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# Tutorial

## G<sup>raf</sup>Compounder 5.0

### Part II

The Graphic Tools  
Analysis and Visualization of Data

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**23. September 2023**

**H-JG Consulting**

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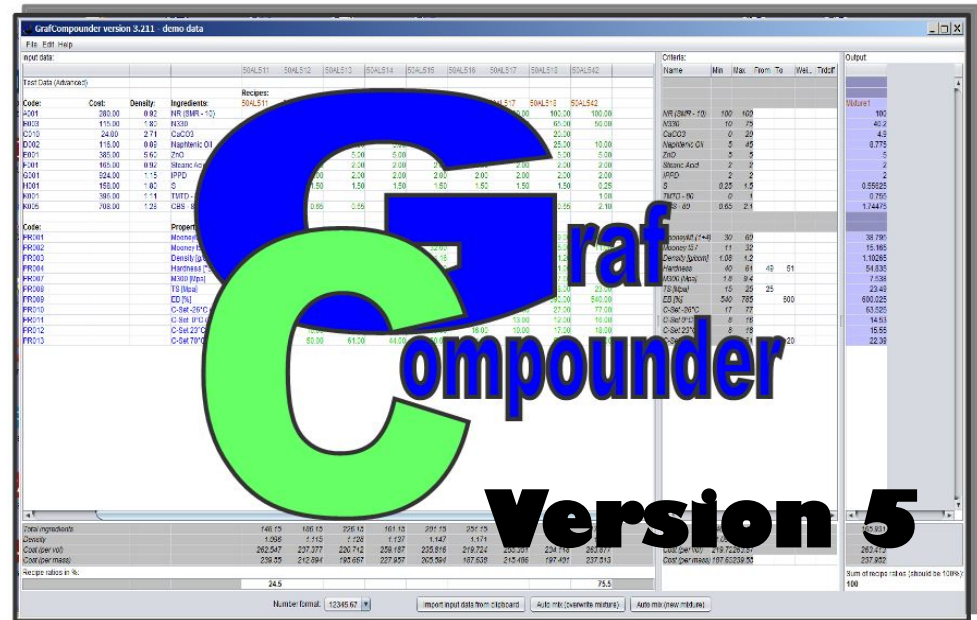
[www.grafcompounder.com](http://www.grafcompounder.com)

# Content:

## GrafCompounder 5.0 Step by Step with Screen Shots Part II

- Graphic Tools
  - Frequency diagram
  - 2D Scatter Plot
  - 3D Scatter Plot

## Conclusion



The screenshot displays the 'demo data' window of GrafCompounder version 3.211. It features a complex data table with columns for 'Test Data (Advances)', 'Ingredients', 'Recipes', and 'Output'. The 'Ingredients' section lists items like NR (SM-L10), KCOB, CaCO3, Na2CO3, ZnO, and TiO2 with their respective costs and densities. The 'Recipes' section lists various products like PR001 through PR013. The 'Output' section on the right shows a list of materials with their quantities and costs. A large, stylized watermark of the 'GrafCompounder Version 5' logo is overlaid on the center of the screenshot.

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

Code	Weight	Volume	Ingredient	50AL511	50AL512	50AL513	50AL514	50AL515	50AL516
01	280.00	0.92	SMR 10	100.00	100.00	100.00	100.00	100.00	100.00
03	290.00	0.92	SMR CV60						
04	310.00	0.92	SMR L						
07	115.00	1.80	N330	10.00	30.00	50.00	25.00	45.00	
04	115.00	1.80	N336						
05	115.00	1.80	N550						
06	115.00	1.80	N660						
07	115.00	1.80	N762						
10	24.00	2.71	CaCO3	20.00	20.00	20.00	20.00	20.00	
02	116.00	0.89	Naphtenic Oil	45.00	45.00	45.00	45.00	45.00	
01	120.00	0.90	Paraffinic Oil						
01	385.00	5.60	ZnO	5.00	5.00	5.00	5.00	5.00	
21	150.00	1.80	Zn-2EH						
01	165.00	0.92	Stearic Acid	2.00	2.00	2.00	2.00	2.00	
01	130.00	0.90	Paraffin Wax						
01	924.00	1.15	TMQ						
01	924.00	1.15	IPPD	2.00	2.00	2.00	2.00	2.00	
01	158.00	1.80	S-80	1.88	1.88	1.88	1.88	1.88	
04	420.00	1.28	DPG-80						
02	360.00	1.28	DTDM-80						
03			TBTD-80						
01	396.00	1.11	TMTD-80						
05	708.00	1.28	CBS-80	0.63	0.63	0.63	0.63	0.63	
001			MooneyML(1+4) 100°C	32.00	36.00	31.00	34.00	30.00	
002			Mooney t5 / 120°C	28.00	28.00	32.00	28.00	32.00	
			MH-ML	15	13	11.5	18	16	
003			Density	1.08	1.12	1.16	1.13	1.16	
004			Hardness	42.00	41.00	40.00	48.00	48.00	
005			M 100	0.60	0.70	0.70	1.00	0.90	

Criteria:

Name	Min	Max	From	To	Weight	Trdoff
SMR 10	0	100				
SMR CV60	0	100				
SMR L	0	100				
N330	0	75				
N336	0	40				
N550	0	60				
N660	0	25				
N762	0	85				
CaCO3	0	20				
Naphtenic Oil	0	45				
Paraffinic Oil	0	10				
ZnO	0	10				
Zn-2EH	0	2				
Stearic Acid	0	2				
Paraffin Wax	0	4				
TMQ	0	2				
IPPD	2	4				
S-80	0.31	4.06				
DPG-80	0	0.25				
DTDM-80	0	1.25				
TBTD-80	0	0.8				
TMTD-80	0	1.5				
CBS-80	0	2.63				
MooneyML(1+4)	27	80				
Mooney t5 / 120°C	8	39				
MH-ML	11.5	39				
Density	1.02	1.21				
Hardness	40	71				
M 100	0.6	2.8				

Output:

Mixture	Sum of recipe ratios (should be 100%):
Mixture1	0

Number format: 12345.67

Import input data from clipboard

Auto mix (overwrite mixture)

Auto mix (new mixture)

## Click Button "Diagram"

- Select „Frequency Distribution Diagram“

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

Code	Testdateien	Recipes:	50AL511	50AL512	50AL513	50AL514	50AL515	50AL516
01	280.00	0.92	SMR 10					
03	290.00	0.92	SMR CV60					
04	310.00	0.92	SMR L					
07	115.00	1.80	N330	10.00	30.00	50.00	25.00	45.00
04	115.00	1.80	N336					
05	115.00	1.80	N550					
06	115	1.8	N660					
07	115.00	1.80	N762					
10	24.00	2.71	CaCO3	20.00	20.00	20.00	20.00	
02	116.00	0.89	Naphtenic Oil	45.00	45.00	5.00	25.00	
01	120.00	0.90	Paraffinic Oil					
01	385.00	5.60	ZnO	5.00	5.00	5.00	5.00	5.00
21	150.00	1.80	Zn-2EH					
01	165.00	0.92	Stearic Acid	2.00	2.00	2.00	2.00	2.00
01	130.00	0.90	Paraffin Wax					
01	924.00	1.15	TMQ					
01	924.00	1.15	IPPD	2.00	2.00	2.00	2.00	2.00
01	158.00	1.80	S-80	1.88	1.88	1.88	1.88	1.88
04	420.00	1.28	DPG-80					
02	360.00	1.28	DTDM-80					
03			TBTD-80					
01	396.00	1.11	TMTD-80					
05	708.00	1.28	CBS-80	0.63	0.63	0.63	0.63	0.63
01			Properties:					
R001			MooneyML(1+4) 100°C	32.00	36.00	31.00	34.00	30.00
R002			Mooney t5 / 120°C	28.00	28.00	32.00	28.00	32.00
			MH-ML	15	13	11.5	18	16
R003			Density	1.08	1.12	1.16	1.13	1.16
R004			Hardness	42.00	41.00	40.00	48.00	48.00
R005			M 100	0.60	0.70	0.70	1.00	0.90

Criteria:

Name	Min	Max	From	To	Weight	Trdiff
SMR 10	0	100				
SMR CV60	0	100				
SMR L	0	100				
N330	0	75				
N336	0	40				
N550	0	60				
N660	0	25				
N762	0	85				
CaCO3	0	20				
Naphtenic Oil	0	45				
Paraffinic Oil	0	10				
ZnO	0	10				
Zn-2EH	0	2				
Stearic Acid	0	2				
Paraffin Wax	0	4				
TMQ	0	2				
IPPD	2	4				
S-80	0.31	4.06				
DPG-80	0	0.25				
DTDM-80	0	1.25				
TBTD-80	0	0.8				
TMTD-80	0	1.5				
CBS-80	0	2.63				
MooneyML(1+4)	27	80				
Mooney t5 / 120°C	8	39				
MH-ML	11.5	39				
Density	1.02	1.21				
Hardness	40	71				
M 100	0.6	2.8				

Output:

Name	Min	Max	From	To	Weight	Trdiff
Mixture1						

Number format: 12345.67

Import input data from clipboard

Auto mix (overwrite mixture)

Auto mix (new mixture)

Sum of recipe ratios (should be 100%): 0

## Click Button "Diagram"

- Select „Frequency Distribution Diagram“
- Select "Ingredients:" with click on square

**Frequency Distribution - Tutorial GC 5 NR-Data Plus GTools.gc**

Please select one or more ingredients/properties.

**Ingredients:**

- SMR 10
- SMR CV60
- SMR L
- N330
- N336
- N550
- N660
- N762
- CaCO3
- Naphtenic Oil
- Paraffinic Oil
- ZnO
- Zn-2EH
- Stearic Acid
- Paraffin Wax
- TMQ
- IPPD
- S-80
- DPG-80
- DTDM-80
- TBTD-80
- TMTD-80
- CBS-80

**Properties:**

- MooneyML(1+4) 100°C
- Mooney t5 / 120°C
- MH-ML
- Density
- Hardness
- M 100
- M300
- TS
- EB
- Tear(Trouser)Median 23°C
- Tear(Trouser)Median 100°C

## Click Button “Diagram”

- New Window opens
- Select either “Ingredients:” or “Properties:” clicking on button

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

Code	Testdateien	Recipes:	50AL511	50AL512	50AL513
01	280.00	0.92	SMR 10		
03	290.00	0.92	SMR CV60		
04	310.00	0.92	SMR L		
02	115.00	1.80	N330	10.00	30.00
04	115.00	1.80	N336		
05	115.00	1.80	N550		
06	115	1.8	N660		
07	115.00	1.80	N762		
10	24.00	2.71	CaCO3	20.00	20.00
02	116.00	0.89	Naphtenic Oil	20.00	45.00
01	120.00	0.90	Paraffinic Oil		
01	385.00	5.60	ZnO	5.00	5.00
02	150.00	1.80	Zn-2EH		
01	165.00	0.92	Stearic Acid	2.00	2.00
01	130.00	0.90	Paraffin Wax		
01	924.00	1.15	TMQ		
01	924.00	1.15	IPPD	2.00	2.00
01	158.00	1.80	S-80	1.88	1.88
04	420.00	1.28	DPG-80		
02	360.00	1.28	DTDM-80		
03			TBTD-80		
01	396.00	1.11	TMTD-80		
05	708.00	1.28	CBS-80	0.63	0.63

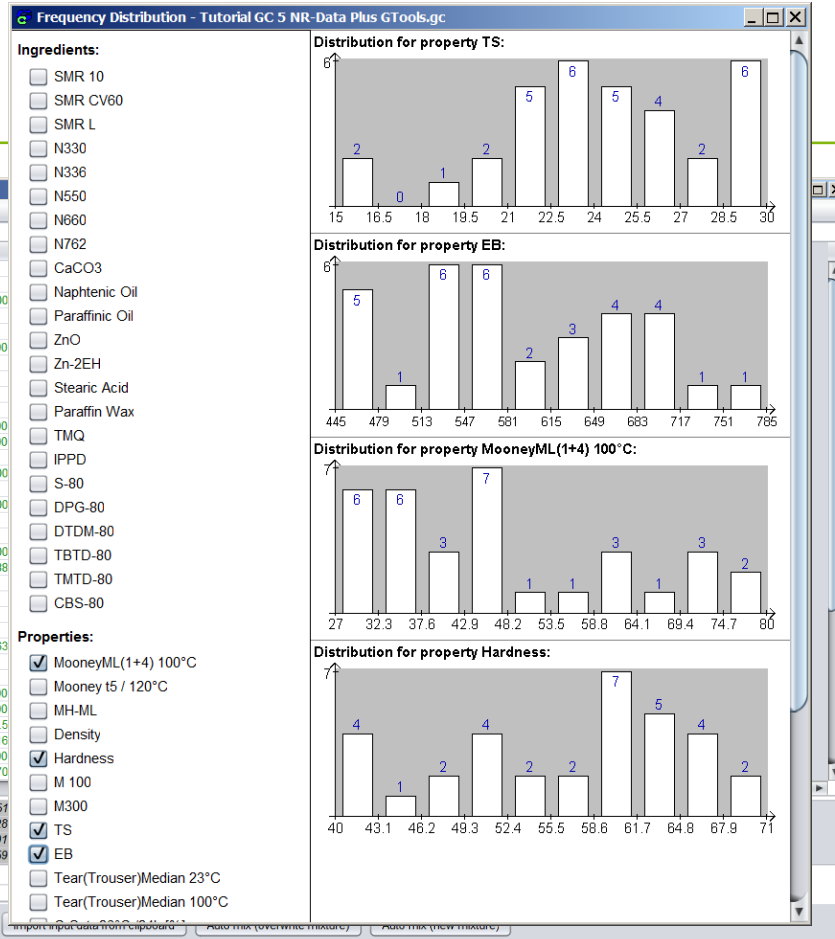
Code	Properties:	50AL511	50AL512	50AL513
R001	MooneyML(1+4) 100°C	32.00	36.00	31.00
R002	Mooney t5 / 120°C	28.00	28.00	32.00
	MH-ML	15	13	11.5
R003	Density	1.08	1.12	1.16
R004	Hardness	42.00	41.00	40.00
R005	M 100	0.60	0.70	0.70

