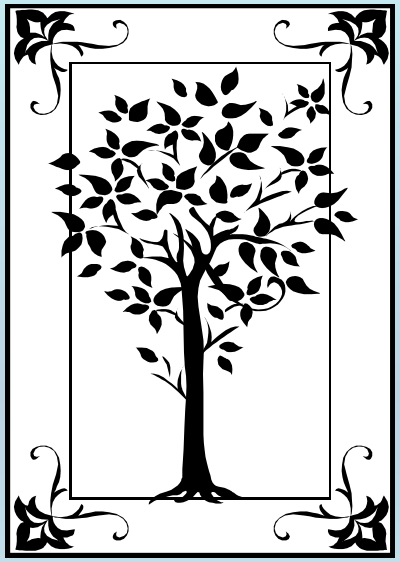
METADATA AND NUMERICAL DATA CAPTURE:
Viscosity
(2 – Components)

Guided Data Capture (GDC)



This tutorial describes
METADATA AND NUMERICAL DATA CAPTURE:
for **Viscosity**
(2-components)
with the Guided Data Capture (GDC) software.

NOTE:

The tutorials proceed sequentially to ease the descriptions. It is not necessary to enter *all* compounds before entering *all* samples, etc.

Compounds, samples, properties, etc., can be added or modified at any time.

However, the hierarchy must be maintained (i.e., a property cannot be entered, if there is no associated sample or compound.)

The experimental data used in this example is from:

216 *J. Chem. Eng. Data* 2002, *47*, 216−218

Densities, Viscosities, and Surface Tensions of the Trifluoroethanol + Quinoline System

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Densities, viscosities, and surface tensions of 2,2,2-trifluoroethanol (TFE) + quinoline were measured at various temperatures and concentrations. This system was chosen as it is a possible candidate for an organic working pair for an absorption heat pump. All results were correlated by a polynomial equation as a function of temperature and concentration, and the parameters of the regression equation were determined by a least-squares method. The average absolute deviations between the experimental and calculated values in the density, viscosity, and surface tension measurements were 0.12, 1.8, and 0.76%, respectively. The density values decreased with increasing temperature and quinoline mass fraction. As the temperature of the liquid mixture increased and the quinoline mass fraction decreased, the viscosity and surface tension values decreased.

Viscosities (η) for the binary system **2,2,2-trifluoroethanol + quinoline** at p = 101.3 kPa and various temperatures

Table 2. Measured Viscosities (η) for the 2,2,2-Trifluoroethanol ($1 - w$) + Quinoline (w) Mixtures

	η/mPa·s at the following T/K					
w	298.15	303.15	308.15	313.15	318.15	323.15
0.00	1.73	1.53	1.35	1.21	1.09	0.98
0.20	2.34	2.05	1.84	1.62	1.46	1.32
0.40	2.91	2.57	2.27	2.04	1.83	1.65
0.60	3.14	2.79	2.46	2.21	2.00	1.82
0.80	3.17	2.80	2.49	2.25	2.05	1.87
1.00	3.36	3.01	2.68	2.43	2.21	2.03

This data set is considered here.

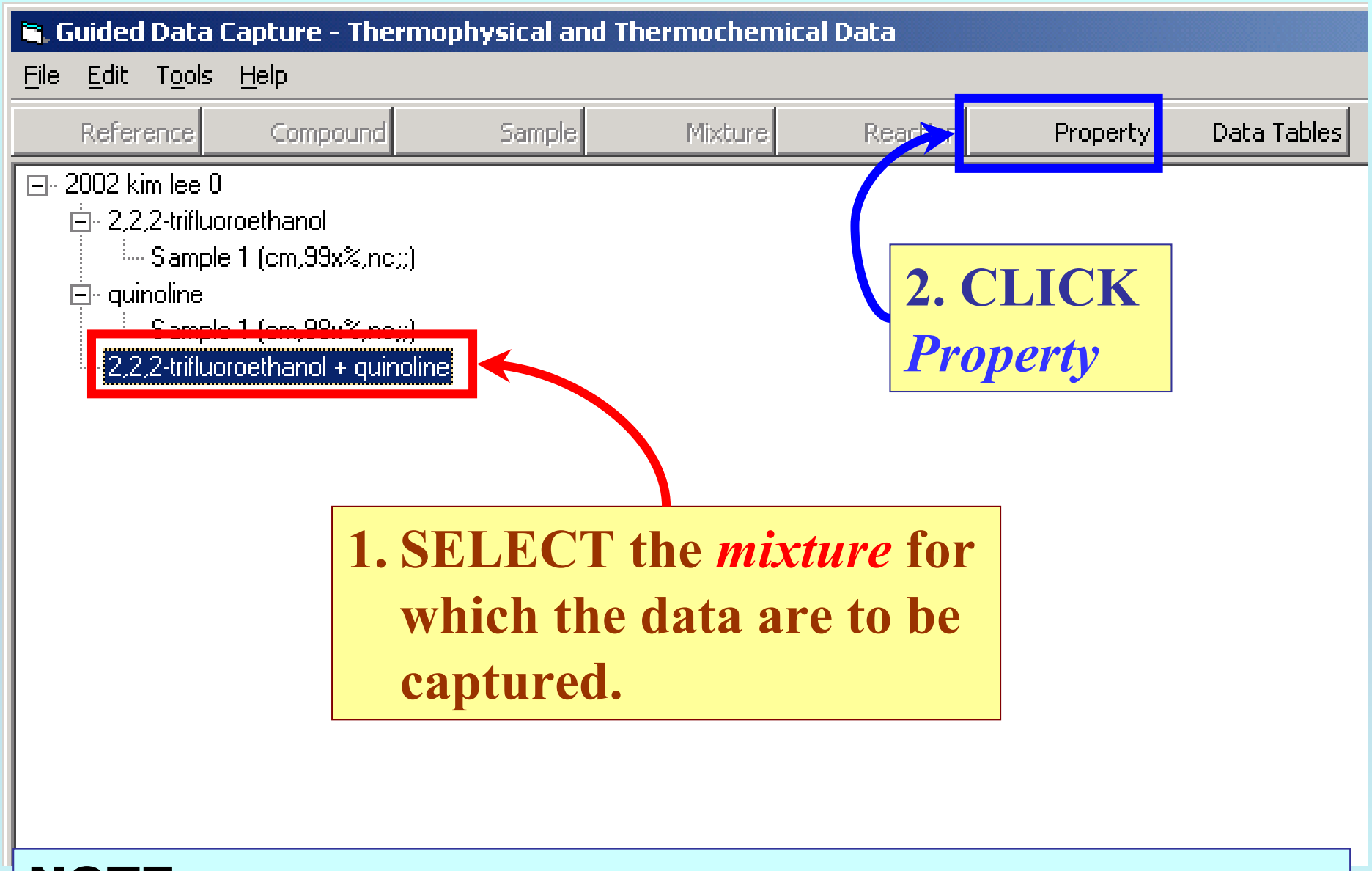
Experimental Method Info:

(ii) Viscosity Measurement. The viscosities of the binary mixture were measured with three appropriate Ubbelohde viscometers. The equipment and procedure used for the viscosity measurement were the same as those for our previous investigation.[7,9] A suitable viscometer was selected considering the viscosity values. The viscometer was put into a bath whose temperature was controlled with a bath circulator within ±0.05 K. The equilibrium time was about 15 min. The efflux time of the liquid solution through the capillary was measured manually with a stopwatch.

