KM 331 PROSES BENZETİM PROGRAMLARI
DERS NOTLARI [1-4]

Kaynaklar

1. Chemcad User Guide and Tutorial, Chemstations, Inc. Version 6.1.
2. Aspen Technology, Inc., Apsen HYSYS ® Version 7.
3. ChemCad Eğitim Notları , Chemstations, Inc- Houston,TX,USA.
4. A Guide for Getting Started in Aspen HYSYS
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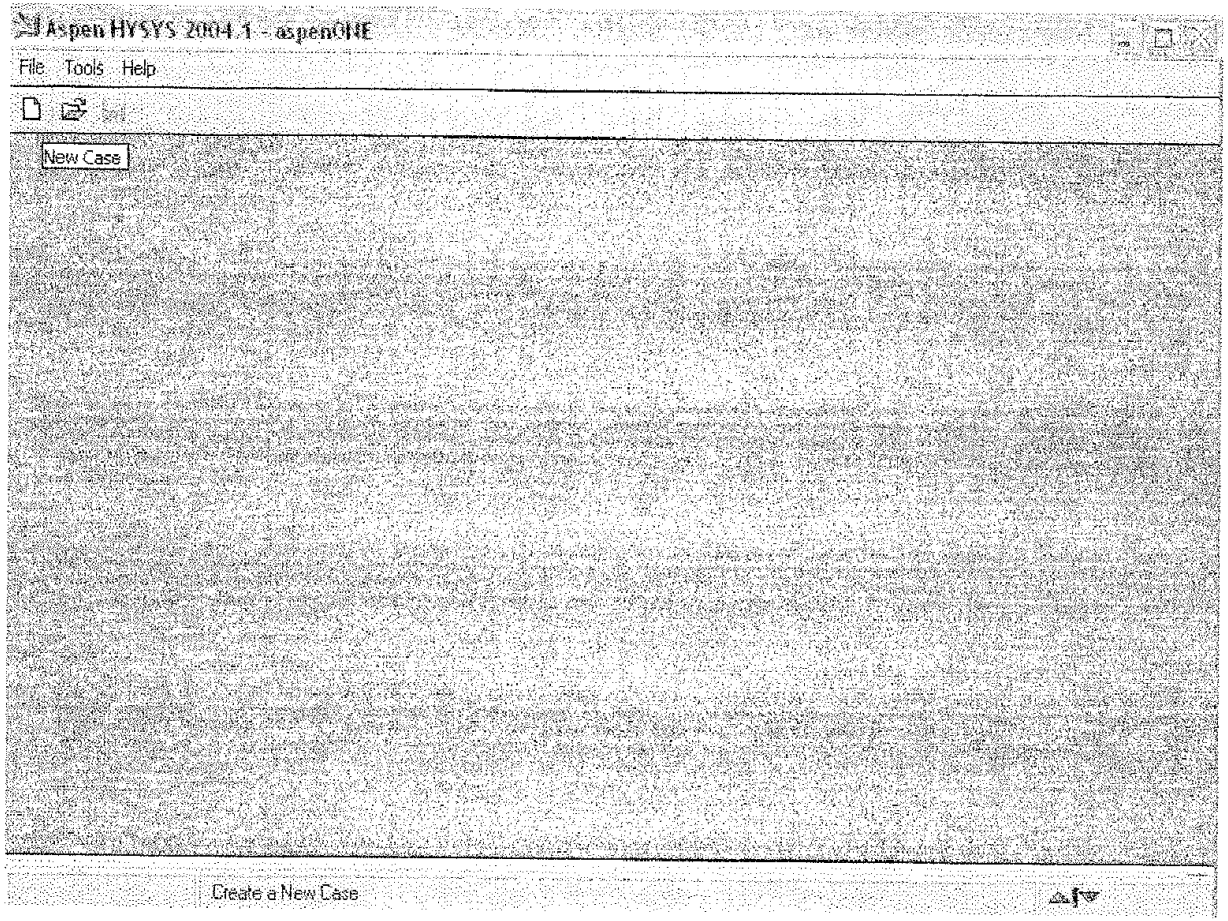
1.1 Starting HYSYS

The installation process creates the following shortcut to HYSYS:

1. Click on the **Start** menu.
2. Select **Programs | AspenTech | Aspen Engineering Suite | Aspen HYSYS 2004.1 | Aspen HYSYS 2004.1**.

