CRODA | Pharma

SMART SCIENCE TO IMPROVE LIVES™



USING HLB METHOD **for topical formulations**

The hydrophilic–lipophilic balance (HLB) method is commonly used as a practical guide for surfactant selection, helping topical drug formulators save a significant amount of time during development.

Learn how HLB is used to identify the ideal emulsion system for topical delivery of small molecule APIs.

This guide contains:

- Expansive list of our topical excipient offerings with known HLB values
- Required HLB values for oil excipients
- HLB computograph used by formulators to calculate ideal surfactant ratios

HLB values (in numerical order)

For some excipients in our product range, the HLB value is difficult to calculate due to their complexity. The below surfactants are suitable for the emulsification of a diverse selection of lipophilic materials.

Approximate HLB	Product name	Chemical description
1.0	**Super Refined™ Oleic Acid**	Oleic Acid
1.8	**Span™ 85 pharma**	Sorbitan Trioleate
3.0	**Cithrol™ GMO HP**	Glyceryl Oleate
3.4	**Cithrol™ GMS 40 pharma**	Glyceryl Monostearate
3.7	**Span™ 83 pharma**	Sorbitan Sesquioleate
4.0	**Medilan™, Pharmalan™**	Lanolin
4.0	**Super Hartolan™ pharma**	Lanolin Alcohol
4.3	**Span™ 80 HP, Span™ 80 pharma**	Sorbitan Oleate
4.5	**Super Refined™ PGML**	Propylene Glycol Monolaurate
4.7	**Span™ 60 pharma**	Sorbitan Stearate
4.9	**Brij™ S2 pharma**	Steareth-2
4.9	**Super Refined™ Brij™ O2**	Oleth-2
5.0	**Croduret™ 7 pharma**	PEG-7 Hydrogenated Castor Oil
5.5	**Cithrol™ DPHS pharma**	PEG-30 Dipolyhydroxystearate
5.5	**Cithrol™ PG32IS pharma**	Polyglyceryl-3 Diisostearate
6.7	**Span™ 40 pharma**	Sorbitan Palmitate
8.0	**Super Refined™ Hexyl Laurate**	Hexyl Laurate
8.0	**Brij™ LT3 pharma**	C12-C13 Pareth-3
8.6	**Span™ 20 HP, Span™ 20 pharma**	Sorbitan Laurate
8.7	**Arlacel™ 983 pharma**	Glyceryl Stearate (and) PEG-30 Stearate
9.0	**Arlatone™ TV pharma**	Polyoxyethylene (40) Sorbitol Peroleate
9.1	**Brij™ O5 pharma**	Oleth-5
9.5	**Brij™ LT4 pharma**	C12-C13 Pareth-4
10.8	**Myrj™ S8 pharma**	PEG-8 Stearate
11.0	**Arlacel™ 165 pharma**	Glyceryl Stearate/PEG-100 Stearate
11.6	**Super Refined™ Propylene Glycol**	Propylene Glycol
12.4	**Brij™ O10 pharma**	Oleth-10
12.4	**Brij™ S10 pharma**	Steareth-10
12.9	**Super Refined™ Benzyl Alcohol**	Benzyl Alcohol
13.0	**Croduret™ 40 pharma**	Poloxyl 40 Hydrogenated Castor Oil
13.0	**Etocas™ 35 pharma, Super Refined™ P35 Castor Oil**	Polyoxyl 35 Castor Oil/PEG-35 Castor Oil
13.1	**Crodasinic™ LS95 pharma**	Sodium Lauroyl Sarcosine
13.4	**Brij™ CS12 pharma**	Ceteareth-12
14.3	**Brij™ L9 pharma**	Polidocanol
14.5	**Super Refined™ Oleyl Alcohol**	Oleyl Alcohol
14.9	**Tween™ 60 HP, Tween™ 60 pharma, Super Refined™ Polysorbate 60**	Polysorbate 60

HP refers to our High Purity version

Approximate HLB	Product name	Chemical description
15.0	**Tween™ 80 HP, Tween™ 80 pharma, Super Refined™ Polysorbate 80**	Polysorbate 80
15.3	**Brij™ S20 pharma**	Steareth-20
15.5	**Brij™ O20 pharma**	Oleth-20
15.6	**Tween™ 40 pharma**	Polysorbate 40
15.7	**Brij™ CS20 pharma**	Ceteareth-20
15.7	**Cetomacrogol™ 1000 pharma**	Polyoxyl 20 Cetostearyl Ether
16.0	**Super Refined™ DEGEE**	Diethylene Glycol Monoethyl Ether
16.2	**Brij™ CS25 pharma**	Ceteareth-25
16.7	**Tween™ 20 HP, Tween™ 20 pharma, Super Refined™ Polysorbate 20**	Polysorbate 20
16.7	**Myrj™ S40 pharma**	Poloxyl 40 Stearate
16.9	**Brij™ L23 pharma**	Laureth-23
18.8	**Myrj™ S100 pharma**	PEG-100 Stearate

