            |                |
| Comp Mole Frac (Methane)   | 0.0320  | 0.0000 *  | 0.0385   | 0.0000      | 0.0385           | 0.0385         |
| Comp Mole Frac (H2O)   | 0.0041  | 0.0000 *  | 0.0000   | 0.1316      | 0.0000           | 0.0000         |
| Comp Mole Frac (CO)  | 0.0893  | 0.0000 *  | 0.0001   | 0.4285      | 0.0001           | 0.0001         |
| Comp Mole Frac (CARBAMATO*)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Comp Mole Frac (Hydrogen)  | 0.5509  | 0.0000 *  | 0.6626   | 0.0026      | 0.6626           | 0.6626         |
| Comp Mole Frac (CO2)   | 0.0736  | 0.0000 *  | 0.0001   | 0.3532      | 0.0001           | 0.0001         |
| Comp Mole Frac (Oxygen)  | 0.0520  | 0.0000 *  | 0.0626   | 0.0000      | 0.0626           | 0.0626         |
| Comp Mole Frac (Nitrogen)  | 0.1981  | 0.0000 *  | 0.2361   | 0.0095      | 0.2361           | 0.2361         |
| Comp Mole Frac (Ammonia)   | 0.0000  | 0.0000 *  | 0.0000   | 0.0000      | 0.0000           | 0.0000         |
| Comp Mole Frac (MDEthniAmine)  | 0.0000  | 1.0000 *  | 0.0000   | 0.0745      | ***              | ***            |
| Comp Mole Frac (H2S)   | 0.0000  | 0.0000 *  | 0.0000   | 0.0000      | ***              | ***            |
| Comp Mole Frac (Urea)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Name   | AMIN-2  | AMIN-3  | MET-1    | MET-2       | RESIDUO 5        |                |
| Comp Mole Frac (Methane)   | 0.0000  | 0.0000  | 0.0385   | 0.0387      | 0.0387           | 0.0387         |
| Comp Mole Frac (H2O)   | 0.1316  | 0.1316  | 0.0000   | 0.0003      | 0.0003           | 0.0003         |
| Comp Mole Frac (CO)  | 0.4285  | 0.4285  | 0.0001   | 0.0000      | 0.0000           | 0.0000         |
| Comp Mole Frac (CARBAMATO*)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Comp Mole Frac (Hydrogen)  | 0.0026  | 0.0026  | 0.6626   | 0.6621      | 0.6621           | 0.6621         |
| Comp Mole Frac (CO2)   | 0.3532  | 0.3532  | 0.0001   | 0.0000      | 0.0000           | 0.0000         |
| Comp Mole Frac (Oxygen)  | 0.0000  | 0.0000  | 0.0626   | 0.0626      | 0.0626           | 0.0626         |
| Comp Mole Frac (Nitrogen)  | 0.0095  | 0.0095  | 0.2361   | 0.2362      | 0.2362           | 0.2362         |
| Comp Mole Frac (Ammonia)   | 0.0000  | 0.0000  | 0.0000   | 0.0000      | 0.0000           | 0.0000         |
| Comp Mole Frac (MDEthniAmine)  | 0.0745  | 0.0745  | ***      | ***         | ***              | ***            |
| Comp Mole Frac (H2S)   | 0.0000  | 0.0000  | ***      | ***         | ***              | ***            |
| Comp Mole Frac (Urea)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Name   | MET-3   | MET-4   | MET-5    | MET-6       | RESIDUO METANADO |                |
| Comp Mole Frac (Methane)   | 0.0387  | 0.0387  | 0.0387   | 0.0387      | 0.0387           | 0.0000         |
| Comp Mole Frac (H2O)   | 0.0003  | 0.0003  | 0.0003   | 0.0003      | 0.0003           | 0.9998         |
| Comp Mole Frac (CO)  | 0.0000  | 0.0000  | 0.0000   | 0.0000      | 0.0000           | 0.0000         |
| Comp Mole Frac (CARBAMATO*)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Comp Mole Frac (Hydrogen)  | 0.6621  | 0.6621  | 0.6621   | 0.6621      | 0.6621           | 0.0000         |
| Comp Mole Frac (CO2)   | 0.0000  | 0.0000  | 0.0000   | 0.0000      | 0.0000           | 0.0000         |
| Comp Mole Frac (Oxygen)  | 0.0626  | 0.0626  | 0.0626   | 0.0626      | 0.0626           | 0.0000         |
| Comp Mole Frac (Nitrogen)  | 0.2362  | 0.2362  | 0.2362   | 0.2362      | 0.2362           | 0.0002         |
| Comp Mole Frac (Ammonia)   | 0.0000  | 0.0000  | 0.0000   | 0.0000      | 0.0000           | 0.0000         |
| Comp Mole Frac (MDEthniAmine)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Comp Mole Frac (H2S)   | ***     | ***   | ***      | ***         | ***              | ***            |
| Comp Mole Frac (Urea)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Name   | GSINT-1 | SOBRANTES DEL ME                                    | AGUA     | AMINA-SOLUC | AGUA-1           |                |
| Comp Mole Frac (Methane)   | 0.0000  | 0.3813  | 0.0000 * | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (H2O)   | 0.0000  | 0.0028  | 1.0000 * | 0.6000 *    | 1.0000           | 1.0000         |
| Comp Mole Frac (CO)  | 0.0000  | 0.0000  | 0.0000 * | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (CARBAMATO*)  | ***     | ***   | ***      | ***         | ***              | ***            |
| Comp Mole Frac (Hydrogen)  | 0.7370  | 0.0000  | 0.0000 * | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (CO2)   | 0.0000  | 0.0000  | 0.0000 * | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (Oxygen)  | 0.0000  | 0.6159  | 0.0000 * | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (Nitrogen)  | 0.2630  | 0.0000  | 0.0000 * | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (Ammonia)   | 0.0000  | 0.0000  | 0.0000 * | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (MDEthniAmine)  | ***     | ***   | ***      | 0.4000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (H2S)   | ***     | ***   | ***      | 0.0000 *    | 0.0000           | 0.0000         |
| Comp Mole Frac (Urea)  | ***     | ***   | ***      | ***         | ***              | ***            |