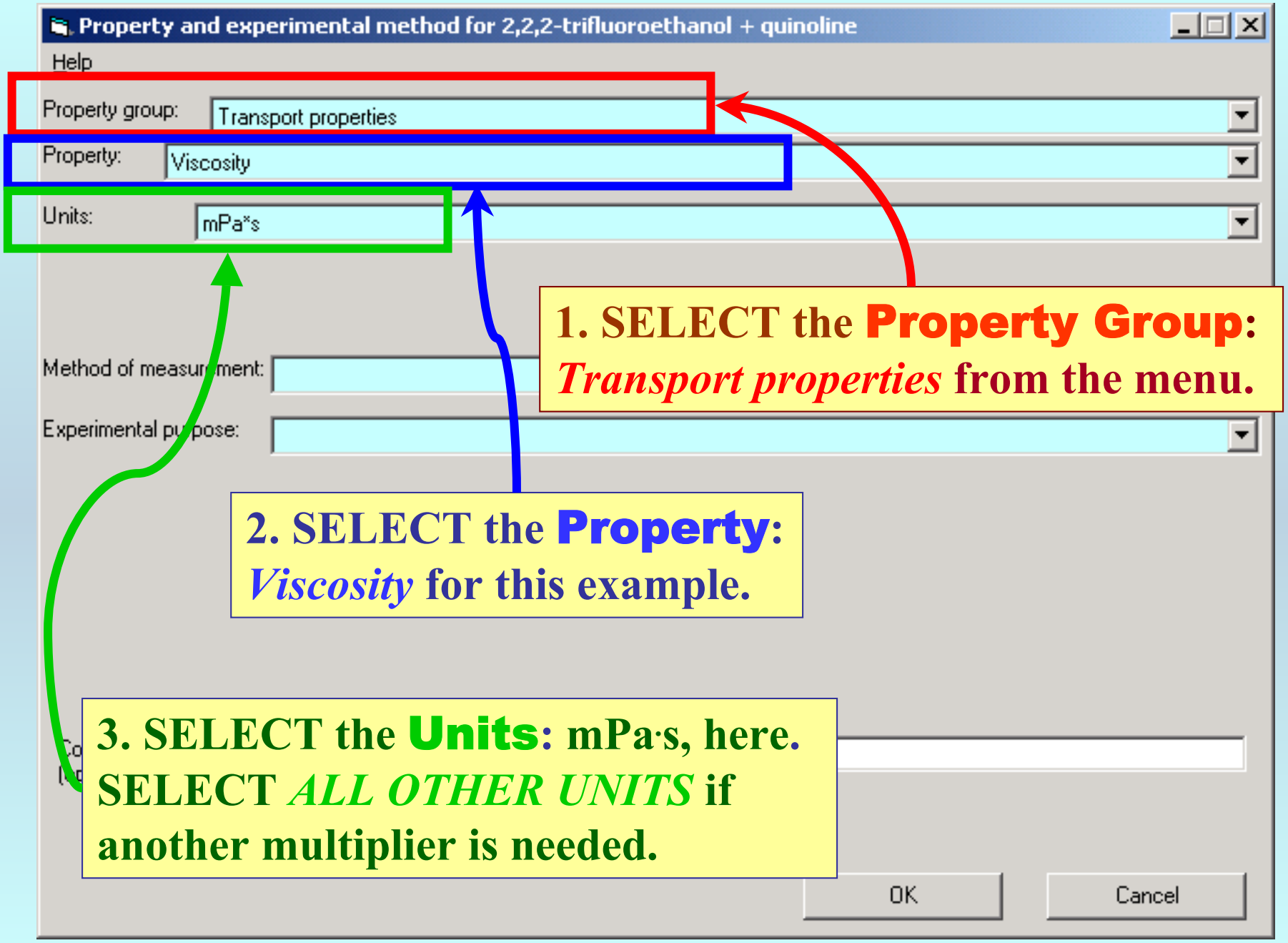
The dynamic viscosity values were calculated from

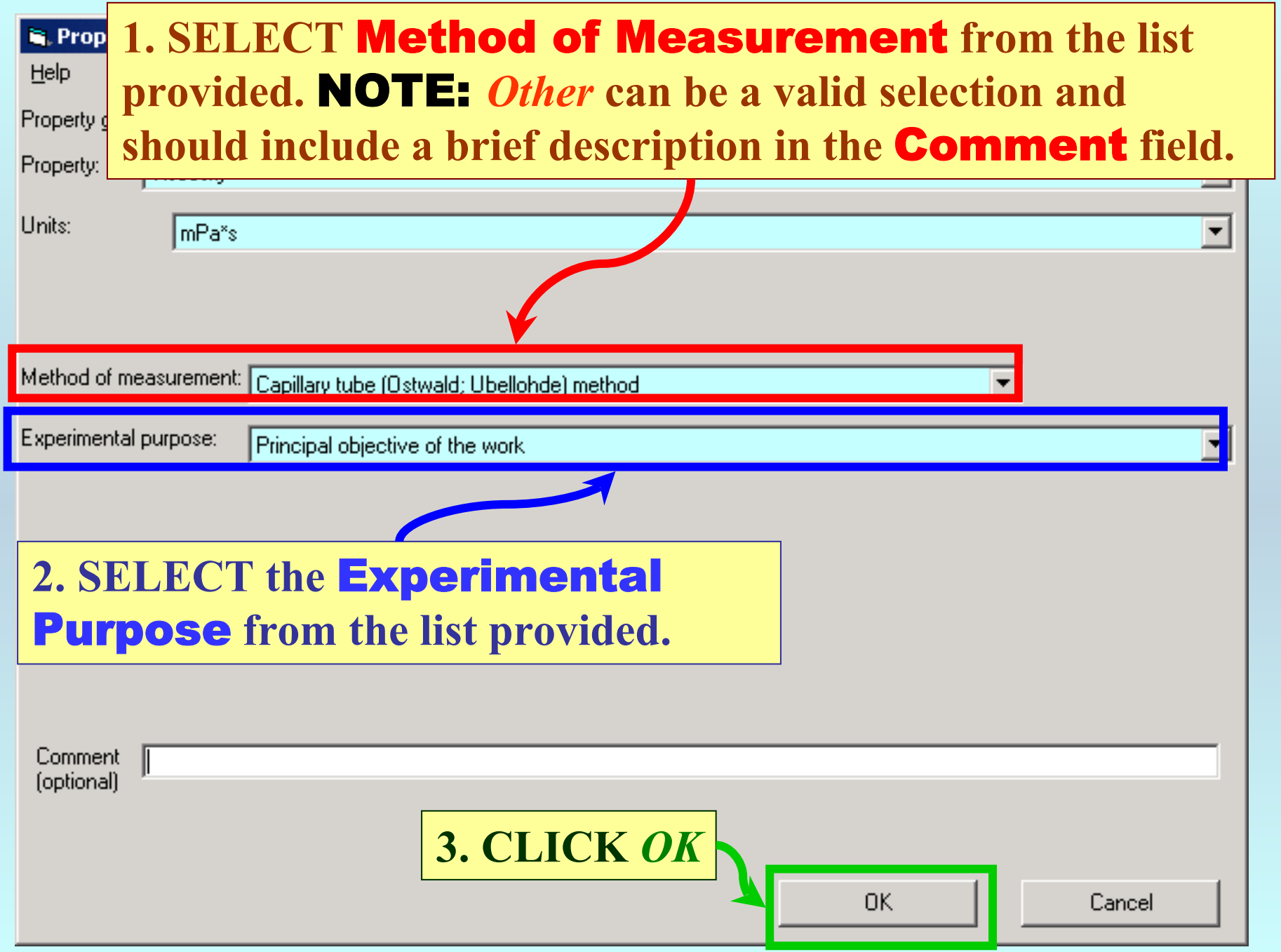
$$\eta = Kt\rho \qquad (1)$$

where η is the dynamic viscosity, K the instrument constant, t the efflux time, and ρ the density of the sample.

