

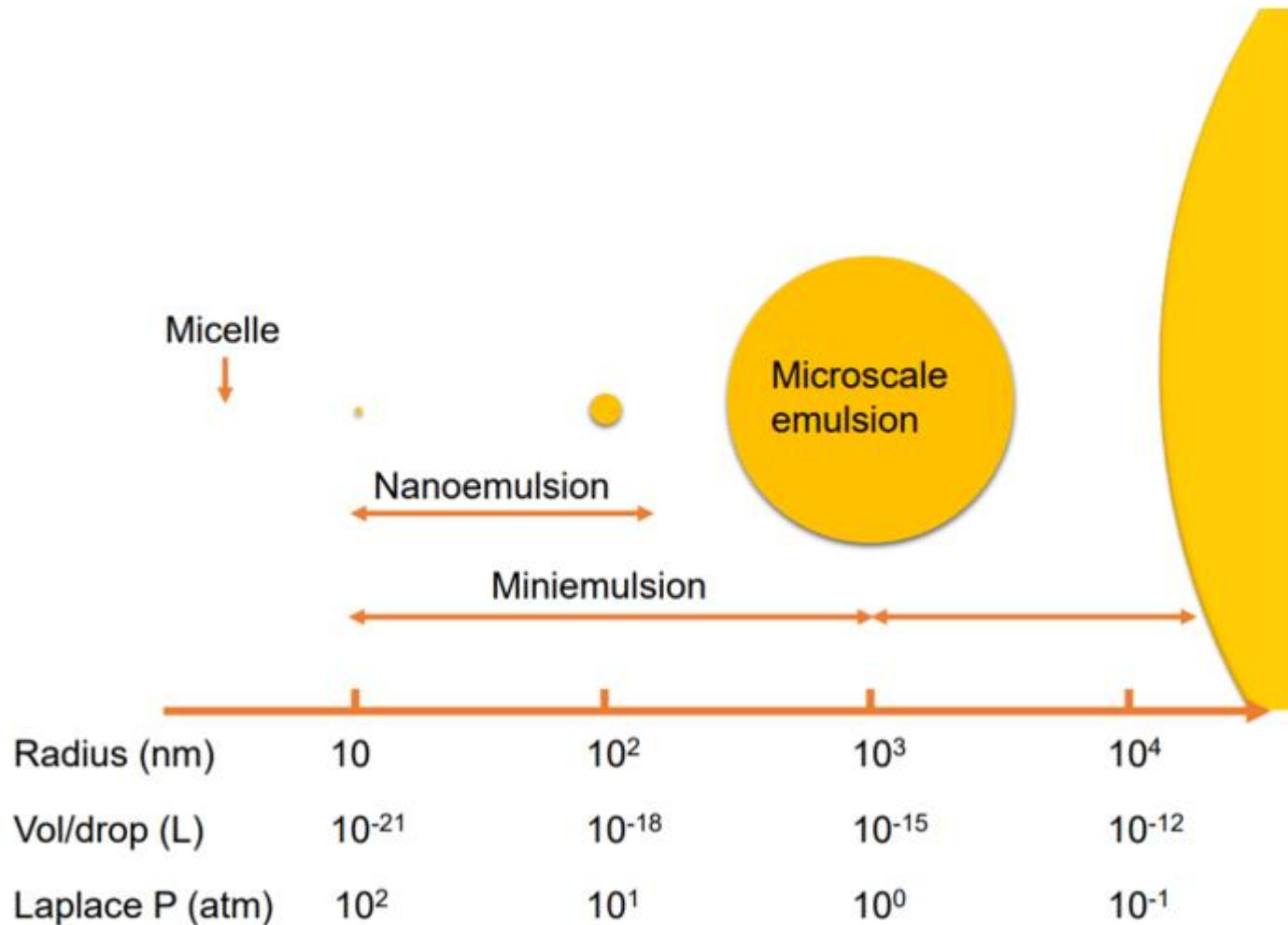
# **Aqua Phytoplex Series:**

**SUNJIN BEAUTY SCIENCE**

**March. 2020**

**ver 2.0**

# Size scales of Emulsions

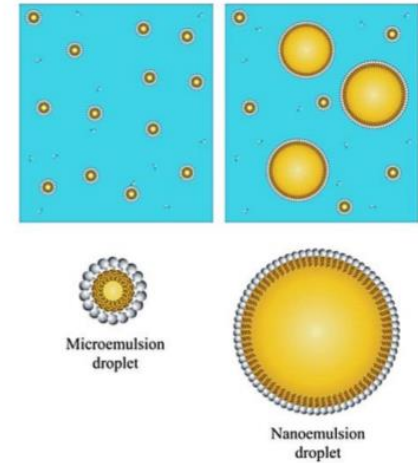


\* $\sigma=10\text{dyne/cm}$ ,  $\eta_c=1\text{cP}$

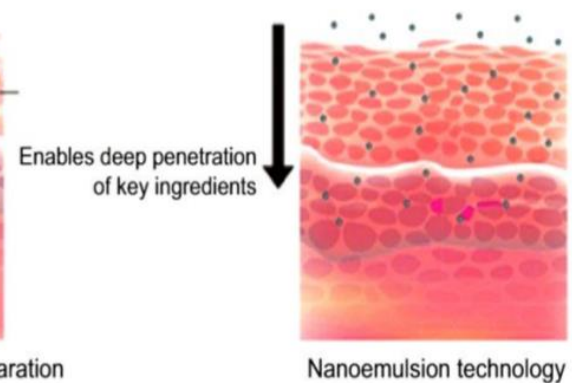
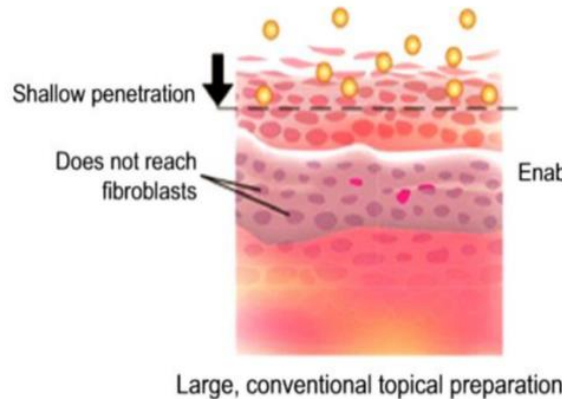
# Advantages of Nano Emulsion

## ■ Advantages

- Enhanced long-term stability
- Better penetration and absorption
- Higher solubilization capacity
- Good delivery system
- Variety of formulations
- Use of low concentration surfactant

