

Quotients

Introduction

- The GHS provides different means for classifying a preparation
 - Data on the preparation itself
 - Data on a similar preparation --- bridging principle
 - Data on the raw material ingredients of the preparation
- The *Quotients* are the results of applying the data provided by the raw materials into the formulae and/or to the limits presented by the legislation
- The *Quotients* aid not only in understanding the calculated results, but also in seeing from where hazards are arising (what ingredients are causing them).

Please direct additional questions to our hotline
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Via email to info@dr-software.com

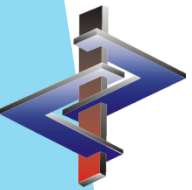
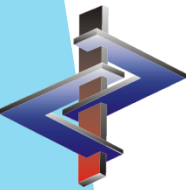


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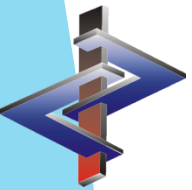
1. Quotient Basics

For every preparation, you can access the *Quotients* here:

The screenshot shows the 'Maintenance of preparations' software window. The 'Basic screen' tab is active, displaying preparation details for 'Resin solution X 50'. The 'GHS classification' section lists several hazard classes, some of which are greyed out. The 'Transport' section shows ADR, DOT, IMDG, and IATA codes. The 'DPD classification' section shows various hazard codes. The 'NFPA' diamond is visible with values 2, 3, and 0. The 'Quotients' menu item is highlighted in the bottom toolbar.

All applicable classes of Health and Environmental Hazards will be accessible. Ones that are greyed-out, do not apply to this preparation:

The dialog box titled 'Toxicological values (3.1)' displays a list of hazard classes. The first item, 'A Toxicological values (3.1)', is highlighted in yellow. Other items include 'B Skin and eye corrosion and irritation (3.2, 3.3)', 'C Respiratory or skin sensitization (3.4)', 'D Cell harming substances (3.5 - 3.7)', 'E Specific target organ systemic toxicity (3.8, 3.9)', 'F Hazardous to the aquatic environment (4.1)', 'G Hazardous to the ozone layer (5.1)', and 'H EU hazard symbols and risk phrases'.



2. Toxicological Values (3.1)

1. Here you can see the basic country to which your ChemGes is set. This indicates for which country, the data is provided for the ingredient substances.
2. The *Results* list the calculation results on a country-specific basis, showing the GHS nuances taken into consideration in the application of the formulae.
3. The *Limits* table is taken from the legislation and marked in yellow are the results superimposed upon that table.
4. This lists the substances that are contained at their consideration limit or above and are thus applied to the formula.
5. Here are the corresponding percentages that each of the substances under #4, are contained in the preparation.
6. These are the toxicological values and their corresponding categories within class 3.1, per raw material.
7. This indicates that if the 'tox-Value' of a substance is not available, the 'default value' as given in the GHS, that corresponds to the category in which the substance is classified, is given.

The calculated ATEs of the preparation are then considered the LD50/LC50 of the preparation, and thus lead to classification.

Red values are default values from GHS

Type of test	Result	1	2	3	4	5 (GHS)
oral	3.448 / 4.000 / 512	5	50	300	2.000	5.000
dermal	0	50	200	1.000	2.000	5.000
inhalation	54,4 / 60 / 5125ml / 0	0,5	2	10	20	5.000

Product code	Description	%	oral	dermal	inhalative		
			Cat.	Value	Cat.	Value	
108-88-3	toluene	20,0000		5.000		12.124	5.320
141-78-6	ethyl acetate	10,0000		5.620			1.600
67-63-0	propan-2-ol	5,0000		5.045		12.800	30
78-92-2	butanol	5,0000		6.480			
50-00-0	formaldehyde ... %	5,0000	3	>200			3

$$\frac{100}{ATE_{mix}} = \sum \frac{C_i}{ATE_i}$$

3. Skin and eye corrosion and irritation (3.2, 3.3)

1. Shows the final classification result of the preparation.
2. The limits that are applied for classification (in these classes, as in the following classes, there is not a formula for calculating the classification, but limits that must be reached).
3. The pH value for the whole preparation, if there is one, is used for the classification.
4. List of substances that have reached the consideration limit and are thus used in the classification.
5. The classification of these ingredients.
6. Special limits for classification, that apply to these ingredients and are used in the classification of the mixture.