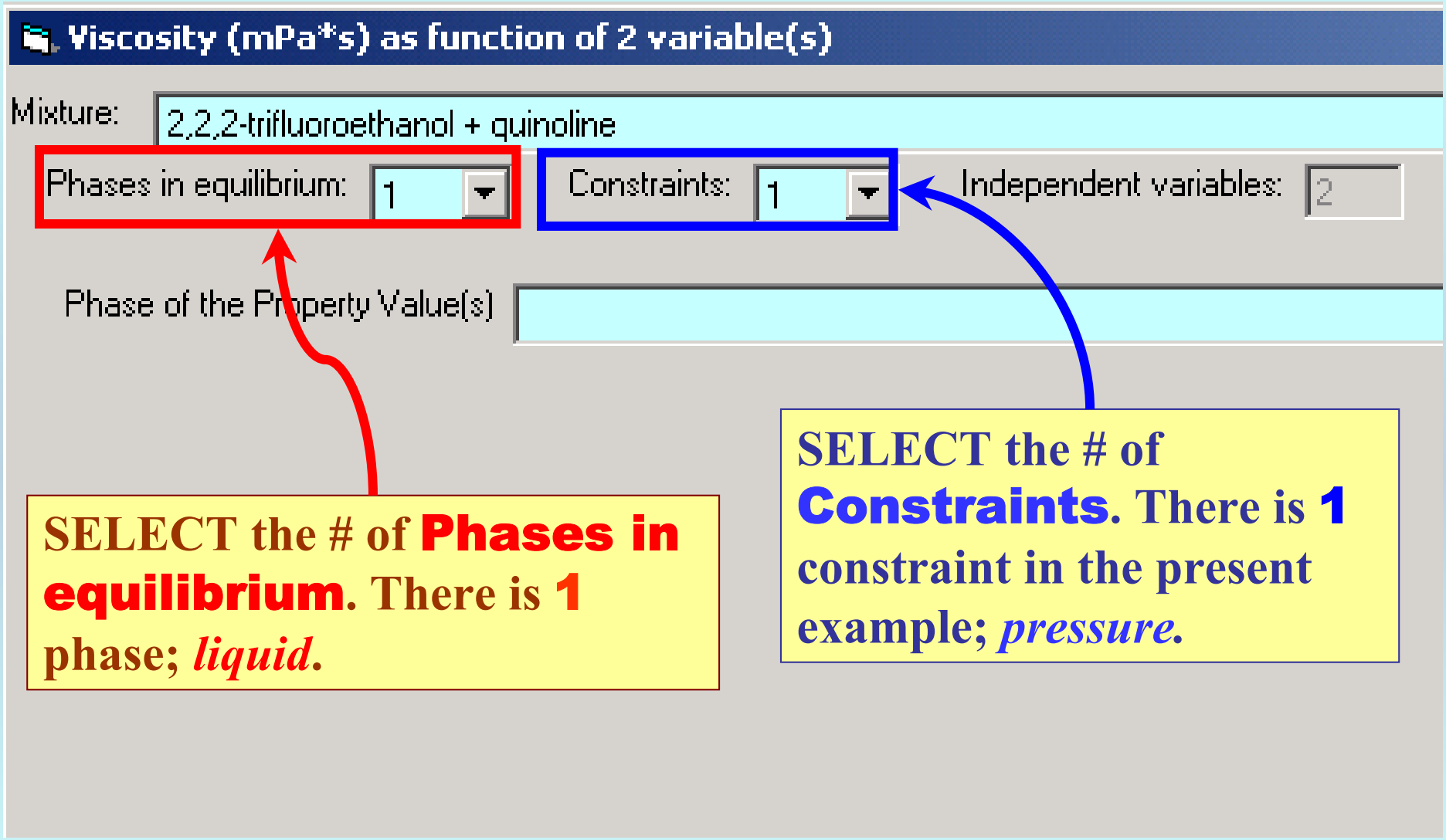


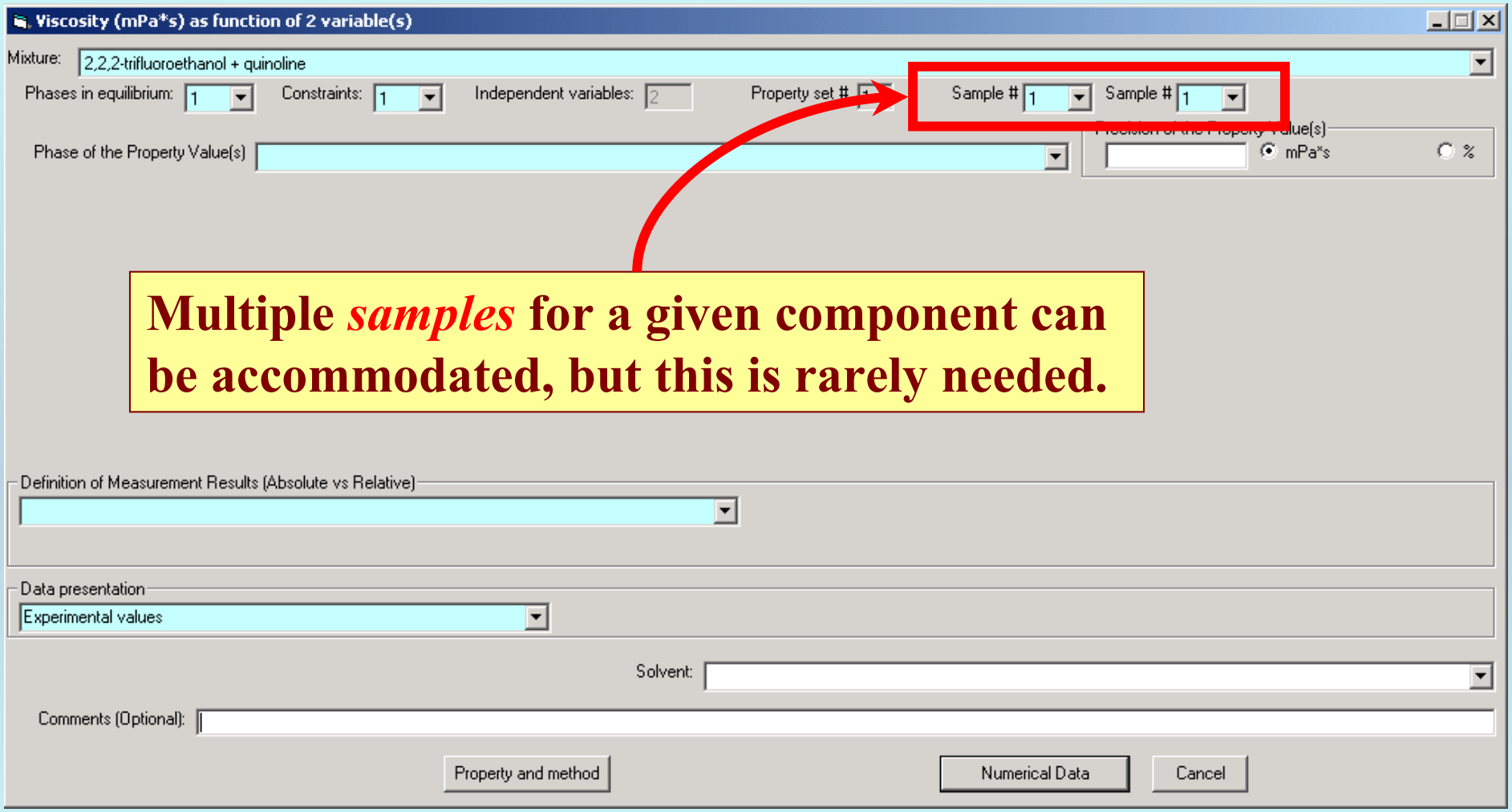
NOTE: The **bibliographic information**, **compound identities**, **sample descriptions**, and **mixture** were entered previously. (There are separate tutorials, which describe capture of this information, if needed.)