## ANEXO 15

### REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS (CONTINUACION)

| Company Name Not Available<br>Bedford, MA<br>USA |                 | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |          |                  |                |
|--|-----------------|---|----------|------------------|----------------|
|  |                 | Unit Set: AMONIACO                                  |          |                  |                |
|  |                 | Date/Time: Wed Nov 22 16:06:51 2023                 |          |                  |                |
| Workbook: Case (Main) (continued)                |                 |   |          |                  |                |
| Compositions (continued)                         |                 |   |          |                  |                |
|  |                 |   |          |                  | Fluid Pkg: All |
| Name   | AMIN-4          | AMINA PRESURI                                       | CO2 PURO | GASES DE RESIDIO | AMINA PURA     |
| Comp Mole Frac (Methane)                         | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (H2O)                             | 0.2035          | 0.0000  | 0.0000   | 0.2271           | 0.0000         |
| Comp Mole Frac (CO)                              | 0.6627          | 0.0000  | 0.0000   | 0.7394           | 0.0000         |
| Comp Mole Frac (CARBAMATO*)                      | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (Hydrogen)                        | 0.0037          | 0.0000  | 0.0006   | 0.0042           | 0.0000         |
| Comp Mole Frac (CO2)                             | 0.0000          | 0.0000  | 0.9994   | 0.0000           | 0.0000         |
| Comp Mole Frac (Oxygen)                          | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Nitrogen)                        | 0.0147          | 0.0000  | 0.0000   | 0.0164           | 0.0000         |
| Comp Mole Frac (Ammonia)                         | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (MDEthnlAmine)                    | 0.1153          | 1.0000  | 0.0000   | 0.0129           | 1.0000         |
| Comp Mole Frac (H2S)                             | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Urea)                            | ***             | ***   | ***      | ***              | ***            |
| Name   | amina calentada | AMI-REPOSI  | GSINT-2  | GSINT-3          | GSINT-1.1      |
| Comp Mole Frac (Methane)                         | 0.0000          | 0.0000 *  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (H2O)                             | 0.0000          | 0.0000 *  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (CO)                              | 0.0000          | 0.0000 *  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (CARBAMATO*)                      | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (Hydrogen)                        | 0.0000          | 0.0000 *  | 0.3568   | 0.3568           | 0.7370         |
| Comp Mole Frac (CO2)                             | 0.0000          | 0.0000 *  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Oxygen)                          | 0.0000          | 0.0000 *  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Nitrogen)                        | 0.0000          | 0.0000 *  | 0.6216   | 0.6216           | 0.2630         |
| Comp Mole Frac (Ammonia)                         | 0.0000          | 0.0000 *  | 0.0215   | 0.0215           | 0.0000         |
| Comp Mole Frac (MDEthnlAmine)                    | 1.0000          | 1.0000 *  | ***      | ***              | ***            |
| Comp Mole Frac (H2S)                             | 0.0000          | 0.0000 *  | ***      | ***              | ***            |
| Comp Mole Frac (Urea)                            | ***             | ***   | ***      | ***              | ***            |
| Name   | GSINT-4         | GSINT-5   | GSINT-6  | GSINT-7          | GSINT-8        |
| Comp Mole Frac (Methane)                         | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (H2O)                             | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (CO)                              | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (CARBAMATO*)                      | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (Hydrogen)                        | 0.3586          | 0.0027  | 0.3586   | 0.3586           | 0.1795         |
| Comp Mole Frac (CO2)                             | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Oxygen)                          | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Nitrogen)                        | 0.6247          | 0.0024  | 0.6247   | 0.6247           | 0.6443         |
| Comp Mole Frac (Ammonia)                         | 0.0167          | 0.9950  | 0.0167   | 0.0167           | 0.1762         |
| Comp Mole Frac (MDEthnlAmine)                    | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (H2S)                             | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (Urea)                            | ***             | ***   | ***      | ***              | ***            |
| Name   | GSINT-9         | GSINT-10  | GSINT-11 | GSINT-12         | GSINT-13       |
| Comp Mole Frac (Methane)                         | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (H2O)                             | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (CO)                              | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (CARBAMATO*)                      | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (Hydrogen)                        | 0.1795          | 0.1461  | 0.1461   | 0.1323           | 0.1323         |
| Comp Mole Frac (CO2)                             | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Oxygen)                          | 0.0000          | 0.0000  | 0.0000   | 0.0000           | 0.0000         |
| Comp Mole Frac (Nitrogen)                        | 0.6443          | 0.6490  | 0.6490   | 0.6495           | 0.6495         |
| Comp Mole Frac (Ammonia)                         | 0.1762          | 0.2059  | 0.2059   | 0.2182           | 0.2182         |
| Comp Mole Frac (MDEthnlAmine)                    | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (H2S)                             | ***             | ***   | ***      | ***              | ***            |
| Comp Mole Frac (Urea)                            | ***             | ***   | ***      | ***              | ***            |

## ANEXO 15

### REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS (CONTINUACION)

|  Company Name Not Available<br>Bedford, MA<br>USA |              | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |              |             |                 |                |
|--|--------------|---|--------------|-------------|-----------------|----------------|
|  |              | Unit Set: AMONIACO                                  |              |             |                 |                |
|  |              | Date/Time: Wed Nov 22 16:06:51 2023                 |              |             |                 |                |
| Workbook: Case (Main) (continued)  |              |   |              |             |                 |                |
| Compositions (continued)   |              |   |              |             |                 | Fluid Pkg: All |
| Name   | PROD-1       | PROD-2  | RECIR AMO-1  | RECIR AMO-2 | PROD-3          |                |
| Comp Mole Frac (Methane)   | 0.0000       | 0.0000  | 0.0000 *     | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (H2O)   | 0.0000       | 0.0000  | 0.0000 *     | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (CO)  | 0.0000       | 0.0000  | 0.0000 *     | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (CARBAMATO*)  | ***          | ***   | ***          | ***         | ***             | ***            |
| Comp Mole Frac (Hydrogen)  | 0.1636       | 0.0017  | 0.1643 *     | 0.1643      | 0.0017          | 0.0017         |
| Comp Mole Frac (CO2)   | 0.0000       | 0.0000  | 0.0000 *     | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (Oxygen)  | 0.0000       | 0.0000  | 0.0000 *     | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (Nitrogen)  | 0.8039       | 0.0045  | 0.8032 *     | 0.8032      | 0.0044          | 0.0044         |
| Comp Mole Frac (Ammonia)   | 0.0325       | 0.9939  | 0.0325 *     | 0.0325      | 0.9939          | 0.9939         |
| Comp Mole Frac (MDEthniAmine)  | ***          | ***   | ***          | ***         | ***             | ***            |
| Comp Mole Frac (H2S)   | ***          | ***   | ***          | ***         | ***             | ***            |
| Comp Mole Frac (Urea)  | ***          | ***   | ***          | ***         | ***             | ***            |
| Name   | NH3 FRIO     | NH3   | NH3 CALIENTE | AMONIACO    | GAS DE AMONIACO |                |
| Comp Mole Frac (Methane)   | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (H2O)   | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (CO)  | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (CARBAMATO*)  | ***          | ***   | ***          | ***         | ***             | ***            |
| Comp Mole Frac (Hydrogen)  | 0.0003       | 0.0003  | 0.0003       | 0.0003      | 0.0593          | 0.0593         |
| Comp Mole Frac (CO2)   | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (Oxygen)  | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (Nitrogen)  | 0.0006       | 0.0006  | 0.0006       | 0.0006      | 0.1310          | 0.1310         |
| Comp Mole Frac (Ammonia)   | 0.9991       | 0.9991  | 0.9991       | 0.9991      | 0.8097          | 0.8097         |
| Comp Mole Frac (MDEthniAmine)  | ***          | ***   | ***          | ***         | ***             | ***            |
| Comp Mole Frac (H2S)   | ***          | ***   | ***          | ***         | ***             | ***            |
| Comp Mole Frac (Urea)  | ***          | ***   | ***          | ***         | ***             | ***            |
| Name   | LIQ AMONIACO | PROD-4  | PROD-5       | GSINT 7.1   |                 |                |
| Comp Mole Frac (Methane)   | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (H2O)   | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (CO)  | 0.0000       | 0.0000  | 0.0000       | 0.0000      | 0.0000          | 0.0000         |
| Comp Mole Frac (CARBAMATO*)  | ***          | ***   | ***          | ***         | ***             | ***            |
| Comp Mole Frac (Hydrogen)  | 0.0002       | 0.2298  | 0.0003       | 0.3586      |                 |                |
| Comp Mole Frac (CO2)   | 0.0000       | 0.0000  | 0.0000       | 0.0000      |                 |                |
| Comp Mole Frac (Oxygen)  | 0.0000       | 0.0000  | 0.0000       | 0.0000      |                 |                |
| Comp Mole Frac (Nitrogen)  | 0.0004       | 0.6296  | 0.0006       | 0.6247      |                 |                |
| Comp Mole Frac (Ammonia)   | 0.9994       | 0.1406  | 0.9991       | 0.0167      |                 |                |
| Comp Mole Frac (MDEthniAmine)  | ***          | ***   | ***          | ***         |                 |                |
| Comp Mole Frac (H2S)   | ***          | ***   | ***          | ***         |                 |                |
| Comp Mole Frac (Urea)  | ***          | ***   | ***          | ***         |                 |                |

\* Specified by user.