HP refers to our High Purity version

Required HLB

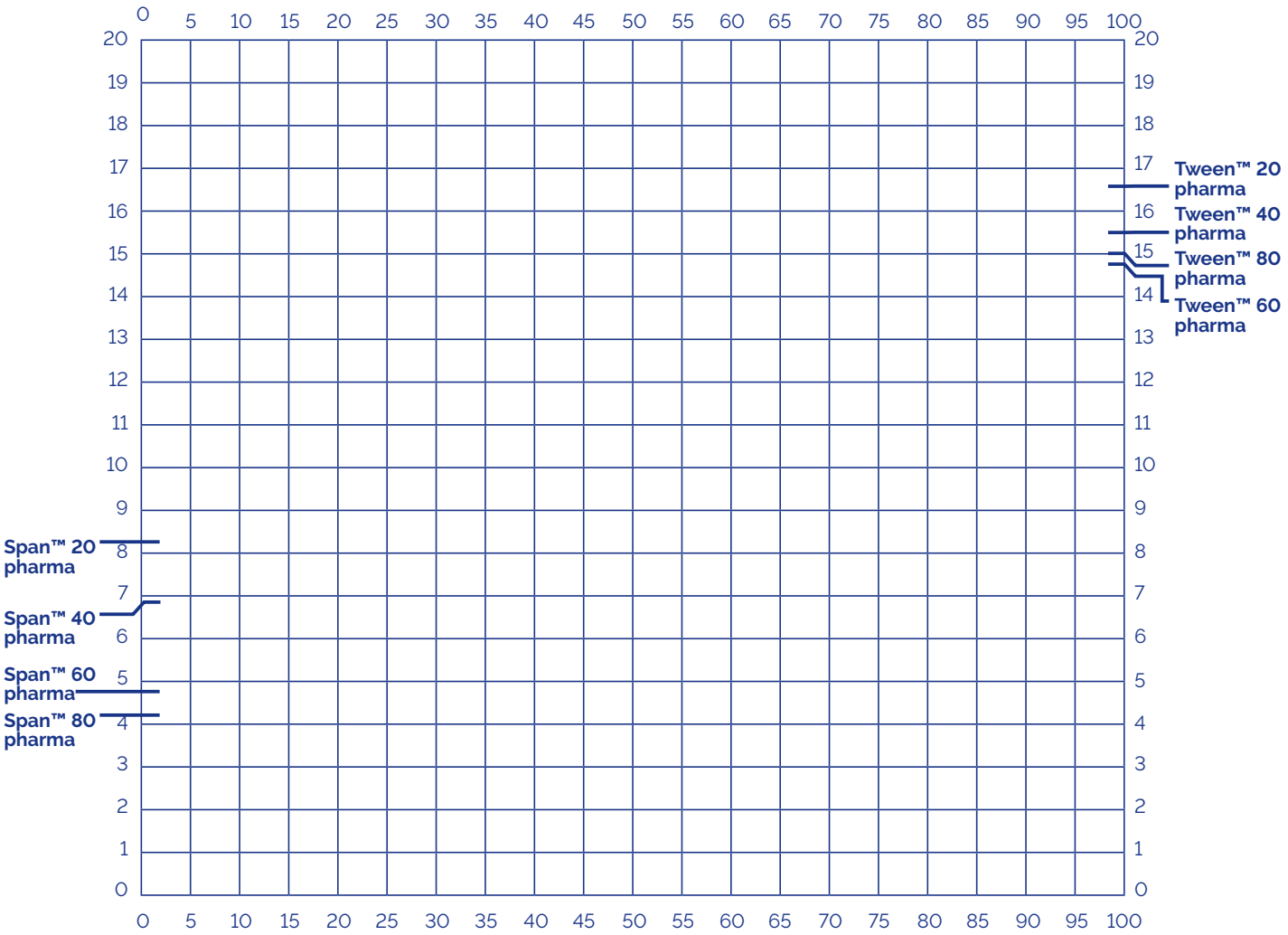
Oils do not have a HLB. Instead, they have a required HLB, which is the HLB required by a surfactant to create a stable emulsion with the oil. Our oils can be emulsified with various surfactants to create a unique topical formulation. Below are some of our most lipophilic excipients, for which the required HLB value is known.

