ELECTRONIC SUPPORTING INFORMATION

Novel Double Nanoemulsion Loading of *Cordyceps militaris* Extract: Formulation, Stability, *In Vitro* Digestion, and *In Vivo* Evaluation for Regulation of Acute Lipid Disorders

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Table S1. Effect of PGPR content

No	PGPR, g (m1)	W1, g (m2)	Oil, g (m3)	$CaCl_2$, g	SWR, %	SWOR, %	EE %		Visual appearence
							ADE	COR	
1	0.638	10	24.82	0.03	6.0	30.0	93.2 ± 1.3	92.5 ± 0.86	Separated
2	0.695	10	24.95	0.03	6.5	30.0	93.2 ± 1.1	92.2 ± 1.2	Separated
3	0.753	10	25.08	0.03	7.0	30.0	93.2 ± 1.0	92.5 ± 1.0	Separated
4	0.811	10	25.22	0.03	7.5	30.0	93.3 ± 0.87	92.3 ± 0.46	Homogeneous emulsion
5	0.87	10	25.36	0.03	8.0	30.0	93.9 ± 1.0	92.7 ± 0.48	Homogeneous emulsion
6	0.929	10	25.5	0.03	8.5	30.0	92.7 ± 1.1	92.1 ± 1.1	Homogeneous emulsion

Table S2. Effect of SOWR

No	PGPR, g (m1)	Extract, g (m2)	Oil (m3)	$CaCl_2$, %	SWR, %	SOWR, %	EE %		
							ADE	COR	
1	0.811	10	25.22	1	7.5	30.0	96.8 ± 0.64	96.3 ± 0.60	**Visual appearence**
2	0.811	10	20.12	1	7.5	35.0	97.5 ± 0.76	97.0 ± 0.66	Hệ nhũ tương đồng nhất
3	0.811	10	16.2	1	7.5	40.0	97.2 ± 0.68	96.9 ± 0.59	Homogeneous emulsion
4	0.811	10	13.2	1	7.5	45.0	96.6 ± 0.59	96.2 ± 0.84	Homogeneous emulsion
5	0.811	10	10.8	1	7.5	50.0	-	-	Separated

Table S3. Effect of $CaCl_2$ concentration

No	PGPR, g (m1)	Extract, g (m2)	Oil (m3)	$CaCl_2$, %	SWR, %	SWOR, %	EE %		Visual appearence
							ADE	COR	
1	0.811	10	25.22	0.2	7.5	30.0	56.9 ± 1.8	57.1 ± 1.6	Homogeneous emulsion
2	0.811	10	25.22	0.4	7.5	30.0	72.9 ± 1.6	73.1 ± 1.6	Homogeneous emulsion
3	0.811	10	25.22	0.6	7.5	30.0	87.0 ± 1.4	86.5 ± 2.0	Homogeneous emulsion
4	0.811	10	25.22	0.8	7.5	30.0	94.9 ± 1.1	94.4 ± 1.1	Homogeneous emulsion
5	0.811	10	25.22	1.0	7.5	30.0	97.0 ± 1.1	96.5 ± 1.1	Homogeneous emulsion
6	0.811	10	25.22	1.2	7.5	30.0	97.0 ± 1.1	96.5 ± 1.1	Homogeneous emulsion
7	0.811	10	25.22	1.4	7.5	30.0	96.9 ± 1.0	96.3 ± 0.84	Homogeneous emulsion

Table S4. Effect of HLB_{mix}

HLB	PGPR, (g) (m_4)	Tween 80, (g) (m_5)	W1/O (g) (m_6)	W2 (g) (m_7)	SOR (%)	SOWR (%)	EE %		D, nm	PDI (a.u)
							ADE	COR		
8.0	2.500	1.786	10	80.95	30	15.0	84.8 ± 1.6	84.0 ± 1.5	438.9 ± 2.8	0.328 ± 0.010
8.5	2.321	1.964	10	80.95	30	15.0	84.4 ± 1.1	83.7 ± 0.9	385.9 ± 7.2	0.360 ± 0.013
9.0	2.143	2.143	10	80.95	30	15.0	85.5 ± 1.0	84.9 ± 1.4	315.7 ± 6.4	0.352 ± 0.021
9.5	1.964	2.321	10	80.95	30	15.0	87.2 ± 0.6	86.5 ± 0.5	273.5 ± 3.9	0.276 ± 0.016
10.0	1.786	2.500	10	80.95	30	15.0	89.6 ± 1.4	88.6 ± 1.4	237.5 ± 7.2	0.280 ± 0.012
10.5	1.607	2.679	10	80.95	30	15.0	89.6 ± 1.2	89.0 ± 1.3	211.9 ± 3.9	0.257 ± 0.010
11.0	1.429	2.857	10	80.95	30	15.0	90.1 ± 1.9	89.5 ± 1.9	188.1 ± 7.8	0.253 ± 0.013
11.5	1.250	3.036	10	80.95	30	15.0	91.4 ± 1.4	90.6 ± 1.4	150.8 ± 4.7	0.252 ± 0.015
12.0	1.071	3.214	10	80.95	30	15.0	92.0 ± 0.6	91.1 ± 0.5	133.0 ± 3.6	0.226 ± 0.011
12.5	0.893	3.393	10	80.95	30	15.0	92.3 ± 1.0	91.4 ± 1.0	181.6 ± 5.3	0.347 ± 0.017
13.0	0.714	3.571	10	80.95	30	15.0	91.3 ± 0.6	90.4 ± 0.4	554.7 ± 8.4	0.367 ± 0.033
13.5	0.536	3.750	10	80.95	30	15.0	-	-	-	-
14.0	0.357	3.929	10	80.95	30	15.0	-	-	-	-
14.5	0.179	4.107	10	80.95	30	15.0	-	-	-	-
15.0	0	4.286	10	80.95	30	15.0	-	-	-	-

Table S5. Effect of SOR

PGPR, (g) (m4)	Tween 80, (g) (m5)	W1/O (g) (m6)	W2 (g) (m7)	SOR (%)	SOWR (%)	EE %		D (nm)	PDI (a.u)	Visual appearence
						ADE	COR			
0.278	0.833	10	63.0	10	15.0	-	-	-	Homogeneous emulsion	Separated
0.441	1.324	10	66.5	15	15.0	-	-	-	-	Separated
0.625	1.875	10	71.0	20	15.0	92.0 ± 1.0	91.6 ± 1.1	116.7 ± 2.3	0.208 ± 0.009	Homogeneous emulsion
0.833	2.50	10	75.5	25	15.0	92.4 ± 1.1	91.8 ± 1.3	125.7 ± 2.0	0.208 ± 0.020	Homogeneous emulsion
1.071	3.214	10	81.0	30	15.0	92.0 ± 0.63	91.1 ± 0.52	133.0 ± 3.6	0.226 ± 0.011	Homogeneous emulsion

Table S6. Effect of SOWR

PGPR, (g) (m4)	Tween 80, (g) (m5)	W1/O (g) (m6)	W2 (g) (m7)	SOR (%)	SOWR (%)	EE %		D (nm)	PDI (a.u)	Visual appearence
						ADE	COR			
0.625	1.875	10	71.0	20	15.0	92.0± 1.0	91.6 ± 1.1	116.7 ± 2.3	0.208 ± 0.009	Homogeneous emulsion
0.625	1.875	10	50.0	20	20.0	92.8 ± 0.54	92.3 ± 0.45	118.9 ± 2.0	0.200 ± 0.006	Homogeneous emulsion
0.625	1.875	10	37.5	20	25.0	-	-	-	-	Separated
0.625	1.875	10	29.2	20	30.0	-	-	-	-	Separated

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\001-0901.D
Sample Name: TN 9.1