## ANEXO 16

### REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE ENERGIA DE LA PRODUCCION DE AMONIACO EN ASPEN HYSYS

|  |   |                |                |             |                   |
|--|---|----------------|----------------|-------------|-------------------|
|  Company Name Not Available<br>Bedford, MA<br>USA | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |                |                |             |                   |
|  | Unit Set: AMONIACO                                  |                |                |             |                   |
|  | Date/Time: Wed Nov 22 16:06:58 2023                 |                |                |             |                   |
| <b>Workbook: Case (Main)</b>   |   |                |                |             |                   |
| <b>Energy Streams</b>  |   |                |                |             |                   |
|  |   |                |                |             | Fluid Pkg: All    |
| Name   | Q-100   | Q-REFORMADOR 1 | Q-COMPRESOR    | Q-CAL AIRE  | Q-REFORMADOR 2    |
| Heat Flow (kJ/h)   | 1.038e+012  | 2.352e+012     | 7.058e+011     | 2.412e+011  | 3.564e+012        |
| Name   | Q-2DA CONVER  | Q-SHIFT        | Q-SHIFT BAJA T | Q-SHIFT 2   | Q-ENFRIAMIENTO    |
| Heat Flow (kJ/h)   | 2.295e+012  | 5.513e+011     | 1.112e+012     | -2.321e+010 | 6.812e+011        |
| Name   | Q-PURIFI  | Q-AMINA        | Q-AMINA2       | Q-METANADOR | Q-GAS DE SINTESIS |
| Heat Flow (kJ/h)   | 5.935e+011  | 1.326e+011     | 4.795e+011     | -2.391e+010 | 1.333e+011        |
| Name   | Q-SEPARACION  | Q-BOMBA        | Q-DE AMINA     | Q-125       | Q-126             |
| Heat Flow (kJ/h)   | 1.778e+011  | 9.370e+008     | 1.824e+010     | 1.238e+010  | 1.332e+012        |
| Name   | Q-127   | Q-128          | Q-129          | Q-130       | Q-131             |
| Heat Flow (kJ/h)   | 7.548e+011  | 1.051e+012     | -3.574e+011    | 6.229e+011  | -2.183e+011       |
| Name   | Q-132   | Q-133          | Q-135          | Q-RFP       |                   |
| Heat Flow (kJ/h)   | 4.709e+012  | 1.333e+010     | 1.016e+011     | 0.0000      |                   |

## ANEXO17

### REPORTE DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE UREA EN ASPEN HYSYS

| Company Name Not Available<br>Bedford, MA<br>USA |             | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |             |              |             |                |
|--|-------------|---|-------------|--------------|-------------|----------------|
|  |             | Unit Set: AMONIACO                                  |             |              |             |                |
|  |             | Date/Time: Wed Nov 22 16:07:32 2023                 |             |              |             |                |
| Workbook: FLOW-1 (TPL1)                          |             |   |             |              |             |                |
| Material Streams                                 |             |   |             |              |             | Fluid Pkg: All |
| Name   | CO2 PURO    | LIQ AMONIACO  | AMO-1       | CO2-1        | CO2-2       |                |
| Vapour Fraction                                  | 1.0000      | 0.0000  | 0.0000      | 1.0000       | 1.0000      |                |
| Temperature (C)                                  | 50.00       | 38.00   | 38.00       | 50.00        | 405.6       |                |
| Pressure (bar)                                   | 7.355       | 18.63   | 18.63       | 7.355        | 156.9 *     |                |
| Molar Flow (kgmole/h)                            | 9.483e+006  | 4.695e+007  | 4.693e+007  | 9.483e+006   | 9.483e+006  |                |
| Mass Flow (kg/h)                                 | 4.171e+008  | 7.996e+008  | 7.990e+008  | 4.171e+008   | 4.171e+008  |                |
| Liquid Volume Flow (m3/h)                        | 5.055e+005  | 1.298e+006  | 1.297e+006  | 5.055e+005   | 5.055e+005  |                |
| Heat Flow (kJ/h)                                 | -3.725e+012 | -3.084e+012   | -3.059e+012 | -3.725e+012  | -3.583e+012 |                |
| Name   | AMO-2       | CO2-4   | RX-1        | RX-2         | RX-4        |                |
| Vapour Fraction                                  | 0.0000      | 1.0000  | 1.0000      | 0.0000       | 1.0000      |                |
| Temperature (C)                                  | 45.82       | 405.6   | 200.0       | 200.0 *      | 188.0       |                |
| Pressure (bar)                                   | 196.1 *     | 156.9   | 152.0       | 152.0 *      | 156.9       |                |
| Molar Flow (kgmole/h)                            | 4.693e+007  | 7.776e+006  | 0.0000      | 6.277e+007   | 0.0000      |                |
| Mass Flow (kg/h)                                 | 7.990e+008  | 3.420e+008  | 0.0000      | 1.895e+009   | 0.0000      |                |
| Liquid Volume Flow (m3/h)                        | 1.297e+006  | 4.145e+005  | 0.0000      | 2.322e+006   | 0.0000      |                |
| Heat Flow (kJ/h)                                 | -3.026e+012 | -2.938e+012   | 0.0000      | -5.773e+012  | 0.0000      |                |
| Name   | RX-5        | RX-6  | RX-7        | STR-1        | STRIP-2     |                |
| Vapour Fraction                                  | 0.0000      | 1.0000  | 0.0000      | 0.9687       | 0.2860      |                |
| Temperature (C)                                  | 188.0 *     | 138.0 *   | 138.0       | 153.0 *      | 153.0 *     |                |
| Pressure (bar)                                   | 156.9       | 156.9   | 156.9       | 16.18 *      | 16.18 *     |                |
| Molar Flow (kgmole/h)                            | 7.225e+007  | 8.785e+006  | 6.874e+007  | 6.090e+007   | 2.440e+007  |                |
| Mass Flow (kg/h)                                 | 1.895e+009  | 1.847e+008  | 1.711e+009  | 1.405e+009   | 8.327e+008  |                |
| Liquid Volume Flow (m3/h)                        | 2.247e+006  | 2.725e+005  | 2.073e+006  | 2.012e+006   | 7.480e+005  |                |
| Heat Flow (kJ/h)                                 | -8.307e+012 | -9.481e+011   | -8.298e+012 | -6.441e+012  | -4.954e+012 |                |
| Name   | RX-3.1      | RX-8  | RX-9        | RX-7.1       | RX-10       |                |
| Vapour Fraction                                  | 0.0000      | 1.0000  | 0.0000      | 0.2860       | 1.0000      |                |
| Temperature (C)                                  | 200.2       | 152.0   | 152.0 *     | 153.0        | 100.0       |                |
| Pressure (bar)                                   | 156.9 *     | 16.18   | 16.18       | 16.18 *      | 2.452 *     |                |
| Molar Flow (kgmole/h)                            | 6.277e+007  | 6.858e+006  | 1.755e+007  | 2.440e+007   | 9.473e+005  |                |
| Mass Flow (kg/h)                                 | 1.895e+009  | 1.189e+008  | 7.138e+008  | 8.327e+008   | 1.652e+007  |                |
| Liquid Volume Flow (m3/h)                        | 2.322e+006  | 1.695e+005  | 5.785e+005  | 7.480e+005   | 2.245e+004  |                |
| Heat Flow (kJ/h)                                 | -5.771e+012 | -6.971e+011   | -4.263e+012 | -4.954e+012  | -1.172e+011 |                |
| Name   | RX-11       | AMO-2.1   | RX-13.1     | RX-13.2      | RX-13       |                |
| Vapour Fraction                                  | 0.0000      | 0.0000  | 0.0000      | 0.0000       | 0.0000      |                |
| Temperature (C)                                  | 100.0 *     | 86.55   | 145.8       | 145.8 *      | 138.0       |                |
| Pressure (bar)                                   | 2.452       | 196.1   | 196.1 *     | 196.1 *      | 16.18       |                |
| Molar Flow (kgmole/h)                            | 1.660e+007  | 6.448e+007  | 1.755e+007  | 1.755e+007 * | 1.755e+007  |                |
| Mass Flow (kg/h)                                 | 6.973e+008  | 1.820e+009  | 1.021e+009  | 1.021e+009   | 1.021e+009  |                |
| Liquid Volume Flow (m3/h)                        | 5.561e+005  | 2.295e+005  | 9.979e+005  | 9.978e+005   | 9.979e+005  |                |
| Heat Flow (kJ/h)                                 | -4.214e+012 | -6.291e+012   | -3.265e+012 | -3.264e+012  | -3.291e+012 |                |
| Name   | SEP-1       | SEP-2   | SEP-3       | SEP-4        | SEP-5       |                |
| Vapour Fraction                                  | 1.0000      | 0.6961  | 0.6961      | 0.6961       | 1.0000      |                |
| Temperature (C)                                  | 20.00 *     | 100.0 *   | 132.0 *     | 131.9        | 288.7       |                |
| Pressure (bar)                                   | 0.5700 *    | 0.5700 *  | 0.5700      | 0.3300 *     | 0.3300 *    |                |
| Molar Flow (kgmole/h)                            | 1.700e+009  | 3.118e+007  | 3.118e+007  | 3.118e+007   | 2.037e+007  |                |
| Mass Flow (kg/h)                                 | 2.889e+010  | 9.477e+008  | 9.477e+008  | 9.477e+008   | 3.545e+008  |                |
| Liquid Volume Flow (m3/h)                        | 4.700e+007  | 9.392e+005  | 9.392e+005  | 9.392e+005   | 4.887e+005  |                |
| Heat Flow (kJ/h)                                 | -7.788e+013 | -4.971e+012   | -4.909e+012 | -4.909e+012  | -2.249e+012 |                |