Total ingredients	146.51	166.51	226.51
ensity (calc.)	1.097	1.116	1.128
st (per vol)	262.484	237.406	220.591
st (per mass)	239.274	212.729	195.559

Recipe ratios in %:

Number format: 12345.67



### Click Button "Diagram"

- Selected "Properties:" shown as bars within min-max values in increments of one tenth

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

ide:	Testdateien	Recipes:	50AL511	50AL512	50AL513
01	280.00	0.92	SMR 10		
03	290.00	0.92	SMR CV60		
04	310.00	0.92	SMR L		
02	115.00	1.80	N330	10.00	30.00
04	115.00	1.80	N336		
05	115.00	1.80	N550		
06	115	1.8	N660		
07	115.00	1.80	N762		
10	24.00	2.71	CaCO3	20.00	20.00
02	116.00	0.89	Naphtenic Oil	20.00	45.00
01	120.00	0.90	Paraffinic Oil		
01	385.00	5.60	ZnO	5.00	5.00
01	150.00	1.80	Zn-2EH		
01	165.00	0.92	Stearic Acid	2.00	2.00
01	130.00	0.90	Paraffin Wax		
01	924.00	1.15	TMQ		
01	924.00	1.15	IPPD	2.00	2.00
01	158.00	1.80	S-80	1.88	1.88
04	420.00	1.28	DPG-80		
02	360.00	1.28	DTDM-80		
03			TBTD-80		
01	396.00	1.11	TMTD-80		
05	708.00	1.28	CBS-80	0.63	0.63

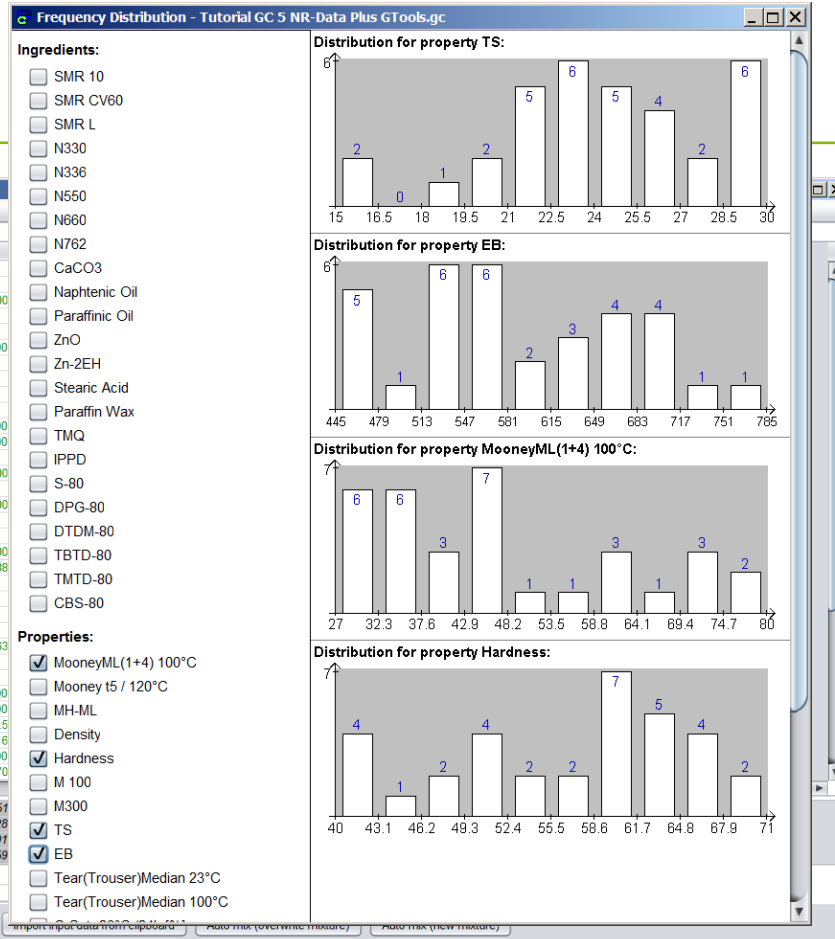
ide:	Properties:	50AL511	50AL512	50AL513
R001	MooneyML(1+4) 100°C	32.00	36.00	31.00
R002	Mooney t5 / 120°C	28.00	28.00	32.00
	MH-ML	15	13	11.5
R003	Density	1.08	1.12	1.16
R004	Hardness	42.00	41.00	40.00
R005	M 100	0.60	0.70	0.70

total ingredients	146.51	166.51	226.51
ensity (calc.)	1.097	1.116	1.128
st (per vol)	262.484	237.406	220.591
st (per mass)	239.274	212.729	195.559

Recipe ratios in %:

Number format: 12345.67



### Click Button "Diagram"

- Selected "Properties:" shown as bar diagram
- Number on bars represent number of compound within a range

- 
- **Frequency Distribution Diagram**  
**Points to consider:**
    - **Spread of Data in Database**
      - **Available for each ingredient or property**
    - **Distribution of Data versus increments**
  - **Database criteria**
    - **Enough ingredient / property regarding target?**
    - **Distribution is even / uneven**
      - **Distance between bars too large?**



GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data: Frequency Distribution Diagram  
 2D Scatter Plot  
 3D Scatter Plot

	50AL511	50AL512	50AL513	50AL514	50AL515	50AL516
<b>Recipe:</b>	100.00	100.00	100.00	100.00	100.00	100.00
<b>Ingredients:</b>						
SMR 10						
SMR CV60						
SMR L						
N330	10.00	30.00	50.00	25.00	45.00	
N336						
N550						
N660						
N762						
CaCO3	20.00	20.00	20.00	20.00	20.00	
Naphthenic Oil	5.00	25.00	45.00	5.00	25.00	
Paraffinic Oil						
ZnO	5.00	5.00	5.00	5.00	5.00	
Zn-2EH						
Stearic Acid	2.00	2.00	2.00	2.00	2.00	
Paraffin Wax						
TMQ						
IPPD	2.00	2.00	2.00	2.00	2.00	
S-80	1.88	1.88	1.88	1.88	1.88	
DPG-80						
DTD-80						
TBTD-80						
TMTD-80						
CBS-80	0.63	0.63	0.63	0.63	0.63	
<b>Properties:</b>						
MooneyML(1+4) 100°C	32.00	36.00	31.00	34.00	30.00	
Mooney 15 / 120°C	28.00	28.00	32.00	28.00	32.00	
MH-ML	15	13	11.5	18	16	
Density	1.08	1.12	1.16	1.13	1.16	
Hardness	42.00	41.00	40.00	48.00	48.00	
M 100	0.60	0.70	0.70	1.00	0.90	
<b>Total ingredients</b>	146.51	186.51	226.51	161.51	201.51	
Density (calc.)	1.097	1.116	1.128	1.138	1.148	
Cost (per vol)	262.484	237.406	220.591	259.16	235.861	
Cost (per mass)	239.274	212.729	195.559	227.733	205.454	

Criteria:

Name	Min	Max	From	To	Weight	Trdrof
SMR 10	0	100				
SMR CV60	0	100				
SMR L	0	100				
N330	0	75				
N336	0	40				
N550	0	60				
N660	0	25				
N762	0	85				
CaCO3	0	20				
Naphthenic Oil	0	45				
Paraffinic Oil	0	10				
ZnO	0	10				
Zn-2EH	0	2				
Stearic Acid	0	2				
Paraffin Wax	0	4				
TMQ	0	2				
IPPD	2	4				
S-80	0.31	4.06				
DPG-80	0	0.25				
DTD-80	0	1.25				
TBTD-80	0	0.8				
TMTD-80	0	1.5				
CBS-80	0	2.63				
MooneyML(1+4)	27	80				
Mooney 15 / 120°C	8	39				
MH-ML	11.5	39				
Density	1.02	1.21				
Hardness	40	71				
M 100	0.6	2.8				
<b>Total ingredients</b>	132.63	251.51				
Density (calc.)	1.027	1.214				
Cost (per vol)	219.811	326.37				
Cost (per mass)	187.552	301.915				

Output:

Mixture1

Sum of recipe ratios (should be 100%):  
0

Number format: 12345.67

Import input data from clipboard

Auto mix (overwrite mixture)

Auto mix (new mixture)

Pull down menu "Diagram", select "2D Scatter Plot"



The screenshot shows the GrafCompounder software interface. On the left is the main data table, and on the right is a '2D Scatter Plot' window.

**Main Data Table:**

Code	Value 1	Value 2	Ingredient
01	280.00	0.92	SMR 10
03	290.00	0.92	SMR CV60
04	310.00	0.92	SMR L
03	115.00	1.80	N330
04	115.00	1.80	N336
05	115.00	1.80	N550
06	115	1.8	N660
07	115.00	1.80	N762
10	24.00	2.71	CaCO3
02	116.00	0.89	Naphtenic Oil
01	120.00	0.90	Paraffinic Oil
01	385.00	5.60	ZnO
02	150.00	1.80	Zn-2EH
01	165.00	0.92	Stearic Acid
01	130.00	0.90	Paraffin Wax
01	924.00	1.15	TMQ
01	924.00	1.15	IPPD
01	158.00	1.80	S-80
04	420.00	1.28	DPG-80
02	360.00	1.28	DTD-80
03			TBTD-80
01	396.00	1.11	TMTD-80
05	708.00	1.28	CBS-80

**Properties:**

Code	Property
R001	MooneyML(1+4) 100°C
R002	Mooney t5 / 120°C
	MH-ML
R003	Density
R004	Hardness
R005	M 100

**2D Scatter Plot Window:**

- Title: 2D Scatter Plot - Tutorial GC 5 NR-Data Plus GTools.gc
- Status: 33 of total 33 recipes included.
- Y-axis label: GrafCompounder
- X-Axis: (Please select)
- Y-Axis: (Please select)
- Show trend line:
- Message: Please define the X-Axis.
- Buttons: Refresh recipes, Export as image...
- Footer: Number format: 12345 67, Import input data from clipboard, Auto mix (overwrite mixture), Auto mix (new mixture)

## Pull down menu "Diagram", select "2D Scatter Plot"

- Select x-axis and y-Axis

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

Testdateien

Ingredients:

01	280.00	0.92	SMR 10
03	290.00	0.92	SMR CV60
04	310.00	0.92	SMR L
03	115.00	1.80	N330
04	115.00	1.80	N336
05	115.00	1.80	N550
06	115	1.8	N660
07	115.00	1.80	N762
110	24.00	2.71	CaCO3
02	116.00	0.89	Naphtenic Oil
01	120.00	0.90	Paraffinic Oil
01	385.00	5.60	ZnO
121	150.00	1.80	Zn-2EH
01	165.00	0.92	Stearic Acid
01	130.00	0.90	Paraffin Wax
01	924.00	1.15	TMQ
01	924.00	1.15	IPPD
01	158.00	1.80	S-80
04	420.00	1.28	DPG-80
02	360.00	1.28	DTDM-80
03			TBTD-80
01	396.00	1.11	TMTD-80
05	708.00	1.28	CBS-80


Properties:

R001 MooneyML(1+4) 100°C  
R002 Mooney t5 / 120°C  
R003 MH-ML  
R004 Density  
R005 Hardness  
M 100

total ingredients  
density (calc.)  
cost (per vol)  
cost (per mass)  
recipe

2D Scatter Plot - Tutorial GC 5 NR-Data Plus GTools.gc

33 of total 33 recipes included.



X-Axis: (Please select)

Y-Axis:

Show tree

Please define the X-Axis.