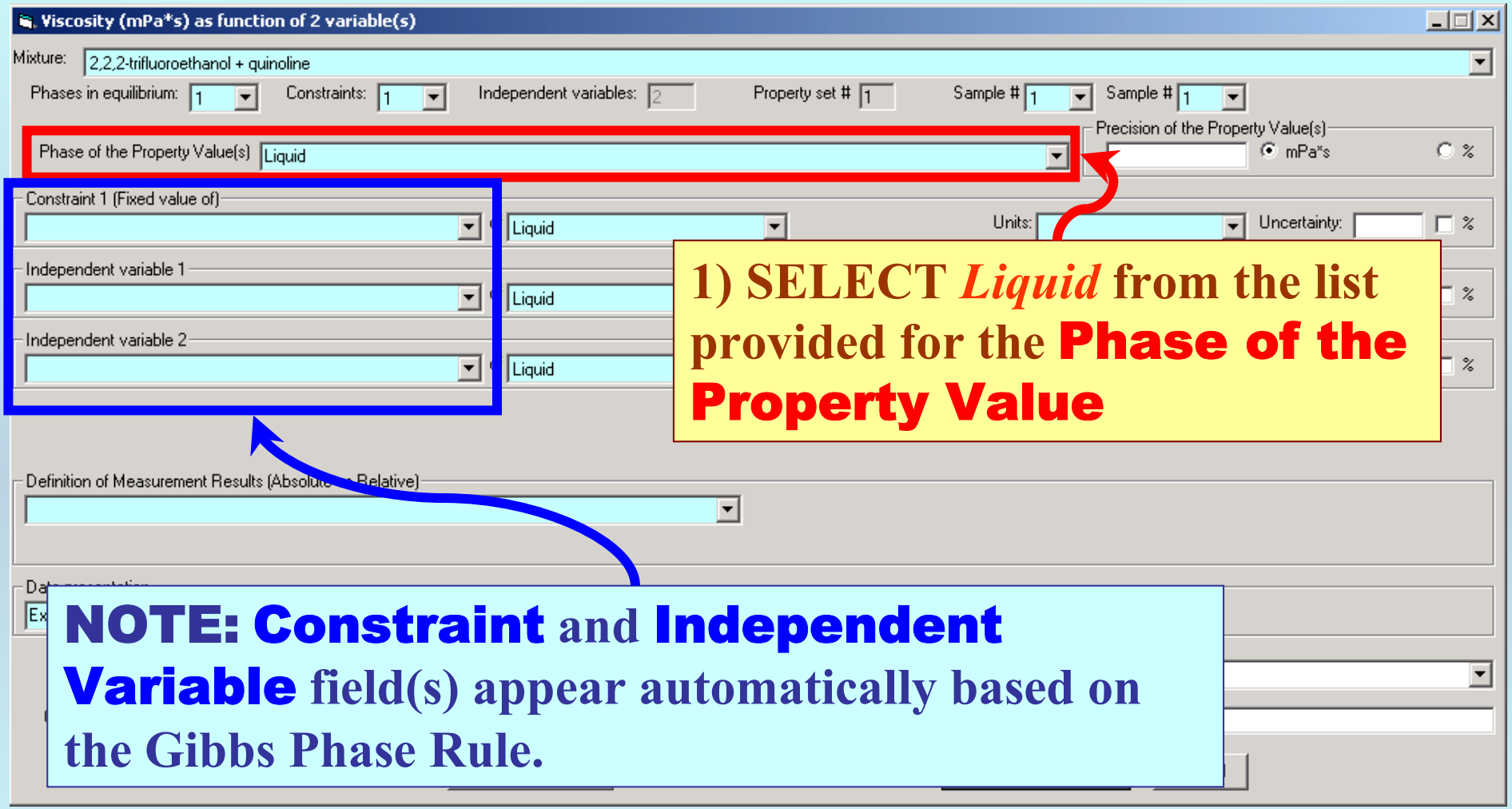

Property and experimental method for 2,2,2-trifluoroethanol + quinoline
Help
Property group:
Transport properties
Property:
Viscosity
Units:
mPa*s
Method of measurement:
Experimental purpose:
OK
Cancel
1. SELECT the Property Group: Transport properties from the menu.
2. SELECT the Property: Viscosity for this example.
3. SELECT the Units: mPa·s, here. SELECT ALL OTHER UNITS if another multiplier is needed.


1. SELECT Method of Measurement from the list provided. NOTE: Other can be a valid selection and should include a brief description in the Comment field.
Prop
Help
Property:
Units:
mPa*s
Method of measurement:
Capillary tube (Ostwald; Ubellohde) method
Experimental purpose:
Principal objective of the work
2. SELECT the Experimental Purpose from the list provided.
Comment (optional)
3. CLICK OK
OK
Cancel