Software window: Skin and eye corrosion and irritation

GHS Type: USA

Type of hazard	Category	Total %		Standard limits (simplified)
		Cat.1	Cat.2	
3.2 Skin corrosion/irritation	2	5	70	1: 5%; 1-2: 1%; 2: 10%
3.3 Serious eye damage/eye irritation	2	5	70	1: 3%; 1-2: 1%; 2: 10%

pH value: ?

Product code	Description	%	Corrosive/Irritant		Special limits
			Skin	Eyes	
25068-38-6	reaction product: bisphenol-A-(epichlorhydrin) ...	50,0000	2	2	3.3/2: 5%, 3.2/2: 5%
108-88-3	toluene	20,0000	2		
141-78-6	ethyl acetate	10,0000		2	
67-63-0	propan-2-ol	5,0000		2	
78-92-2	butanol	5,0000		2	
50-00-0	formaldehyde ... %	5,0000	1	1	3.2/1: 25%, 3.2/2: 5%, 3.3/2: 5%

[Esc] Exit [F1] Change of the GHS type

4. Respiratory or skin sensitization

1. Shows the final classification result of the preparation.
2. Lists the limits that lead to classification.
3. These are the substances that are contained at or above their consideration limit and are thus used for classification.
4. Here are the classifications and special limits of the ingredient raw materials.

Sensitizing substances

File Edit Help (43.2.5) 11.521, 5.290(+), (88%), 695(-), 10(=), 1 User, M 2,72MB, HD

GHS type USA

Type of hazard	Category	Total - %			Standard limits
		1	1A	1B	
Skin sensitization	1	55	0	0	1%
Respiratory sensitization		0	0	0	Solid/liquid: 1%, gaseous: 0,2%

Product code	Description	%	Category		Special limits
			Skin	Resp. syst.	
25068-38-6	reaction product: bisphenol-A-(epichlorhydrin) ...	50,0000	1		
50-00-0	formaldehyde ... %	5,0000	1		Skin: 0,2%

[Esc] Exit [F1] Change of the GHS type

5. Cell harming substances (3.5-3.7)

1. Shows the final classification results of the preparation.
2. These are the limits applied to the substances for classification.
3. The list of substances that are contained in the preparation at or above their consideration limit and are thus used for classification.
4. Here are the classifications and Special Limits of the raw materials.

In this example, the *Special Limits* applied are the IARC and NTP classification of a substance. Please see OSHA HCS Appendix F, on the application of this data for classification.

Cell harming substances

File Edit Help (43.2.5) 11.565, 5.308(+), (88%), 70 User, M 2,72MB, HD 0,56MB, C

GHS type USA

Type of hazard	Cat.	Total %				Lactation	Standard limits
		1A	1B	2			
3.5 Germ cell mutagenicity	2	0	0	5		1A, 1B: 0,1%; 2: 1%	
3.6 Carcinogenicity	1B	0	5	0		1A, 1B: 0,1%	
3.7 Reproductive toxicity	2	0	0	20	0	1A, 1B: 0,1%; 2: 3%; Lactation: 0,1%	

Product code	Description	%	Category			Special limits
			3.5 Muta.	3.6 Carc.	3.7 Repr.	
108-88-3	toluene	20,0000			2	
50-00-0	formaldehyde ... %	5,0000	2	1B		IARC: 1, NTP: K

[Esc] Exit [F1] Change of the GHS type

6. Specific target organ systemic toxicity (3.8, 3.9), Hazardous to the aquatic environment (4.1)

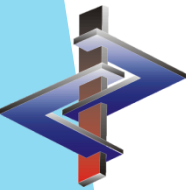
1. Shows the final calculated classification of the preparation.
2. These are the limits from the legislation, that lead to classification.
3. Here are the substances contained at or above their consideration limit and thus used in the calculation of the classification.
4. This is the classification of each individual substance.
5. Any special limits applicable to any of the substances.

