

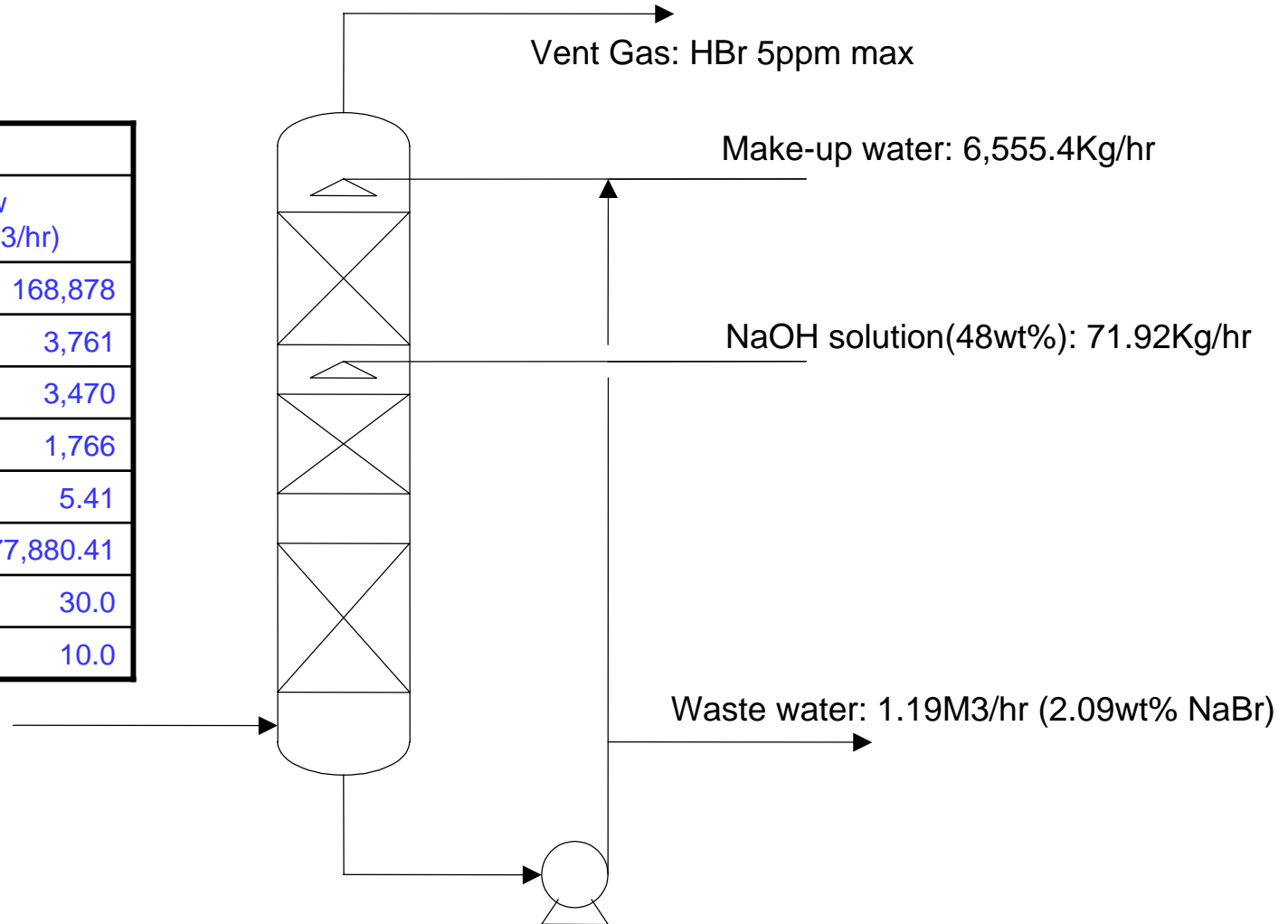
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# HBr Absorption Tower Simulation Using NaOH Aqueous Solution