   The HYSYS Desktop appears:



1.2 Simulation Basis Manager

Aspen HYSYS used the concept of the fluid package to contain all necessary information for performing flash and physical property calculations. This approach allows you to define all information (property package, components, hypothetical components, interaction parameters, reactions, tabular data, etc.) inside a single entity.

There are four key advantages to this approach:

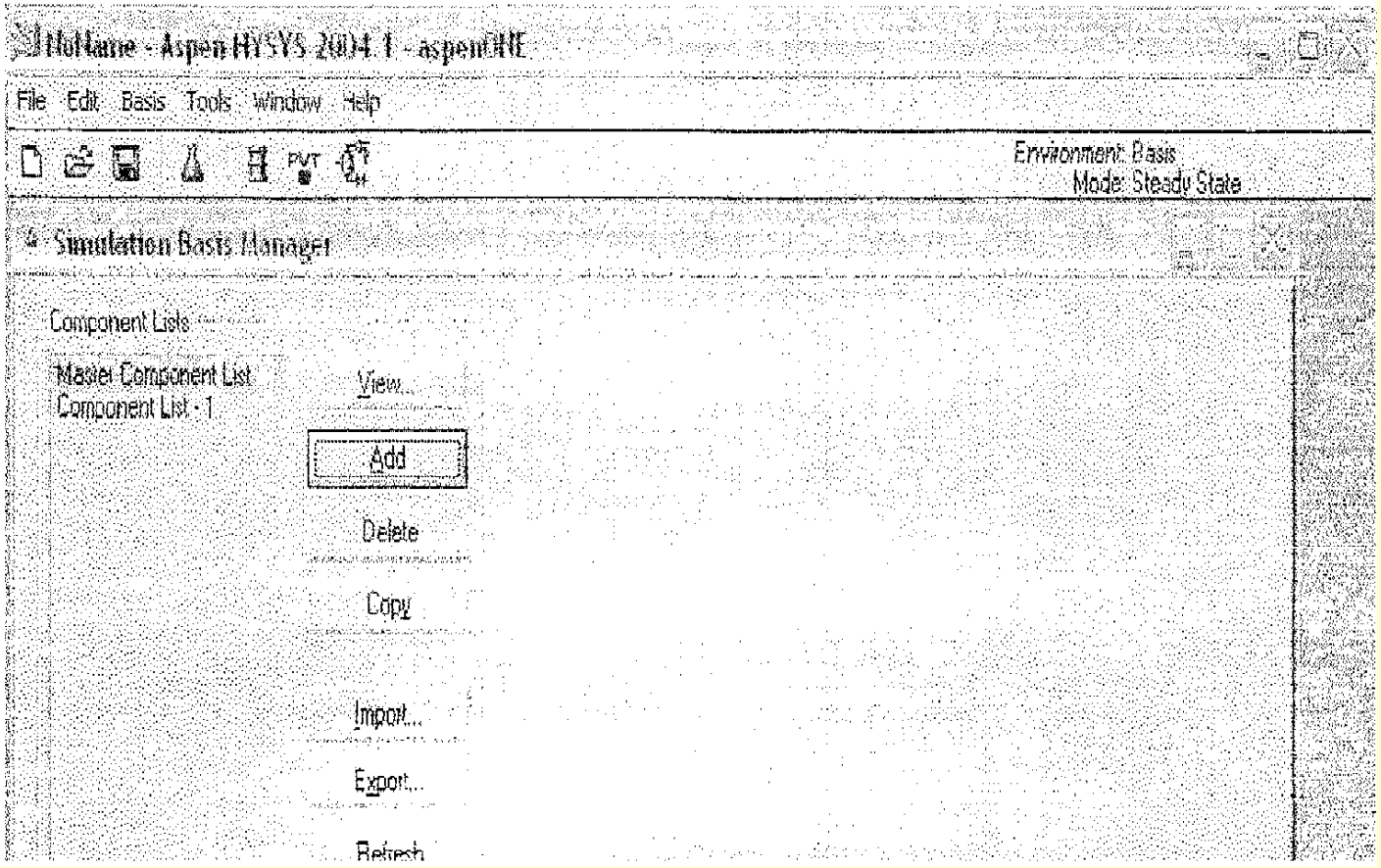
- All associated information is defined in a single location, allowing for easy creation and modification of the information.
- Fluid packages can be stored as completely defined entities for use in any simulation.
- Component lists can be stored out separately from the Fluid Packages as completely defined entities for use in any simulation.