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Acq. Operator   : Nguyen Thanh Tan              Seq. Line :   9
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 1/24/2024 10:46:56 AM             Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
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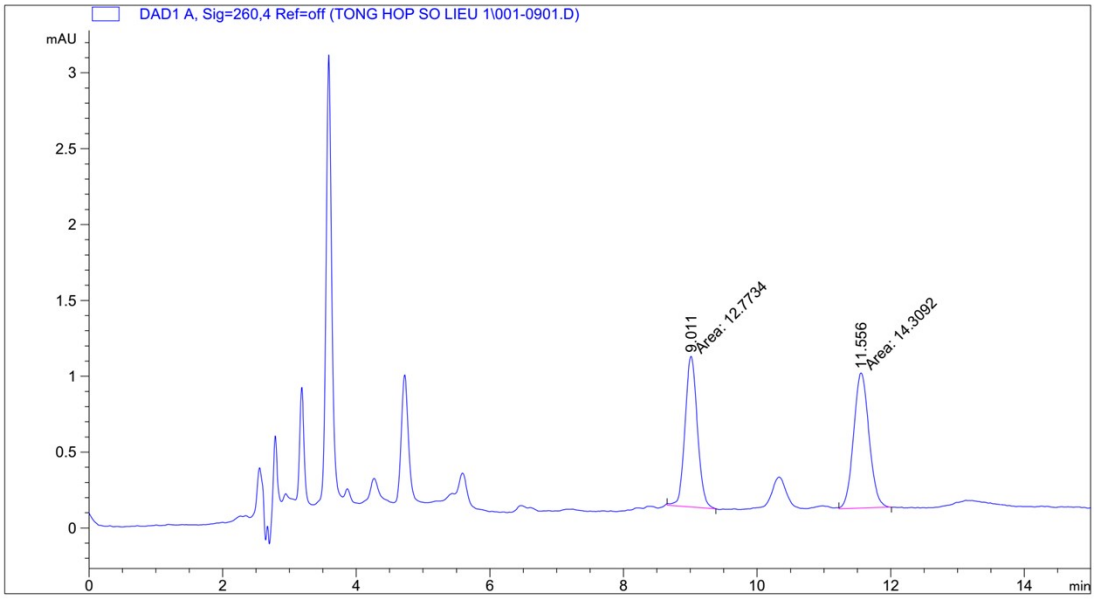


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==================================================================
                      Area Percent Report
==================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.011 MM    0.2143   12.77337 9.93557e-1 47.16457
   2  11.556 MM    0.2674   14.30918 8.91802e-1 52.83543

Totals :                    27.08255    1.88536


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                        *** End of Report ***
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Figure S1: Chromatogram of emulsifier content analysis at SWR 7.5% (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\002-1601.D
Sample Name: TN 10.1

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Acq. Operator   : Nguyen Thanh Tan              Seq. Line :  16
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Injection Date  : 1/24/2024 11:59:21 AM             Inj :   1
Inj Volume : 25 µl
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Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
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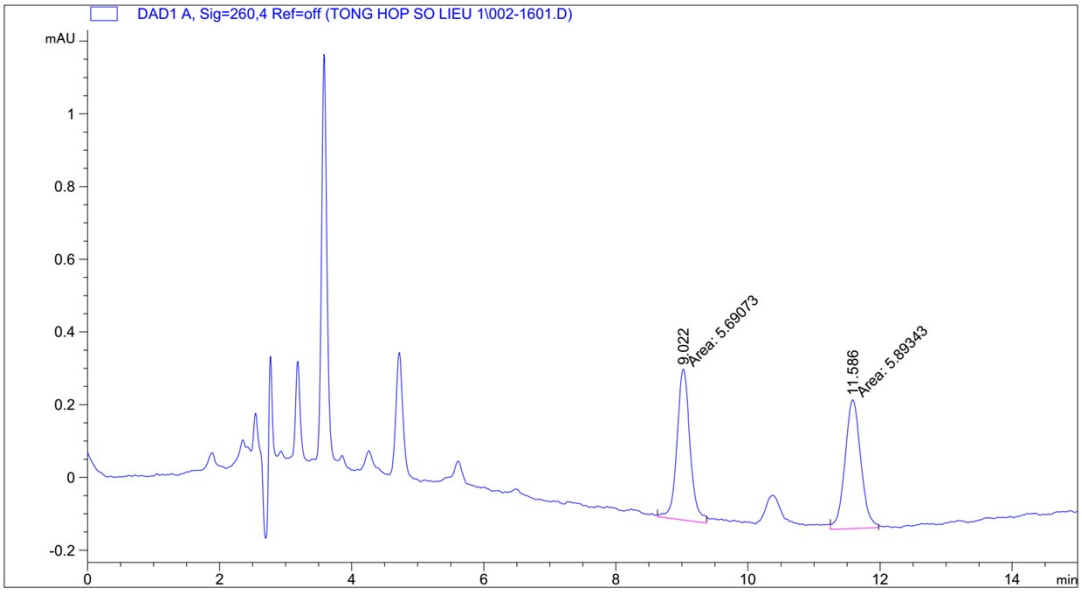


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Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.022 MM    0.2285    5.69073 4.15029e-1 49.12508
   2  11.586 MM    0.2776    5.89343 3.53886e-1 50.87492

Totals :                    11.58416 7.68915e-1


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                          *** End of Report ***
```


Figure S2: Chromatogram of Cordyceps militaris dry extract solution content in the oil phase at SWOR 40% (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\004-4701.D
Sample Name: TN 12.1

```
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Acq. Operator    : Nguyen Thanh Tan               Seq. Line :  47
Acq. Instrument : Instrument 1                    Location : Vial 4
Injection Date  : 1/24/2024 2:57:01 PM               Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
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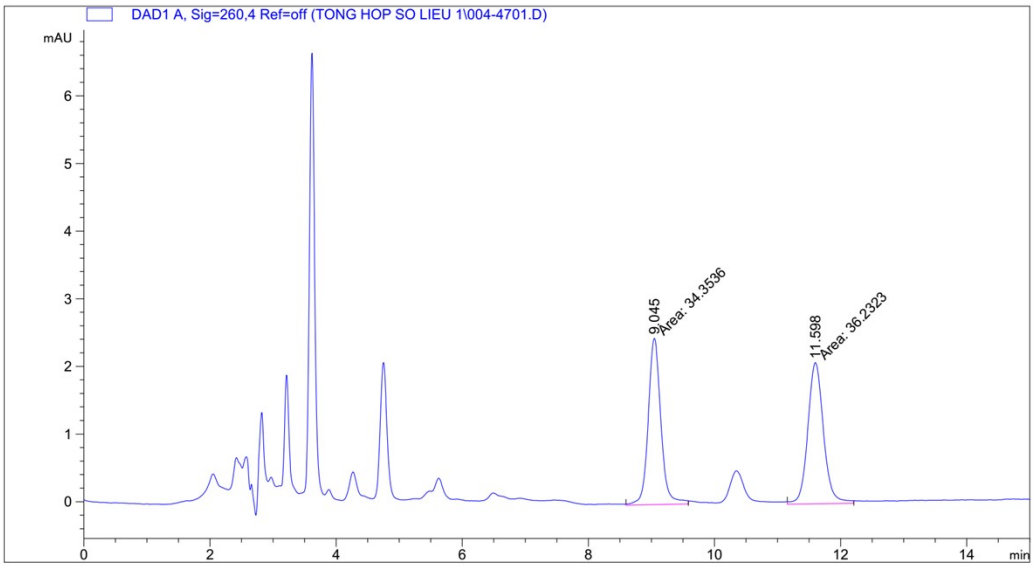


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                        Area Percent Report
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Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.045 MM    0.2328   34.35364    2.45970 48.66926
   2  11.598 MM    0.2891   36.23227    2.08893 51.33074