## ANEXO 17

### REPORTE DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE UREA EN ASPEN HYSYS (CONTINUACION)

|  |   |             |             |              |                |
|--|---|-------------|-------------|--------------|----------------|
|  Company Name Not Available<br>Bedford, MA<br>USA | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |             |             |              |                |
|  | Unit Set: AMONIACO                                  |             |             |              |                |
|  | Date/Time: Wed Nov 22 16:07:32 2023                 |             |             |              |                |
| <b>Workbook: FLOW-1 (TPL1) (continued)</b>   |   |             |             |              |                |
| <b>Material Streams (continued)</b>  |   |             |             |              |                |
|  |   |             |             |              | Fluid Pkg: All |
| Name   | UREA  | MIX-1       | SEP-6       | SEP-6,1      | CO2-3          |
| Vapour Fraction  | 0.0000 *  | 1.0000      | 1.0000      | 1.0000       | 1.0000         |
| Temperature (C)  | 71.31   | 138.1       | 411.3       | 411.3 *      | 405.6          |
| Pressure (bar)   | 0.3300 *  | 16.18       | 16.18 *     | 16.18 *      | 156.9          |
| Molar Flow (kgmole/h)  | 1.081e+007  | 1.715e+009  | 1.700e+009  | 1.685e+009 * | 1.707e+006     |
| Mass Flow (kg/h)   | 5.932e+008  | 2.914e+010  | 2.899e+010  | 2.864e+010   | 7.508e+007     |
| Liquid Volume Flow (m3/h)  | 4.505e+005  | 4.738e+007  | 4.700e+007  | 4.659e+007   | 9.100e+004     |
| Heat Flow (kJ/h)   | -2.660e+012   | -7.236e+013 | -5.076e+013 | -5.032e+013  | -6.449e+011    |
| Name   | AMO-3   | RX-14       |             |              |                |
| Vapour Fraction  | 0.0000  | 1.0000      |             |              |                |
| Temperature (C)  | 138.0 *   | 138.0 *     |             |              |                |
| Pressure (bar)   | 196.1   | 16.18       |             |              |                |
| Molar Flow (kgmole/h)  | 6.448e+007  | 1.708e+009  |             |              |                |
| Mass Flow (kg/h)   | 1.820e+009  | 2.902e+010  |             |              |                |
| Liquid Volume Flow (m3/h)  | 2.295e+006  | 4.721e+007  |             |              |                |
| Heat Flow (kJ/h)   | -5.901e+012   | -7.167e+013 |             |              |                |