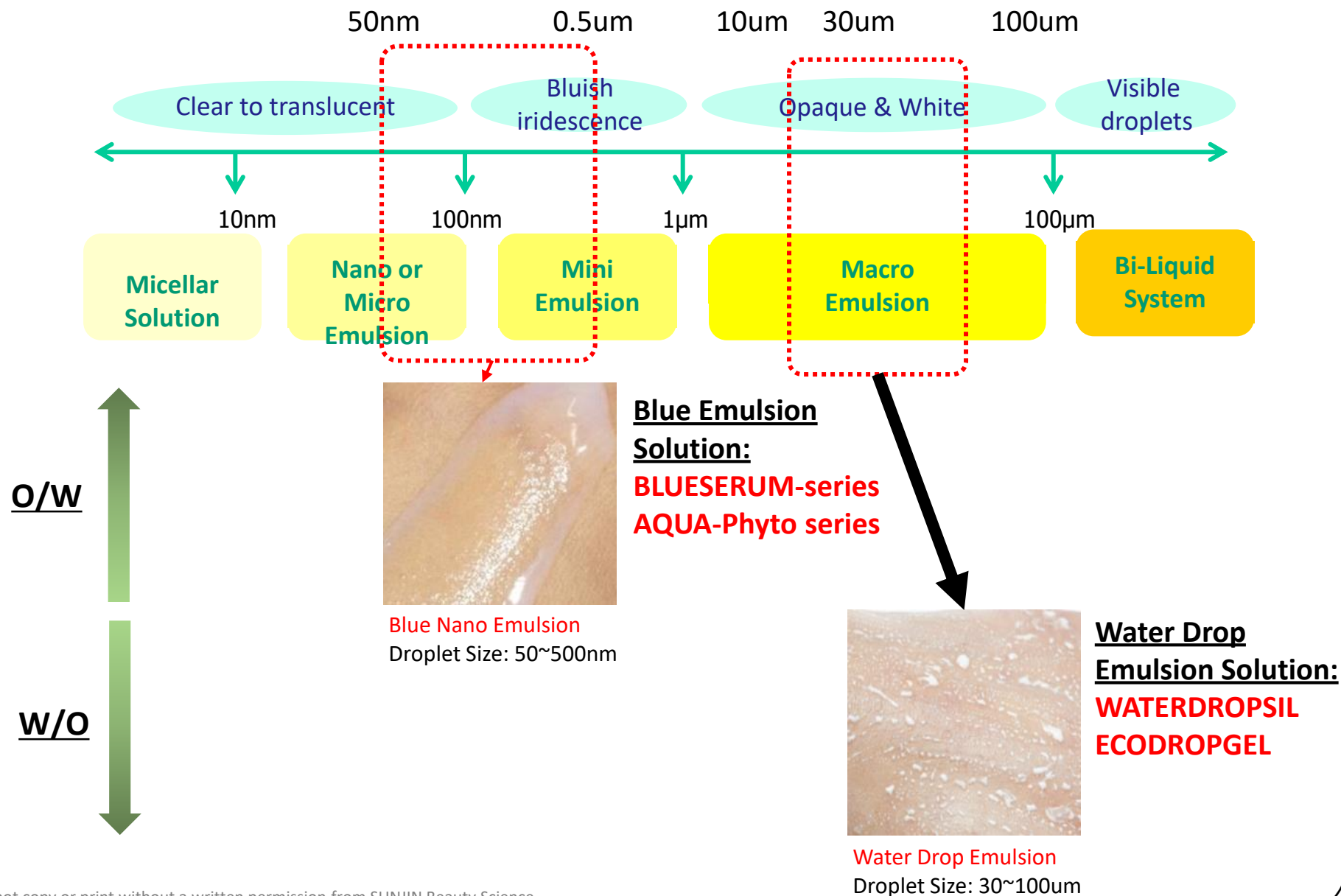


*Soft Matter*, 2012, 8, 1719

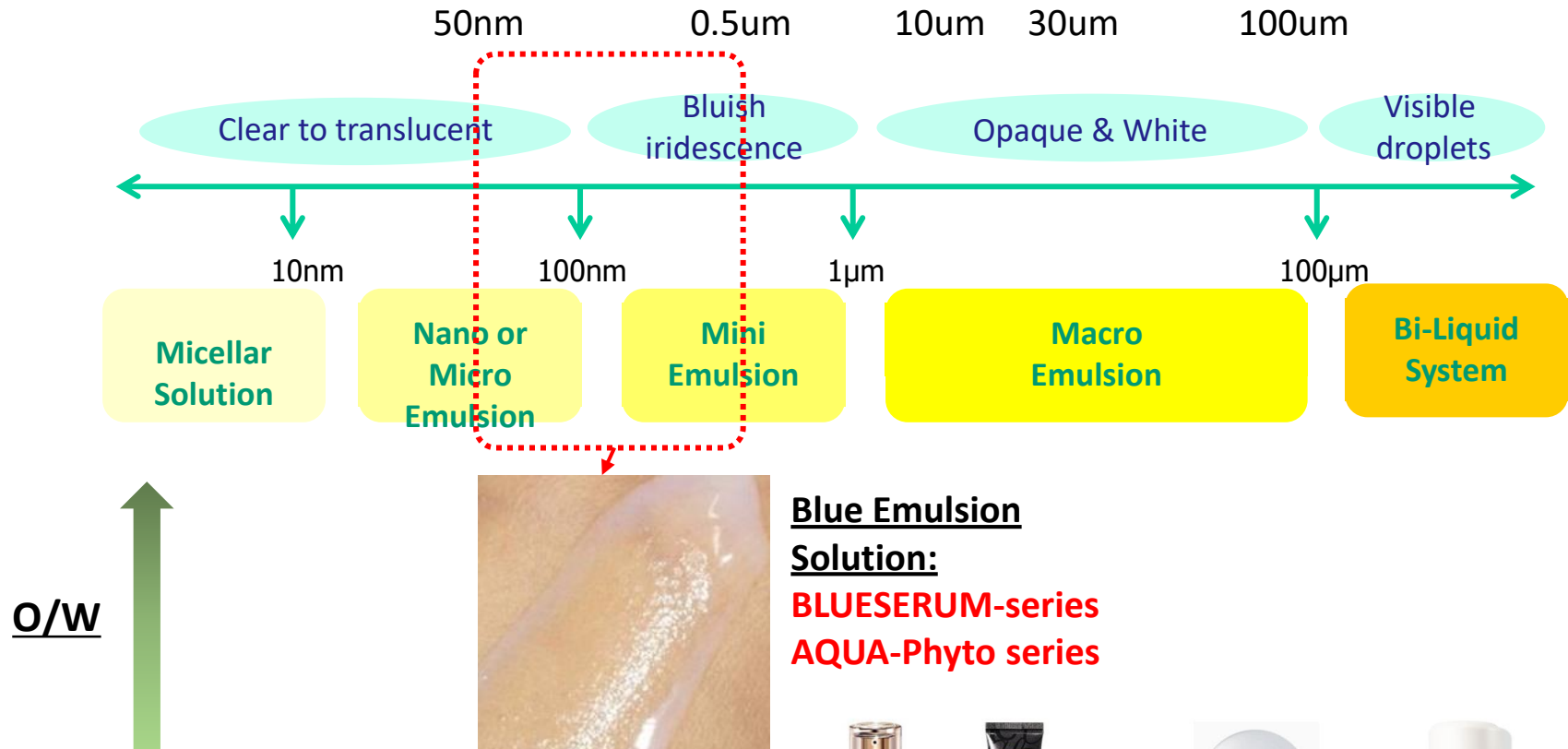


*Eur.J.Nanomed.*;5(2):97-100

# Emulsion Appearance



# O/W Blue Nano Emulsion



Blue Nano Emulsion  
Droplet Size: 50~500nm

## Blue Emulsion Solution:

**BLUESERUM-series**  
**AQUA-Phyto series**



HERA  
OIL SERUM



A.H.C.  
THE REAL EYE CREAM



iRECIPE  
Magic Serum



LANEIGE  
Cream Skin

# Bluish Iridescence



# How to make Blue Emulsion

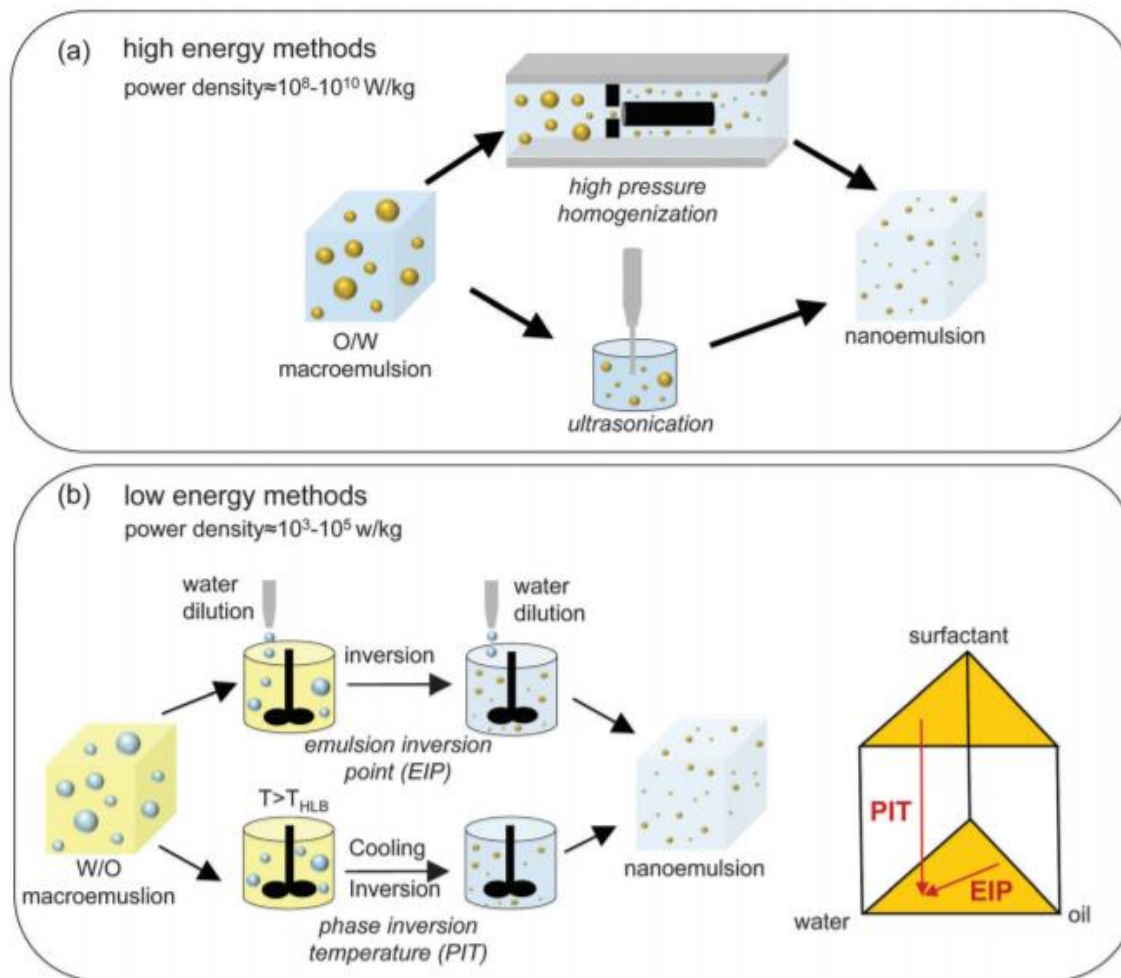


Fig. 2 Overview of high energy and low energy methods for preparing O/W nanoemulsions. (a) High energy such as high pressure homogenization (HPH) and ultrasonication break macroemulsion drops into smaller droplets. (b) Low energy methods start with W/O macroemulsions and break coarse emulsions into smaller droplets as they pass through a state of low interfacial tension during phase inversion. The emulsion inversion point (EIP) technique induces a phase inversion by water dilution whereas the Phase Inversion Temperature (PIT) approach induces a phase inversion on cooling of the mixture. To prepare W/O nanoemulsions, one can simply reverse the continuous and dispersed phases.