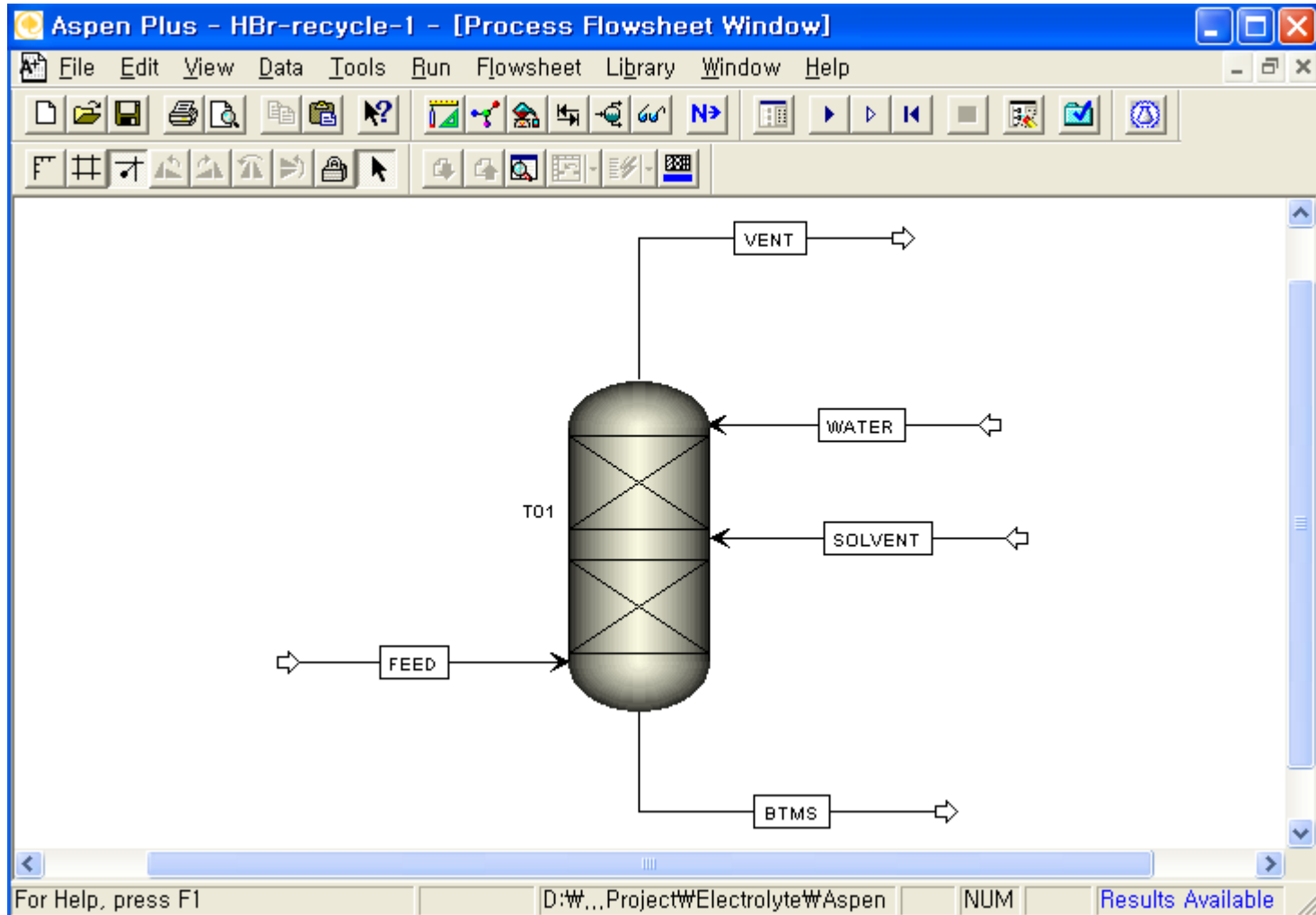
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# Proposed Scheme

Feed Gas	
Component	Flow (Nm <sup>3</sup> /hr)
N <sub>2</sub>	168,878
O <sub>2</sub>	3,761
CO <sub>2</sub>	3,470
H <sub>2</sub> O	1,766
HBr	5.41
Total Flow	177,880.41
Temp. (°C)	30.0
Press. (kPaG)	10.0