Totals :                    70.58590    4.54864

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                        *** End of Report ***
```


Figure S3: Chromatogram evaluating the effect of refined palm oil (acid value 0.16 mg KOH/g) on the W1/O emulsion (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\011-0201.D
Sample Name: TN 14.1

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Acq. Operator   : Nguyen Thanh Tan              Seq. Line :   2
Acq. Instrument : Instrument 1                  Location : Vial 11
Injection Date  : 1/25/2024 1:04:11 PM              Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 PM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
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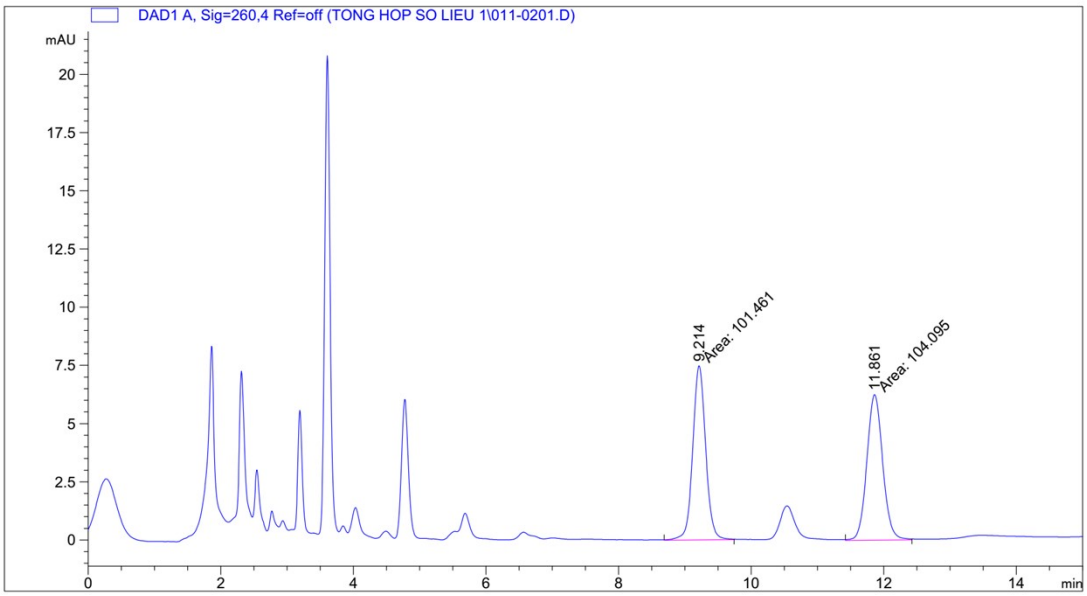


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                        Area Percent Report
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Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.214 MM    0.2259  101.46100    7.48480 49.35933
   2  11.861 MM    0.2774  104.09489    6.25460 50.64067

Totals :                   205.55589   13.73941

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                          *** End of Report ***
```


Figure S4: Chromatogram evaluating the effect of crude oil (acid value 2.96 mg KOH/g) on the W1/O emulsion (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\001-0101.D
Sample Name: TN 20.1

```
Acq. Operator   : Nguyen Thanh Tan              Seq. Line :   1
Acq. Instrument : Instrument 1                  Location : Vial 1
Injection Date  : 1/27/2024 8:00:24 AM              Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
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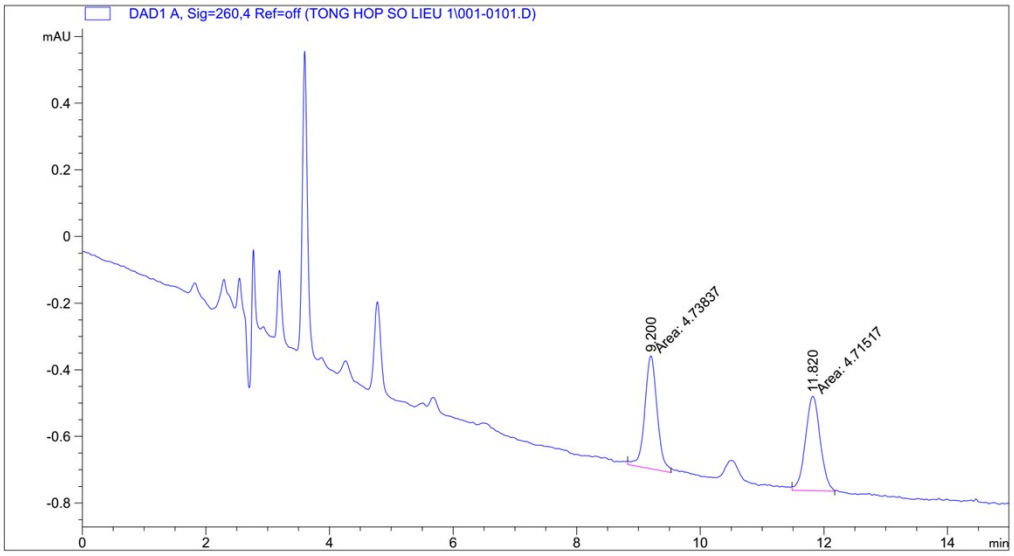


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                          Area Percent Report

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.200 MM    0.2327    4.73837 3.39337e-1 50.12273
   2  11.820 MM    0.2776    4.71517 2.83047e-1 49.87727

Totals :                     9.45354 6.22383e-1


                          *** End of Report ***
```


Figure S5: Chromatogram evaluating the effect of $CaCl_2$ at 1% (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\002-0901.D
Sample Name: TN 32.1

```
==========================================================================
Acq. Operator   : Nguyen Thanh Tan              Seq. Line :   9
Acq. Instrument : Instrument 1                  Location : Vial 2
Injection Date  : 2/5/2024 10:07:47 AM             Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
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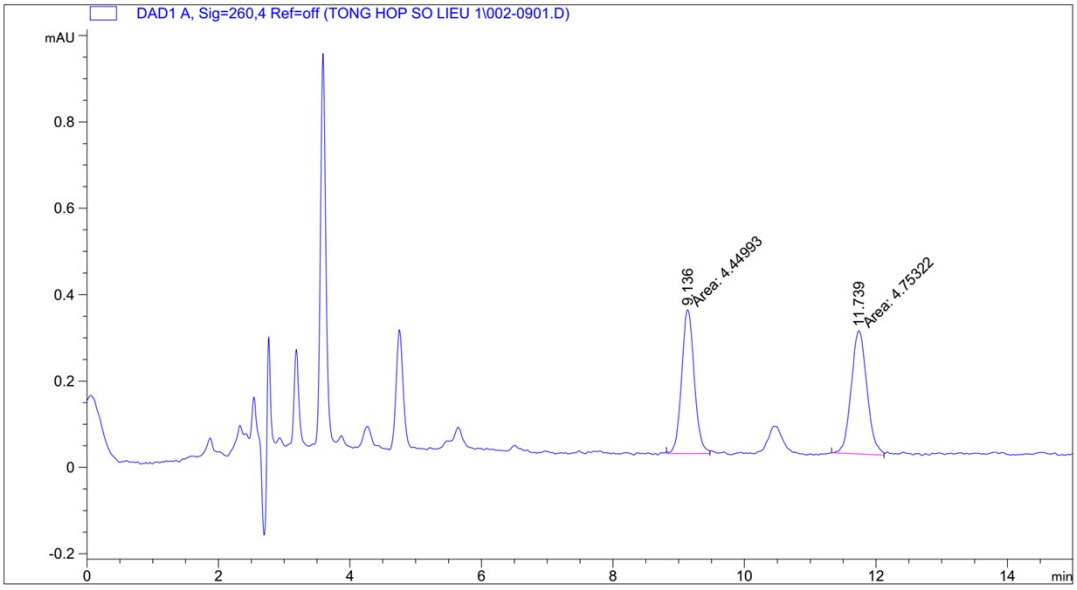


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                          Area Percent Report
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Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.136 MM    0.2225    4.44993 3.33394e-1 48.35226
   2  11.739 MM    0.2774    4.75322 2.85593e-1 51.64774

Totals :                     9.20314 6.18987e-1


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                          *** End of Report ***
```