# Aqua phytoplex

Can make any type of formula



Aqua Phyto series



Easy to disperse in water

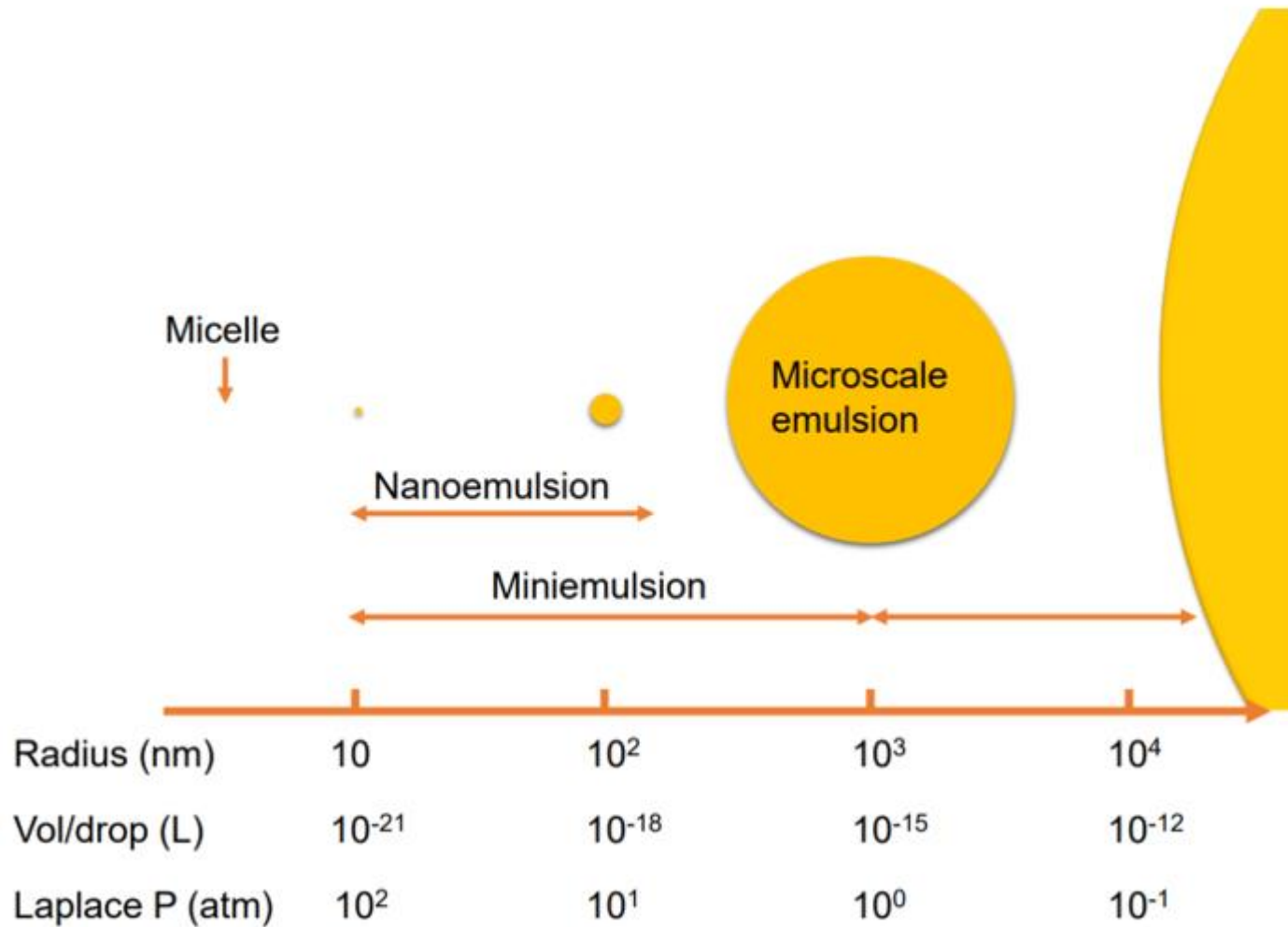
3~5%	Cleanser	
10%	Toner	
20%	Serum Ampule	
30%		
3%	Soothing gel cream	
12%	Mask pack	



# Aqua PhytoPLEX



# Size scales of Emulsions



\* $\sigma=10\text{dyne/cm}$ ,  $\eta_c=1\text{cP}$

# AQUA Phytoplex Series

Grade	INCI	Remarks
AQUA PHYTOPLEX	Glycerin, Limnanthes alba(Meadowfoam) Seed Oil, Canola Oil, Helianthus Annuus (SUNFLOWER) Seed Oil, Rosa Canina Fruit Oil, Argania Spinosa Kernel Oil, Polyglyceryl-10 Stearate	<b>Most economic</b>  <b>For Mask Sheet Essence</b>
AQUA ARGAN	Glycerin, Argania Spinosa Kernel Oil, Polyglyceryl-10 Stearate	
AQUA MEADOWFOAM	Glycerin, Limnanthes alba (Meadowfoam) Seed Oil, Polyglyceryl-10 Stearate	
AQUA SHEA BUTTER	Glycerin, Butyrospermum parkii (shea) butter oil, Polyglyceryl-10 Stearate	
AQUA PHYTOSQUALANE	Glycerin, Squalane Polyglyceryl-10 Stearate	

- **NO Water**, no need preservation, can't be frozen during storage
- Easily can be incorporated to water phase by simple mixing
- **PEG & PPG FREE**
- **COSMOS NATURAL / GMO FREE**(No Lecitin)
- Custom tailored AQUA OILs are available upon request



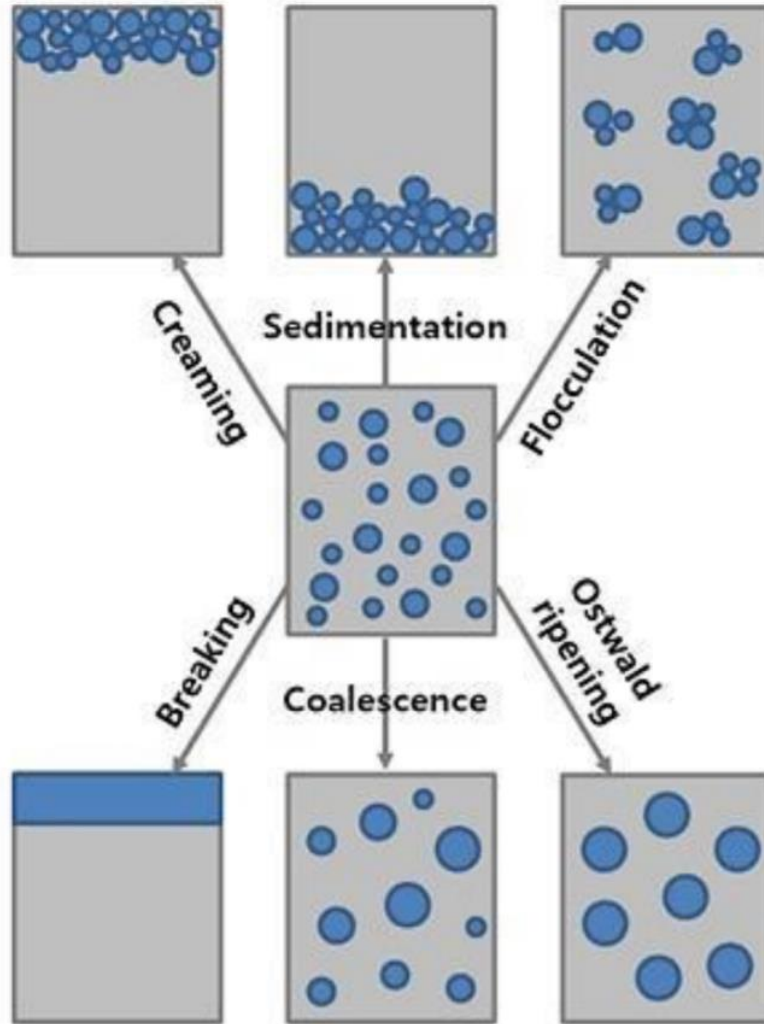
# AQUA Barrier Series

Grade	INCI	Remarks
AQUA BARRIER ARGAN	Glycerin, Argania Spinosa Kernel Oil, Hydrogenated lecithin	
AQUA BARRIER MEADOWFOAM	Glycerin, Limnanthes alba (Meadowfoam) Seed Oil, Hydrogenated lecithin	