## ANEXO 18

### REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE UREA EN ASPEN HYSYS

|  Company Name Not Available<br>Bedford, MA<br>USA |          | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |        |            |         |        |
|--|----------|---|--------|------------|---------|--------|
|  |          | Unit Set: AMONIACO                                  |        |            |         |        |
|  |          | Date/Time: Wed Nov 22 16:07:40 2023                 |        |            |         |        |
| Workbook: FLOW-1 (TPL1)  |          |   |        |            |         |        |
| Compositions   |          |   |        | Fluid Pkg: |         | All    |
| Name   | CO2 PURO | LIQ AMONIACO  | AMO-1  | CO2-1      | CO2-2   |        |
| Comp Mole Frac (Methane)   | 0.0000   | 0.0000  | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2O)   | 0.0000   | 0.0000  | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Comp Mole Frac (CO)  | 0.0000   | 0.0000  | ***    | ***        | ***     | ***    |
| Comp Mole Frac (CARBAMATO*)  | ***      | ***   | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Comp Mole Frac (Hydrogen)  | 0.0006   | 0.0002  | 0.0002 | 0.0006     | 0.0006  | 0.0006 |
| Comp Mole Frac (CO2)   | 0.9994   | 0.0000  | 0.0000 | 0.9994     | 0.9994  | 0.9994 |
| Comp Mole Frac (Oxygen)  | 0.0000   | 0.0000  | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Nitrogen)  | 0.0000   | 0.0004  | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Ammonia)   | 0.0000   | 0.9994  | 0.9998 | 0.0000     | 0.0000  | 0.0000 |
| Comp Mole Frac (MDEthniAmine)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2S)   | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Urea)  | ***      | ***   | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Name   | AMO-2    | CO2-4   | RX-1   | RX-2       | RX-4    |        |
| Comp Mole Frac (Methane)   | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2O)   | 0.0000   | 0.0000  | 0.0000 | 0.0000     | 0.0483  | 0.0483 |
| Comp Mole Frac (CO)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (CARBAMATO*)  | 0.0000   | 0.0000  | 0.0001 | 0.2157     | 0.0000  | 0.0000 |
| Comp Mole Frac (Hydrogen)  | 0.0002   | 0.0006  | 0.0006 | 0.0002     | 0.0010  | 0.0010 |
| Comp Mole Frac (CO2)   | 0.0000   | 0.9994  | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Comp Mole Frac (Oxygen)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Nitrogen)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Ammonia)   | 0.9998   | 0.0000  | 0.9994 | 0.7841     | 0.9507  | 0.9507 |
| Comp Mole Frac (MDEthniAmine)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2S)   | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Urea)  | 0.0000   | 0.0000  | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Name   | RX-5     | RX-6  | RX-7   | STR-1      | STRIP-2 |        |
| Comp Mole Frac (Methane)   | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2O)   | 0.1312   | 0.0352  | 0.1334 | 0.0000     | 0.3883  | 0.3883 |
| Comp Mole Frac (CO)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (CARBAMATO*)  | 0.0562   | 0.0043  | 0.0201 | 0.0233     | 0.0000  | 0.0000 |
| Comp Mole Frac (Hydrogen)  | 0.0002   | 0.0005  | 0.0001 | 0.0003     | 0.0000  | 0.0000 |
| Comp Mole Frac (CO2)   | 0.0000   | 0.1373  | 0.0209 | 0.1710     | 0.0000  | 0.0000 |
| Comp Mole Frac (Oxygen)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Nitrogen)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Ammonia)   | 0.6813   | 0.8227  | 0.6877 | 0.8054     | 0.2233  | 0.2233 |
| Comp Mole Frac (MDEthniAmine)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2S)   | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Urea)  | 0.1312   | 0.0000  | 0.1379 | 0.0000     | 0.3883  | 0.3883 |
| Name   | RX-3.1   | RX-8  | RX-9   | RX-7.1     | RX-10   |        |
| Comp Mole Frac (Methane)   | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2O)   | 0.0000   | 0.3054  | 0.4208 | 0.3883     | 0.4110  | 0.4110 |
| Comp Mole Frac (CO)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (CARBAMATO*)  | 0.2157   | 0.0000  | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Comp Mole Frac (Hydrogen)  | 0.0002   | 0.0000  | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Comp Mole Frac (CO2)   | 0.0000   | 0.0000  | 0.0000 | 0.0000     | 0.0000  | 0.0000 |
| Comp Mole Frac (Oxygen)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Nitrogen)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Ammonia)   | 0.7841   | 0.6946  | 0.0391 | 0.2233     | 0.5890  | 0.5890 |
| Comp Mole Frac (MDEthniAmine)  | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (H2S)   | ***      | ***   | ***    | ***        | ***     | ***    |
| Comp Mole Frac (Urea)  | 0.0000   | 0.0000  | 0.5401 | 0.3883     | 0.0000  | 0.0000 |

\* Specified by user.

## ANEXO 18

### **REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE MATERIA DE LA PRODUCCION DE UREA EN ASPEN HYSYS (CONTINUACION)**

| Company Name Not Available<br>Bedford, MA<br>USA |        | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |         |          |        |                |
|--|--------|---|---------|----------|--------|----------------|
|  |        | Unit Set: AMONIACO                                  |         |          |        |                |
|  |        | Date/Time: Wed Nov 22 16:07:40 2023                 |         |          |        |                |
| <b>Workbook: FLOW-1 (TPL1) (continued)</b>       |        |   |         |          |        |                |
| Compositions (continued)                         |        |   |         |          |        |                |
|  |        |   |         |          |        | Fluid Pkg: All |
| Name   | RX-11  | AMO-2.1   | RX-13,1 | RX-13,2  | RX-13  |                |
| Comp Mole Frac (Methane)                         | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2O)                             | 0.4213 | 0.0000  | 0.0000  | 0.0000 * | 0.0000 | 0.0000         |
| Comp Mole Frac (CO)                              | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (CARBAMATO*)                      | 0.0000 | 0.1835  | 0.6742  | 0.6743 * | 0.6742 | 0.6742         |
| Comp Mole Frac (Hydrogen)                        | 0.0000 | 0.0002  | 0.0001  | 0.0001 * | 0.0001 | 0.0001         |
| Comp Mole Frac (CO2)                             | 0.0000 | 0.0000  | 0.0000  | 0.0000 * | 0.0000 | 0.0000         |
| Comp Mole Frac (Oxygen)                          | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Nitrogen)                        | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Ammonia)                         | 0.0077 | 0.8163  | 0.3257  | 0.3256 * | 0.3257 | 0.3257         |
| Comp Mole Frac (MDEthnlAmine)                    | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2S)                             | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Urea)                            | 0.5710 | 0.0000  | 0.0000  | 0.0000 * | 0.0000 | 0.0000         |
| Name   | SEP-1  | SEP-2   | SEP-3   | SEP-4    | SEP-5  |                |
| Comp Mole Frac (Methane)                         | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2O)                             | 0.0000 | 0.2914  | 0.2914  | 0.2914   | 0.3805 | 0.3805         |
| Comp Mole Frac (CO)                              | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (CARBAMATO*)                      | 0.0000 | 0.0000  | 0.0000  | 0.0000   | 0.0000 | 0.0000         |
| Comp Mole Frac (Hydrogen)                        | 0.0024 | 0.0000  | 0.0000  | 0.0000   | 0.0000 | 0.0000         |
| Comp Mole Frac (CO2)                             | 0.0000 | 0.0000  | 0.0000  | 0.0000   | 0.0000 | 0.0000         |
| Comp Mole Frac (Oxygen)                          | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Nitrogen)                        | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Ammonia)                         | 0.9976 | 0.4047  | 0.4047  | 0.4047   | 0.6195 | 0.6195         |
| Comp Mole Frac (MDEthnlAmine)                    | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2S)                             | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Urea)                            | 0.0000 | 0.3039  | 0.3039  | 0.3039   | 0.0000 | 0.0000         |
| Name   | UREA   | MIX-1   | SEP-6   | SEP-6,1  | CO2-3  |                |
| Comp Mole Frac (Methane)                         | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2O)                             | 0.1237 | 0.0012  | 0.0000  | 0.0000 * | 0.0000 | 0.0000         |
| Comp Mole Frac (CO)                              | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (CARBAMATO*)                      | 0.0000 | 0.0000  | 0.0000  | 0.0000 * | 0.0000 | 0.0000         |
| Comp Mole Frac (Hydrogen)                        | 0.0000 | 0.0024  | 0.0024  | 0.0024 * | 0.0006 | 0.0006         |
| Comp Mole Frac (CO2)                             | 0.0000 | 0.0000  | 0.0000  | 0.0000 * | 0.9994 | 0.9994         |
| Comp Mole Frac (Oxygen)                          | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Nitrogen)                        | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Ammonia)                         | 0.0000 | 0.9964  | 0.9976  | 0.9976 * | 0.0000 | 0.0000         |
| Comp Mole Frac (MDEthnlAmine)                    | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2S)                             | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Urea)                            | 0.8763 | 0.0000  | 0.0000  | 0.0000 * | 0.0000 | 0.0000         |
| Name   | AMO-3  | RX-14   |         |          |        |                |
| Comp Mole Frac (Methane)                         | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2O)                             | 0.0000 | 0.0000  | ***     | ***      | ***    | ***            |
| Comp Mole Frac (CO)                              | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (CARBAMATO*)                      | 0.1835 | 0.0000  | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Hydrogen)                        | 0.0002 | 0.0024  | ***     | ***      | ***    | ***            |
| Comp Mole Frac (CO2)                             | 0.0000 | 0.0000  | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Oxygen)                          | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Nitrogen)                        | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Ammonia)                         | 0.8163 | 0.9976  | ***     | ***      | ***    | ***            |
| Comp Mole Frac (MDEthnlAmine)                    | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (H2S)                             | ***    | ***   | ***     | ***      | ***    | ***            |
| Comp Mole Frac (Urea)                            | 0.0000 | 0.0000  | ***     | ***      | ***    | ***            |