Figure S6: Chromatogram evaluating the effect of HLB value 12 on the double nanoemulsion system (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\001-0401.D
Sample Name: TN 45.1

```
======================================================================
Acq. Operator   : Nguyen Thanh Tan               Seq. Line :   4
Acq. Instrument : Instrument 1                    Location : Vial 1
Injection Date  : 2/25/2024 11:58:09 AM               Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
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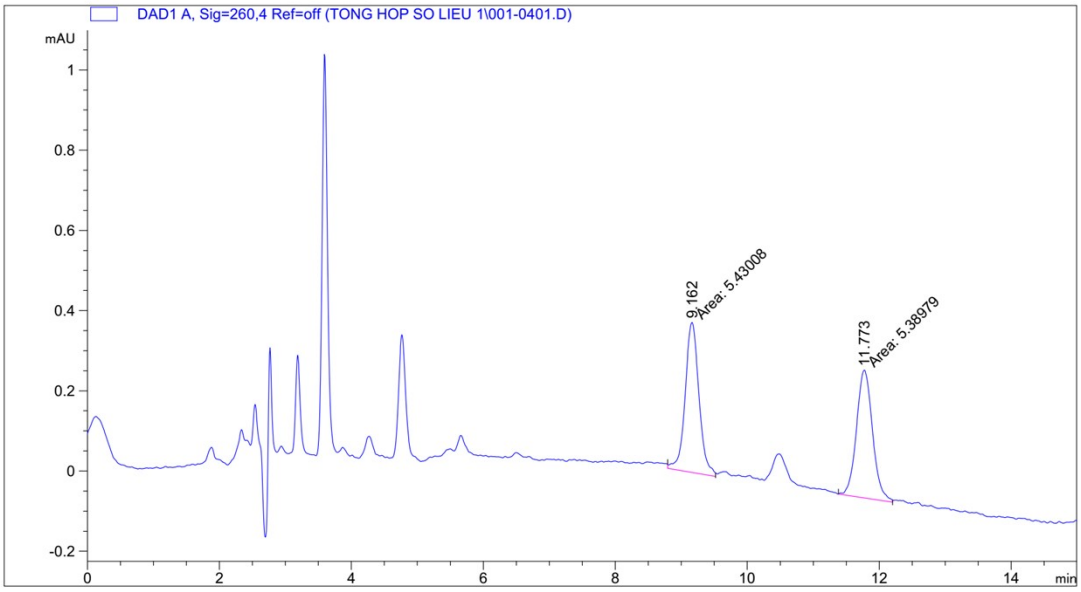


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                        Area Percent Report
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Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.162 MM    0.2420    5.43008 3.74005e-1 50.18618
   2  11.773 MM    0.2819    5.38979 3.18680e-1 49.81382

Totals :                    10.81988 6.92685e-1

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                          *** End of Report ***
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Figure S7: Chromatogram evaluating the effect of emulsifier content at SOR 20% on the double nanoemulsion system (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\001-0201.D
Sample Name: TN 52.1

```
    ======================================================================
    Acq. Operator   : Nguyen Thanh Tan               Seq. Line :   2
    Acq. Instrument : Instrument 1                   Location : Vial 1
    Injection Date  : 2/27/2024 12:33:06 AM                Inj :   1
    Inj Volume : 25 µl
    Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
    Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
    Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
    Additional Info : Peak(s) manually integrated
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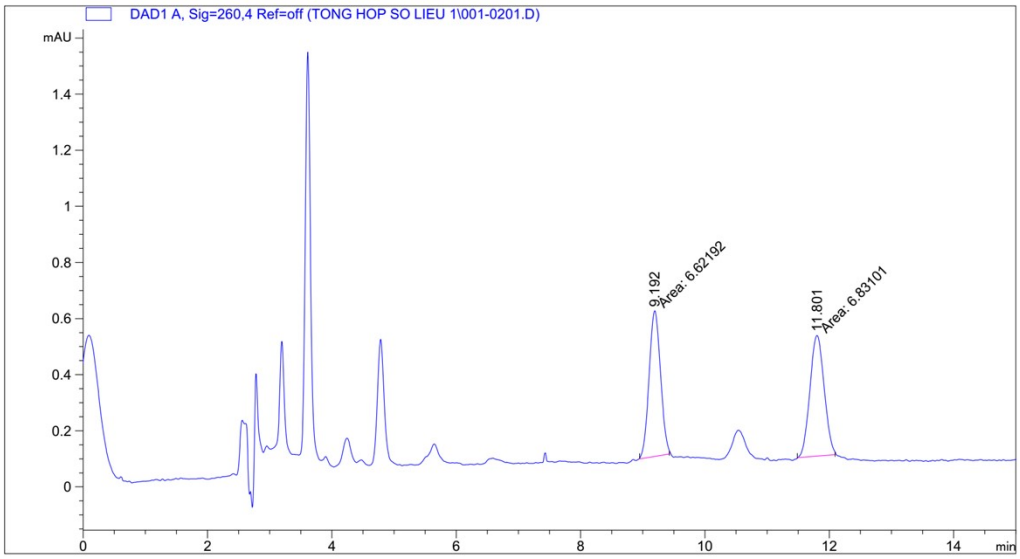


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                               Area Percent Report
    ======================================================================

    Sorted By             :      Signal
    Multiplier:                   :      1.0000
    Dilution:                     :      1.0000
    Use Multiplier & Dilution Factor with ISTDs


    Signal 1: DAD1 A, Sig=260,4 Ref=off

    Peak RetTime Type  Width     Area      Height     Area
      #   [min]        [min]   [mAU*s]     [mAU]       %
    ----|-------|----|-------|----------|----------|--------|
       1   9.192 MM    0.2123    6.62192 5.19801e-1 49.22288
       2  11.801 MM    0.2646    6.83101 4.30284e-1 50.77712

    Totals :                    13.45292 9.50086e-1

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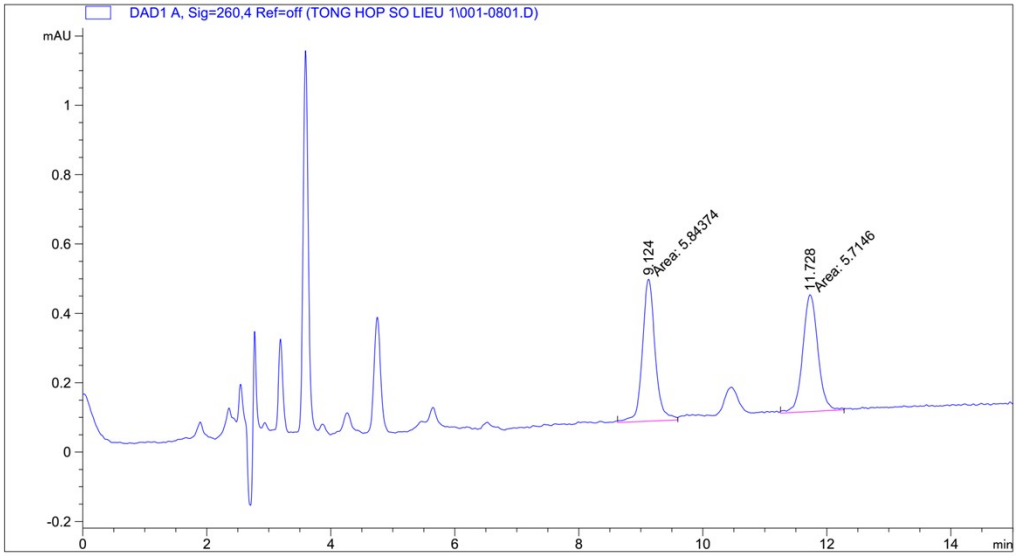
                              *** End of Report ***
```


Figure S8: Chromatogram evaluating the effect of primary emulsion content in the aqueous phase at SOWR 20% on the double nanoemulsion system (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\001-0801.D
Sample Name: TN 59.1

```
==========================================================================
Acq. Operator   : Nguyen Thanh Tan               Seq. Line :   8
Acq. Instrument : Instrument 1                   Location : Vial 1
Injection Date  : 2/28/2024 9:51:51 AM               Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
```




```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.124 MM    0.2378    5.84374 4.09601e-1 50.55861
   2  11.728 MM    0.2830    5.71460 3.36547e-1 49.44139