- **Lecithin used**
- **NO Water**, no need preservation, can't be frozen during storage
- Easily can be incorporated to water phase by simple mixing
- **PEG & PPG FREE**
- **COSMOS NATURAL**
- Custom tailored AQUA OILs are available upon request



# Issues on emulsion stability



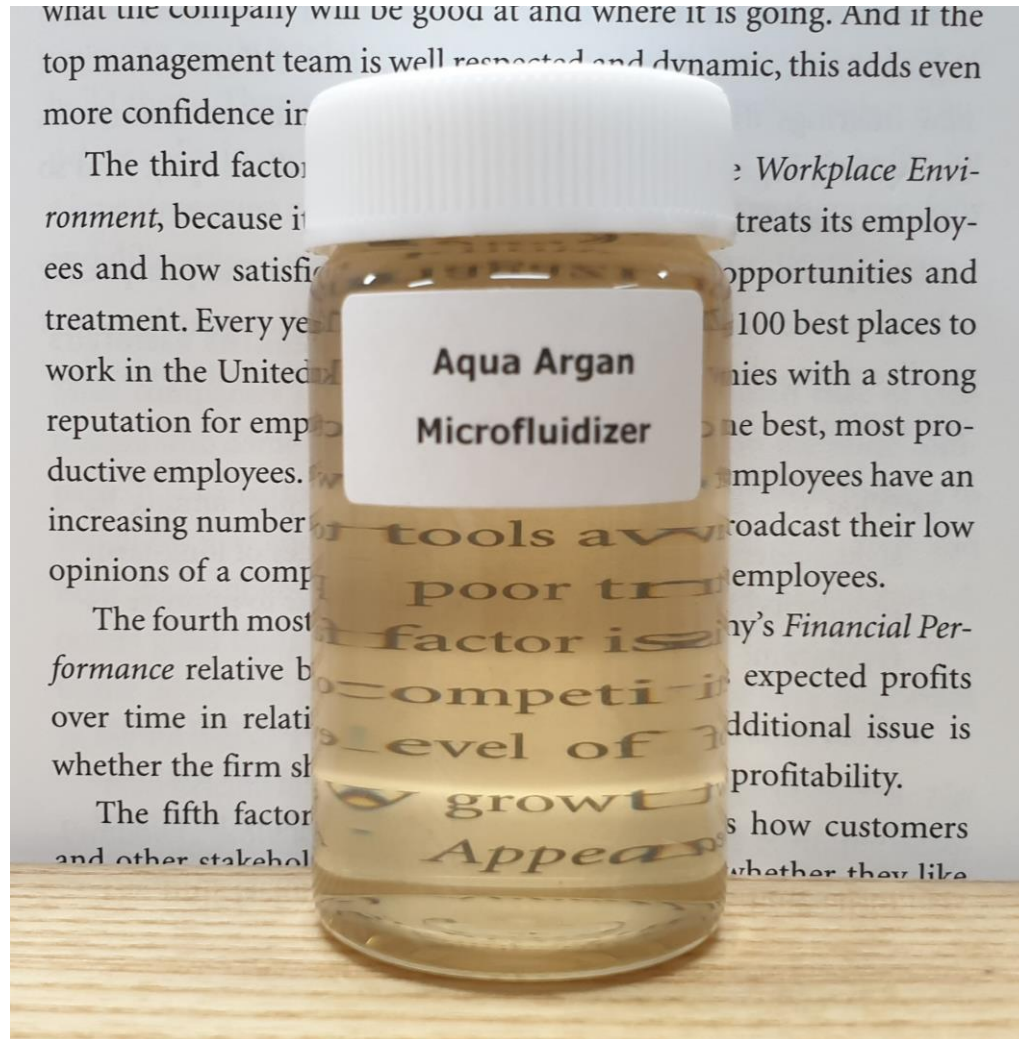
Stokes-Einstein eq.;

$$D = \frac{k_B T}{6\pi\eta a}$$

Separation rate;

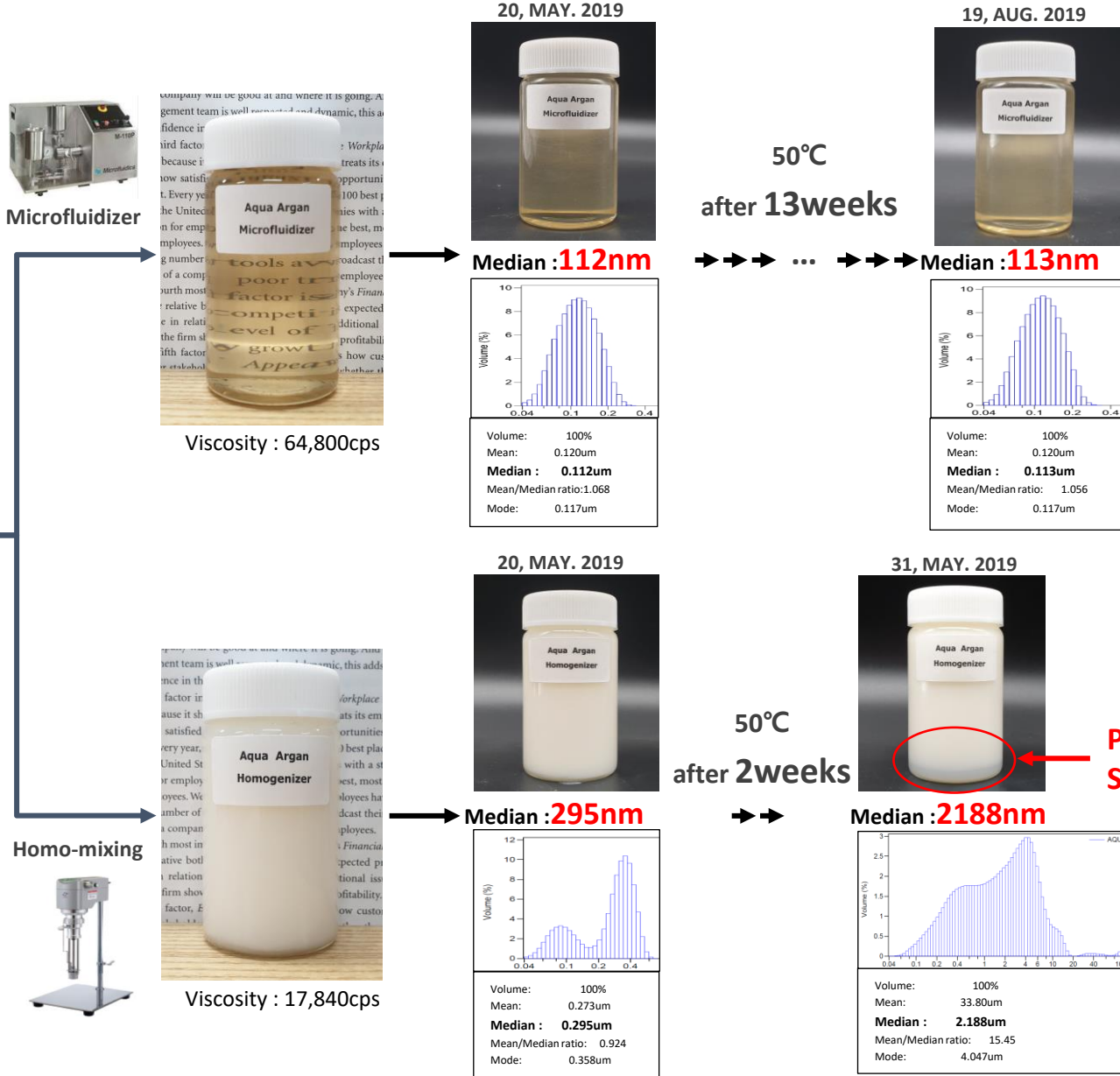
$$v \sim \frac{\Delta\rho g a^2}{\eta} (1 - \phi)^{5.5}$$