SELECTION of # of Phases in Equilibrium and # of Constraints

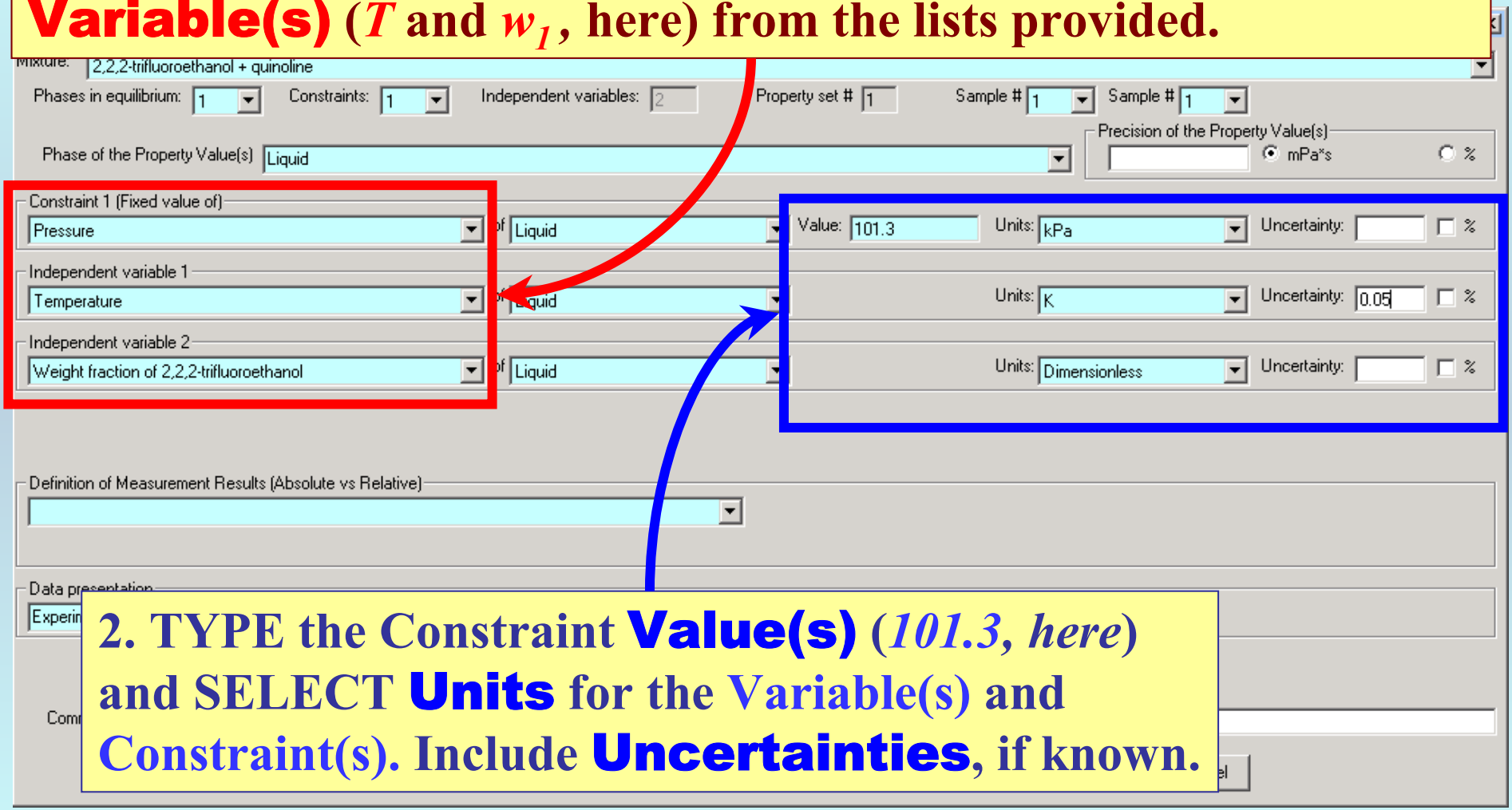



Viscosity (mPa*s) as function of 2 variable(s)
Mixture:
2,2,2-trifluoroethanol + quinoline
Phases in equilibrium:
1
Constraints:
1
Independent variables:
2
Property set #
Sample #
1
Sample #
1
Phase of the Property Value(s)
mPa*s
%
Multiple samples for a given component can be accommodated, but this is rarely needed.
Definition of Measurement Results (Absolute vs Relative)
Data presentation
Experimental values
Solvent:
Comments (Optional):
Property and method
Numerical Data
Cancel


Viscosity (mPa*s) as function of 2 variable(s)
Mixture:
2,2,2-trifluoroethanol + quinoline
Phases in equilibrium:
1
Constraints:
1
Independent variables:
2
Property set #
1
Sample #
1
Sample #
1
Phase of the Property Value(s)
Liquid
Precision of the Property Value(s)
mPa*s
%
Constraint 1 (Fixed value of)
Liquid
Units:
Uncertainty:
%
Independent variable 1
Liquid
%
Independent variable 2
Liquid
%
Definition of Measurement Results (Absolute Relative)
1) SELECT Liquid from the list provided for the Phase of the Property Value
NOTE: Constraint and Independent Variable field(s) appear automatically based on the Gibbs Phase Rule.

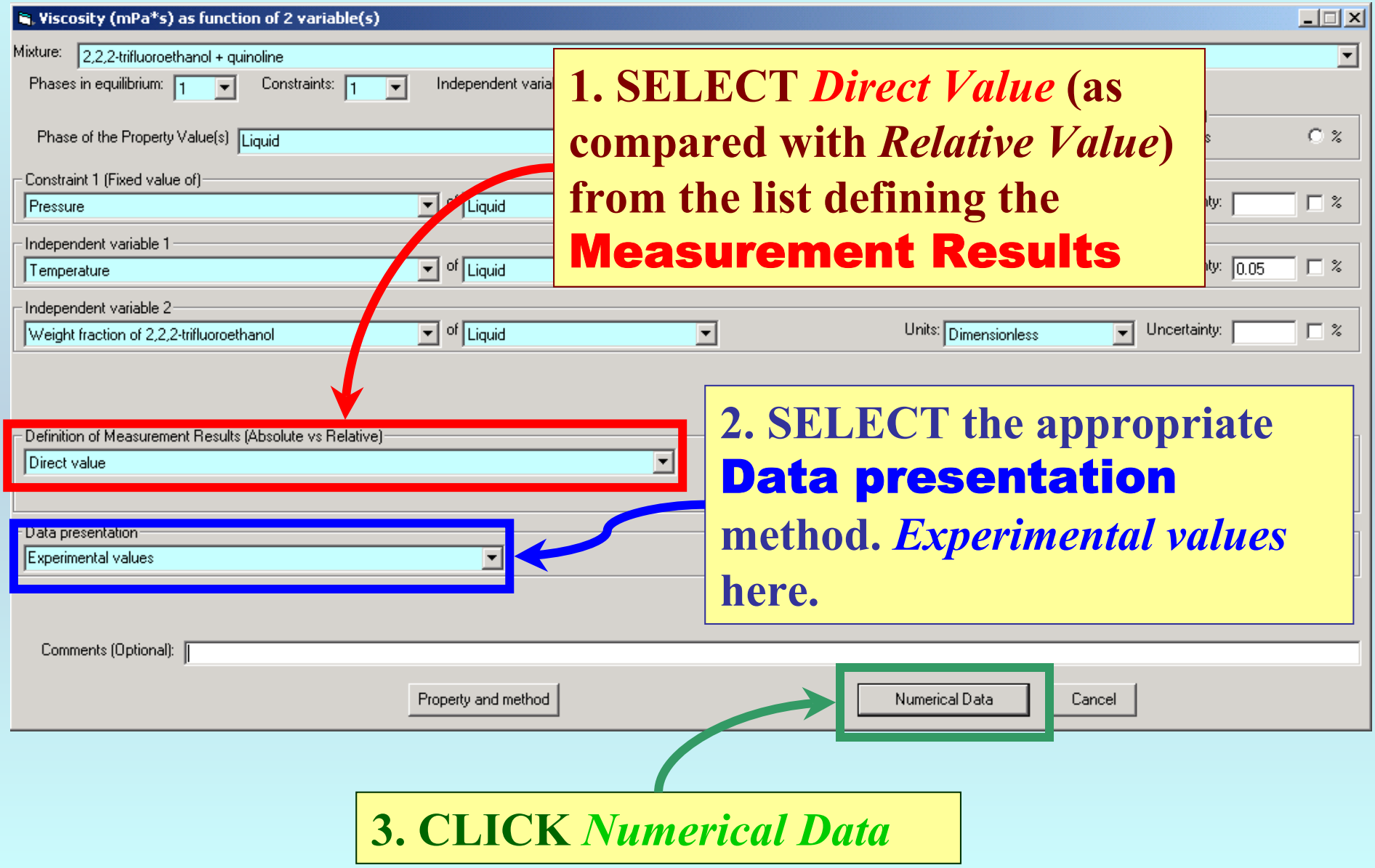
Specification of constraints, constraint values, and constraint units

1. SELECT the Constraint(s) (*p* here) and the Independent Variable(s) (*T* and w_1, here) from the lists provided.



2. TYPE the Constraint Value(s) (*101.3, here*) and SELECT Units for the Variable(s) and Constraint(s). Include Uncertainties, if known.