# Flowsheet Using A+



# Setup Specifications Sheet

The screenshot shows the Aspen Plus software interface for setting up a simulation. The window title is "Aspen Plus - HBr-recycle-1 - [Setup Specifications - Data Browser]". The menu bar includes File, Edit, View, Data, Tools, Run, Plot, Library, Window, and Help. The toolbar contains various icons for file operations and simulation control. The left pane shows a tree view of the simulation setup, with "Specifications" selected. The right pane shows the "Global" settings for the simulation, with the title "HBr Absorption Using NaOH Aqueous Solution".

**Specifications**

- Setup
  - Specifications
  - Simulation Options
  - Stream Class
  - Substreams
  - Units-Sets
  - Custom Units
  - Report Options
- Components
- Properties
- Flowsheet
- Streams
- Utilities
- Blocks
- Reactions
- Convergence
- Flowsheeting Options
- Model Analysis Tools
- EO Configuration
- Results Summary

**Global** | Description | Accounting | Diagnostics

Title: HBr Absorption Using NaOH Aqueous Solution

Units of measurement

Input data: MET

Output results: MET

Global settings

Run type: Flowsheet

Input mode: Steady-State

Stream class: CONVEN

Flow basis: Mole

Ambient pressure: 14.69595 psi

Ambient temp.: 50 F

Valid phases:

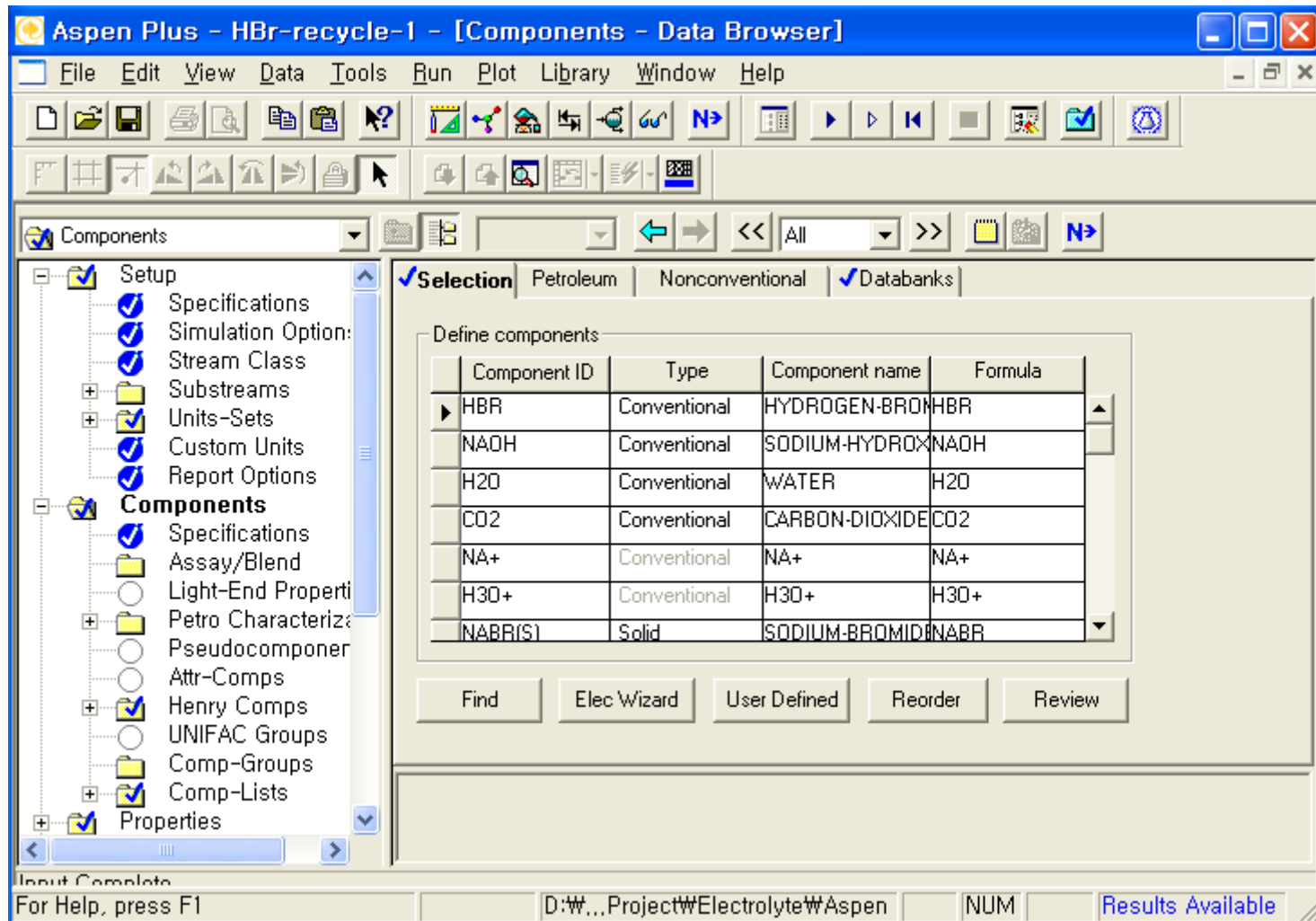
Free water: No

Text to appear on each page of the report file. See Help.