# Aqua Argan Translucent appearance

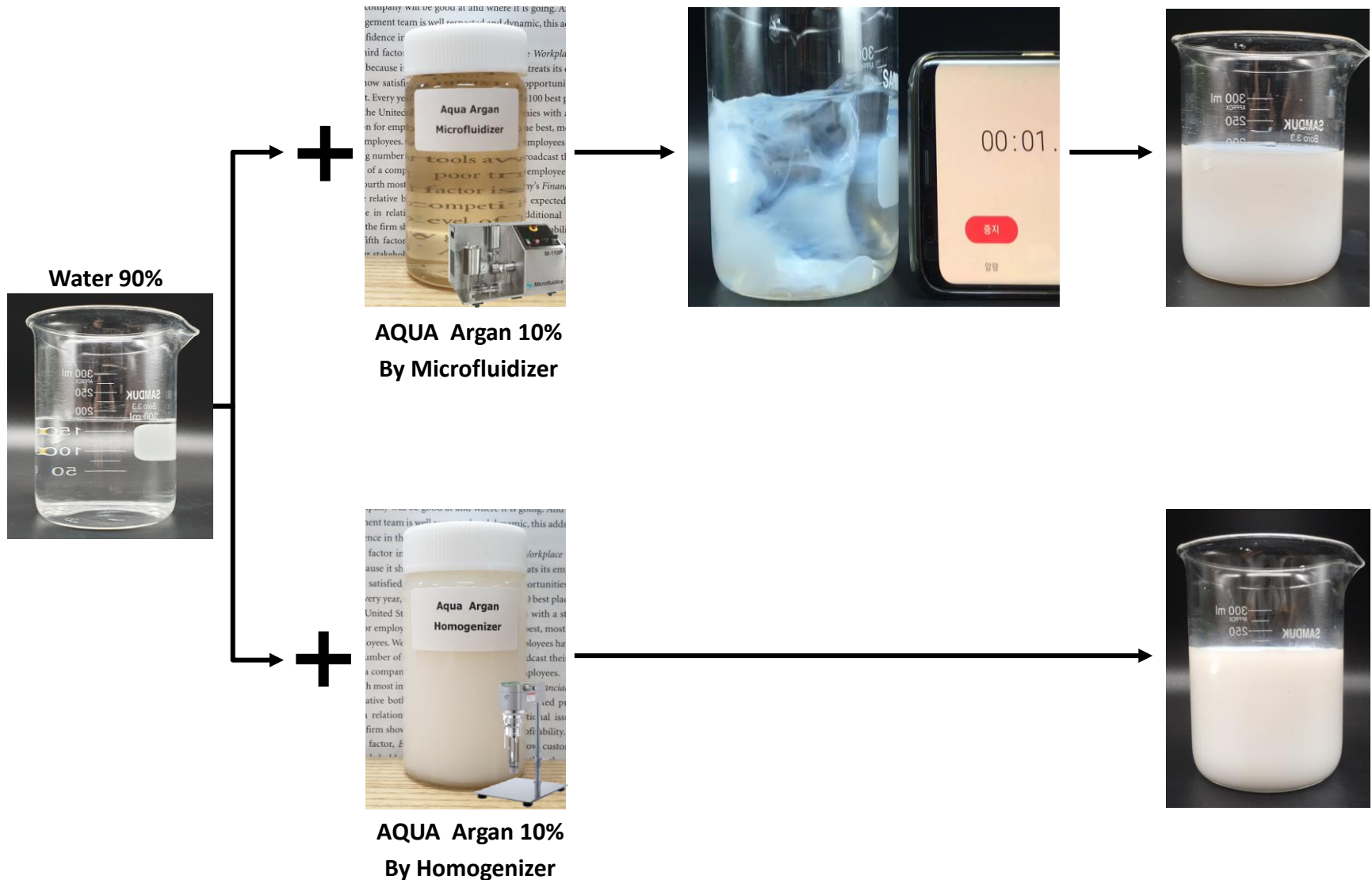


# Aqua Argan made by Microfluidizer Technical

INCI Name	%
Glycerin	66.0
Polyglyceryl-10 Stearate	4.0
Argan oil	30



# Easy to water dispersible Aqua Argan





# AQUA ARGAN 10% sol. Stability 50°C



AQUA Argan 10%  
By Microfluidizer



Water 90%

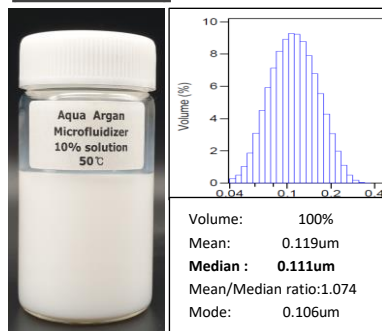


AQUA Argan 10%  
By Homogenizer



## Initial state

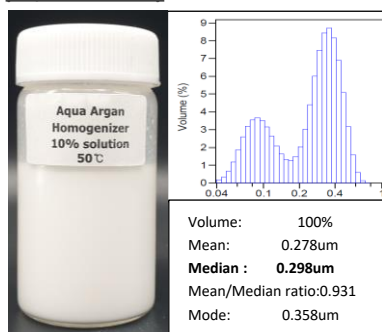
(20, MAY. 2019)



PSD\* of Emulsion : **111nm**

Viscosity : 34cps

(20, MAY. 2019)



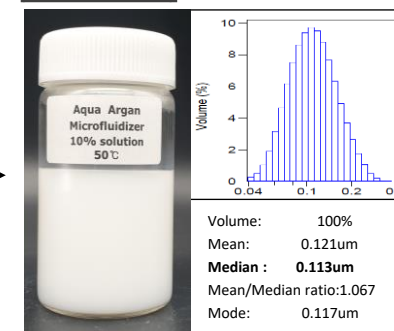
PSD\* of Emulsion : **298nm**

Viscosity : 28cps

50°C  
after 13weeks  
→ → → ..... → → →

## 13weeks

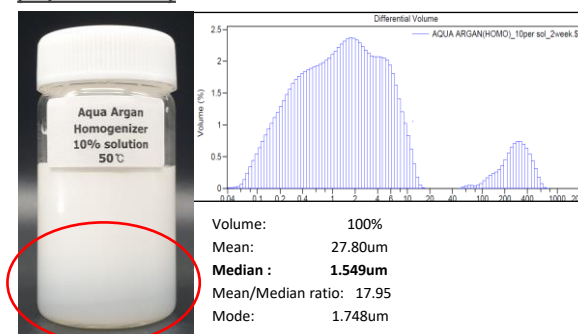
(19, AUG. 2019)



PSD\* of Emulsion : **115nm**

## 2weeks

(31, MAY. 2019)

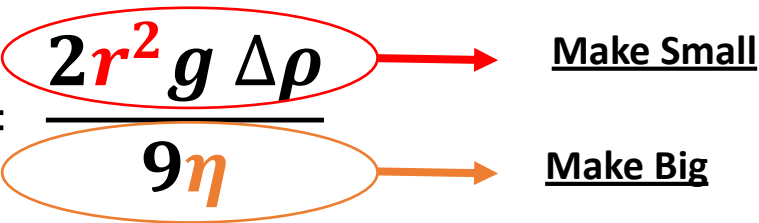


PSD\* of Emulsion : **1,549nm**

# Why AQUA SERIES have good formula stability?

## Stoke's Law on Emulsion Stability

$$V = \frac{2r^2 g \Delta\rho}{9\eta}$$



Make Small

Make Big

V = speed of sedimentation / creaming

r = particle size

g = gravity constant

$\Delta\rho$  = density difference

$\eta$  = zero shear viscosity (external phase)

Reduce speed of sedimentation/creaming by :

A) Minimizing particle size **r**

B) Increasing viscosity  **$\eta$**

# Why AQUA SERIES have good formula stability?

## STOKE'S LAW ON EMULSION STABILITY

$$V = \frac{2 \times r^2 \times g \times \Delta\rho}{9 \times \eta}$$

V = speed of sedimentation / creaming

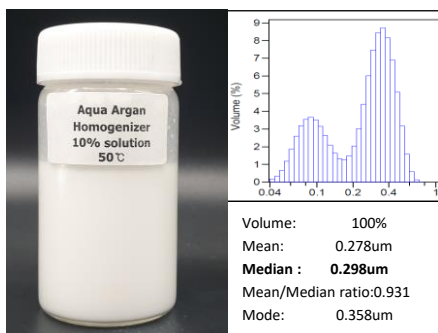
r = particle size

g = gravity constant

$\Delta\rho$  = density difference

$\eta$  = zero shear viscosity (external phase)

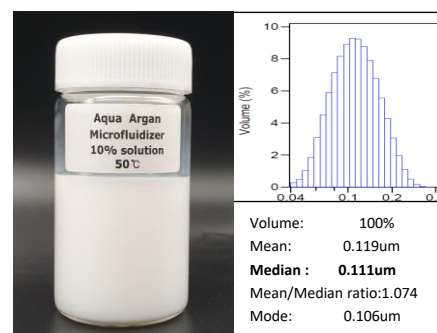
### by Homogenizer 10% sol.