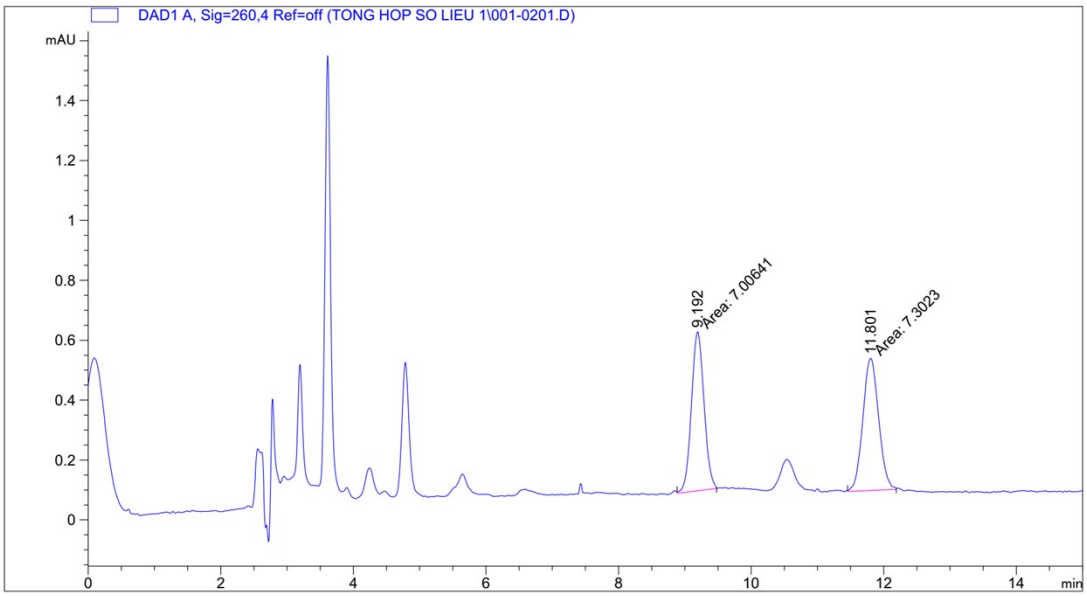
Totals :                   11.55834 7.46148e-1

==========================================================================
                          *** End of Report ***
```


Figure S9: Chromatogram evaluating the effect of ultrasonic power (350 W) on the double nanoemulsion system (first measurement).

Data File C:\CHEM32\1\DATA\TONG HOP SO LIEU 1\001-0201.D
Sample Name: TN 66.1

```
==========================================================================
Acq. Operator   : Nguyen Thanh Tan              Seq. Line :   2
Acq. Instrument : Instrument 1                   Location : Vial 1
Injection Date  : 2/29/2024 12:33:06 AM               Inj :   1
Inj Volume : 25 µl
Acq. Method     : D:\DATA\ADENOSINE-CORDYCEPIN.M
Last changed    : 1/24/2024 8:37:42 AM by Nguyen Thanh Tan
Analysis Method : C:\CHEM32\1\METHODS\DEF_GC.M
Additional Info : Peak(s) manually integrated
```




```
==========================================================================
                        Area Percent Report
==========================================================================

Sorted By             :      Signal
Multiplier:                   :      1.0000
Dilution:                     :      1.0000
Use Multiplier & Dilution Factor with ISTDs


Signal 1: DAD1 A, Sig=260,4 Ref=off

Peak RetTime Type  Width     Area      Height     Area
  #   [min]        [min]   [mAU*s]     [mAU]       %
----|-------|----|-------|----------|----------|--------|
   1   9.192 MM    0.2199    7.00641 5.30946e-1 48.96604
   2  11.801 MM    0.2757    7.30230 4.41436e-1 51.03396