Refresh recipes Export as image...

format: 12345 67 Import input data from clipboard Auto mix (overwrite mixture) Auto mix (new mixture)

Pull down menu “Diagram”, select “2D Scatter Plot”  
Select x-axis and y-axis

- Choose either ingredient or property
- Axis scaled automatically, but can be scaled manually

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.g

File Edit Diagram Help

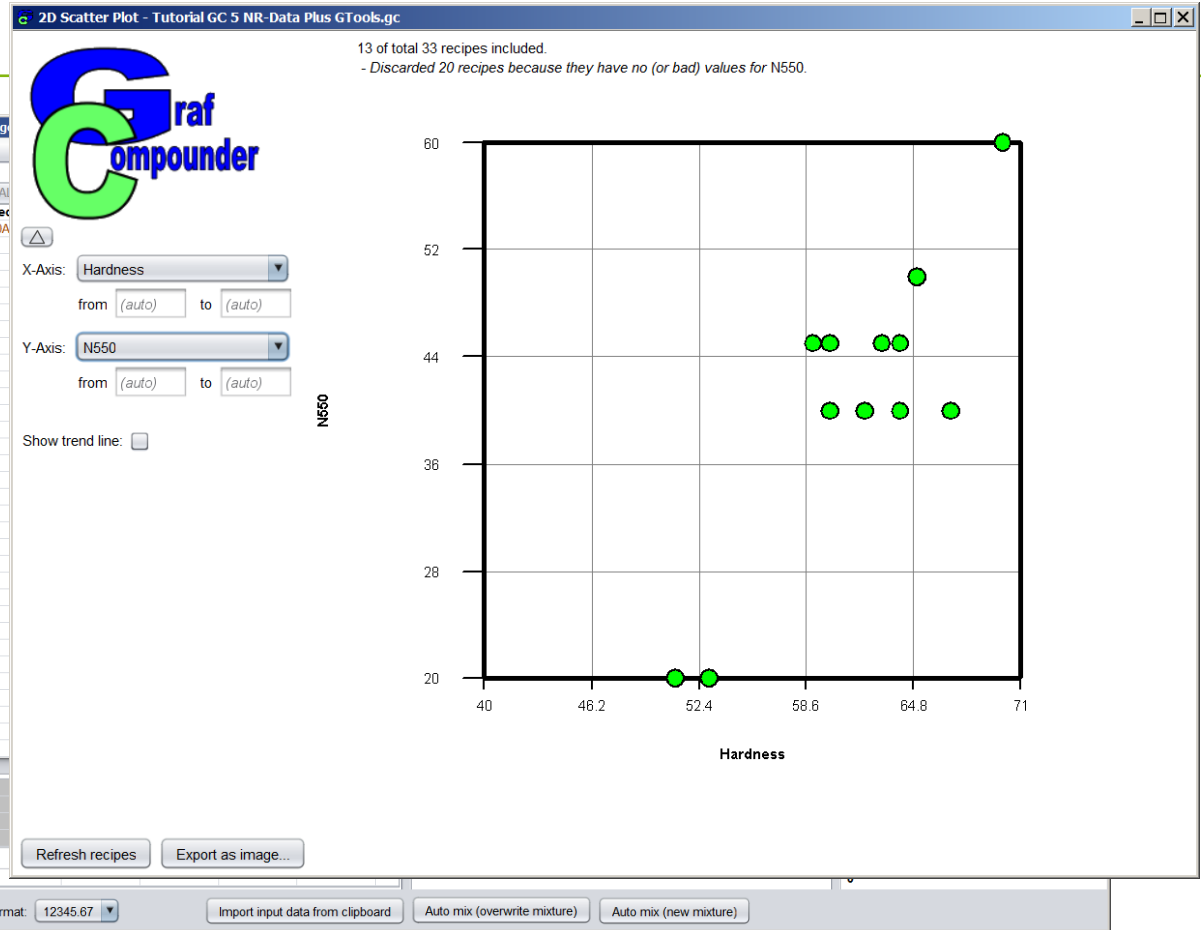
Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

Recipe	Hardness	N550	Ingredients
01	280.00	0.92	SMR 10
03	290.00	0.92	SMR CV60
04	310.00	0.92	SMR L
03	115.00	1.80	N330
04	115.00	1.80	N336
05	115.00	1.80	N550
06	115	1.8	N660
07	115.00	1.80	N762
10	24.00	2.71	CaCO3
02	116.00	0.89	Naphtenic Oil
01	120.00	0.90	Paraffinic Oil
01	385.00	5.60	ZnO
121	150.00	1.80	Zn-2EH
01	165.00	0.92	Stearic Acid
01	130.00	0.90	Paraffin Wax
01	924.00	1.15	TMQ
01	924.00	1.15	IPPD
01	158.00	1.80	S-80
04	420.00	1.28	DPG-80
02	360.00	1.28	DTD-80
03			TBTD-80
01	396.00	1.11	TMTD-80
05	708.00	1.28	CBS-80

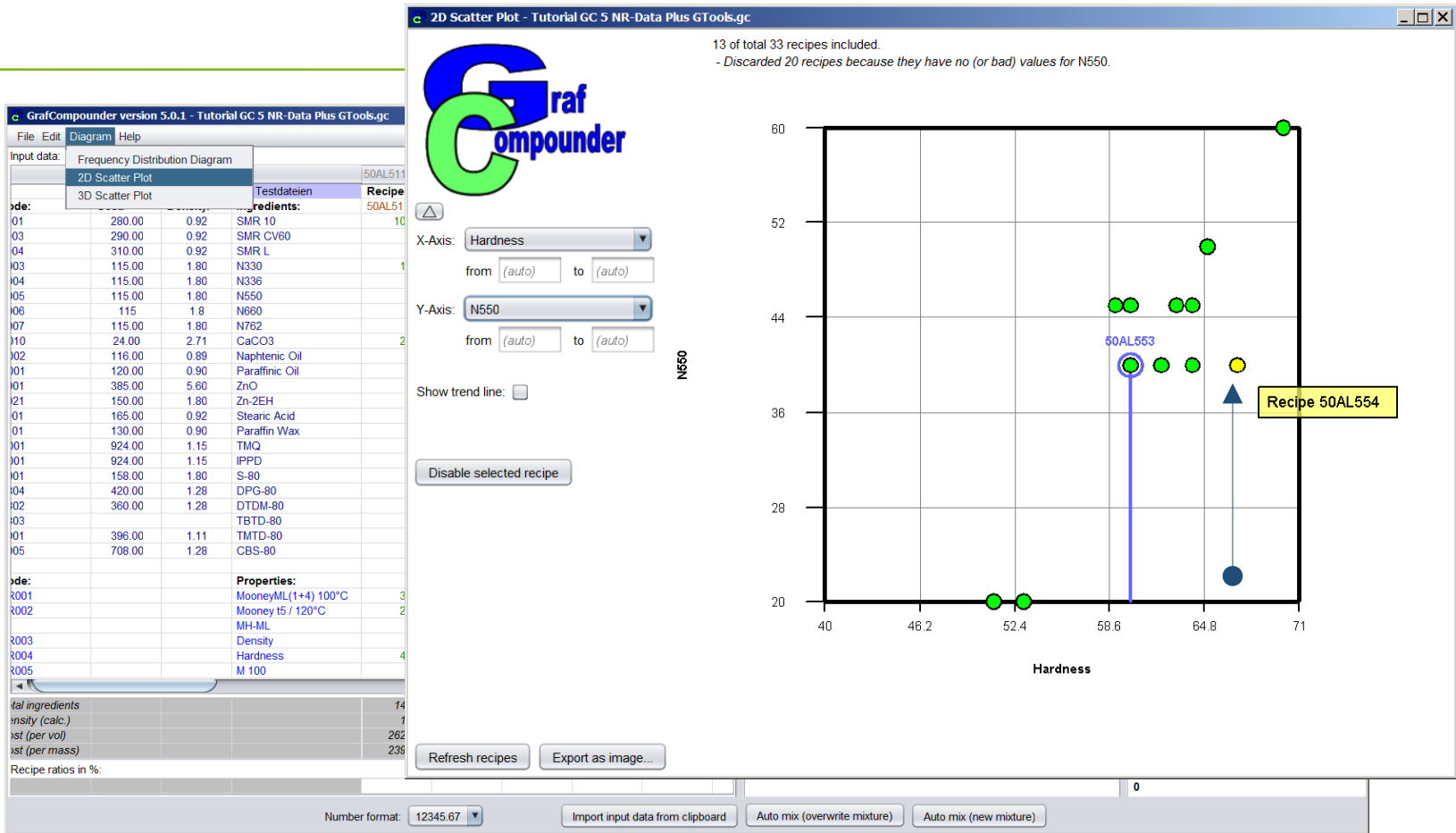
Properties:

- R001 MooneyML(1+4) 100°C
- R002 Mooney I5 / 120°C
- R003 MH-ML
- R004 Density
- R005 Hardness
- M 100

Recipe ratios in %:



Choose "N550:" for y-axis over "Hardness:" for x-axis



## Choose "N550:" y-axis over "Hardness:" x-axis

- Identify recipes and review formula

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

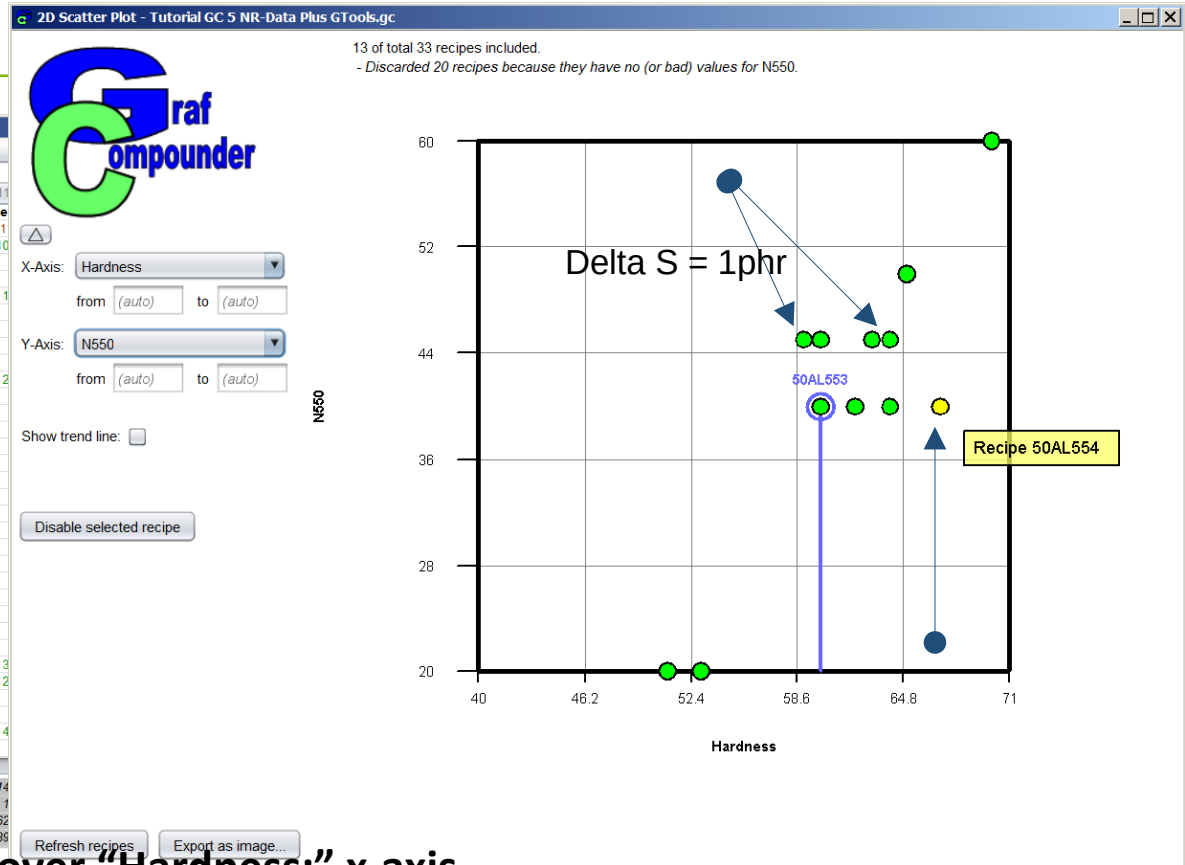
Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

Recipe	Testdateien	Ingredients
01	280.00	0.92 SMR 10
03	290.00	0.92 SMR CV60
04	310.00	0.92 SMR L
03	115.00	1.80 N330
04	115.00	1.80 N336
05	115.00	1.80 N550
06	115	1.8 N660
07	115.00	1.80 N762
10	24.00	2.71 CaCO3
02	116.00	0.89 Naphtenic Oil
01	120.00	0.90 Paraffinic Oil
01	385.00	5.60 ZnO
01	150.00	1.80 Zn-2EH
01	165.00	0.92 Stearic Acid
01	130.00	0.90 Paraffin Wax
01	924.00	1.15 TMQ
01	924.00	1.15 IPPD
01	158.00	1.80 S-80
04	420.00	1.28 DPG-80
02	360.00	1.28 DTD-80
03		TBTD-80
01	396.00	1.11 TMTD-80
05	708.00	1.28 CBS-80

Properties:

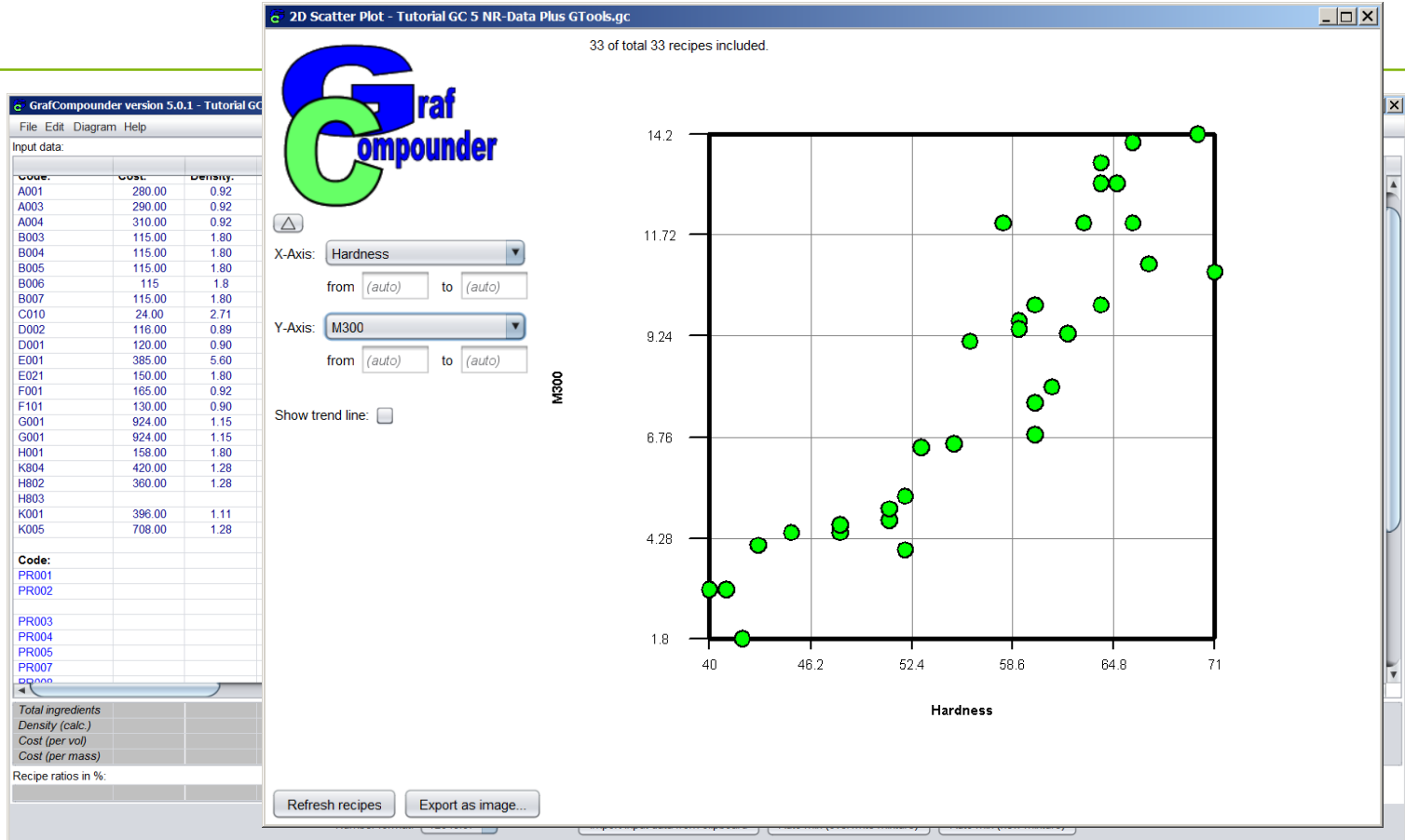
- R001 MooneyML(1+4) 100°C
- R002 Mooney I5 / 120°C
- R003 MH-ML
- R004 Density
- R005 Hardness
- M 100

total ingredients: 14  
density (calc.): 1  
cost (per vol): 262  
cost (per mass): 236

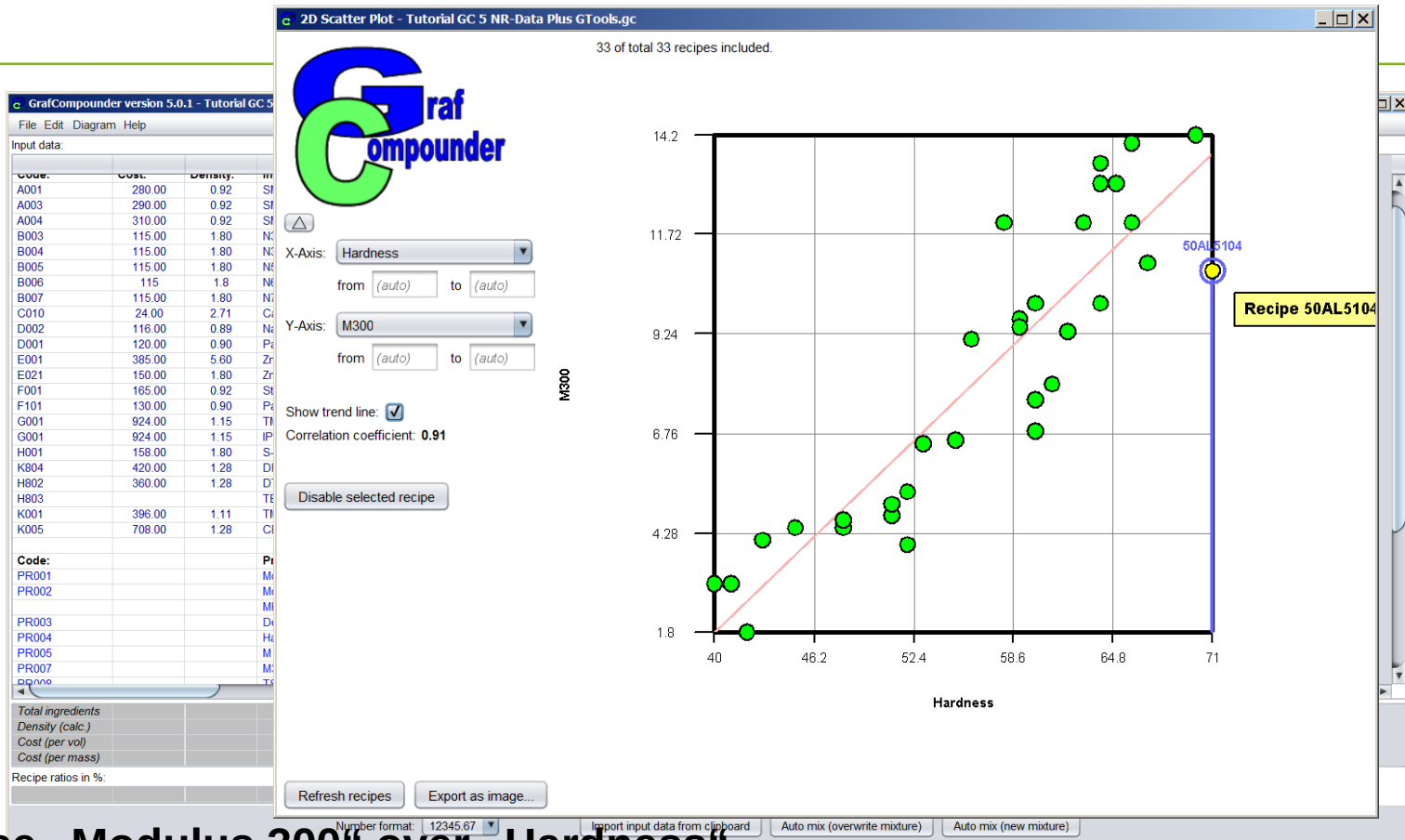


### Choose "N550:" y-axis over "Hardness:" x-axis

- Identify recipes and review formula
- Both compound contain N550 – 40phr,  
Sulfur level 50AL553 – 3phr / Sulfur level 50AL554 – 4phr