PSD\* of Emulsion : 298nm

Viscosity : 28cps

### AQUA ARGAN 10% sol.



PSD\* of Emulsion : 111nm

Viscosity : 34cps

$$V = \frac{2 \times 298^2 \times g \times \Delta\rho}{9 \times 28} = 704.79$$

$$V = \frac{2 \times 111^2 \times g \times \Delta\rho}{9 \times 34} = 80.53$$

**8.75 times slower**

# Moisturizing Effect

## Tested Formula

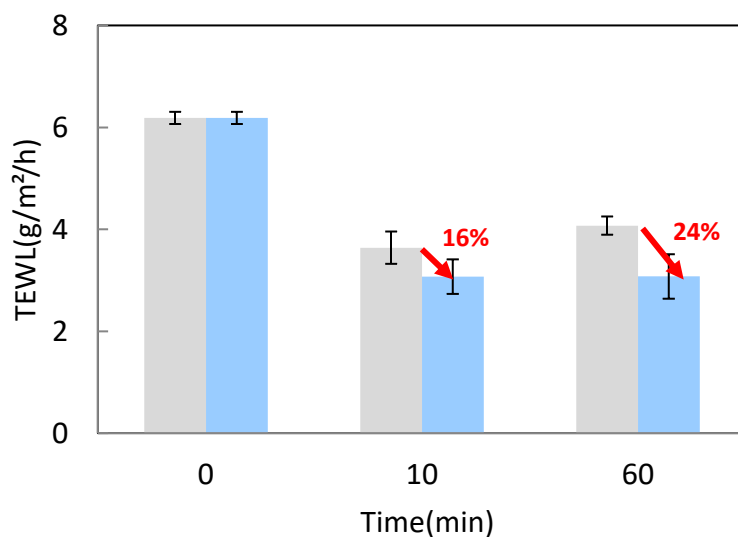
Phase	Product Name	INCI NAME	%	
			SJF-1742	SJF-1930
A	D.I Water	Aqua	65.05	60.05
	Aristoflex Velvet	Polyacrylate Crosspolymer-11	0.4	0.4
B	TPG	Tripropylene Glycol	5	5
	2,3-Butanediol H90	2,3-Butanediol	5	5
	1,2-Hexanediol	1,2-Hexanediol	2	2
	Sensiva SC50	Ethylhexylglycerin	0.05	0.05
	HAX	Water & 2,3 Butanediol & Sodium Hyaluronate Crosspolymer & 1,2-Hexandiol & Ethylhexylglycerin	5	5
	AQUA PHYTOPLEX	Glycerin, Limnanthes alba (Meadowfoam) Seed Oil, Canola Oil, Vitis Vinifera (Grape) Seed Oil, Helianthus Annuus Seed Oil, Calendula Oil, Cannabis sativa Seed Oil, Rosa Canina Fruit Oil, Argania Spinosa Kernel Oil, Polyglyceryl-10 Stearate	-	5
C	Silkflo 364NF	Hydrogenated Polydecene	2	2
	Tegosoft DEC	Diethylhexyl Carbonate	0.5	0.5
D	AQUA-BB	Titanium Dioxide & Silica & Alumina & water & Polysorbate 60 & Oleth-10 & Yell ow Iron Oxide & Red Iron Oxide & Black Iron Oxide & Triethoxycaprylylsilane & 1, 2-Hexanediol	15	15



# Moisturizing Effect

## In-vivo test result

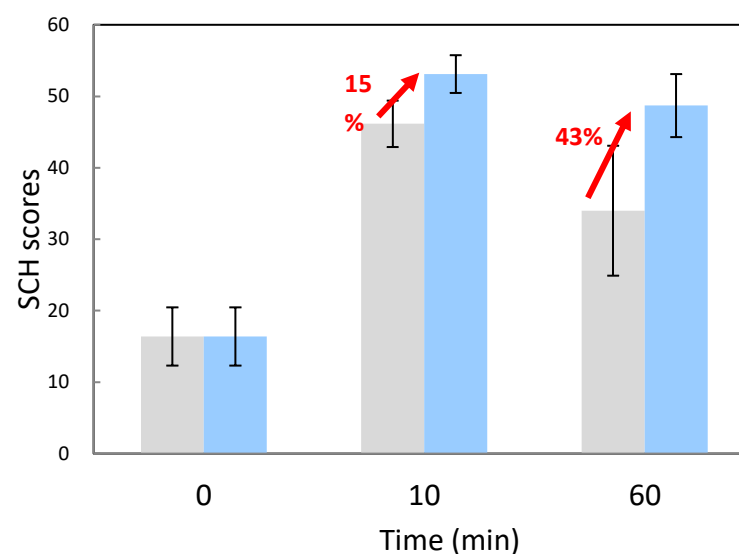


In vivo measurement of **TEWL**  
(Transepidermal water loss)



-  SJF-1742 **without** AQUA PHYTOPLEX
-  SJF-1930 **with** AQUA PHYTOPLEX

In vivo measurement of **SCH**  
(Stratum Corneum Hydration)



**Tested condition:**

- N = 6 subjects
- Formulations were applied on the forearms.
- Error bars represent standard deviation

# Aqua phytoPLEX

Can make any type of formula



**Aqua Phyto series**



Easy to disperse  
in water

3~5%

**Cleanser**



10%

**Toner**



20%

**Serum  
Ampule**



30%

**Soothing  
gel cream**



3%

12%

**Mask pack**



# PEG, PPG Free

New in 2019

Part	Trade Name	INCI	Toner	Essence	Ampule	Maker
			%	%	%	
A	Water	Water	80.75	59.25	44.55	
	2,3-BDO	2,3-Butanediol	6	6	6	GS Caltex
	Glycerin	Glycerin	3	3	3	
	Allantoin	Allantoin	0.1	0.1	0.1	
B	AQUA PHYTOPLEX	Glycerin, Limnanthes alba(Meadowfoam) Seed Oil, Canola Oil, Helianthus Annuus (Sunflower) Seed Oil, Rosa Canina Fruit Oil, Argania Spinosa kernel Oil, Polyglyceryl-10 Stearate	10	20	30	SUNJIN
	Fragrance	Fragrance	0.15	0.15	0.15	
	HAX	Water, 2,3-BG, Sodium Hyaluronate Crosspolymer, Benzyl Glycol, Ethylhexylglycerin		10	15	SUNJIN
C	1,2-Hexandiol	1,2-Hexandiol	0.7	0.7	0.7	
	Sensiva® SC 50	Ethylhexylglycerin	0.1	0.1	0.1	
	Aristoflex® AVC	Ammonium Acryloyldimethyltaurate/VP Copolymer	-	0.3	0.4	

Net content of Argan Oil	3%	6%	9%	
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# PEG, PPG Free

New in 2019

Part	Trade Name	INCI	Toner	Essence	Ampule	Maker
			%	%	%	
A	Water	Water	80.75	59.25	44.55	
	2,3-BDO	2,3-Butanediol	6	6	6	GS Caltex
	Glycerin	Glycerin	3	3	3	
	Allantoin	Allantoin	0.1	0.1	0.1	
B	AQUA PHYTOPLEX	Glycerin, Limnanthes alba(Meadowfoam) Seed Oil, Canola Oil, Helianthus Annuus (Sunflower) Seed Oil, Rosa Canina Fruit Oil, Argania Spinosa kernel Oil, Polyglyceryl-10 Stearate	10	20	30	SUNJIN
	Fragrance	Fragrance	0.15	0.15	0.15	
	HAX	Water, 2,3-BG, Sodium Hyaluronate Crosspolymer, Benzyl Glycol, Ethylhexylglycerin		10	15	SUNJIN
C	1,2-Hexandiol	1,2-Hexandiol	0.7	0.7	0.7	
	Sensiva® SC 50	Ethylhexylglycerin	0.1	0.1	0.1	
	Aristoflex® AVC	Ammonium Acryloyldimethyltaurate/VP Copolymer	-	0.3	0.4	



Net content of Argan Oil	3%	6%	9%	
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# Cica essence Biocellulose mask

PEG, PPG Free

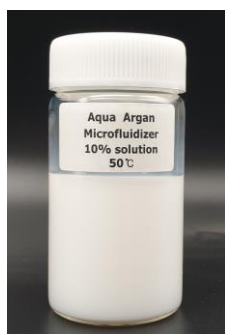
	Ingredients	INCI Name	%	New in 2020 Maker
A	Centella Asiatica Leaf Extract	Water, Centella Asiatica Leaf Extract, 1,2-Hexanediol	70.63	
	Greendiol	2,3-Butanediol	10.00	SUNJIN
	AQUA PHYTOPLEX	Glycerin, Limnanthes alba(Meadowfoam) Seed Oil, Canola Oil, Helianthus Annuu(Sunflower)Seed Oil, Rosa Canina Fruit Oil, Argania Spinosa Kernel Oil, Polyglyceryl-10 Stearate	12.00	SUNJIN
	Glycerin	Glycerin	6.00	
	KMO-6	1,2-Hexanediol	1.00	
	Hexandiol-9 (500ppm-0.1%:1% ) 1.1%	1,2-Hexanediol, Water, Zeolite	0.50	
	Amaze XT	Dehydroxanthan Gum	0.12	
	Trehalose	Trehalose	0.10	
	ALLANTOIN	Allantoin	0.10	
	HEC CF-Y	Hydroxyethylcellulose	0.08	
	Centella asiatica powder	Asiaticoside, Madecassoside, Dextrin	0.05	
	pk-17438	Glycerin	0.02	