Totals :                    14.30871 9.72382e-1

==========================================================================
                          *** End of Report ***
```


Figure S10: Chromatogram evaluating the effect of ultrasonication time (6 minutes) on the double nanoemulsion system (first measurement).

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HLB 12.1.nsz

Measurement Results

Date	:	February 6, 2024
Measurement Type	:	Particle Size
Sample Name	:	HLB 12.1
Scattering Angle	:	173
Temperature of the Holder	:	25.0 °C
Dispersion Medium Viscosity	:	0.897 mPa·s
Transmission Intensity before Meas.	:	28403
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1161 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	166.0 nm	43.7 nm	160.4 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	166.0 nm	43.7 nm	160.4 nm

Cumulant Operations

Z-Average	:	132.7 nm
PI	:	0.226

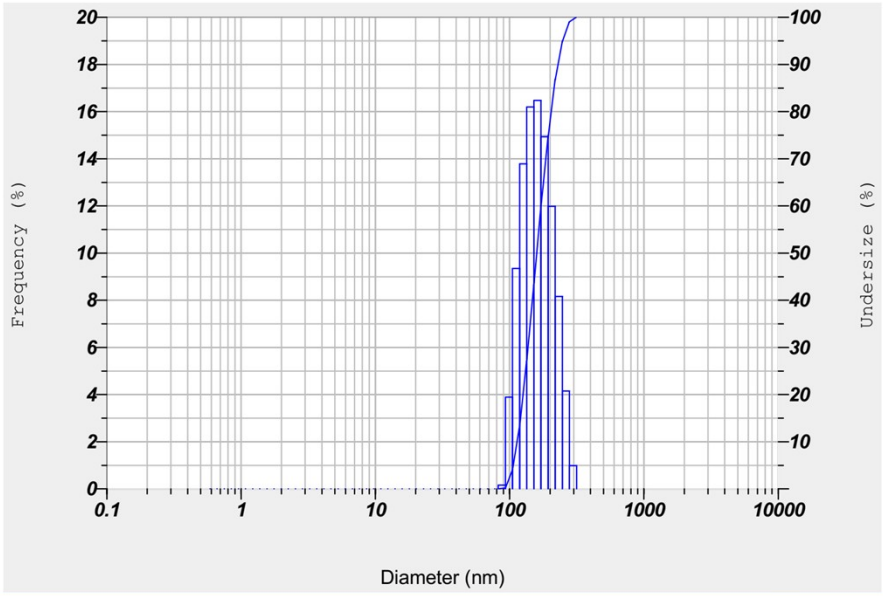

Figure S11: Particle size of the double nanoemulsion system at HLB value 12 measured by DLS (first measurement).

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SOR 20.1.nsz

Measurement Results

Date	:	February 25, 2024
Measurement Type	:	Particle Size
Sample Name	:	SOR 20.1
Scattering Angle	:	173
Temperature of the Holder	:	24.9 °C
Dispersion Medium Viscosity	:	0.897 mPa·s
Transmission Intensity before Meas.	:	29416
Distribution Form	:	Standard
Distribution Form(Dispersity)	:	Monodisperse
Representation of Result	:	Scattering Light Intensity
Count Rate	:	1816 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	122.8 nm	35.3 nm	111.8 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	122.8 nm	35.3 nm	111.8 nm

Cumulant Operations

Z-Average	:	117.2 nm
PI	:	0.216

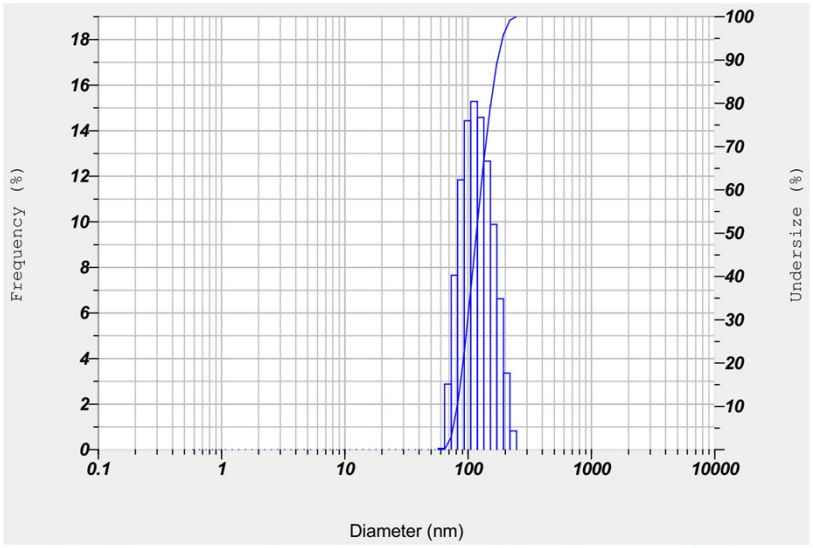

Figure S12: Particle size of the double nanoemulsion system at SOR 20% measured by DLS (first measurement).