## ANEXO 19

### REPORTE DE LA COMPOSICION DE TODAS LAS CORRIENTES DE ENERGIA DE LA PRODUCCION DE UREA EN ASPEN HYSY

|  |             |   |             |             |             |
|--|-------------|---|-------------|-------------|-------------|
|  Company Name Not Available<br>Bedford, MA<br>USA |             | Case Name: SIMULACION DE LA PLANTA DE BULO-BULO.hsc |             |             |             |
|  |             | Unit Set: AMONIACO                                  |             |             |             |
|  |             | Date/Time: Wed Nov 22 16:07:46 2023                 |             |             |             |
| <b>Workbook: FLOW-1 (TPL1)</b>   |             |   |             |             |             |
| <b>Energy Streams</b> <span style="float: right;">Fluid Pkg: All</span>  |             |   |             |             |             |
| Name   | Q-100       | Q-101   | Q-103       | Q-104       | Q-105       |
| Heat Flow (kJ/h)   | 1.426e+011  | 3.263e+010  | 3.894e+011  | 7.735e+011  | -9.383e+011 |
| Name   | Q-106       | Q-108   | Q-107       | Q-109       | Q-110       |
| Heat Flow (kJ/h)   | 7.860e+011  | -2.536e+012   | 2.137e+006  | 2.642e+010  | -5.997e+009 |
| Name   | Q-111       | Q-112   | Q-113       | Q-114       | Q-115       |
| Heat Flow (kJ/h)   | -1.820e+013 | -6.777e+010   | -6.277e+012 | 6.158e+010  | 2.712e+013  |
| Name   | Q-116       |   |             |             |             |
| Heat Flow (kJ/h)   | 1.954e+009  |   |             |             |             |
|  |             |   |             |             |             |
| Aspen Technology Inc.  |             | Aspen HYSYS Version 14                              |             | Page 1 of 1 |             |
| Licensed to: Company Name Not Available  |             | * Specified by user.                                |             |             |             |

## ANEXO 20

### REPORTE DE LA REACCIÓN DE REFORMADOR PRIMARIO

|   |   |   |                                   |           |     |            |                         |
|---|---|---|-----------------------------------|-----------|-----|------------|-------------------------|
|  <p>Company Name Not Available<br/>Bedford, MA<br/>USA</p> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Case Name:</td> <td>REPORTES Y BALANCE DE MATERIA.hsc</td> </tr> <tr> <td>Unit Set:</td> <td>PAU</td> </tr> <tr> <td>Date/Time:</td> <td>Sun Jun 9 18:38:31 2024</td> </tr> </table> | Case Name:                                  | REPORTES Y BALANCE DE MATERIA.hsc | Unit Set: | PAU | Date/Time: | Sun Jun 9 18:38:31 2024 |
| Case Name:  | REPORTES Y BALANCE DE MATERIA.hsc   |   |                                   |           |     |            |                         |
| Unit Set:   | PAU   |   |                                   |           |     |            |                         |
| Date/Time:  | Sun Jun 9 18:38:31 2024   |   |                                   |           |     |            |                         |
| <b>Conversion: CO-1</b>   |   |   |                                   |           |     |            |                         |
| <b>STOICHIOMETRY</b>  |   |   |                                   |           |     |            |                         |
| <b>Component</b>  | <b>Mole Weight</b>  | <b>Stoichiometric Coeff.</b>                |                                   |           |     |            |                         |
| Methane   | 16.043  | -1.000 *                                    |                                   |           |     |            |                         |
| H2O   | 18.015  | -1.000 *                                    |                                   |           |     |            |                         |
| CO  | 28.011  | 1.000 *                                     |                                   |           |     |            |                         |
| Hydrogen  | 2.016   | 3.000 *                                     |                                   |           |     |            |                         |
| Balance Error: 0.0000   |   | Reaction Heat (25 C) : 2.061e+005 kJ/kgmole |                                   |           |     |            |                         |
| <b>BASIS</b>  |   |   |                                   |           |     |            |                         |
| Base Component: Methane   | Conversion Percent: 9.80 *  | Reaction Phase: VapourPhase                 |                                   |           |     |            |                         |
| <b>PARAMETERS</b>   |   |   |                                   |           |     |            |                         |

## ANEXO 21

### REPORTE DE LA REACCIÓN DEL REFORMADOR SECUNDARIO

|   |  |   |                                   |           |     |            |                         |
|---|--|---|-----------------------------------|-----------|-----|------------|-------------------------|
|  <p>Company Name Not Available<br/>Bedford, MA<br/>USA</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Case Name:</td> <td>REPORTES Y BALANCE DE MATERIA.hsc</td> </tr> <tr> <td>Unit Set:</td> <td>PAU</td> </tr> <tr> <td>Date/Time:</td> <td>Sun Jun 9 18:38:31 2024</td> </tr> </table> | Case Name:                                  | REPORTES Y BALANCE DE MATERIA.hsc | Unit Set: | PAU | Date/Time: | Sun Jun 9 18:38:31 2024 |
| Case Name:  | REPORTES Y BALANCE DE MATERIA.hsc  |   |                                   |           |     |            |                         |
| Unit Set:   | PAU  |   |                                   |           |     |            |                         |
| Date/Time:  | Sun Jun 9 18:38:31 2024  |   |                                   |           |     |            |                         |
| <b>Conversion: CO2-1</b>  |  |   |                                   |           |     |            |                         |
| <b>STOICHIOMETRY</b>  |  |   |                                   |           |     |            |                         |
| Component   | Mole Weight  | Stoichiometric Coeff.                       |                                   |           |     |            |                         |
| Methane   | 16.043   | -1.000 *                                    |                                   |           |     |            |                         |
| H2O   | 18.015   | -2.000 *                                    |                                   |           |     |            |                         |
| CO2   | 44.010   | 1.000 *                                     |                                   |           |     |            |                         |
| Hydrogen  | 2.016  | 4.000 *                                     |                                   |           |     |            |                         |
| Balance Error: 0.0000   |  | Reaction Heat (25 C) : 1.647e+005 kJ/kgmole |                                   |           |     |            |                         |
| <b>BASIS</b>  |  |   |                                   |           |     |            |                         |
| Base Component: Methane   | Conversion Percent: 23.80 *  | Reaction Phase: VapourPhase                 |                                   |           |     |            |                         |
| <b>PARAMETERS</b>   |  |   |                                   |           |     |            |                         |