Required HLB	Product name	Chemical description
7.0	**Crodamol™ SS pharma**	Cetyl Esters Wax
7.0	**Super Refined™ Oleyl Oleate**	Oleyl Oleate
7.7	**Super Refined™ Olive Oil**	Olive Oil
7.7	**Super Refined™ Soybean Oil**	Soybean Oil
7.8	**Super Refined™ Peanut Oil**	Peanut Oil
7.8	**Super Refined™ Sesame Oil**	Sesame Oil
7.9	**Super Refined™ Corn Oil**	Corn Oil
7.9	**Super Refined™ Cottonseed**	Cottonseed Oil
8.0	**Super Refined™ Myristyl myristate**	Tetradecanoic Acid, Tetradecyl Ester
8.0	**Crodamol™ PC pharma**	Propylene Glycol, Dicaprylate/Dicaprate
9.0	**Crodamol™ DA pharma**	Diisopropyl Adipate
10.0	**Super Refined™ GTCC, Crodamol™ GTCC pharma**	Caprylic/Capric Triglyceride
10.0	**Crodamol™ CP pharma**	Cetyl Palmitate
10.0	**Super Refined™ IPM, Crodamol™ IPM**	Isopropyl Myristate
10.0	**Super Refined™ IPP, Crodamol™ IPP pharma**	Isopropyl Palmitate
11.0	**Crodamol™ EO pharma**	Ethyl Oleate
11.0	**Crodamol™ ISIS pharma**	Isooctadecanoic Acid, Isooctadecyl Ester
12.0	**Crodamol AB™ pharma**	C12-15 Alkyl Benzoate
14.0	**Super Refined™ Castor Oil**	Castor Oil

HLB Computograph

If you are calculating a ratio of emulsifiers to reach a desired HLB, you can use the HLB Computograph. The HLB Computograph can be placed on a plastic cover or use a paper copy for your own calculations. HLB values of the Span™ range are marked on the left and those HLB values of the Tween™ range on the right. The percentage of Tween is shown from 0 to 100 across the bottom and top.

If you are working with a Span and a Tween, you would draw a line with a ruler from the HLB value of one to the other. Next, draw a horizontal line for HLB value you would like your blend to have. By drawing a perpendicular line through the intersection of your two previous lines, you can determine the percentage of Tween you need at the top or bottom of the graph. You may also enter the HLB values of any emulsifiers you would like on the left or the right to compute the HLB of any desired blend.



The HLB is transferable to all non-ionic emulsifiers. To screen for the best HLB, Span 80/Tween 80, which are cold processible emulsifiers, are utilised to find the optimum ratio and are perfect to use as a reference for formulation work. The optimum HLB result obtained can then be used for other emulsifier combinations.

HLB values of blended Croda surfactants																					
	100/0	95/5	90/10	85/15	80/20	75/25	70/30	65/35	60/40	55/45	50/50	45/55	40/60	35/65	30/70	25/75	20/80	15/85	10/90	5/95	0/100
Span 20*/ Tween 20**	8.6	9.0	9.4	9.8	10.2	10.6	11.0	11.4	11.8	12.3	12.6	13.1	13.4	13.9	14.3	14.7	15.1	15.5	15.9	16.3	16.7
Span 40*/ Tween 40**	6.7	7.1	7.6	8.0	8.5	8.9	9.4	9.8	10.2	10.7	11.1	11.6	12.0	12.5	12.9	13.3	13.8	14.2	14.7	15.1	15.6
Span 60*/ Tween 60**	4.7	5.2	5.7	6.2	6.7	7.3	7.7	8.3	8.8	9.3	9.8	10.3	10.8	11.3	11.8	12.4	12.9	13.4	13.9	14.4	14.9
Span 80*/ Tween 80**	4.3	4.9	5.3	5.9	6.4	7.0	7.5	8.0	8.5	9.1	9.6	10.2	10.7	11.2	11.8	12.3	12.8	13.4	13.9	14.4	15.0

*Applies to all Croda Pharma Span varieties, including HP and pharma grades
**Applies to all Croda Pharma Tween varieties, including HP, pharma, and Super Refined Polysorbates

Span™ and Tween™ HLB Key

Product name	HLB
Span™ 20*	8.6
Span™ 40*	6.7
Span™ 60*	4.7
Span™ 80*	4.3

Product name	HLB
Tween™ 20**	16.7
Tween™ 40**	15.6
Tween™ 60**	14.9
Tween™ 80**	15.0



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MORE THAN JUST YOUR INGREDIENTS PROVIDER

Free samples and expert formulation support

Partner with Croda Pharma to develop your next-generation formulations with confidence.

Croda Pharma also offers custom excipient development, tailored to your specific formulation requirements.

Contact us to request a sample or speak with one of our experts to learn how Croda Pharma can support your formulation goals.

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