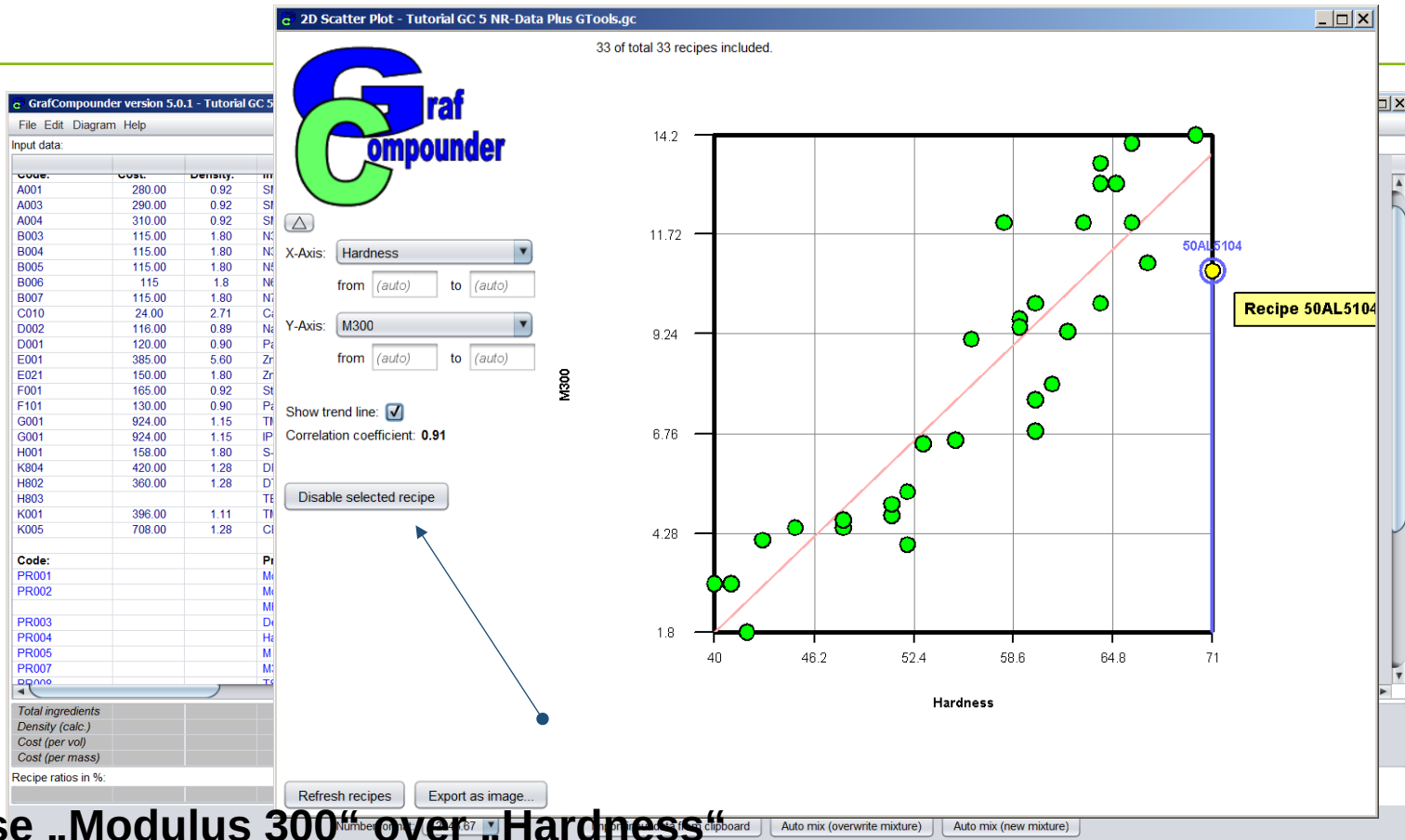
Choose „Modulus 300“ over „Hardness“



Choose „Modulus 300“ over „Hardness“

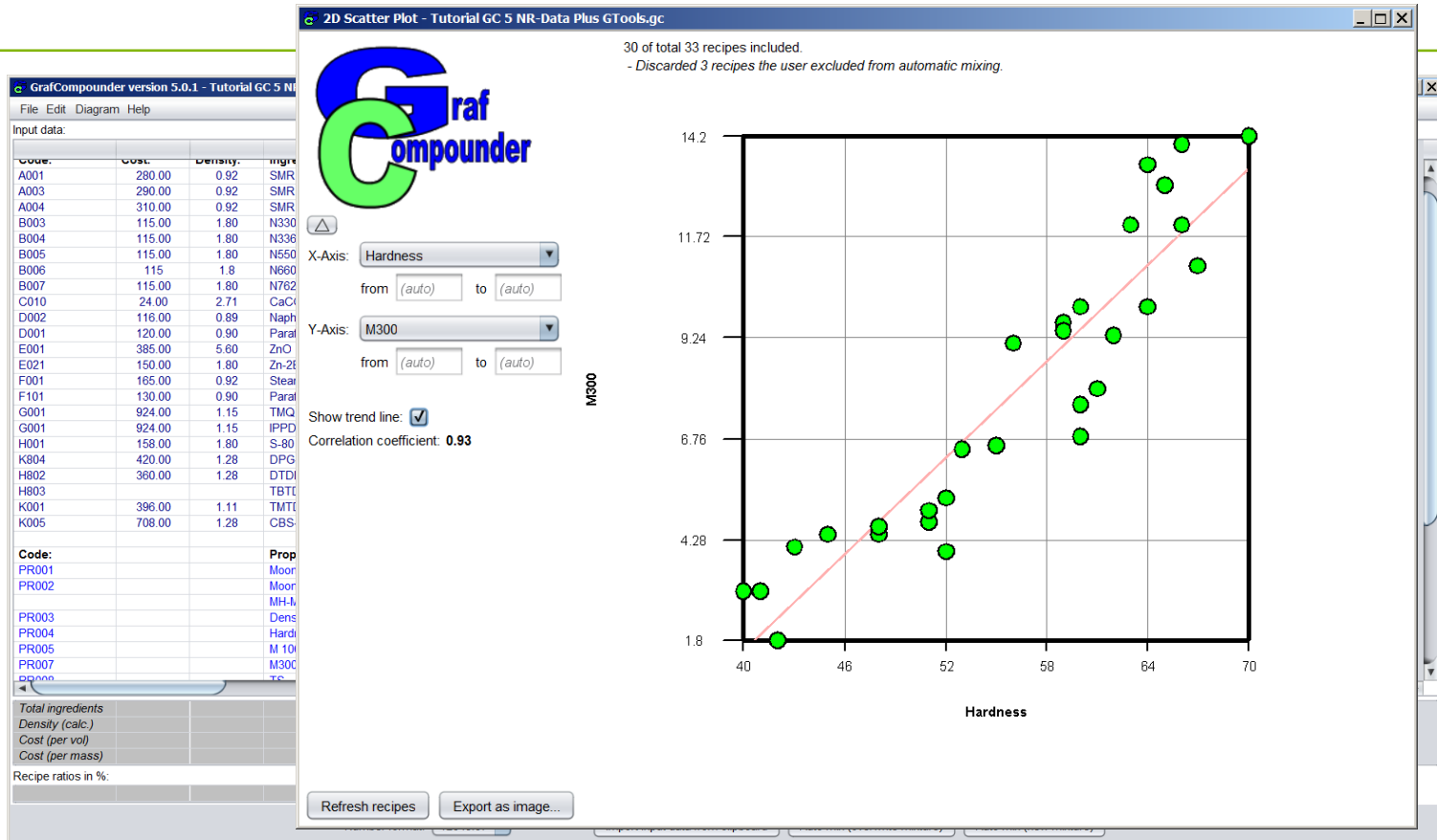
- Click „Trendline“, Correlation Coefficient 0,91
- Click one dot to identify compound





## Choose „Modulus 300“ over „Hardness“

- Click a dot to identify compound as possible outlier
- Click „Disable selected recipe“



Choose „Modulus 300“ over „Hardness“

- Click button „Show Tendline“ Correlation Coefficient: 0,93 (after removal of compound)

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus

File Edit Diagram Help

Input data:

Code	Cost	Density	Ingredients
A001	280.00	0.92	SMR 10
A003	290.00	0.92	SMR CV60
A004	310.00	0.92	SMR L
B003	115.00	1.80	N330
B004	115.00	1.80	N336
B005	115.00	1.80	N550
B006	115	1.8	N660
B007	115.00	1.80	N762
C010	24.00	2.71	CaCO3
D002	116.00	0.89	Naphtenic Oil
D001	120.00	0.90	Paraffinic Oil
E001	385.00	5.60	ZnO
E021	150.00	1.80	Zn-2EH
F001	165.00	0.92	Stearic Acid
F101	130.00	0.90	Paraffin Wax
G001	924.00	1.15	TMQ
G001	924.00	1.15	IPPD
H001	158.00	1.80	S-80
K804	420.00	1.28	DPG-80
H802	360.00	1.28	DTDM-80
H803			TBTD-80
K001	396.00	1.11	TMTD-80
K005	708.00	1.28	CBS-80

Properties:

- PR001 MooneyML(1+4)
- PR002 Mooney t5 / 120°C
- MH-ML
- Density
- Hardness
- M 100
- M300
- TS

Total ingredients  
Density (calc.)  
Cost (per vol)  
Cost (per mass)

Recipe ratios in %:

2D Scatter Plot - Tutorial GC 5 NR-Data Plus GTools.gc

32 of total 33 recipes included.  
- Discarded 1 recipe the user excluded from automatic mixing.

X-Axis: Hardness  
from (auto) to (auto)

Y-Axis: M300  
from (auto) to (auto)

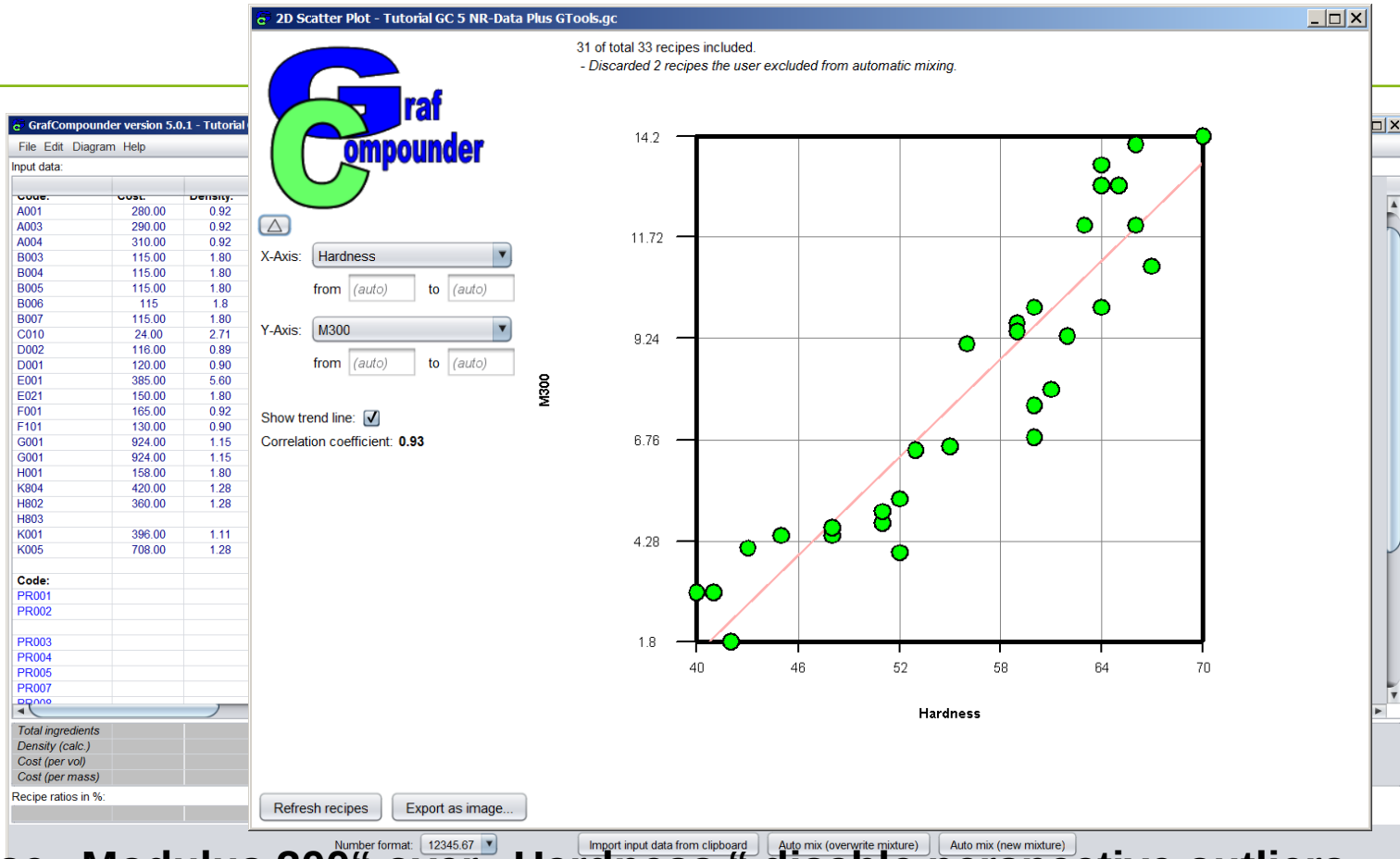
Show trend line:   
Correlation coefficient: 0.92

Disable selected recipe

Refresh recipes    Export as image...

## Choose „Modulus 300“ over „Hardness,“ disable perspective outliers

- Click a point to identify compound
  - Click „Disable selected recipe“
- Repeat with indicated compound**



Choose „Modulus 300“ over „Hardness,“ disable perspective outliers

- Evaluate disabled compounds in data sets
- Correlation coefficient increased to 0,93

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data:

	50AL531	50AL532	50AL533	50AL534	50AL541	50AL542	50AL551	50AL552	50AL553	50AL554
10	100.00	100.00	100.00	100.00	100.00	100.00				
10					50.00	50.00				
10	45.00	45.00	40.00	45.00			20.00	20.00	40.00	40.00
10	10.00	10.00	10.00	10.00	10.00	10.00	2.00	2.00	4.00	4.00
10	5.00	5.00	5.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00
10	2.00	2.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00
10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
10	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00
10	3.13	2.81	2.81	1.88	0.80	0.31	3.13	4.06	3.13	4.06
10	0.13	0.25	0.25							
10			1.25							
10	0.00	0.00	0.00	1.50	0.80	1.25	0.75	1.00	0.75	1.00
10				1.50	1.70	2.63				
10	51.00	48.00	45.00	60.00	66.00	41.00	27.00	29.00	34.00	35.00
10	9.00	8.00	10.00	12.00	23.00	11.00	39.00	33.00	31.00	27.00
10	30	30.5	39	31	16.5	24.5				
14	1.10	1.10	1.09	1.13	1.11	1.11	1.04	1.04	1.09	1.10
10	59.00	60.00	64.00	64.00	58.00	59.00	51.00	53.00	60.00	67.00
10	1.90	2.10	2.80	2.00	2.20	1.6				
10	9.60	10.00	13.00	13.50	12.00	9.40	5.00	6.50	10.00	11.00
10	23.00	23.00	24.00	24.00	23.00	23.00	20.00	25.50	26.00	22.00
8	169.26	169.06	165.31	175.88	173.3	175.19	137.88	139.06	159.88	161.06
10	1.105	1.104	1.093	1.129	1.112	1.112	1.043	1.046	1.098	1.101
10	266.85	266.923	269.431	283.753	274.886	286.337	287.16	277.402	278.336	278.336
14	241.493	241.778	246.506	251.331	242.649	247.2	274.532	274.532	252.643	252.803

Recipe ratios in %:

	50AL531	50AL532	50AL533	50AL534	50AL541	50AL542	50AL551	50AL552	50AL553	50AL554
10	100.00	100.00	100.00	100.00	100.00	100.00				
10					50.00	50.00				
10	45.00	45.00	40.00	45.00			20.00	20.00	40.00	40.00
10	10.00	10.00	10.00	10.00	10.00	10.00	2.00	2.00	4.00	4.00
10	5.00	5.00	5.00	10.00	5.00	5.00	5.00	5.00	5.00	5.00
10	2.00	2.00	2.00	2.00	1.00	2.00	2.00	2.00	2.00	2.00
10	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
10	2.00	2.00	2.00	2.00	2.00	2.00	3.00	3.00	3.00	3.00
10	3.13	2.81	2.81	1.88	0.80	0.31	3.13	4.06	3.13	4.06
10	0.13	0.25	0.25							
10			1.25							
10	0.00	0.00	0.00	1.50	0.80	1.25	0.75	1.00	0.75	1.00
10				1.50	1.70	2.63				
10	51.00	48.00	45.00	60.00	66.00	41.00	27.00	29.00	34.00	35.00
10	9.00	8.00	10.00	12.00	23.00	11.00	39.00	33.00	31.00	27.00
10	30	30.5	39	31	16.5	24.5				
14	1.10	1.10	1.09	1.13	1.11	1.11	1.04	1.04	1.09	1.10
10	59.00	60.00	64.00	64.00	58.00	59.00	51.00	53.00	60.00	67.00
10	1.90	2.10	2.80	2.00	2.20	1.6				
10	9.60	10.00	13.00	13.50	12.00	9.40	5.00	6.50	10.00	11.00
10	23.00	23.00	24.00	24.00	23.00	23.00	20.00	25.50	26.00	22.00
8	169.26	169.06	165.31	175.88	173.3	175.19	137.88	139.06	159.88	161.06
10	1.105	1.104	1.093	1.129	1.112	1.112	1.043	1.046	1.098	1.101
10	266.85	266.923	269.431	283.753	274.886	286.337	287.16	277.402	278.336	278.336
14	241.493	241.778	246.506	251.331	242.649	247.2	274.532	274.532	252.643	252.803

Criteria:

Name	Min	Max	From	To	Weight	Trdff
SMR 10	0	100				
SMR CV60	0	100				
SMR L	0	100				
N330	0	75				
N336	0	40				
N550	0	60				
N660	0	25				
N762	0	85				
CaCO3	0	20				
Naphtenic Oil	0	45				
Paraffinic Oil	0	10				
ZnO	0	10				
Zn-2EH	0	2				
Stearic Acid	0	2				
Paraffin Wax	0	4				
TMQ	0	2				
JPPD	2	4				
S-80	0.31	4.06				
DPG-80	0	0.25				
DTD-80	0	1.25				
TBTD-80	0	0.8				
TMTD-80	0	1.5				
CBS-80	0	2.63				
MooneyML(1+4)	27	80				
Mooney I5 / 120°C	8	39				
MH-ML	11.5	39				
Density	1.02	1.21				
Hardness	40	70				
M 100	0.6	2.8				
M300	1.8	14.2				
TS	18	20				
Total ingredients	132.63	251.51				
Density (calc.)	1.027	1.214				
Cost (per vol)	219.811	326.37				
Cost (per mass)	187.552	301.915				

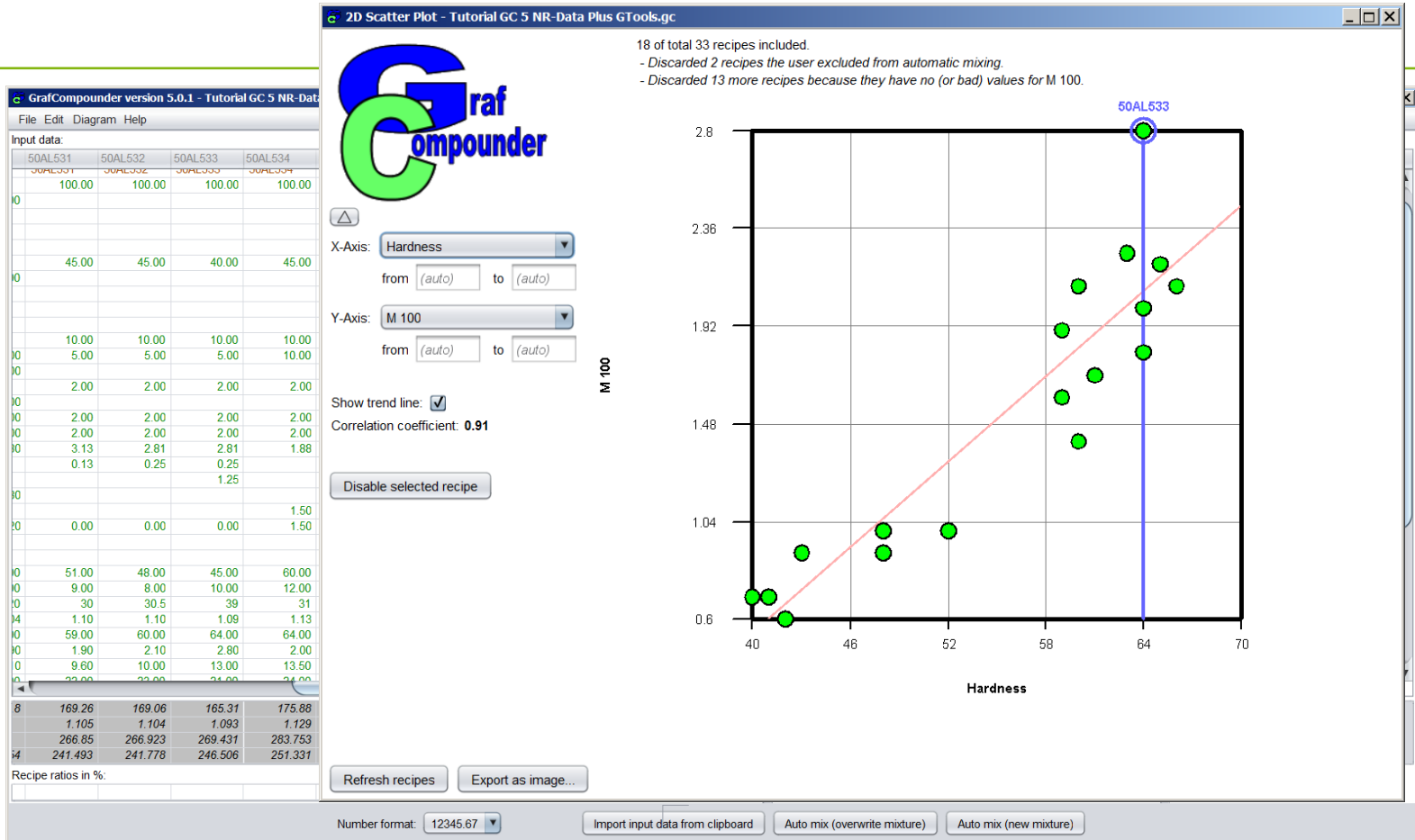
Output:

Sum of recipe ratios (should be 100%)

0

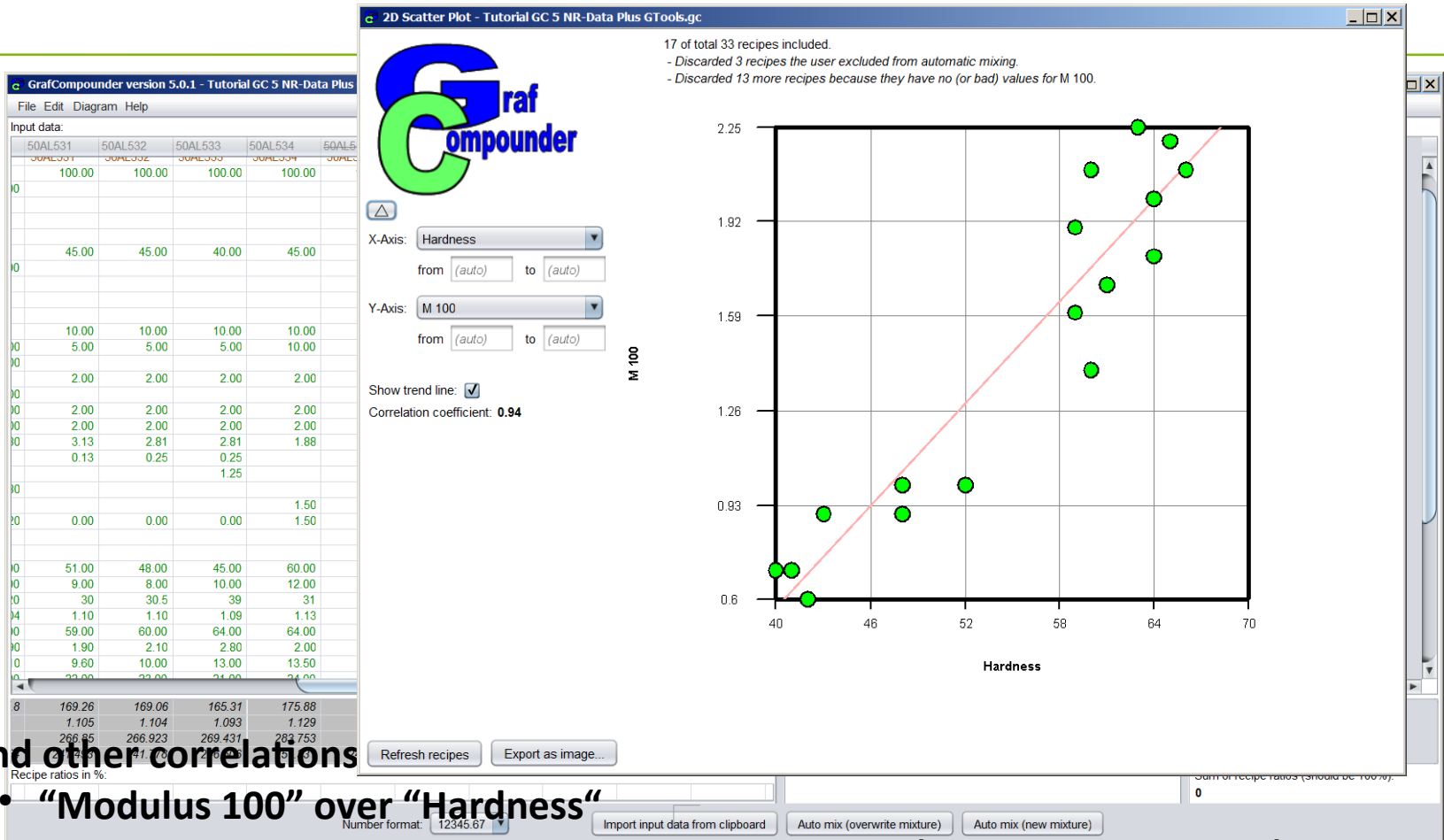
Choose „Modulus 300“ over „Hardness,“ disable perspective outliers

- Identify disabled compounds in data set.  
(Recipe name is striked out, excluded from calculation)
- Confirm, that compounds are outliers



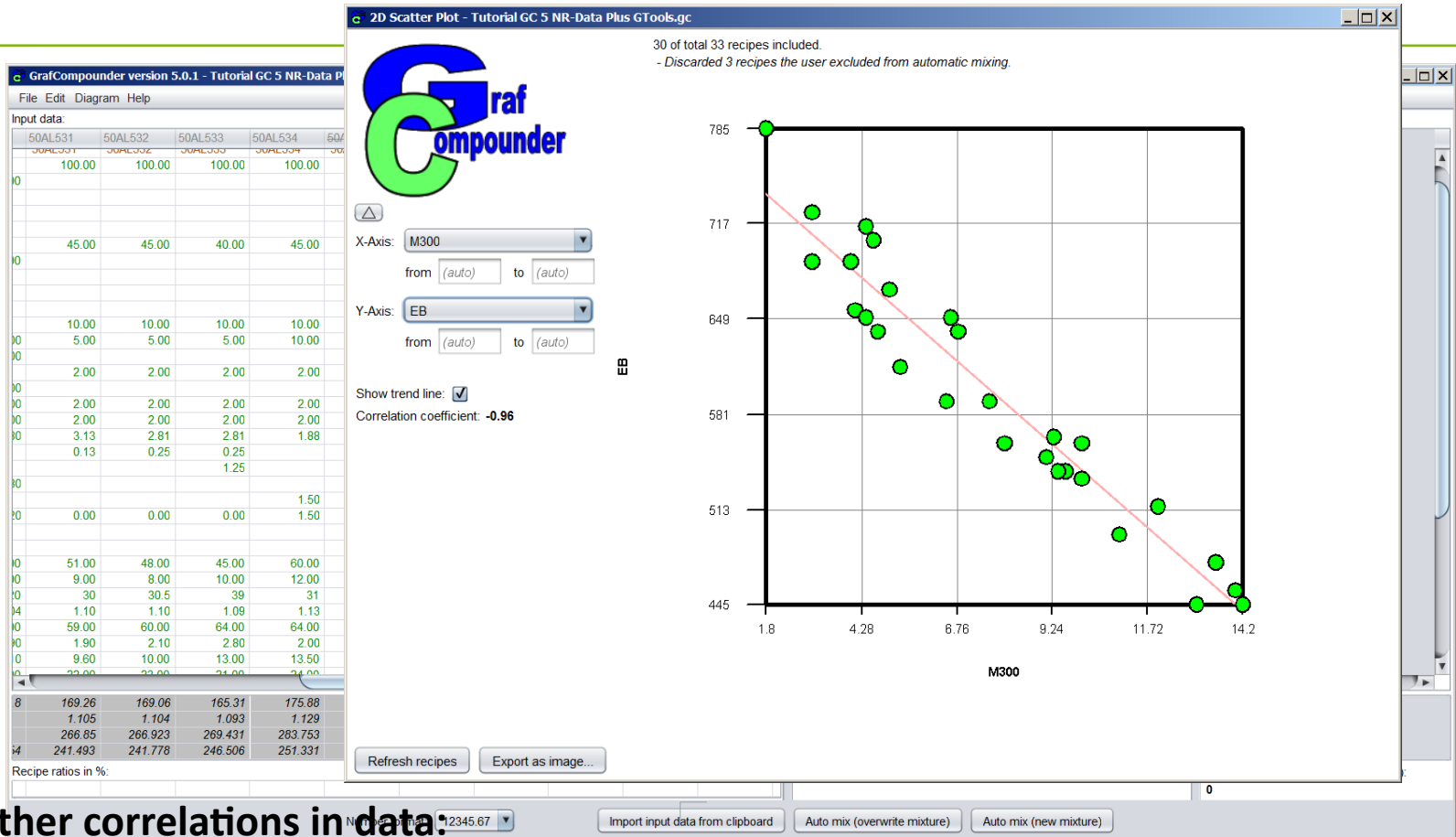
## Find other correlations

- “Modulus 100” over “Hardness”