## ANEXO 22

### REPORTE DE LA REACCIÓN DE SHIFT

|   |             |  |  |  |  |
|---|-------------|--|--|--|--|
|  |             | Company Name Not Available<br>Bedford, MA<br>USA |  | Case Name: REPORTES Y BALANCE DE MATERIA.hsc |  |
|   |             |  |  | Unit Set: PAU                                |  |
|   |             |  |  | Date/Time: Sun Jun 9 18:38:31 2024           |  |
| <b>Equilibrium: SHIFT</b>   |             |  |  |  |  |
| <b>STOICHIOMETRY</b>  |             |  |  |  |  |
| Component   |             | Molecular Weight                                 |  | Stoichiometric Coefficient                   |  |
| CO  |             | 28.01  |  | -1 *   |  |
| H2O   |             | 18.02  |  | -1 *   |  |
| CO2   |             | 44.01  |  | 1 *  |  |
| Hydrogen  |             | 2.016  |  | 1 *  |  |
| Balance Error : 0.0000  |             |  | Reaction Heat (25 C) : -4.139e+004 kJ/kgmole |  |  |
| <b>BASIS</b>  |             |  |  |  |  |
| Basis   | Phase       | Approach (C)                                     | Min. Temp (C)                                | Max. Temp (C)                                |  |
| Partial Press   | VapourPhase | ---  | -273.1                                       | 3000   |  |
| <b>PARAMETERS</b>   |             |  |  |  |  |
| Source : K Vs. T Table  |             |  |  |  |  |
| Coeff A   | -12.11      | R2   | 0.999972 *                                   |  |  |
| Coeff B   | 5319        | T High   | ---  |  |  |
| Coeff C   | 1.012       | T Low  | ---  |  |  |
| Coeff D   | 1.144e-004  |  |  |  |  |
| Temperature (C)   | Keq         | KCalc  | Percentage Error                             |  |  |
| 93.33 *   | 4523 *      | 4547 *   | -0.5253 *                                    |  |  |
| 148.9 *   | 783.6 *     | 781.3 *  | 0.2930 *                                     |  |  |
| 204.4 *   | 206.8 *     | 205.7 *  | 0.5220 *                                     |  |  |
| 232.2 *   | 119.0 *     | 118.5 *  | 0.4317 *                                     |  |  |
| 260.0 *   | 72.75 *     | 72.52 *  | 0.3227 *                                     |  |  |
| 287.8 *   | 48.70 *     | 48.73 *  | -6.095e-002 *                                |  |  |
| 315.6 *   | 31.44 *     | 31.47 *  | -9.652e-002 *                                |  |  |
| 343.3 *   | 22.00 *     | 22.02 *  | -7.583e-002 *                                |  |  |
| 371.1 *   | 15.89 *     | 15.92 *  | -0.1914 *                                    |  |  |
| 398.9 *   | 11.80 *     | 11.85 *  | -0.4180 *                                    |  |  |
| 426.7 *   | 9.030 *     | 9.046 *  | -0.1747 *                                    |  |  |
| 454.4 *   | 7.050 *     | 7.062 *  | -0.1689 *                                    |  |  |
| 482.2 *   | 5.810 *     | 5.824 *  | -0.2448 *                                    |  |  |
| 510.0 *   | 4.550 *     | 4.558 *  | -0.1851 *                                    |  |  |
| 537.8 *   | 3.749 *     | 3.754 *  | -0.1305 *                                    |  |  |
| 565.6 *   | 3.130 *     | 3.136 *  | -0.1800 *                                    |  |  |
| 593.3 *   | 2.653 *     | 2.653 *  | 4.376e-004 *                                 |  |  |
| 621.1 *   | 2.270 *     | 2.271 *  | -3.510e-002 *                                |  |  |
| 648.9 *   | 1.966 *     | 1.964 *  | 9.143e-002 *                                 |  |  |
| 676.7 *   | 1.720 *     | 1.715 *  | 0.2717 *                                     |  |  |
| 704.4 *   | 1.512 *     | 1.511 *  | 5.921e-002 *                                 |  |  |
| 732.2 *   | 1.340 *     | 1.342 *  | -0.1385 *                                    |  |  |
| 760.0 *   | 1.202 *     | 1.200 *  | 0.1409 *                                     |  |  |
| 787.8 *   | 1.080 *     | 1.081 *  | -8.556e-002 *                                |  |  |
| 815.6 *   | 0.9813 *    | 0.9795 *   | 0.1881 *                                     |  |  |
| 843.3 *   | 0.8940 *    | 0.8926 *   | 0.1580 *                                     |  |  |
| 871.1 *   | 0.8192 *    | 0.8177 *   | 0.1799 *                                     |  |  |
| 898.9 *   | 0.7540 *    | 0.7528 *   | 0.1574 *                                     |  |  |
| 926.7 *   | 0.6970 *    | 0.6962 *   | 0.1147 *                                     |  |  |
| 954.4 *   | 0.6470 *    | 0.6466 *   | 6.748e-002 *                                 |  |  |
| 982.2 *   | 0.6037 *    | 0.6028 *   | 0.1451 *                                     |  |  |

## ANEXO 23

### REPORTE DE LA REACCIÓN DEL METANADOR

|   |  |  |                                   |               |     |            |                         |
|---|--|--|-----------------------------------|---------------|-----|------------|-------------------------|
|  <p>Company Name Not Available<br/>Bedford, MA<br/>USA</p> | <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Case Name:</td> <td>REPORTES Y BALANCE DE MATERIA.hsc</td> </tr> <tr> <td>Unit Set:</td> <td>PAU</td> </tr> <tr> <td>Date/Time:</td> <td>Sun Jun 9 18:38:31 2024</td> </tr> </table> | Case Name:                                   | REPORTES Y BALANCE DE MATERIA.hsc | Unit Set:     | PAU | Date/Time: | Sun Jun 9 18:38:31 2024 |
| Case Name:  | REPORTES Y BALANCE DE MATERIA.hsc  |  |                                   |               |     |            |                         |
| Unit Set:   | PAU  |  |                                   |               |     |            |                         |
| Date/Time:  | Sun Jun 9 18:38:31 2024  |  |                                   |               |     |            |                         |
| <h3>Equilibrium: CO<sub>2</sub>+2H<sub>2</sub>-CH<sub>4</sub>+2H<sub>2</sub>O</h3>  |  |  |                                   |               |     |            |                         |
| <h4>STOICHIOMETRY</h4>  |  |  |                                   |               |     |            |                         |
| Component   | Molecular Weight   | Stoichiometric Coefficient                   |                                   |               |     |            |                         |
| CO <sub>2</sub>   | 44.01  | -1 *   |                                   |               |     |            |                         |
| Hydrogen  | 2.016  | -4 *   |                                   |               |     |            |                         |
| Methane   | 16.04  | 1 *  |                                   |               |     |            |                         |
| H <sub>2</sub> O  | 18.02  | 2 *  |                                   |               |     |            |                         |
| Balance Error : 0.0000  |  | Reaction Heat (25 C) : -1.647e+005 kJ/kgmole |                                   |               |     |            |                         |
| <h4>BASIS</h4>  |  |  |                                   |               |     |            |                         |
| Basis   | Phase  | Approach (C)                                 | Min. Temp (C)                     | Max. Temp (C) |     |            |                         |
| Partial Press   | VapourPhase  | ---  | -273.1                            | 3000          |     |            |                         |
| <h4>PARAMETERS</h4>   |  |  |                                   |               |     |            |                         |
| <p><b>Source : Gibbs Free Energy</b></p>  |  |  |                                   |               |     |            |                         |