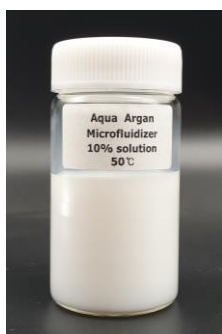
# **Appendix I**

# Aqua Argan 10% sol. Stability **50°C**

Initial state  
(20, MAY. 2019)



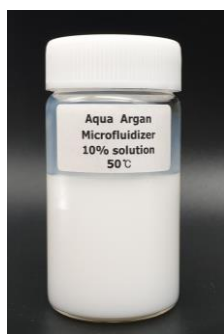
1week  
(27, MAY. 2019)



2weeks  
(02, JUN. 2019)



3weeks  
(10, JUN. 2019)



4weeks  
(17, JUN. 2019)



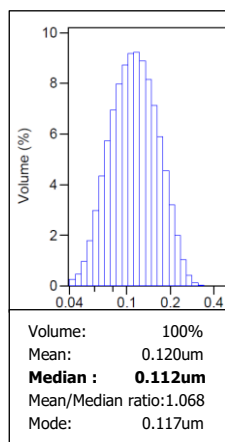
5weeks  
(24, JUN. 2019)



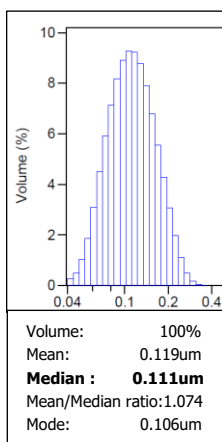
6weeks  
(1, JUL. 2019)



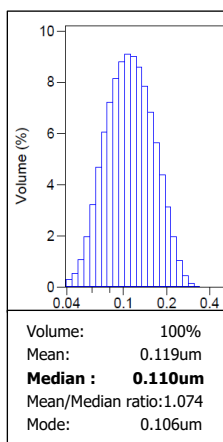
Median : **112nm**



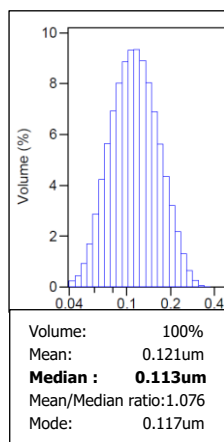
Median : **111nm**



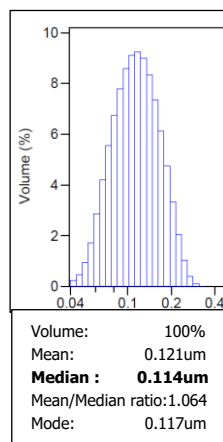
Median : **110nm**



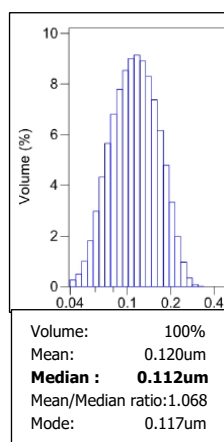
Median : **113nm**



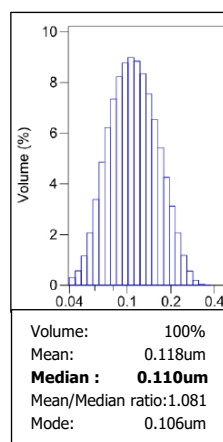
Median : **114nm**



Median : **112nm**



Median : **110nm**



# Aqua Argan 10% sol. Stability **50°C**

7weeks

(8, JUL. 2019)



8weeks

(15, JUL. 2019)



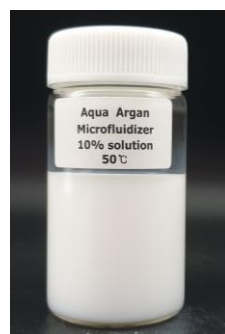
9weeks

(22, JUL. 2019)



10weeks

(29, JUL. 2019)



11weeks

(5, AUG. 2019)



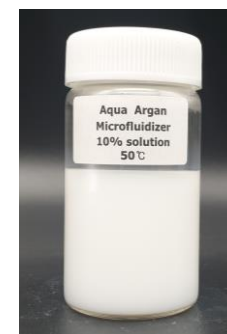
12weeks

(12, AUG. 2019)

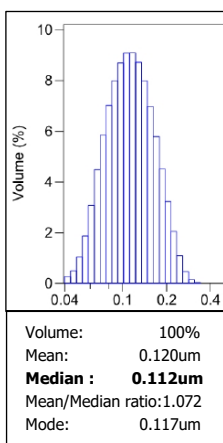


13weeks

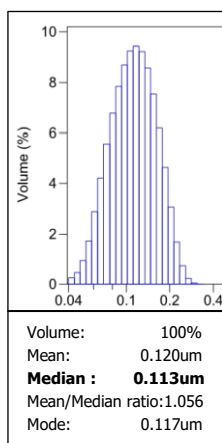
(19, AUG. 2019)



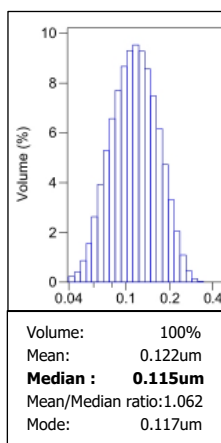
**Median :112nm**



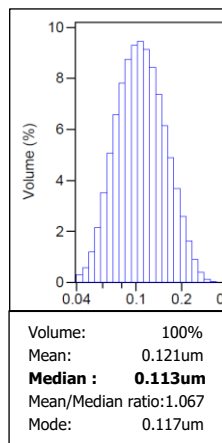
**Median :113nm**



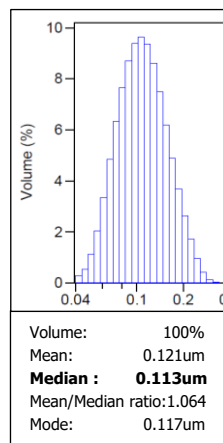
**Median :115nm**



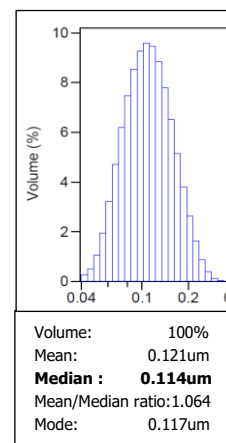
**Median :113nm**



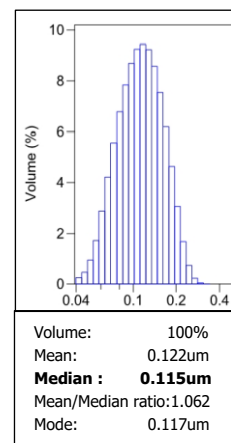
**Median :114nm**



**Median :114nm**



**Median :115nm**



# Aqua Argan 10% sol. PSD of Emulsion

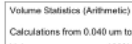
20, MAY. 2019



LS Particle Size Analyzer

Beckman Coulter LS 13 320

20 May 2019 14:08



LS Particle Size Analyzer

27, MAY. 2019

27 May 2019 13:19

03, JUN. 2019

3 Jun 2019 14:39

10, JUN. 2019

10 Jun 2019 15:10

17, JUN. 2019

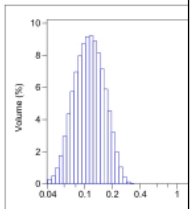
17 Jun 2019 11:45

24, JUN. 2019

01, JUL. 2019

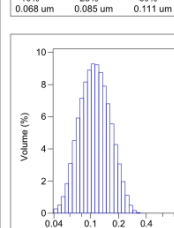
1 Jul 2019 14:27

Volume Statistics (Arithmetic)  
Calculations from 0.040 um to 2000 um  
Volume: 100%  
Mean: 0.120 um  
Median: 0.112 um  
Mean/Median ratio: 1.068  
Mode: 0.117 um  
<10% <25% <50%  
0.069 um 0.086 um 0.112 um