Measurement definition and Data presentation



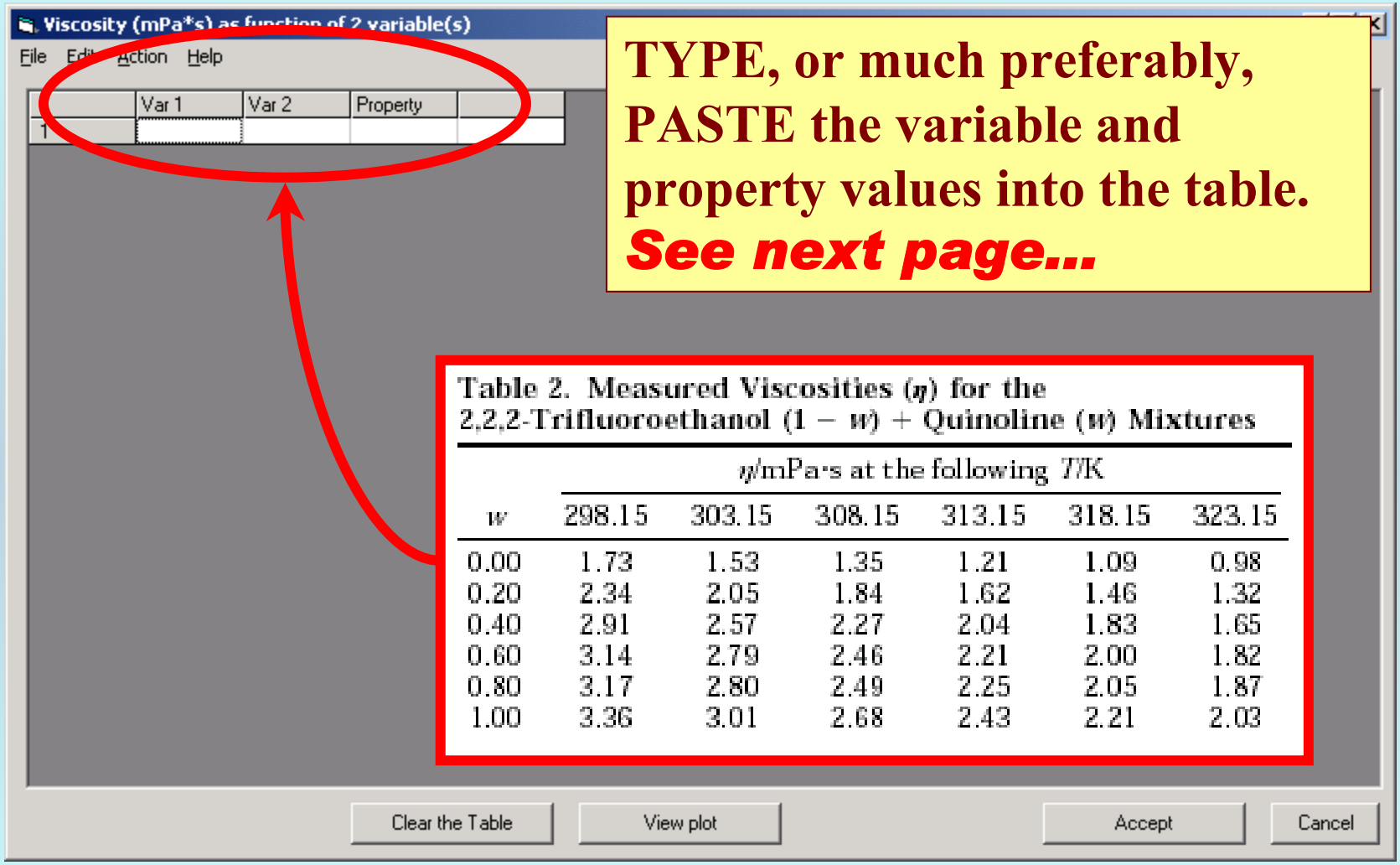


Table 2. Measured Viscosities (η) for the 2,2,2-Trifluoroethanol ($1 - w$) + Quinoline (w) Mixtures

	η/mPa·s at the following T/K					
w	298.15	303.15	308.15	313.15	318.15	323.15
0.00	1.73	1.53	1.35	1.21	1.09	0.98
0.20	2.34	2.05	1.84	1.62	1.46	1.32
0.40	2.91	2.57	2.27	2.04	1.83	1.65
0.60	3.14	2.79	2.46	2.21	2.00	1.82
0.80	3.17	2.80	2.49	2.25	2.05	1.87
1.00	3.36	3.01	2.68	2.43	2.21	2.03

Viscosity (mPa*s) as function of 2 variable(s)

File Edit Action Help

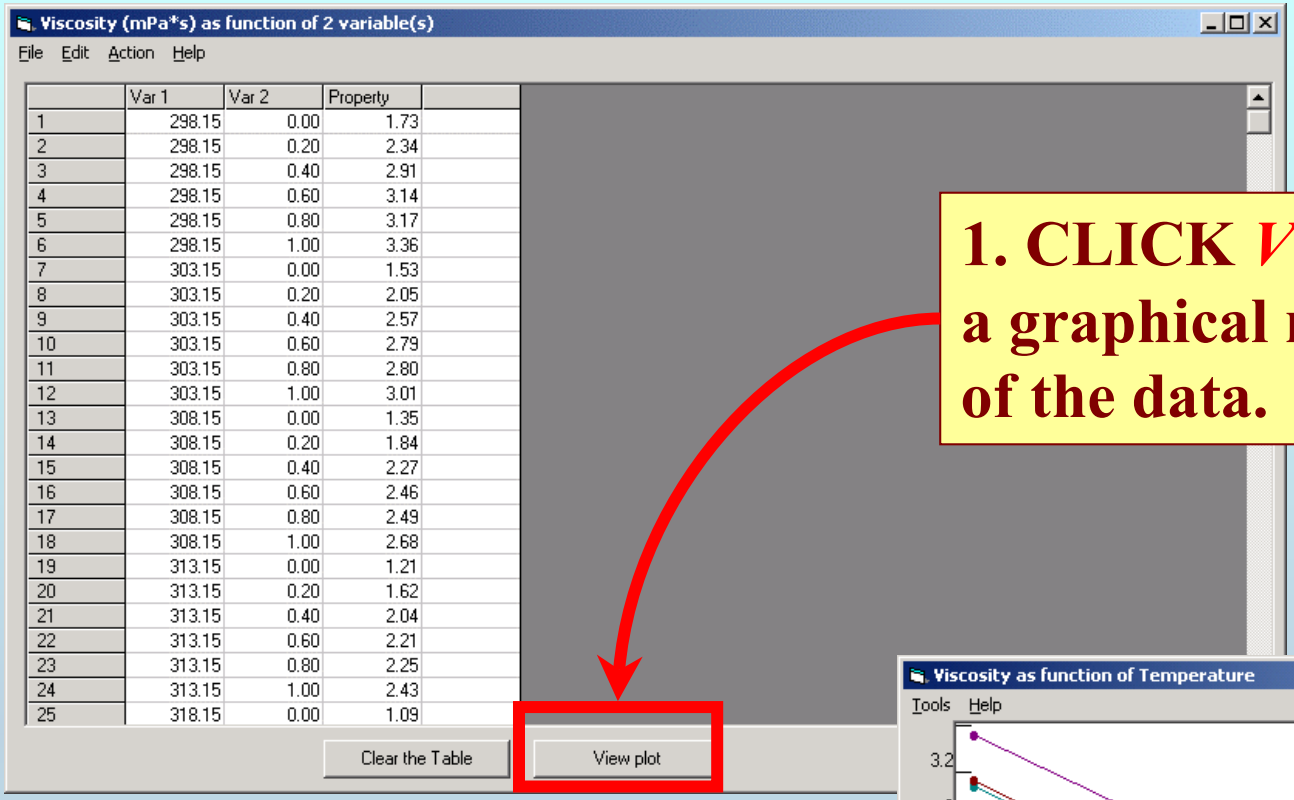
	Var 1	Var 2	Property
1	298.15	0.00	1.73
2	298.15	0.20	2.34
3	298.15	0.40	2.91
4	298.15	0.60	3.14
5	298.15	0.80	3.17
6	298.15	1.00	3.36
7	303.15	0.00	1.53
8	303.15	0.20	2.05
9	303.15	0.40	2.57
10	303.15	0.60	2.79
11	303.15	0.80	2.80
12	303.15	1.00	3.01
13	308.15	0.00	1.35
14	308.15	0.20	1.84
15	308.15	0.40	2.27
16	308.15	0.60	2.46
17	308.15	0.80	2.49
18	308.15	1.00	2.68
19	313.15	0.00	1.21
20	313.15	0.20	1.62
21	313.15	0.40	2.04
22	313.15	0.60	2.21
23	313.15	0.80	2.25
24	313.15	1.00	2.43
25	318.15	0.00	1.09