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SOWR 20.1.nsz
Measurement Results

Date	: February 26, 2024
Measurement Type	: Particle Size
Sample Name	: SOWR 20.1
Scattering Angle	: 173
Temperature of the Holder	: 24.9 °C
Dispersion Medium Viscosity	: 0.897 mPa·s
Transmission Intensity before Meas.	: 29416
Distribution Form	: Standard
Distribution Form(Dispersity)	: Monodisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 1816 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	126.8 nm	36.6 nm	112.2 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	126.8 nm	36.6 nm	112.2 nm

Cumulant Operations

Z-Average	: 121.2 nm
PI	: 0.199

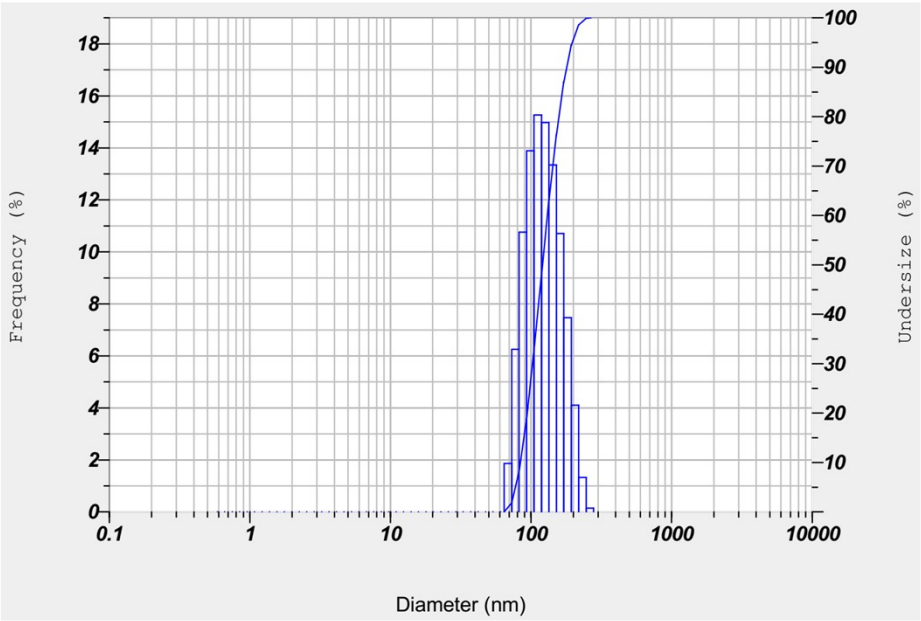

Figure S13: Particle size of the double nanoemulsion system at SOWR 20% measured by DLS (first measurement).

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PU 350W.1.nsz
Measurement Results

Date	: February 29, 2024
Measurement Type	: Particle Size
Sample Name	: PU 350W.1
Scattering Angle	: 173
Temperature of the Holder	: 25.0 °C
Dispersion Medium Viscosity	: 0.897 mPa·s
Transmission Intensity before Meas.	: 28780
Distribution Form	: Standard
Distribution Form(Dispersity)	: Monodisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 2337 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	104.2 nm	28.3 nm	98.6 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	104.2 nm	28.3 nm	98.6 nm

Cumulant Operations

Z-Average	: 101.1 nm
PI	: 0.188

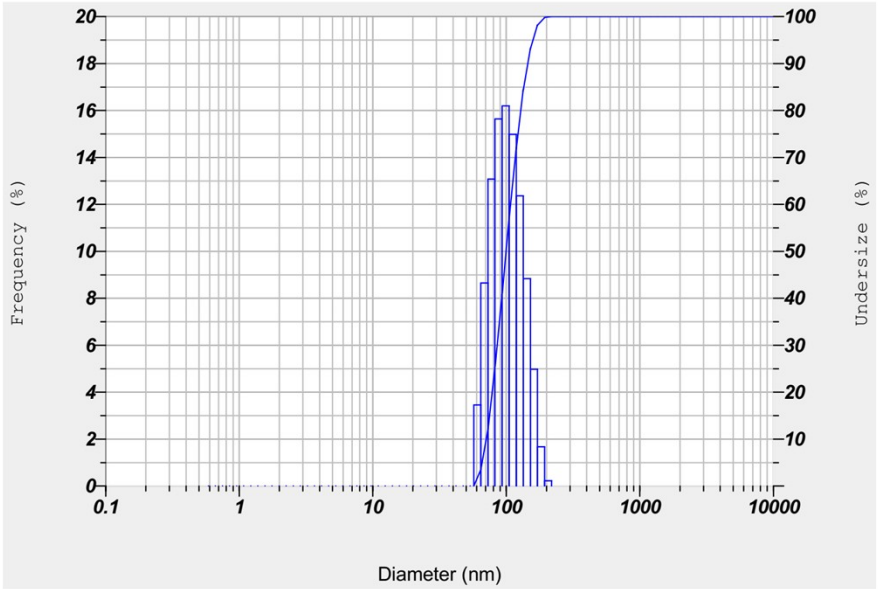

Figure S14: Particle size of the double nanoemulsion system at ultrasonic power 350 W measured by DLS (first measurement).

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TU 6.1.nsz

Measurement Results

Date	: February 29, 2024
Measurement Type	: Particle Size
Sample Name	: TU 6.1
Scattering Angle	: 173
Temperature of the Holder	: 25.0 °C