Specific system organ systemic toxicity	category	1	2	3	Total %	Standard limits
3.8 Single exposure	3	0	0	40		1,2: 1%; 1-2: 1%; 3: 20%
3.9 Repeated exposure	2	0	20			1,2: 1%; 1-2: 1%

Product code	Description	%	Single Exposure	Repeated Exposure	Special limits
108-88-3	toluene	20,0000	3	2	
141-78-6	ethyl acetate	10,0000	3		
67-63-0	propan-2-ol	5,0000	3		
78-92-2	butanol	5,0000	3		

Aquatic environment	Calculated tox value	Total % (x M)				Standard limits
		1	2	3	4	
acute	-	30	0	0	0	1: ≥25%; 2: 10x1+2≥25%; 3: 100x1+10x2+3≥25%
chronic	-	30	25	0	0	1: ≥25%; 2: 10x1+2≥25%; 3: 100x1+10x2+3≥25%; 4: 1+2+3+4≥25%

Product code	Description	%	acute water hazard	chronic	Special limits
123-45-6	Name	30,0000	1	1	
25068-38-6	reaction product: bisphenol-A-(epichlorhydrin	25,0000		2	



8. Hazardous to the ozone layer

This screen simply shows the substance that leads to classification and at what percentage it is contained, as well as any limits or special limits that apply.

Hazardous for the ozone layer

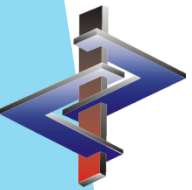
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GHS type EU

Hazardous for the ozone layer Total % Standard limit %

Product code	Description	%	Special limits
123-45-6	Name	30,0000	

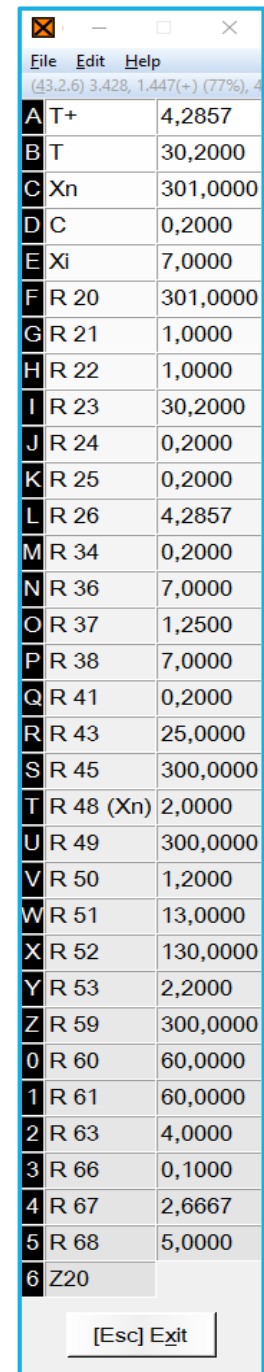
[Esc] Exit [F 1] Change of the GHS type



9. EU hazards symbols and risk phrases

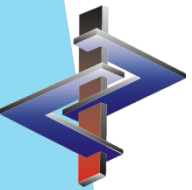
These are the quotients based on the DSD/DPD classification system (R and S Phrases). This system has been mostly replaced by the GHS, world-wide.

The calculation uses the percentage that a substance is contained and the limit value. This result is then added to the results (quotients) of other substances that exhibit the same hazard. When the resulting quotient exceeds 1.0, then the final preparation is classified in the corresponding class.



A	T+	4,2857
B	T	30,2000
C	Xn	301,0000
D	C	0,2000
E	Xi	7,0000
F	R 20	301,0000
G	R 21	1,0000
H	R 22	1,0000
I	R 23	30,2000
J	R 24	0,2000
K	R 25	0,2000
L	R 26	4,2857
M	R 34	0,2000
N	R 36	7,0000
O	R 37	1,2500
P	R 38	7,0000
Q	R 41	0,2000
R	R 43	25,0000
S	R 45	300,0000
T	R 48 (Xn)	2,0000
U	R 49	300,0000
V	R 50	1,2000
W	R 51	13,0000
X	R 52	130,0000
Y	R 53	2,2000
Z	R 59	300,0000
0	R 60	60,0000
1	R 61	60,0000
2	R 63	4,0000
3	R 66	0,1000
4	R 67	2,6667
5	R 68	5,0000
6	Z20	

[Esc] Exit



More detailed Information can be found in the Manual to ChemGes

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