- Multiple Fluid Packages can be used in the same simulation. However, they are defined inside the common Basis Manager.

The Simulation Basis Manager is property view that allows you to create and manipulate multiple fluid packages or component lists in the simulation.

1.3 Creating A New Simulation

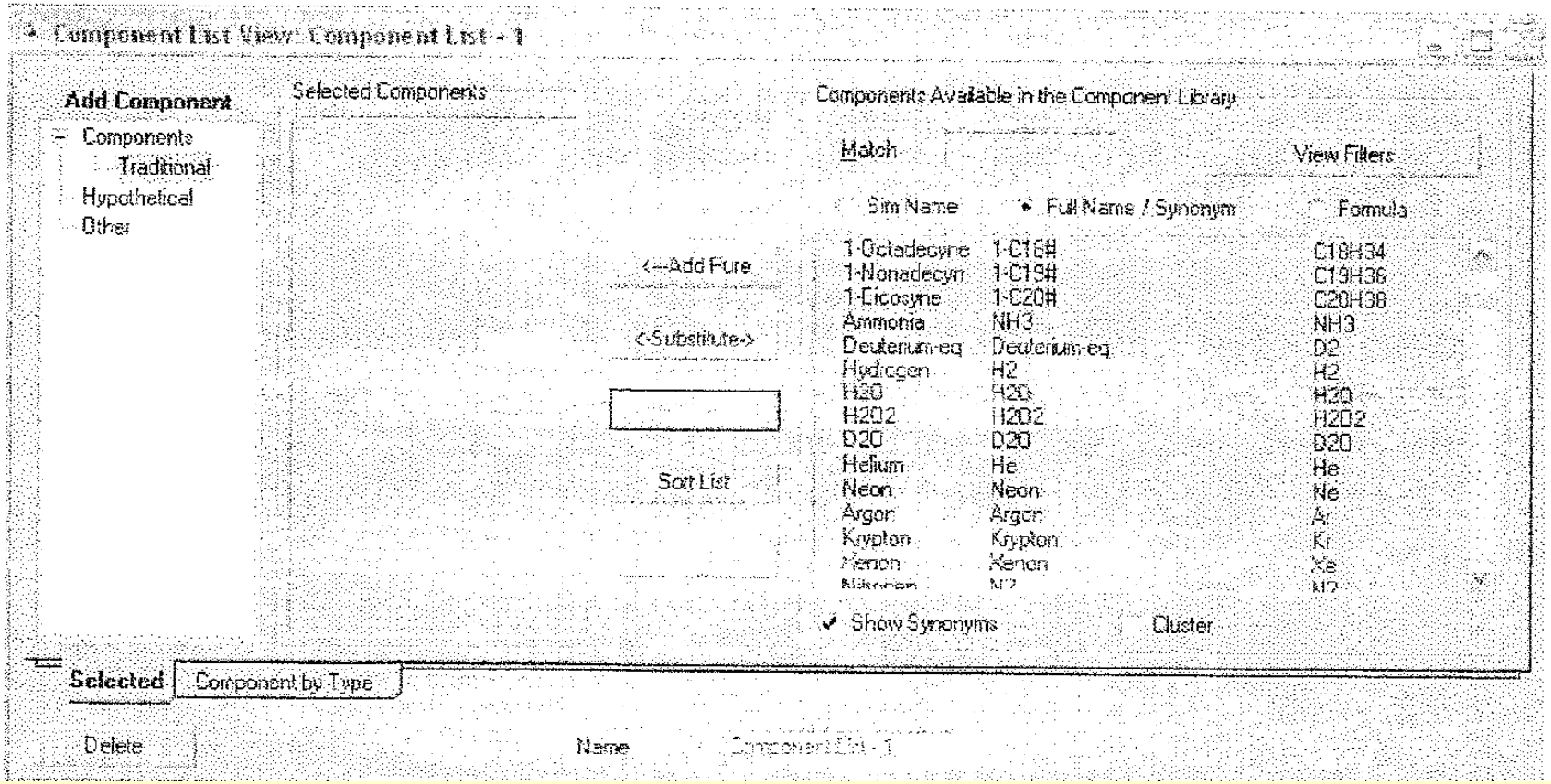
Select **File/New/Case** or press **Crtl+N** or click on the **New Case**  to start a new case. In HYSYS, your simulation is referred to as a "case". This will open up the **Simulation Basis Manager** which is where all of the components and their properties can be specified.