Dispersion Medium Viscosity	: 0.897 mPa·s
Transmission Intensity before Meas.	: 28780
Distribution Form	: Standard
Distribution Form(Dispersity)	: Monodisperse
Representation of Result	: Scattering Light Intensity
Count Rate	: 2419 kCPS

Calculation Results

Peak No.	S.P.Area Ratio	Mean	S. D.	Mode
1	1.00	104.9 nm	28.6 nm	98.7 nm
2	---	--- nm	--- nm	--- nm
3	---	--- nm	--- nm	--- nm
Total	1.00	104.9 nm	28.6 nm	98.7 nm

Cumulant Operations

Z-Average	: 99.4 nm
PI	: 0.186

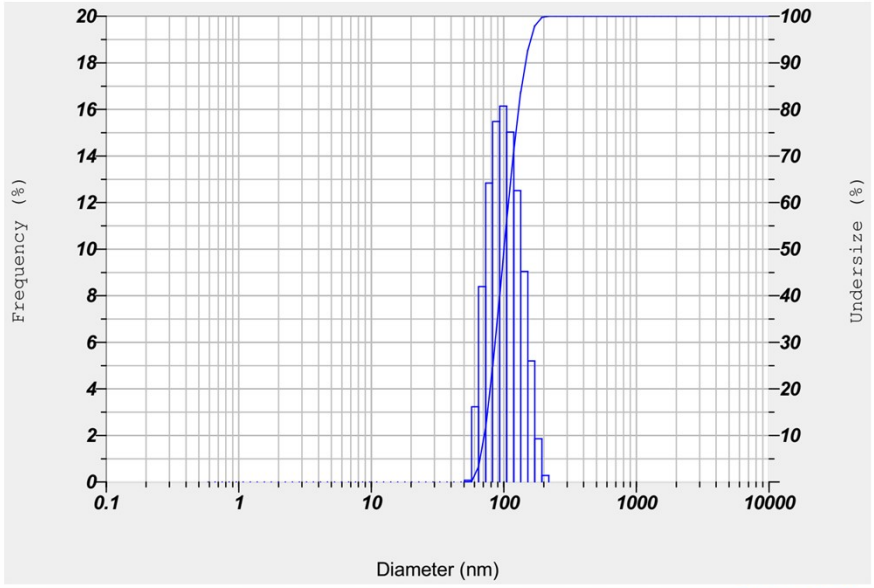

Figure S15: Particle size of the double nanoemulsion system at ultrasonication time (6 minutes) measured by DLS (first measurement).

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Measurement Results

Nano NCMs.1.nzt
Measurement Results

Date	: March 3, 2024
Measurement Type	: Zeta Potential
Sample Name	: Nano NCMs.1
Temperature of the Holder	: 25.0 °C
Dispersion Medium Viscosity	: 0.945 mPa·s
Conductivity	: 0.149 mS/cm
Electrode Voltage	: 3.3 V

Calculation Results

Peak No.	Zeta Potential	Electrophoretic Mobility
1	-70.0 mV	-0.000541 cm2/Vs
2	--- mV	--- cm2/Vs
3	--- mV	--- cm2/Vs

Zeta Potential (Mean) : **-70.0 mV**
Electrophoretic Mobility Mean : **-0.000541 cm^2/Vs**

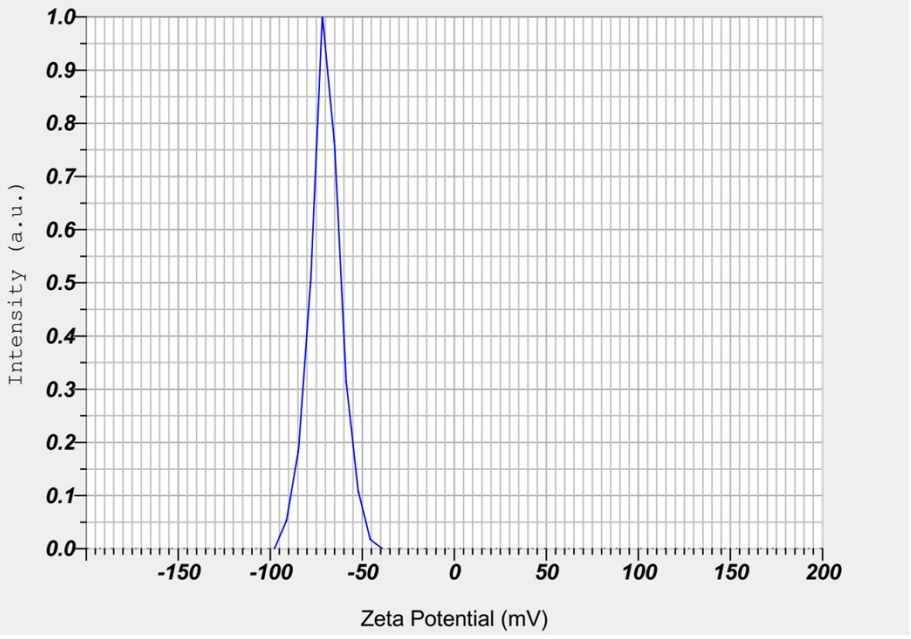

Figure S16: Zeta potential of the NCMs double nanoemulsion system (first measurement).

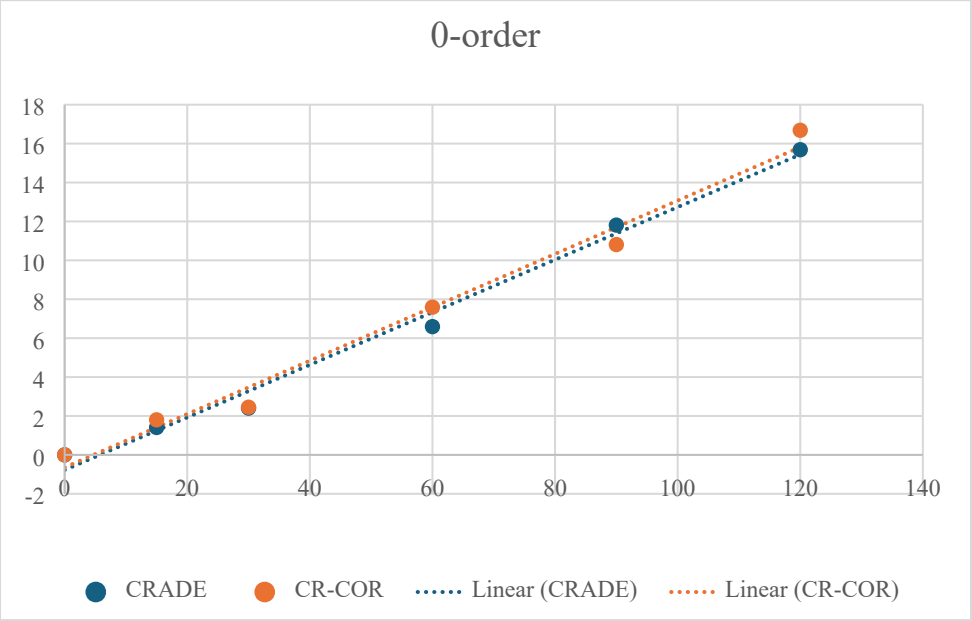

Figure S17. Zero- order model in SGF

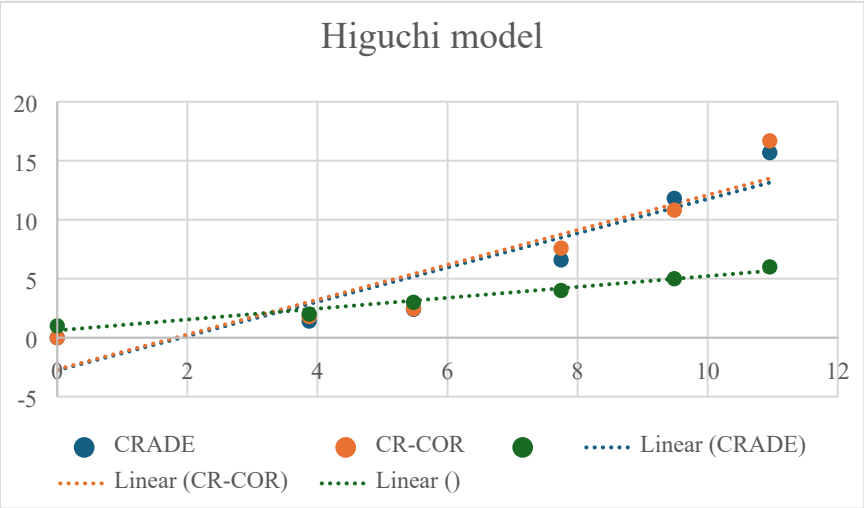

Figure S18. Higuchi model in SGF

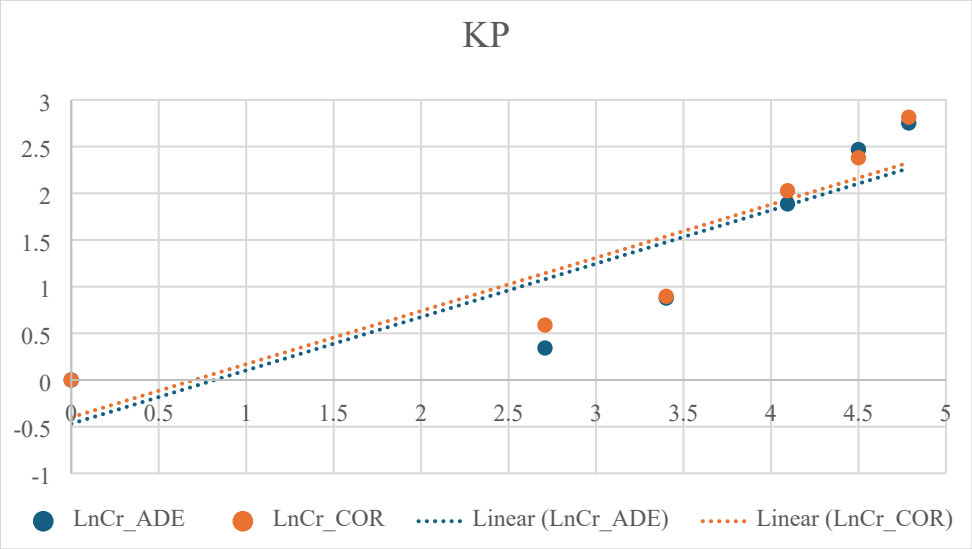

Figure S19. Korsmeyer-Peppas model in SGF

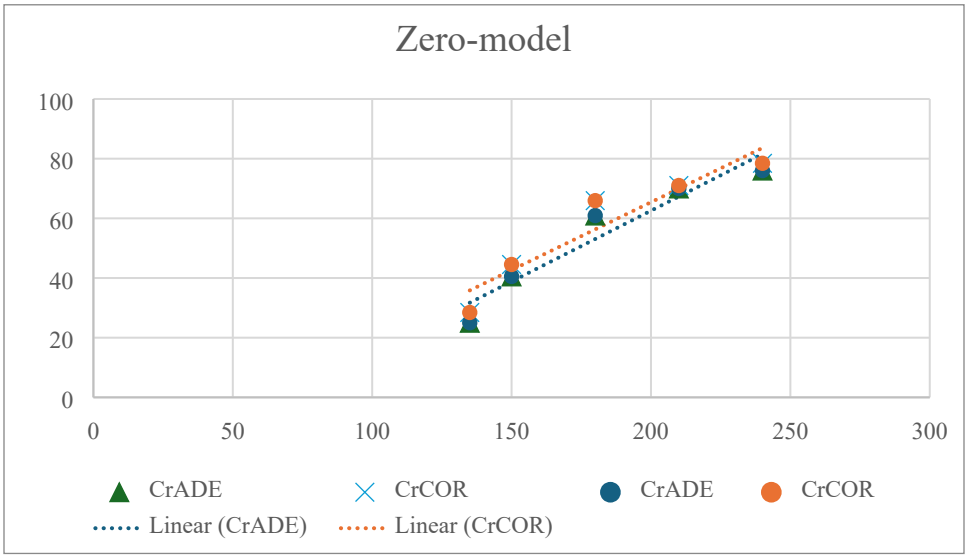

Figure S20. Zero-model in SIF

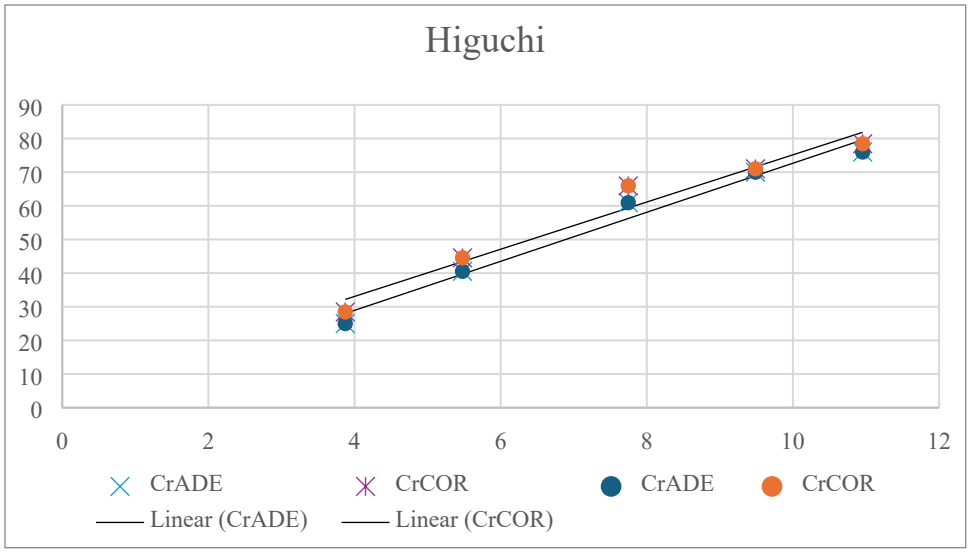

Figure S21. Higuchi model in SIF

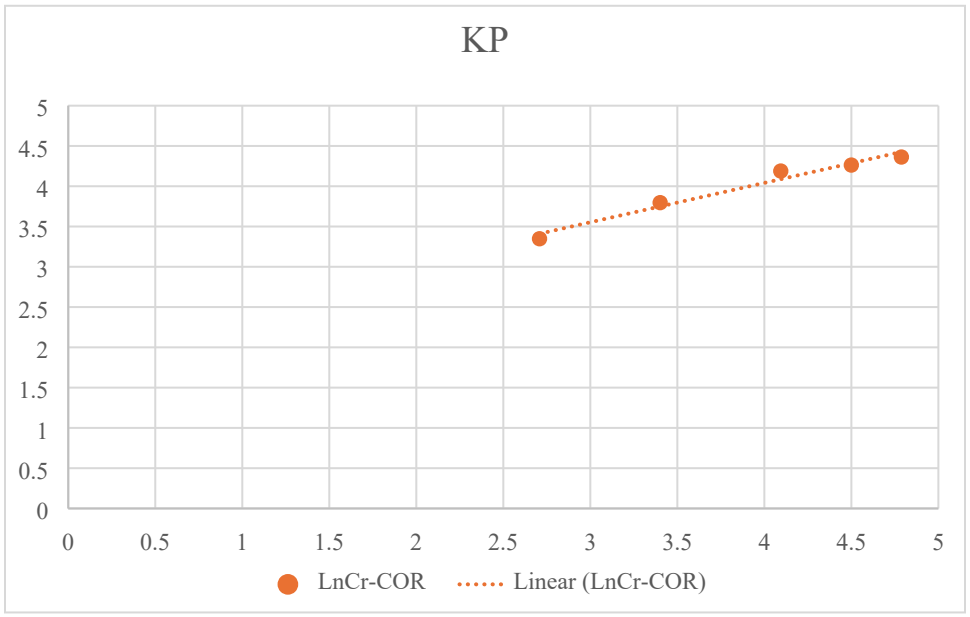

Figure S22. COR_KP model in SIF

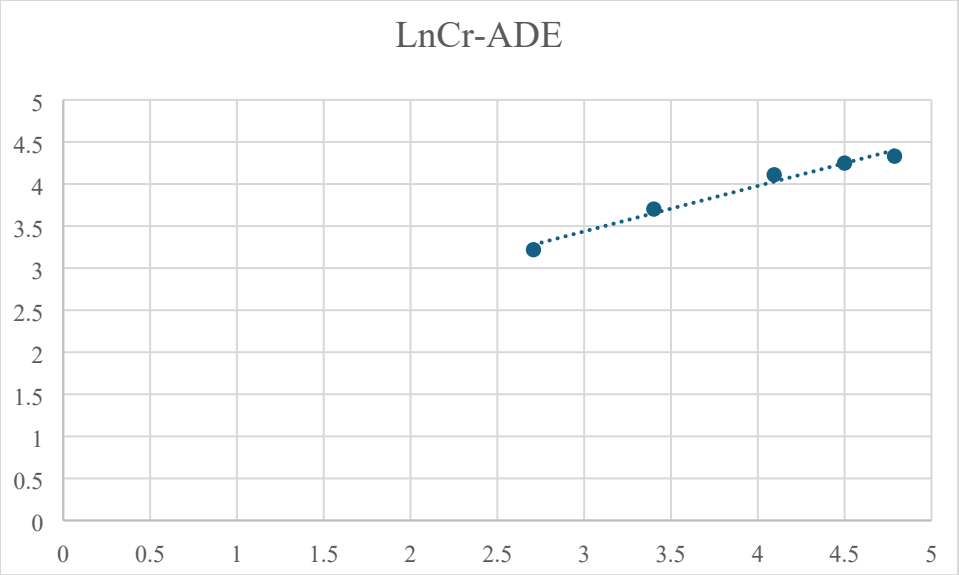

Figure S23. ADE_KP model in SIF