Channel	Diff.	Channel	Diff.	Channel	Diff.
Diameter	Volume	Diameter	Volume	Diameter	Volume
(um)	(%)	(um)	(%)	(um)	(%)
0.030	0.26	1.251			
0.034	0.47	1.334			
0.038	0.78	1.421			
0.043	1.16	1.512			
0.048	1.61	1.607			
0.053	2.17	1.707			
0.058	2.87	1.812			
0.063	3.73	1.922			
0.068	4.78	2.037			
0.073	6.06	2.157			
0.078	7.59	2.282			
0.083	9.37	2.412			
0.088	11.43	2.547			
0.093	13.78	2.687			
0.098	16.44	2.832			
0.103	19.42	2.982			
0.108	22.73	3.137			
0.113	26.37	3.297			
0.118	30.35	3.462			
0.123	34.68	3.632			
0.128	39.35	3.807			
0.133	44.37	3.987			
0.138	49.74	4.172			
0.143	55.46	4.362			
0.148	61.53	4.557			
0.153	67.96	4.757			
0.158	74.74	4.962			
0.163	81.87	5.172			
0.168	89.35	5.387			
0.173	97.18	5.607			
0.178	105.36	5.832			
0.183	113.89	6.062			
0.188	122.77	6.297			
0.193	132.00	6.537			
0.198	141.58	6.782			
0.203	151.50	7.032			
0.208	161.76	7.287			
0.213	172.36	7.547			
0.218	183.30	7.812			
0.223	194.58	8.082			
0.228	206.19	8.357			
0.233	218.13	8.637			
0.238	230.40	8.922			
0.243	242.99	9.212			
0.248	255.89	9.507			
0.253	269.10	9.807			
0.258	282.61	10.112			
0.263	296.42	10.422			
0.268	310.53	10.737			
0.273	324.94	11.057			
0.278	339.65	11.382			
0.283	354.66	11.712			
0.288	369.96	12.047			
0.293	385.55	12.387			
0.298	401.43	12.732			
0.303	417.60	13.082			
0.308	434.06	13.437			
0.313	450.81	13.797			
0.318	467.85	14.162			
0.323	485.18	14.532			
0.328	502.79	14.907			
0.333	520.68	15.287			
0.338	538.85	15.672			
0.343	557.29	16.062			
0.348	576.00	16.457			
0.353	595.07	16.857			
0.358	614.40	17.262			
0.363	634.00	17.672			
0.368	653.86	18.087			
0.373	674.00	18.507			
0.378	694.40	18.932			
0.383	715.00	19.362			
0.388	735.80	19.797			
0.393	756.80	20.237			
0.398	778.00	20.682			
0.403	799.40	21.132			
0.408	821.00	21.587			
0.413	842.80	22.047			
0.418	864.80	22.512			
0.423	887.00	22.982			
0.428	909.40	23.457			
0.433	932.00	23.937			
0.438	954.80	24.422			
0.443	977.80	24.912			
0.448	1001.00	25.407			
0.453	1024.40	25.907			
0.458	1048.00	26.412			
0.463	1071.80	26.922			
0.468	1095.80	27.437			
0.473	1120.00	27.957			
0.478	1144.40	28.482			
0.483	1169.00	29.012			
0.488	1193.80	29.547			
0.493	1218.80	30.087			
0.498	1244.00	30.632			
0.503	1269.40	31.182			
0.508	1295.00	31.737			
0.513	1320.80	32.297			
0.518	1346.80	32.862			
0.523	1373.00	33.432			
0.528	1400.00	34.007			
0.533	1427.00	34.587			
0.538	1454.00	35.172			
0.543	1481.00	35.762			
0.548	1508.00	36.357			
0.553	1535.00	36.957			
0.558	1562.00	37.562			
0.563	1589.00	38.172			
0.568	1616.00	38.787			
0.573	1643.00	39.402			
0.578	1670.00	40.022			
0.583	1697.00	40.647			
0.588	1724.00	41.272			
0.593	1751.00	41.902			
0.598	1778.00	42.537			
0.603	1805.00	43.172			
0.608	1832.00	43.812			
0.613	1859.00	44.457			
0.618	1886.00	45.102			
0.623	1913.00	45.752			
0.628	1940.00	46.402			
0.633	1967.00	47.057			
0.638	1994.00	47.712			
0.643	2021.00	48.372			
0.648	2048.00	49.032			
0.653	2075.00	49.697			
0.658	2102.00	50.362			
0.663	2129.00	51.032			
0.668	2156.00	51.702			
0.673	2183.00	52.372			
0.678	2210.00	53.042			
0.683	2237.00	53.712			
0.688	2264.00	54.382			
0.693	2291.00	55.052			
0.698	2318.00	55.722			
0.703	2345.00	56.392			
0.708	2372.00	57.062			
0.713	2400.00	57.732			
0.718	2427.00	58.402			
0.723	2454.00	59.072			
0.728	2481.00	59.742			
0.733	2508.00	60.412			
0.738	2535.00	61.082			
0.743	2562.00	61.752			
0.748	2589.00	62.422			
0.753	2616.00	63.092			
0.758	2643.00	63.762			
0.763	2670.00	64.432			
0.768	2697.00	65.102			
0.773	2724.00	65.772			
0.778	2751.00	66.442			
0.783	2778.00	67.112			
0.788	2805.00	67.782			
0.793	2832.00	68.452			
0.798	2859.00	69.122			
0.803	2886.00	69.792			
0.808	2913.00	70.462			
0.813	2940.00	71.132			
0.818	2967.00	71.802			
0.823	2994.00	72.472			
0.828	3021.00	73.142			
0.833	3048.00	73.812			
0.838	3075.00	74.482			
0.843	3102.00	75.152			
0.848	3129.00	75.822			
0.853	3156.00	76.492			
0.858	3183.00	77.162			
0.863	3210.00	77.832			
0.868	3237.00	78.502			
0.873	3264.00	79.172			
0.878	3291.00	79.842			
0.883	3318.00	80.512			
0.888	3345.00	81.182			
0.893	3372.00	81.852			
0.898	3400.00	82.522			
0.903	3427.00	83.192			
0.908	3454.00	83.862			
0.913	3481.00	84.532			
0.918	3508.00	85.202			
0.923	3535.00	85.872			
0.928	3562.00	86.542			
0.933	3589.00	87.212			
0.938	3616.00	87.882			
0.943	3643.00	88.552			
0.948	3670.00	89.222			
0.953	3697.00	89.892			
0.958	3724.00	90.562			
0.963	3751.00	91.232			
0.968	3778.00	91.902			
0.973	3805.00	92.572			
0.978	3832.00	93.242			
0.983	3859.00	93.912			
0.988	3886.00	94.582			
0.993	3913.00	95.252			
0.998	3940.00	95.922			
1.003	3967.00	96.592			
1.008	3994.00	97.262			
1.013	4021.00	97.932			
1.018	4048.00	98.602			
1.023	4075.00	99.272			
1.028	4102.00	99.942			
1.033	4129.00	100.612			
1.038	4156.00	101.282			
1.043	4183.00	101.952			
1.048	4210.00	102.622			
1.053	4237.00	103.292			
1.058	4264.00	103.962			
1.063	4291.00	104.632			
1.068	4318.00	105.302			
1.073	4345.00	105.972			
1.078	4372.00	106.642			
1.083	4400.00	107.312			
1.088	4427.00	107.982			
1.093	4454.00	108.652			
1.098	4481.00	109.322			
1.103	4508.00	110.000			

Volume Statistics (Arithmetic)  
Calculations from 0.040 um to 2000 um  
Volume: 100%  
Mean: 0.119 um  
Median: 0.111 um  
Mean/Median ratio: 1.074  
Mode: 0.106 um  
<10% <25% <50%  
0.068 um 0.085 um 0.111 um



Channel	Diff.	Channel	Diff.	Channel	Diff.
Element	Volume	Element	Volume	Element	Volume
0.000	0.026	1.281			
0.000	0.000	1.281			
0.008	1.093	1.590			
0.000	1.087	1.668			
0.008	3.089	1.802			
0.000	6.052	2.011			
0.070	9.961	2.227			
0.000	7.014	2.437			
0.084	8.116	2.600			
0.092	8.900	2.800			
0.000	9.000	2.900			
0.112	9.223	3.019			
0.000	9.000	3.100			
0.000	7.900	3.200			
0.000	7.900	3.400			
0.180	9.500	3.610			
0.180	3.000	4.108			
0.220	1.000	4.300			
0.220	1.000	4.500			
0.298	0.000	4.800			
0.298	0.000	4.900			
0.310	0.000	5.100			
0.310	0.000	5.100			
0.370	0.000012	11.83			
0.410	0.000	16.18			
0.470	0.000	15.05			
0.500	0.000	15.05			
0.508	0.000	22.46			
0.508	0.000	22.46			
0.508	0.000	22.73			
0.508	0.000	24.05			
0.508	0.000	27.19			
0.508	0.000	27.19			
1.140	0.000	38.24			

## Aqua Argan 10% sol. PSD of Emulsion

08, JUL. 2019

**15, JUL. 2019**

**22, JUL. 2019**

**29, JUL. 2019**

05, AUG. 2019

12, AUG. 2019

**19, AUG. 2019**

