



Utilising HLB method for topical formulations

The 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	INCI nomenclature
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

Approximate HLB	Product name	INCI nomenclature
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	Cetareth-20
15.7	Cetomacrogol™ 1000 pharma	Polyoxyl 20 Cetostearyl Ether
16.0	Super Refined™ DEGEE	Diethylene Glycol Monoethyl Ether
16.2	Brij™ CS25 pharma	Cetareth-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

Required HLB

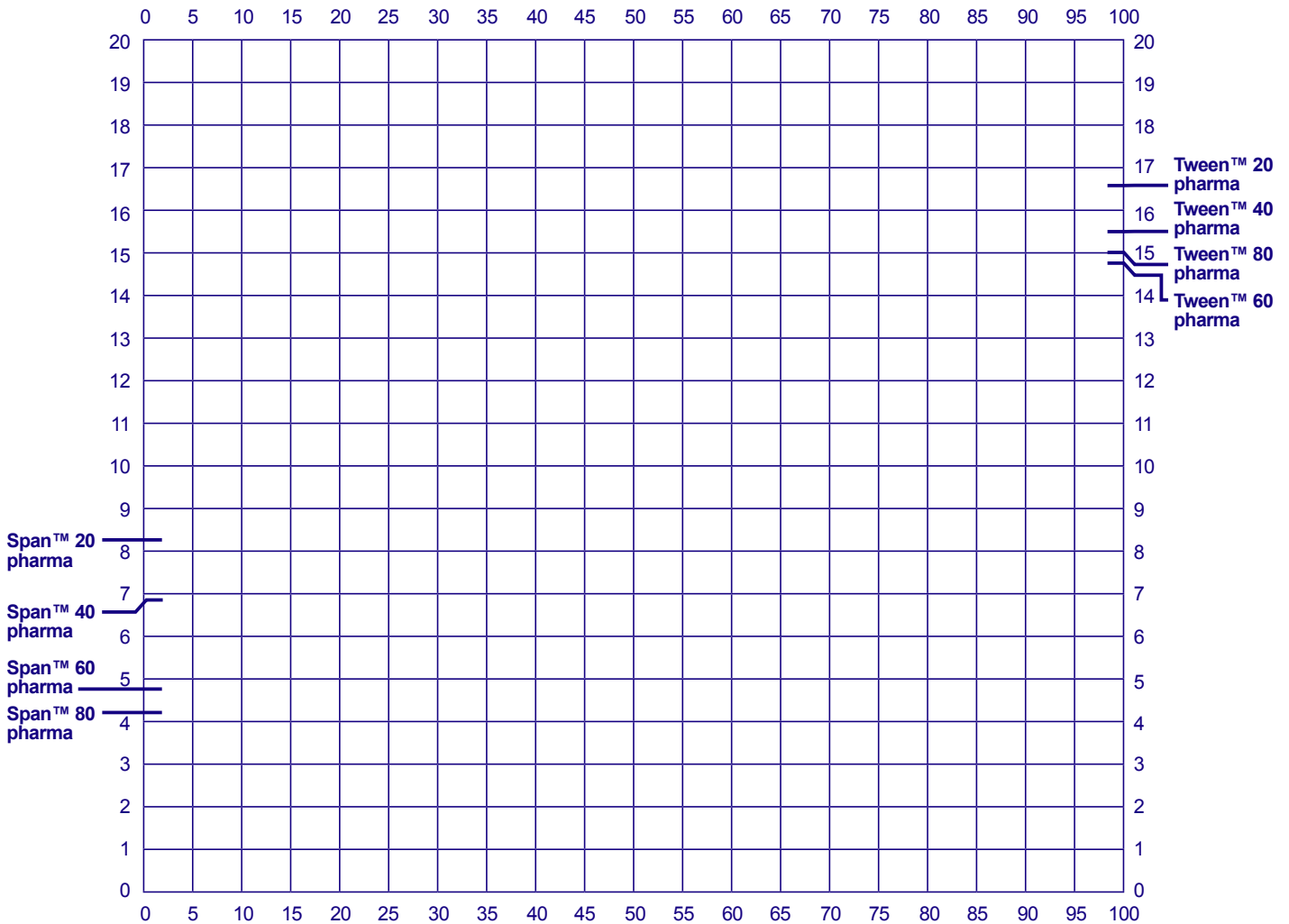
Oils do not have an HLB. Instead, they have a required HLB, which is the HLB required by a surfactant to create a stable emulsion with the oil. Our oils can be emulsified with various surfactants to create a unique topical formulation. Below are some of our most lipophilic excipients, for which the required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

Required HLB	Product name	INCI nomenclature
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 Myri	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	Medium-Chain Triglycerides
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 ratio of emulsifiers to reach a desired HLB, you can use the HLB Computograph. The HLB computograph can be placed in 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.



Croda Pharma

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 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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