Clear the Table | View plot | Accept | Cancel

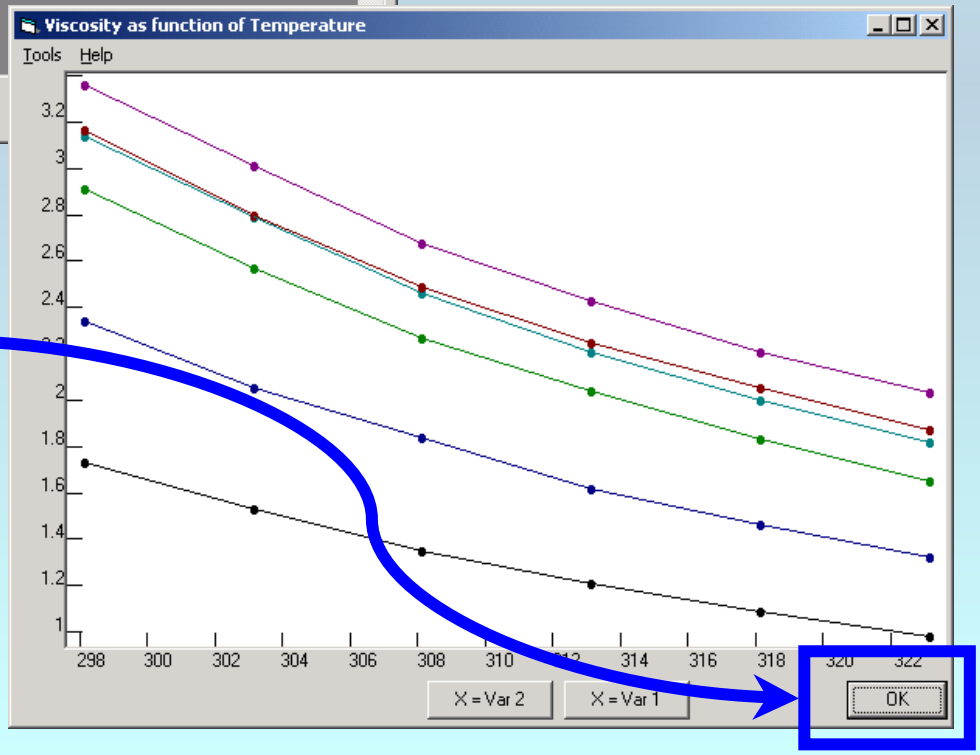
Table 2. Measured Viscosities (η) for the 2,2,2-Trifluoroethanol (1 − w) + Quinoline (w) Mixtures

	η/mPa·s at the following T/K					
w	298.15	303.15	308.15	313.15	318.15	323.15
0.00	1.73	1.53	1.35	1.21	1.09	0.98
0.20	2.34	2.05	1.84	1.62	1.46	1.32
0.40	2.91	2.57	2.27	2.04	1.83	1.65
0.60	3.14	2.79	2.46	2.21	2.00	1.82
0.80	3.17	2.80	2.49	2.25	2.05	1.87
1.00	3.36	3.01	2.68	2.43	2.21	2.03

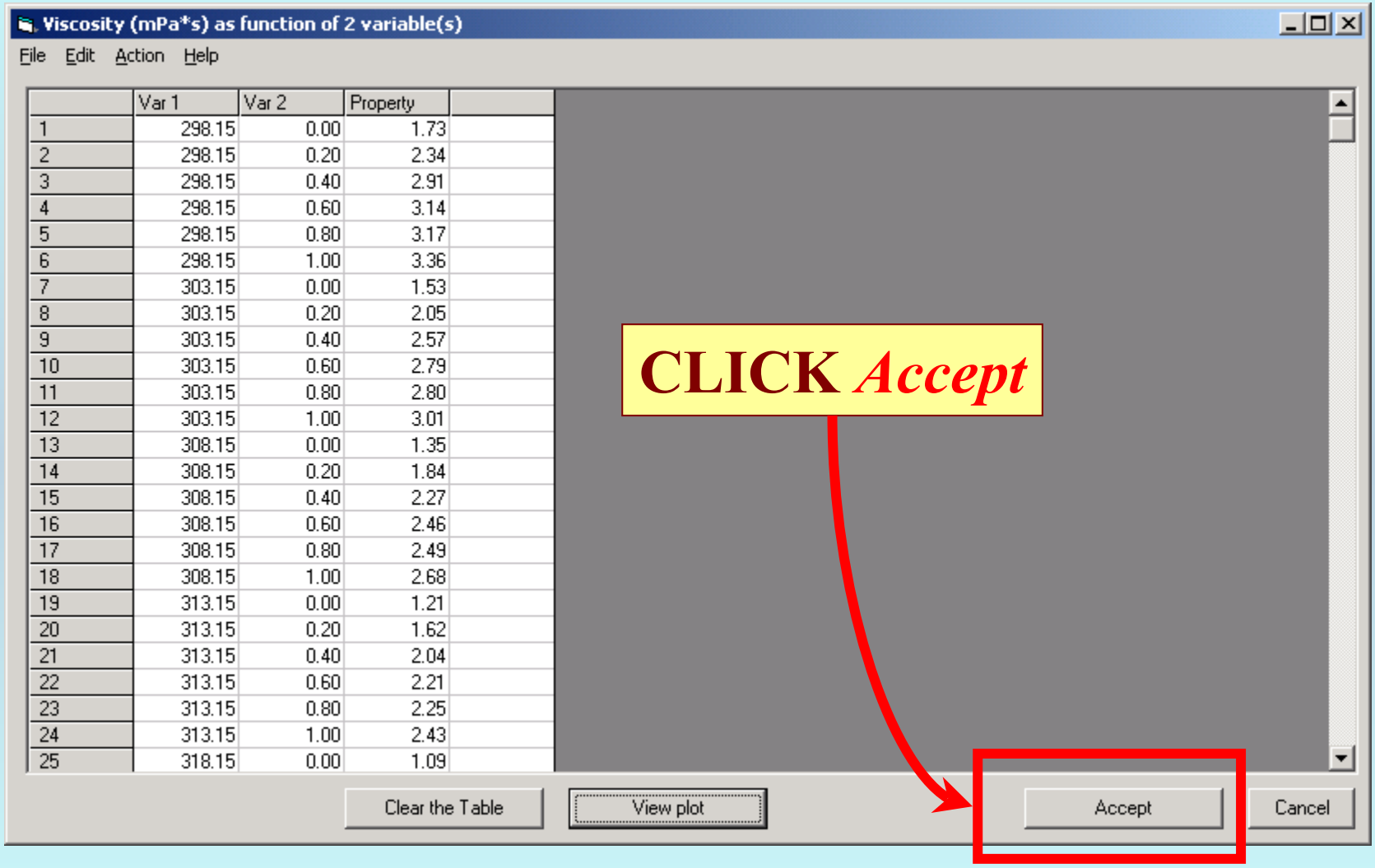
NOTE: Simple CUT/PASTE procedures can be used within the table to convert the original table into the required number of columns. (This can also be done externally in spreadsheet software, e.g., EXCEL.)