## ANEXO 24

### REPORTE DE LA REACCIÓN DE AMONIACO

|   |                            |  |  |               |   |
|---|----------------------------|--|--|---------------|---|
|  | Company Name Not Available | Case Name: REPORTES Y BALANCE DE MATERIA.hsc |  |               |   |
|   | USA                        | Unit Set: PAU                                |  |               |   |
|   |                            | Date/Time: Sun Jun 9 18:48:12 2024           |  |               |   |
| <b>Kinetic: AMONIACO</b>  |                            |  |  |               |   |
| <b>STOICHIOMETRY</b>  |                            |  |  |               |   |
| Component   | Molecular Weight           | Stoich Coeff                                 | Forward Order                                | Reverse Order |   |
| Nitrogen  | 28.01                      | -1 *   | 1.000  | 0.0000        |   |
| Hydrogen  | 2.016                      | -3 *   | 3.000  | 0.0000        |   |
| Ammonia   | 17.03                      | 2 *  | 0.0000                                       | 2.000         |   |
| Balance Error : 0.0000  |                            |  | Reaction Heat (25 C) : -9.142e+004 kJ/kgmole |               |   |
| <b>BASIS</b>  |                            |  |  |               |   |
| Basis   | Base Component             | Rxn Phase                                    | Min. Temp (C)                                | Max. Temp (C) |   |
| Partial Pres  | Nitrogen                   | VapourPhase                                  | -273.1                                       | 3000          |   |
| <b>PARAMETERS</b>   |                            |  |  |               |   |
| Forward Reaction  |                            |  | Reverse Reaction                             |               |   |
| A :   | 1.000e+004                 | *  | A' :   | 1.300e+010    | * |
| E :   | 9.100e+004                 | *  | E' :   | 1.410e+005    | * |

## ANEXO 25

### Reporte de la reacción de obtención de carbamato

|  |   |   |                                   |           |     |            |                         |
|--|---|---|-----------------------------------|-----------|-----|------------|-------------------------|
|  <p style="margin-left: 20px;">Company Name Not Available<br/>Bedford, MA<br/>USA</p> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Case Name:</td> <td>REPORTES Y BALANCE DE MATERIA.hsc</td> </tr> <tr> <td>Unit Set:</td> <td>PAU</td> </tr> <tr> <td>Date/Time:</td> <td>Sun Jun 9 18:48:12 2024</td> </tr> </table> | Case Name:                                  | REPORTES Y BALANCE DE MATERIA.hsc | Unit Set: | PAU | Date/Time: | Sun Jun 9 18:48:12 2024 |
| Case Name:   | REPORTES Y BALANCE DE MATERIA.hsc   |   |                                   |           |     |            |                         |
| Unit Set:  | PAU   |   |                                   |           |     |            |                         |
| Date/Time:   | Sun Jun 9 18:48:12 2024   |   |                                   |           |     |            |                         |
| <b>Conversion: AMO+CO2-CARBAM</b>  |   |   |                                   |           |     |            |                         |
| <b>STOICHIOMETRY</b>   |   |   |                                   |           |     |            |                         |
| Component  | Mole Weight   | Stoichiometric Coeff.                       |                                   |           |     |            |                         |
| Ammonia  | 17.030  | -2.000 *                                    |                                   |           |     |            |                         |
| CO2  | 44.010  | -1.000 *                                    |                                   |           |     |            |                         |
| CARBAMATO*   | 78.071  | 1.000 *                                     |                                   |           |     |            |                         |
| Balance Error: 0.0000  |   | Reaction Heat (25 C) : 1.713e+005 kJ/kgmole |                                   |           |     |            |                         |
| <b>BASIS</b>   |   |   |                                   |           |     |            |                         |
| Base Component: Ammonia  | Conversion Percent: 60.00 *   | Reaction Phase: Overall                     |                                   |           |     |            |                         |
| <b>PARAMETERS</b>  |   |   |                                   |           |     |            |                         |

## ANEXO 25

### REPORTE DE LA REACCIÓN DE OBTENCIÓN DE UREA

|   |  |   |                                   |           |     |            |                         |
|---|--|---|-----------------------------------|-----------|-----|------------|-------------------------|
|  <p style="margin-top: 10px;">Company Name Not Available<br/>Bedford, MA<br/>USA</p> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%; border-right: 1px solid black;">Case Name:</td> <td>REPORTES Y BALANCE DE MATERIA.hsc</td> </tr> <tr> <td style="border-right: 1px solid black;">Unit Set:</td> <td>PAU</td> </tr> <tr> <td style="border-right: 1px solid black;">Date/Time:</td> <td>Sun Jun 9 18:48:12 2024</td> </tr> </table> | Case Name:                                  | REPORTES Y BALANCE DE MATERIA.hsc | Unit Set: | PAU | Date/Time: | Sun Jun 9 18:48:12 2024 |
| Case Name:  | REPORTES Y BALANCE DE MATERIA.hsc  |   |                                   |           |     |            |                         |
| Unit Set:   | PAU  |   |                                   |           |     |            |                         |
| Date/Time:  | Sun Jun 9 18:48:12 2024  |   |                                   |           |     |            |                         |
| <h3 style="margin: 0;">Conversion: CARBAM-UREA+H2O</h3>   |  |   |                                   |           |     |            |                         |
| <b>STOICHIOMETRY</b>  |  |   |                                   |           |     |            |                         |
| Component   | Mole Weight  | Stoichiometric Coeff.                       |                                   |           |     |            |                         |
| CARBAMATO*  | 78.071   | -1.000 *                                    |                                   |           |     |            |                         |
| Urea  | 60.056   | 1.000 *                                     |                                   |           |     |            |                         |
| H2O   | 18.015   | 1.000 *                                     |                                   |           |     |            |                         |
| Balance Error: 0.0000   |  | Reaction Heat (25 C): -3.448e+005 kJ/kgmole |                                   |           |     |            |                         |
| <b>BASIS</b>  |  |   |                                   |           |     |            |                         |
| Base Component: CARBAMATO*  | Conversion Percent: 70.00 *  | Reaction Phase: Overall                     |                                   |           |     |            |                         |
| <b>PARAMETERS</b>   |  |   |                                   |           |     |            |                         |

## ANEXO 26

### REPORTE DE LA REACCIÓN DEGRADACIÓN DE CARBAMATO

|   |   |  |                                   |           |     |            |                         |
|---|---|--|-----------------------------------|-----------|-----|------------|-------------------------|
|  <p>Company Name Not Available<br/>Bedford, MA<br/>USA</p> | <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Case Name:</td> <td>REPORTES Y BALANCE DE MATERIA.hsc</td> </tr> <tr> <td>Unit Set:</td> <td>PAU</td> </tr> <tr> <td>Date/Time:</td> <td>Sun Jun 9 18:48:12 2024</td> </tr> </table> | Case Name:                                   | REPORTES Y BALANCE DE MATERIA.hsc | Unit Set: | PAU | Date/Time: | Sun Jun 9 18:48:12 2024 |
| Case Name:  | REPORTES Y BALANCE DE MATERIA.hsc   |  |                                   |           |     |            |                         |
| Unit Set:   | PAU   |  |                                   |           |     |            |                         |
| Date/Time:  | Sun Jun 9 18:48:12 2024   |  |                                   |           |     |            |                         |
| <h3>Conversion: CARBAM-AMO+CO2</h3>   |   |  |                                   |           |     |            |                         |
| <h4>STOICHIOMETRY</h4>  |   |  |                                   |           |     |            |                         |
| Component   | Mole Weight   | Stoichiometric Coeff.                        |                                   |           |     |            |                         |
| CARBAMATO*  | 78.071  | -1.000 *                                     |                                   |           |     |            |                         |
| Ammonia   | 17.030  | 2.000 *                                      |                                   |           |     |            |                         |
| CO2   | 44.010  | 1.000 *                                      |                                   |           |     |            |                         |
| Balance Error: 0.0000   |   | Reaction Heat (25 C) : -3.426e+005 kJ/kgmole |                                   |           |     |            |                         |
| <h4>BASIS</h4>  |   |  |                                   |           |     |            |                         |
| Base Component: CARBAMATO*  | Conversion Percent: 65.00 *   | Reaction Phase: Overall                      |                                   |           |     |            |                         |
| <h4>PARAMETERS</h4>   |   |  |                                   |           |     |            |                         |