### Find other correlations

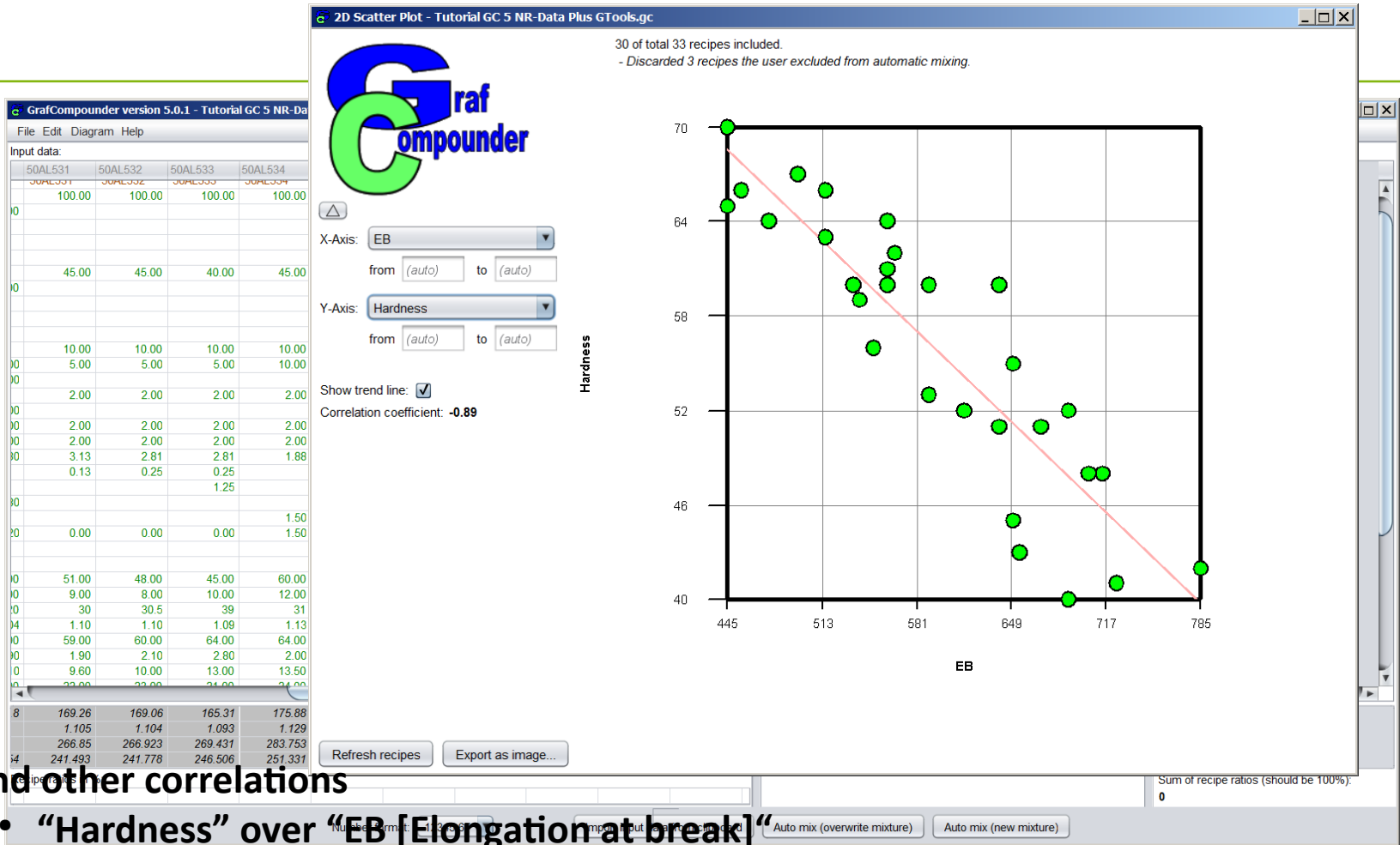
- “Modulus 100” over “Hardness”
- Eliminate indicated compound as possible outlier (confirm in data sets)
- Correlation coefficient increase: 0,94



### Find other correlations in data:

- “EB” [Elongation at Break] over “Modulus 300” (correlation coefficient: - 0,96)





### Find other correlations

- “Hardness” over “EB [Elongation at break]”
- Correlation coefficient: - 0,89)

GrafCompounder version 5.0.1 - Tutorial GC 5 NR-Data Plus GTools.gc

File Edit Diagram Help

Input data: Frequency Distribution Diagram  
2D Scatter Plot  
3D Scatter Plot

Code	50AL511	50AL512	50AL513	50AL514	50AL515
A001	100.00	100.00	100.00	100.00	100.00
A003	290.00	0.92			
A004	310.00	0.92			
B004	115.00	1.80	10.00	30.00	50.00
B004	115.00	1.80			45.00
B005	115.00	1.80			
B006	115.00	1.80			
C010	24.00	2.71	20.00	20.00	20.00
D002	116.00	0.89	5.00	25.00	45.00
D001	120.00	0.90			
E001	385.00	5.60	5.00	5.00	5.00
E021	150.00	1.80			
F001	165.00	0.92	2.00	2.00	2.00
F101	130.00	0.90			
G001	924.00	1.15			
G001	924.00	1.15	2.00	2.00	2.00
H001	158.00	1.80	1.88	1.88	1.88
K804	420.00	1.28			
H802	360.00	1.28			
H803					
K001	396.00	1.11			
K005	708.00	1.28	0.63	0.63	0.63

Ingredients:

- SMR 10
- SMR CV60
- SMR L
- N330
- N336
- N550
- N660
- N762
- CaCO3
- Naphtenic Oil
- Paraffinic Oil
- ZnO
- Zn-2EH
- Stearic Acid
- Paraffin Wax
- TMQ
- IPPD
- S-80
- DPG-80
- DTDM-80
- TBTD-80
- TMTD-80
- CBS-80

Properties:

- MooneyML(1+4) 100°C
- Mooney I5 / 120°C
- MH-ML
- Density
- Hardness
- M 100
- M 300

Criteria:

Name	Min	Max	From	To	Weight	Trdoff
SMR 10	0	100				
SMR CV60	0	100				
SMR L	0	100				
N330	0	75				
N336	0	40				
N550	0	60				
N660	0	25				
N762	0	85				
CaCO3	0	20				
Naphtenic Oil	0	45				
Paraffinic Oil	0	10				
ZnO	0	10				
Zn-2EH	0	2				
Stearic Acid	0	2				
Paraffin Wax	0	4				
TMQ	0	2				
IPPD	2	4				
S-80	0.31	4.06				
DPG-80	0	0.25				
DTDM-80	0	0				
TBTD-80	0	0.8				
TMTD-80	0	1.5				
CBS-80	0	2.63				
MooneyML(1+4)	27	80				
Mooney I5 / 120°C	8	39				
MH-ML	11.5	33				
Density	1.02	1.21				
Hardness	40	70				
M 100	0.6	2.25				
M 300	1.8	14.2				

Output:

Total ingredients	146.51	186.51	226.51	161.51	201.51
Density (calc.)	1.097	1.116	1.128	1.138	1.148
Cost (per vol)	262.484	237.406	220.591	259.16	235.861
Cost (per mass)	239.274	212.729	195.559	227.733	205.454

Recipe ratios in %:

Total ingredients	132.63	251.51
Density (calc.)	1.027	1.214
Cost (per vol)	219.811	326.37
Cost (per mass)	187.552	301.915

Sum of recipe ratios (should be 100%): 0

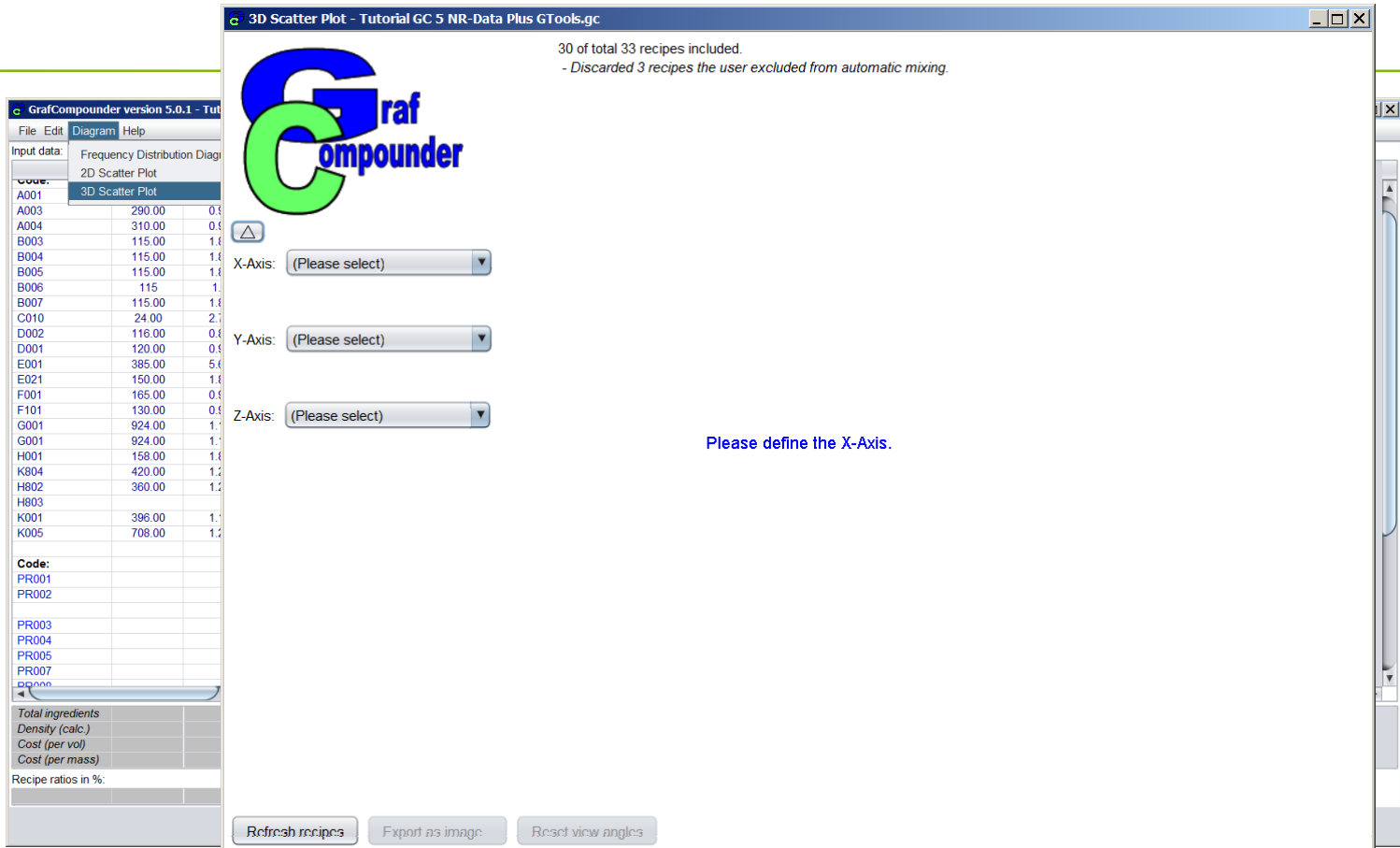
Number format: 12345.67

Import input data from clipboard

Auto mix (overwrite mixture)

Auto mix (new mixture)

Click „Diagram“, Chose „3D Scatter Plot“



The screenshot shows the GrafCompounder software interface. On the left is a data table with columns for 'Code', 'Density (calc.)', 'Cost (per vol)', and 'Cost (per mass)'. The main window is titled '3D Scatter Plot - Tutorial GC 5 NR-Data Plus GTools.gc' and contains the GrafCompounder logo, a status message, axis selection dropdowns, and a 'Please define the X-Axis.' prompt.

Code	Density (calc.)	Cost (per vol)	Cost (per mass)
A001			
A003	290.00	0.8	
A004	310.00	0.8	
B003	115.00	1.8	
B004	115.00	1.8	
B005	115.00	1.8	
B006	115	1.	
B007	115.00	1.8	
C010	24.00	2.7	
D002	116.00	0.8	
D001	120.00	0.8	
E001	385.00	5.4	
E021	150.00	1.8	
F001	165.00	0.8	
F101	130.00	0.8	
G001	924.00	1.7	
G001	924.00	1.7	
H001	158.00	1.8	
K804	420.00	1.2	
H802	360.00	1.2	
H803			
K001	396.00	1.7	
K005	708.00	1.2	

3D Scatter Plot - Tutorial GC 5 NR-Data Plus GTools.gc

30 of total 33 recipes included.  
- Discarded 3 recipes the user excluded from automatic mixing.