1.4 Adding Components To The Simulation

The first step in establishing the simulation basis is to set the chemical components which will be present in your simulation.

1. To add components to the simulation, click on the **Add** button in the Simulation Basis Manager.
2. Clicking on **Add** will bring up the **Component List View** which is a list of all the components available in HYSYS.



3. Select the desired components for your simulation. You can search through the list of components in one of three ways:

    a. Sim Name
    b. Full Name
    c. Formula

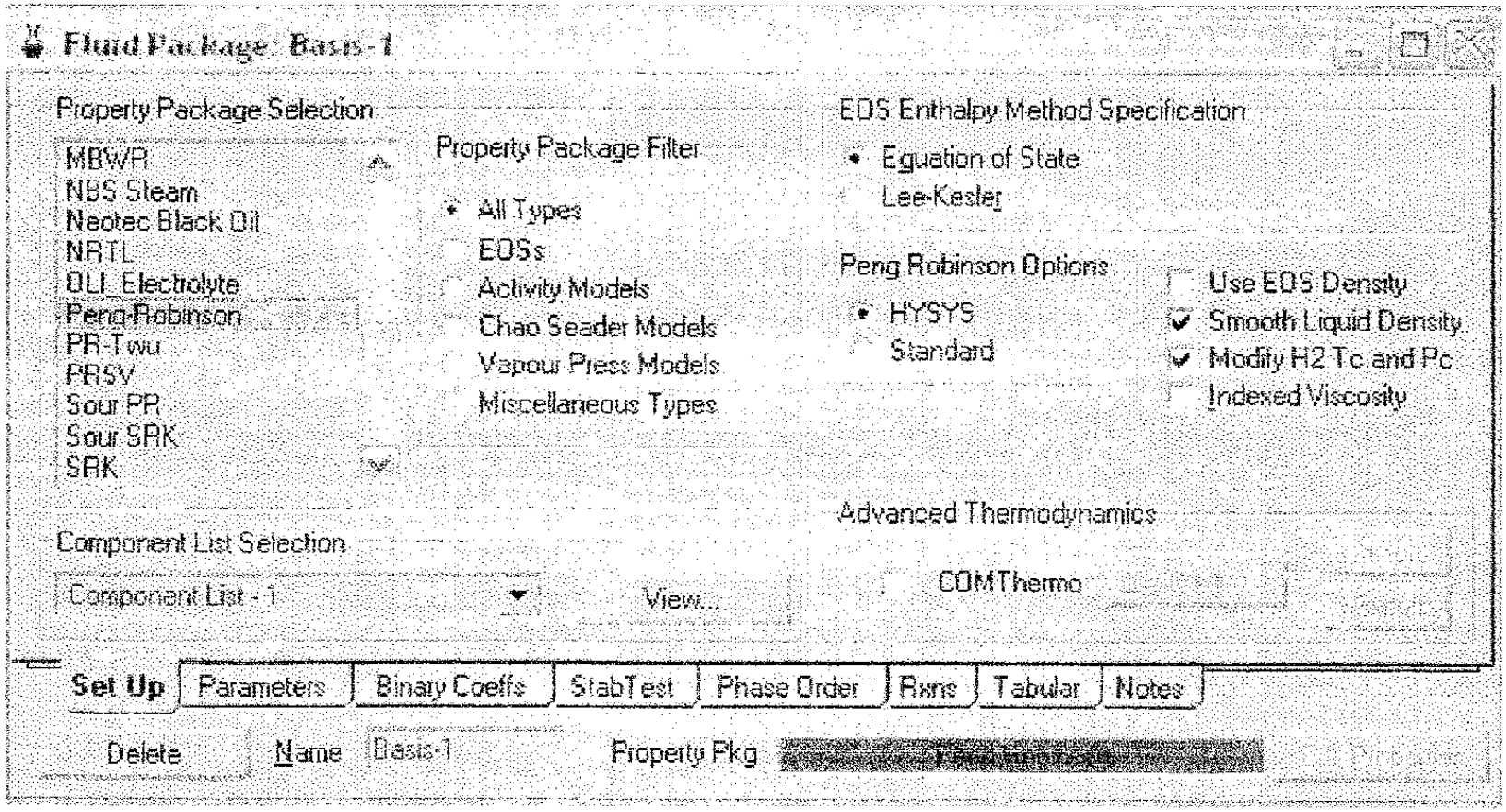
    Select which match term you want of the three above types by selecting the corresponding button above the list of components. Then type in the name of the component you are looking for. For example, typing in **water** for a Sim Name narrows the list down to a single component. If your search attempt does not yield the desired component, then either try another name or try searching under full name or formula.
4. Once you have located the desired component, either **double click** on the component or click <---**Add Pure** to add it to the list of components for the simulation.
5. At the bottom of the components page, you can give your component list a name.
6. Once this is complete, simply close the window by clicking the **red X** at the upper right hand corner of the component list view, which will return you to the simulation basis manager.