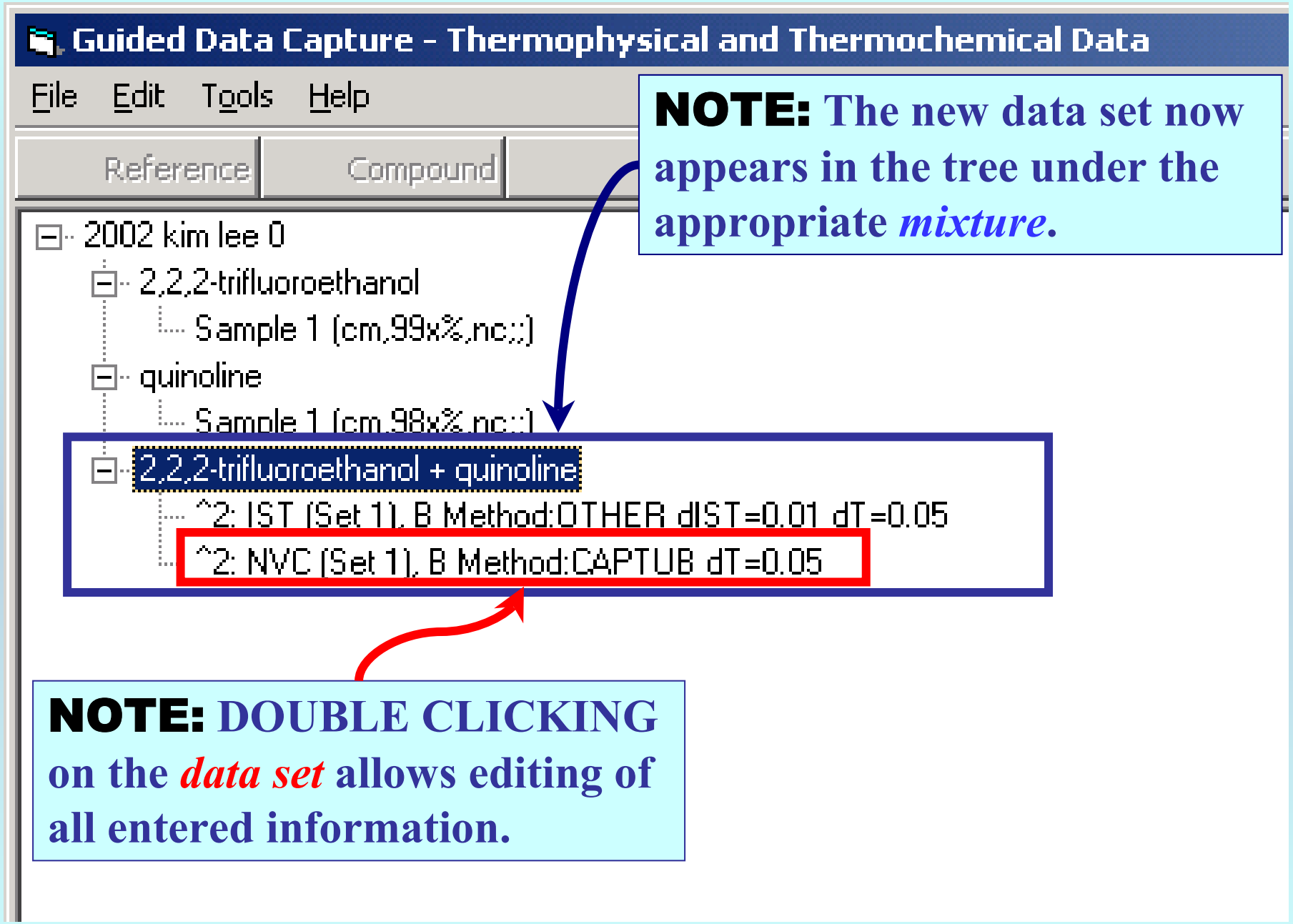


1. CLICK *View plot* to see a graphical representation of the data.



2. Check for typographical errors, and CLICK *OK*, when done.


Viscosity (mPa*s) as function of 2 variable(s)
File Edit Action Help
Var 1 Var 2 Property
1 298.15 0.00 1.73
2 298.15 0.20 2.34
3 298.15 0.40 2.91
4 298.15 0.60 3.14
5 298.15 0.80 3.17
6 298.15 1.00 3.36
7 303.15 0.00 1.53
8 303.15 0.20 2.05
9 303.15 0.40 2.57
10 303.15 0.60 2.79
11 303.15 0.80 2.80
12 303.15 1.00 3.01
13 308.15 0.00 1.35
14 308.15 0.20 1.84
15 308.15 0.40 2.27
16 308.15 0.60 2.46
17 308.15 0.80 2.49
18 308.15 1.00 2.68
19 313.15 0.00 1.21
20 313.15 0.20 1.62
21 313.15 0.40 2.04
22 313.15 0.60 2.21
23 313.15 0.80 2.25
24 313.15 1.00 2.43
25 318.15 0.00 1.09
CLICK Accept
Clear the Table
View plot
Accept
Cancel


Guided Data Capture - Thermophysical and Thermochemical Data
File Edit Tools Help
Reference
Compound
2002 kim lee 0
2,2,2-trifluoroethanol
Sample 1 (cm,99x%,nc::)
quinoline
Sample 1 (cm,98x%,nc::)
2,2,2-trifluoroethanol + quinoline
^2: IST (Set 1), B Method:OTHER dIST=0.01 dT=0.05
^2: NVC (Set 1), B Method:CAPTUB dT=0.05
NOTE: The new data set now appears in the tree under the appropriate mixture.
NOTE: DOUBLE CLICKING on the data set allows editing of all entered information.

END

Continue with other compounds, samples, properties, reactions, etc...

***or* save your file and exit the program.**