GrafCompounder

X-Axis: (Please select)

Y-Axis: (Please select)

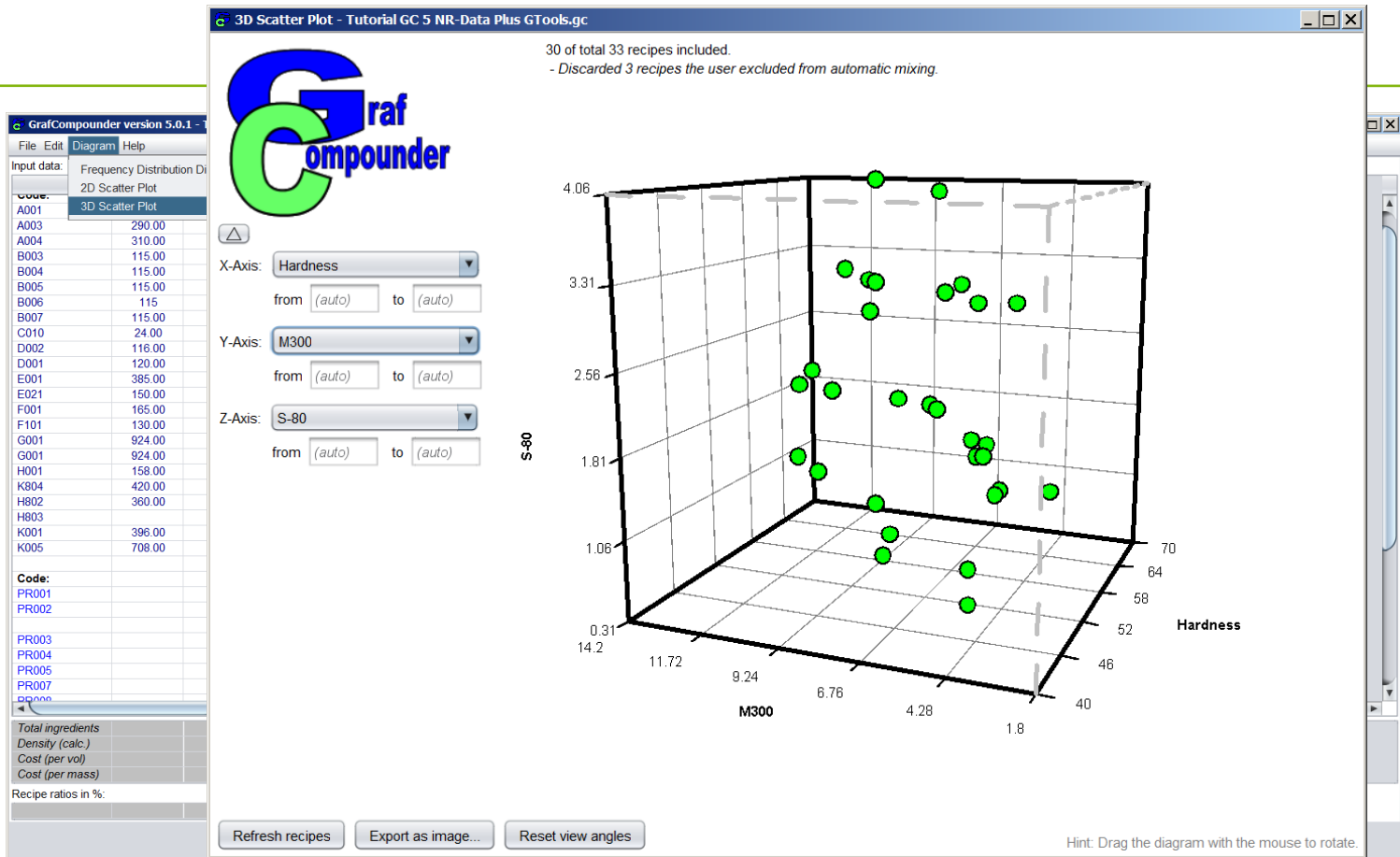
Z-Axis: (Please select)

Please define the X-Axis.

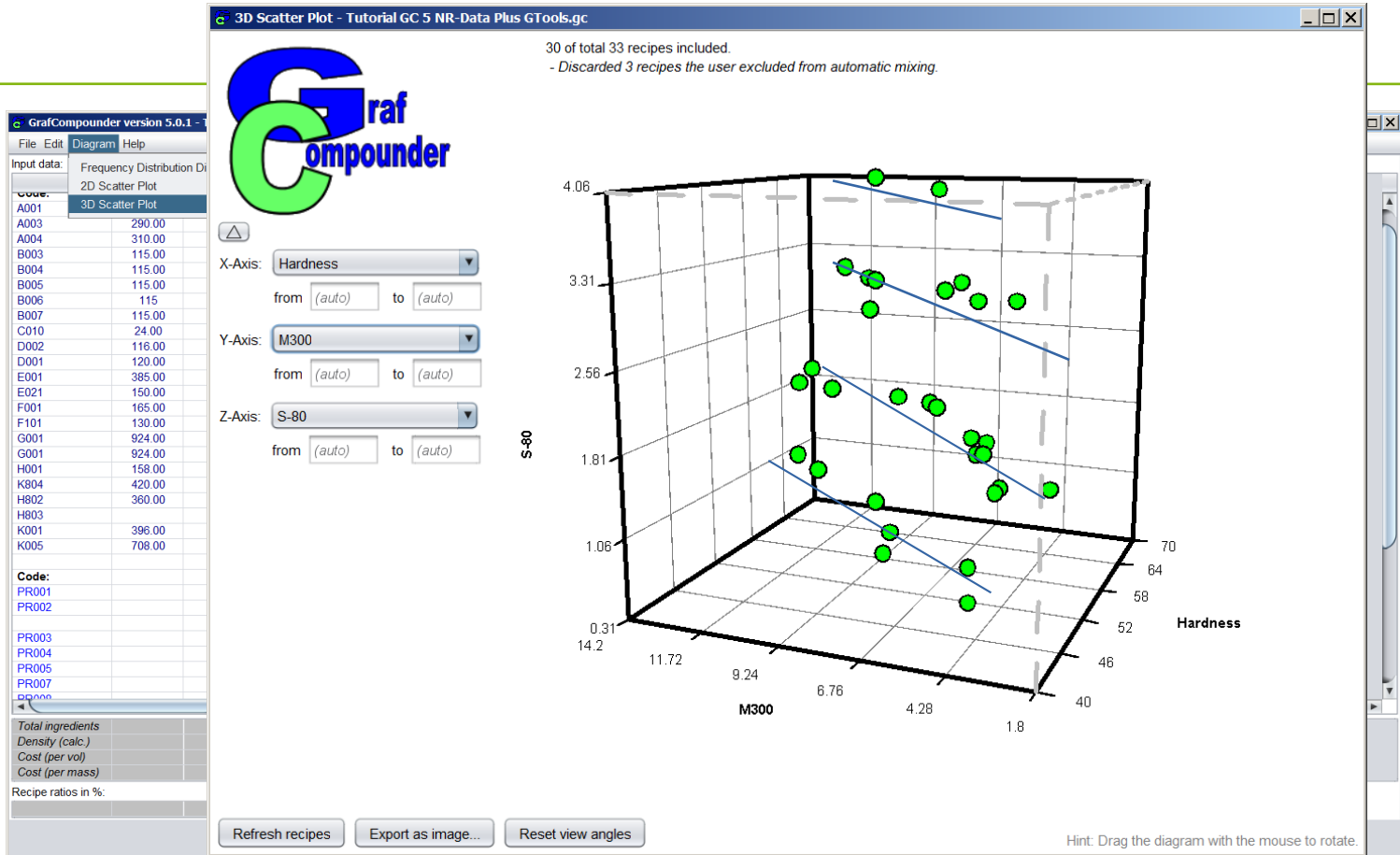
Refresh recipes    Export as image    Reset view angles

Click „Diagram“, Choose „3D Scatter Plot“

- Select x, y, z – axis

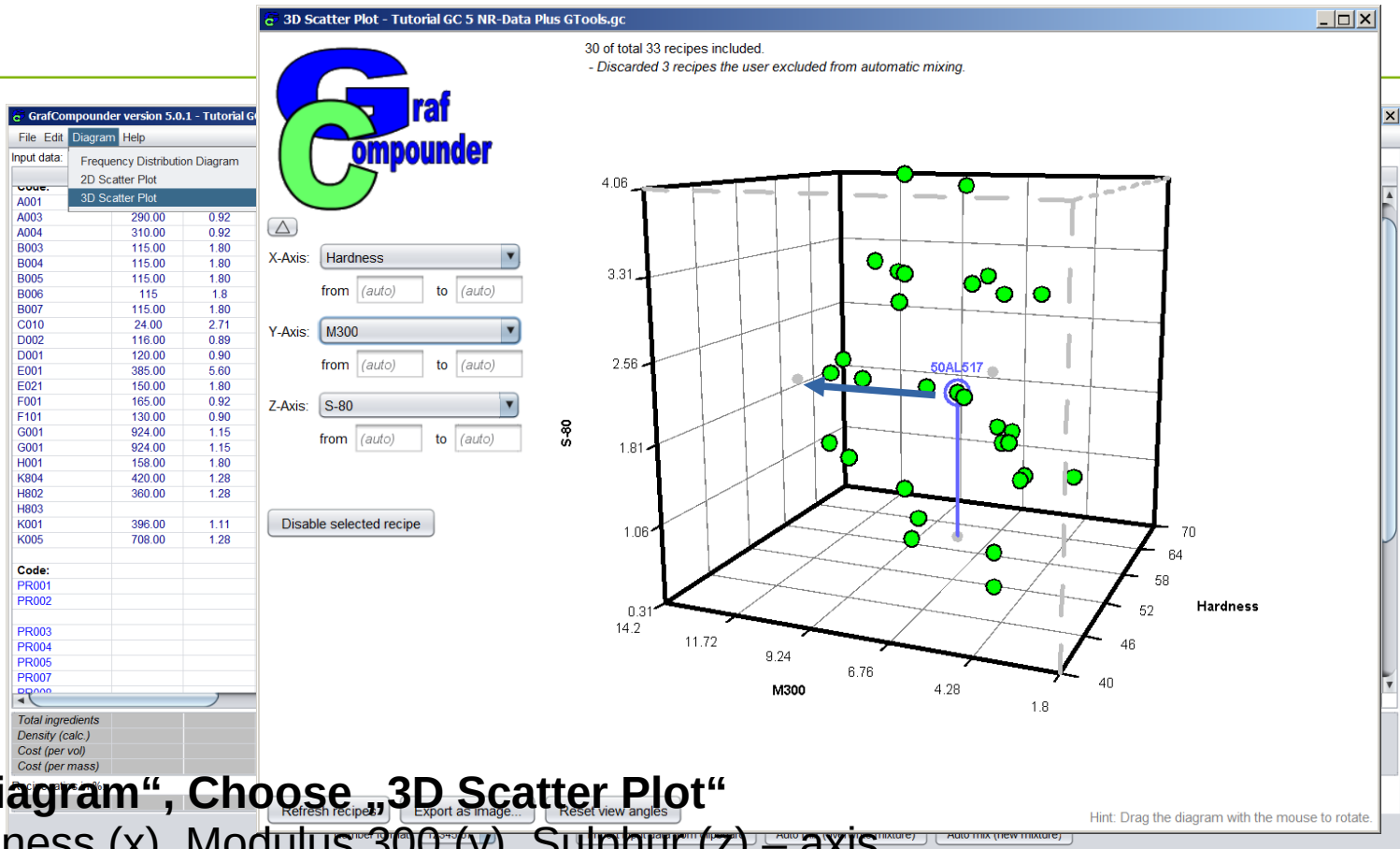


- Click „Diagram“, Choose „3D Scatter Plot“**
- **Hardness (x), Modulus 300 (y), Sulphur (z) – axis**



Click „Diagram“, Choose „3D Scatter Plot“

- Hardness (x), Modulus 300 (y), Sulphur (z) – axis
- Evaluate influence of Sulfur on Hardness and Modulus

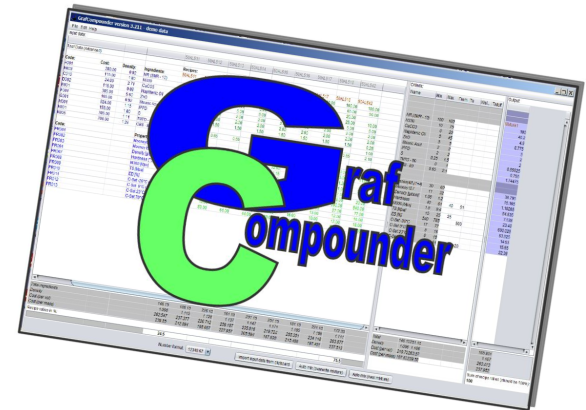


Click „Diagram“, Choose „3D Scatter Plot“

- Hardness (x), Modulus 300 (y), Sulphur (z) – axis
- Identify coordinates of compound
- Z-axis show small dot: exact position on x/z plane

## Conclusion

- Frequency diagram for spread of data in data set
- 2D Scatter plot for evaluation of correlations
  - trendline and correlation coefficient
- 3D Scatter Plot for influence of ingredients on properties (or any other combination)





- ➔ **Release „G<sup>raf</sup>Compounder“ Version 5.0  
July 2023**
- ➔ **Upgrades from earlier versions upon request**

**Send us your:  
Questions, Remarks, Discussion ?**

***More information under: [www.grafcompounder.com](http://www.grafcompounder.com)***