1.5 Selecting A Fluids Package

Once you have specified the components present in your simulation, you can now set the fluid package for your simulation. The fluid package is used to calculate the fluid/thermodynamic properties of the components and mixtures in your simulation (such as enthalpy, entropy, density, vapour-liquid equilibrium etc.). Therefore, it is very important that you select the correct fluid package since this forms the basis for the results returned by your simulation.

1. From the simulation basis manager (Figure 1-2), select the **Fluid Pkgs** tab.
2. Click the **Add** button to create a new fluid package as shown below:

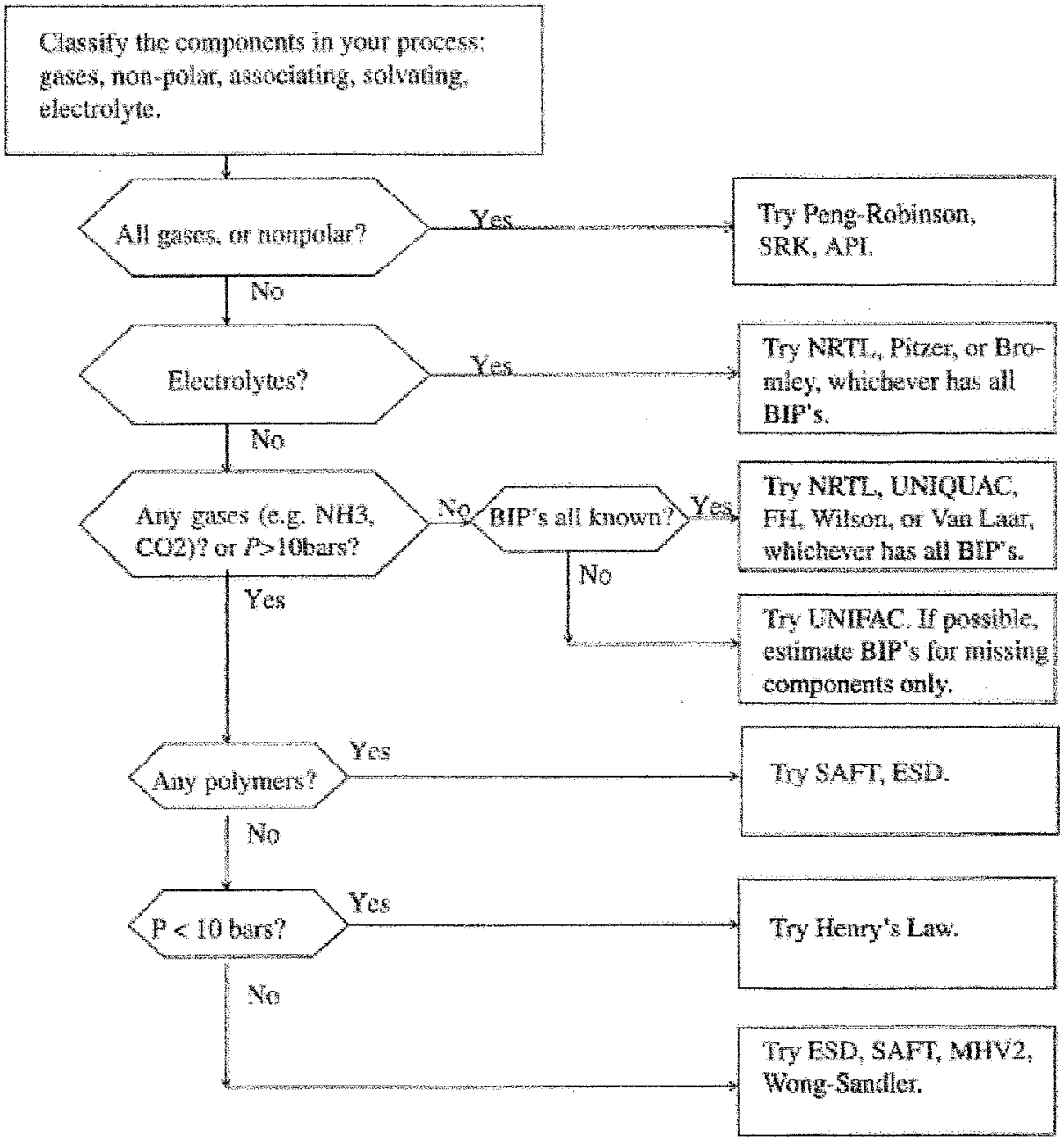
3. From the list of fluid packages, select the desired thermodynamic package. The list of available packages can be narrowed by selecting a filter to the left of the list (such as EOSs, activity models etc.).
4. Once the desired model has been located, select it by clicking on it once (no need to double click). For example, select **Peng-Robinson** property package for your simulation.
5. You can give your fluid package a name at the bottom of the fluid package screen (e.g. the name in Figure 1-4 is **Basis-1**).
6. Once this is done, close the window by clicking on the **red X** on the upper right hand corner of the Fluid Packages window.