Input Complete  
For Help, press F1

D:\W...Project\Electrolyte\Aspen NUM Results Available

# Component Specifications

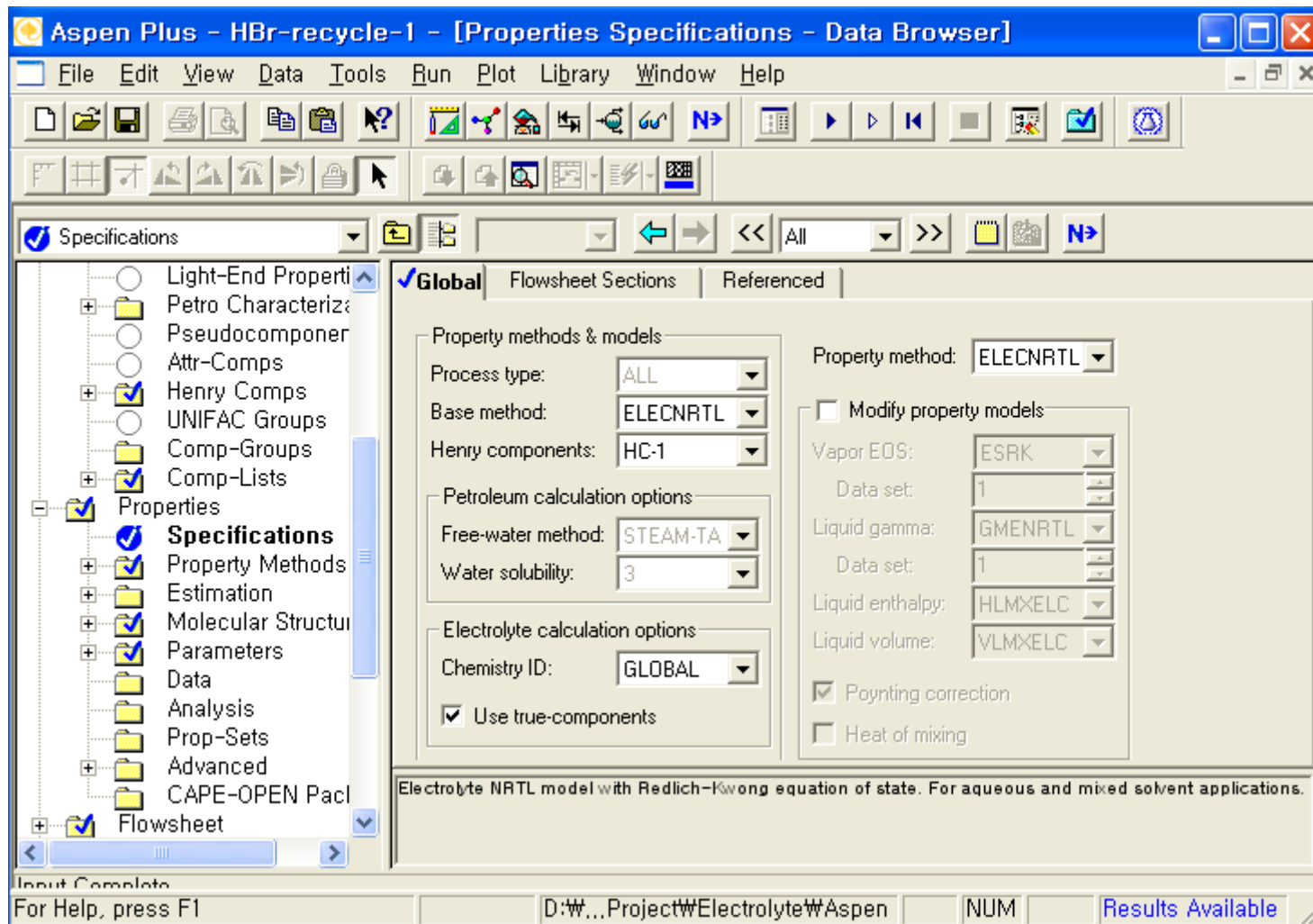


The screenshot displays the Aspen Plus Data Browser interface. The left pane shows a tree view with 'Components' selected. The main area shows a table of defined components with the following data:

Component ID	Type	Component name	Formula
HBR	Conventional	HYDROGEN-BROM	HBR
NAOH	Conventional	SODIUM-HYDROX	NAOH
H2O	Conventional	WATER	H2O
CO2	Conventional	CARBON-DIOXIDE	CO2
NA+	Conventional	NA+	NA+
H3O+	Conventional	H3O+	H3O+
NABR(S)	Solid	SODIUM-BROMIDE	NABR

Buttons at the bottom of the table include Find, Elec Wizard, User Defined, Reorder, and Review. The status bar at the bottom indicates 'Input Complete', 'For Help, press F1', and 'Results Available'.

# Properties Specifications



The screenshot shows the Aspen Plus software interface for the 'Properties Specifications' dialog box. The window title is 'Aspen Plus - HBr-recycle-1 - [Properties Specifications - Data Browser]'. The menu bar includes File, Edit, View, Data, Tools, Run, Plot, Library, Window, and Help. The toolbar contains various icons for file operations and navigation. The left pane shows a tree view of the project structure, with 'Specifications' selected. The main area is divided into three tabs: 'Global' (selected), 'Flowsheet Sections', and 'Referenced'. The 'Global' tab contains several sections of settings:

- Property methods & models:**
  - Process type: ALL
  - Base method: ELECNRTL
  - Henry components: HC-1
- Petroleum calculation options:**
  - Free-water method: STEAM-TA
  - Water solubility: 3
- Electrolyte calculation options:**
  - Chemistry ID: GLOBAL
  - Use true-components
- Property method:** ELECNRTL
- Modify property models:**
  - Modify property models
  - Vapor EOS: ESRK
  - Data set: 1
  - Liquid gamma: GMENRTL
  - Data set: 1
  - Liquid enthalpy: HLMXELC
  - Liquid volume: VLMXELC
  - Poynting correction
  - Heat of mixing

At the bottom of the dialog, a text box reads: 'Electrolyte NRTL model with Redlich-Kwong equation of state. For aqueous and mixed solvent applications.' The status bar at the bottom shows 'Input Complete', 'For Help, press F1', the file path 'D:\W...Project\Electrolyte\Aspen', the number 'NUM', and a 'Results Available' button.

# Feedstock Characterization

Aspen Plus - HBr-recycle-1 - [Stream FEED (MATERIAL) - Data Browser]

File Edit View Data Tools Run Plot Library Window Help

FEED MET << All >>

Specifications Flash Options PSD Component Attr. EO Options

Substream name:  MIXED Ref Temperature

State variables

Temperature: 40 C

Pressure: 10 kPag

Total flow: Mass 210739 kg/hr

Solvent:

Composition

Mass-Flow kg/hr

Component	Value
HBR	1663
NAOH	0
H2O	1292
CO2	13365
NA+	0
H3O+	0
MADIC	0
Total:	210739

Lets you select the substream name.

Results Available

For Help, press F1

D:\W...Project\Electrolyte\Aspen NUM Results Available

# Feed for Solvent

Aspen Plus - HBr-recycle-1 - [Stream SOLVENT (MATERIAL) - Data Browser]

File Edit View Data Tools Run Plot Library Window Help

SOLVENT MET

Specifications Flash Options PSD Component Attr. EO Options

Substream name:  Ref Temperature

State variables

Temperature:

Pressure:

Total flow:

Composition

Mass-Flow

Component	Value
HBR	
NAOH	34.72
H2O	37.4
CO2	
NA+	
H3O+	
MIXED(C)	
Total:	72.12

Solvent:

Lets you select the substream name.

Results Available

For Help, press F1

D:\W...Project\W\Electrolyte\W\Aspen NUM Results Available



# Configurations for Column

The screenshot displays the Aspen Plus software interface for configuring a column (Block T01). The window title is "Aspen Plus - HBr-recycle-1 - [Block T01 (RadFrac) - Data Browser]". The menu bar includes File, Edit, View, Data, Tools, Run, Plot, Library, Window, and Help. The toolbar contains various icons for file operations and simulation control. The left-hand navigation tree shows the following items:

- Setup
- Design Spec: Vary
- Heaters Cool
- Pumparound: Decanters
- Efficiencies
- Reactions
- Condenser H
- Reboiler Hcur
- Tray Sizing
- Tray Rating
- Pack Sizing
- Pack Rating
- Properties
- Estimates
- Convergence
- Analysis
- Report

The main configuration panel is divided into two sections:

**Setup options:**

- Number of stages: 10
- Condenser: None
- Reboiler: None
- Valid phases: Vapor-Liquid
- Convergence: Standard

**Operating specifications:**

- Free water reflux ratio: [ ]
- Feed basis: [ ]

The status bar at the bottom shows "Results Available" and "10 Stages, 0 Pumparound(s)".

# Column

Aspen Plus - HBr-recycle-1 - [Block T01 (RadFrac) - Data Browser]

File Edit View Data Tools Run Plot Library Window Help

T01 MET

- Setup
- Design Spec: Vary
- Heaters Cool
- Pumparound: Decanters
- Efficiencies
- Reactions
- Condenser H
- Reboiler Hcur
- Tray Sizing
- Tray Rating
- Pack Sizing
- Pack Rating
- Properties
- Estimates
- Convergence
- Analysis
- Report

Configuration Streams Pressure Condenser Reboiler 3-Phase

Feed streams

Name	Stage	Convention
FEED	11	Above-Stage
WATER	1	Above-Stage
SOLVENT	4	Above-Stage

Product streams

Name	Stage	Phase	Basis	Flow	Units
VENT	1	Vapor	Mole		kmol/hr
BTMS	10	Liquid	Mole		kmol/hr

Results Available  
For Help, press F1  
D:\W...Project\W\Electrolyte\W\Aspen NUM Results Available

# Column

The screenshot shows the Aspen Plus Data Browser for Block T01 (RadFrac). The 'Pressure' tab is selected, showing the following configuration:

- View:** Top / Bottom
- Top stage / Condenser pressure:** Stage 1 / Condenser pressure: 1 kPag
- Stage 2 pressure (optional):**
  - Stage 2 pressure: [ ] atm
  - Condenser pressure drop: [ ] atm
- Pressure drop for rest of column (optional):**
  - Stage pressure drop: [ ] atm
  - Column pressure drop: 5 kPa

The status bar at the bottom indicates: 10 Stages, 0 Pumparound(s), Results Available.