Fluid Package: Basis-1
Property Package Selection
MBWR
NBS Steam
Neotec Black Oil
NRTL
OLI_Electrolyte
Peng-Robinson
PR-Twu
PRSV
Sour PR
Sour SRK
SRK
Property Package Filter
All Types
EOSs
Activity Models
Chao Seader Models
Vapour Press Models
Miscellaneous Types
EOS Enthalpy Method Specification
Equation of State
Lee-Kesler
Peng Robinson Options
HYSYS
Standard
Use EOS Density
Smooth Liquid Density
Modify H2 Tc and Pc
Indexed Viscosity
Advanced Thermodynamics
COMThermo
Component List Selection
Component List - 1
View...
Set Up
Parameters
Binary Coeffs
StabTest
Phase Order
Rxns
Tabular
Notes
Delete
Name
Basis-1
Property Pkg

1.6 Selecting Thermodynamics Model

When faced with choosing a thermodynamic model, it is helpful to at least a logical procedure for deciding which model to try first. Elliott and Lira (1999)[1] suggested a decision tree as shown in Figure 1-5.

The property packages available in HYSYS allow you to predict properties of mixtures ranging from well defined light hydrocarbon systems to complex oil mixtures and highly non-ideal (non-electrolyte) chemical systems. HYSYS provides enhanced equations of state (**PR** and **PRSV**) for rigorous treatment of hydrocarbon systems; semiempirical and vapor pressure models for the heavier hydrocarbon systems; steam correlations for accurate steam property predictions; and activity coefficient models for chemical systems. All of these equations have their own inherent limitations and you are encouraged to become more familiar with the application of each equation.


Classify the components in your process: gases, non-polar, associating, solvating, electrolyte.
All gases, or nonpolar?
Yes
Try Peng-Robinson, SRK, API.
No
Electrolytes?
Yes
Try NRTL, Pitzer, or Bromley, whichever has all BIP's.
No
Any gases (e.g. NH3, CO2)? or P>10bars?
No
BIP's all known?
Yes
Try NRTL, UNIQUAC, FH, Wilson, or Van Laar, whichever has all BIP's.
No
Try UNIFAC. If possible, estimate BIP's for missing components only.
Yes
Any polymers?
Yes
Try SAFT, ESD.
No
P < 10 bars?
Yes
Try Henry's Law.
No
Try ESD, SAFT, MHV2, Wong-Sandler.

The following table lists some typical systems and recommended correlations.

Type of System	Recommended Property Method
TEG Dehydration	PR
Sour Water	PR, Sour PR
Cryogenic Gas Processing	PR, PRSV
Air Separation	PR, PRSV
Atm. Crude Towers	PR, PR Options, GS
Vacuum Towers	PR, PR Options, GS (<10 mmHg), Braun K10, Esso K
Ethylene Towers	Lee Kesler Plocker
High H_2 Systems	PR, ZJ or GS
Reservoir Systems	Steam Package, CS or GS
Hydrate Inhibition	PR
Chemical Systems	Activity Models, PRSV
HF Alkylation	PRSV, NRTL