Electronic Supplementary Material (ESI) for Journal of Materials Chemistry B.

Evaluating the impact of systematic hydrophobic modification of model drugs on the control, stability and loading of lipid-based nanoparticles

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Supplementary Information

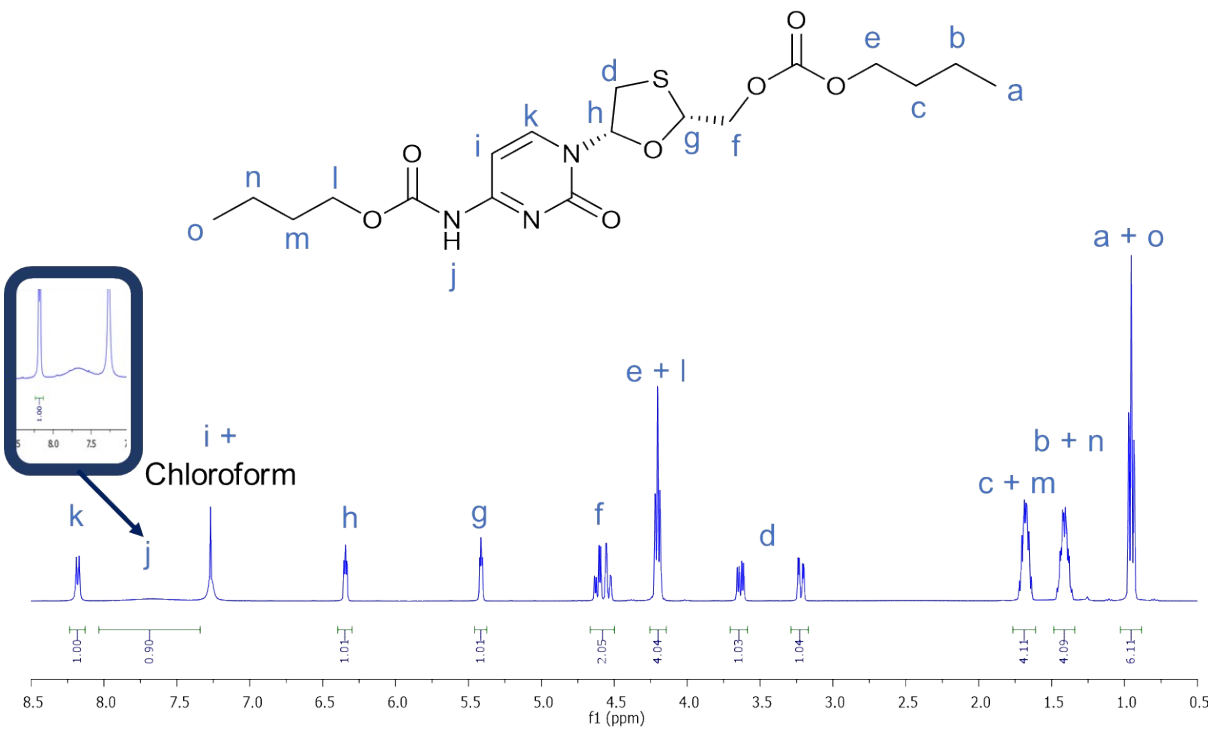

Figure 1- ^{1}H NMR (400 MHz) spectra of butyl drug analogue in CD_3Cl_3

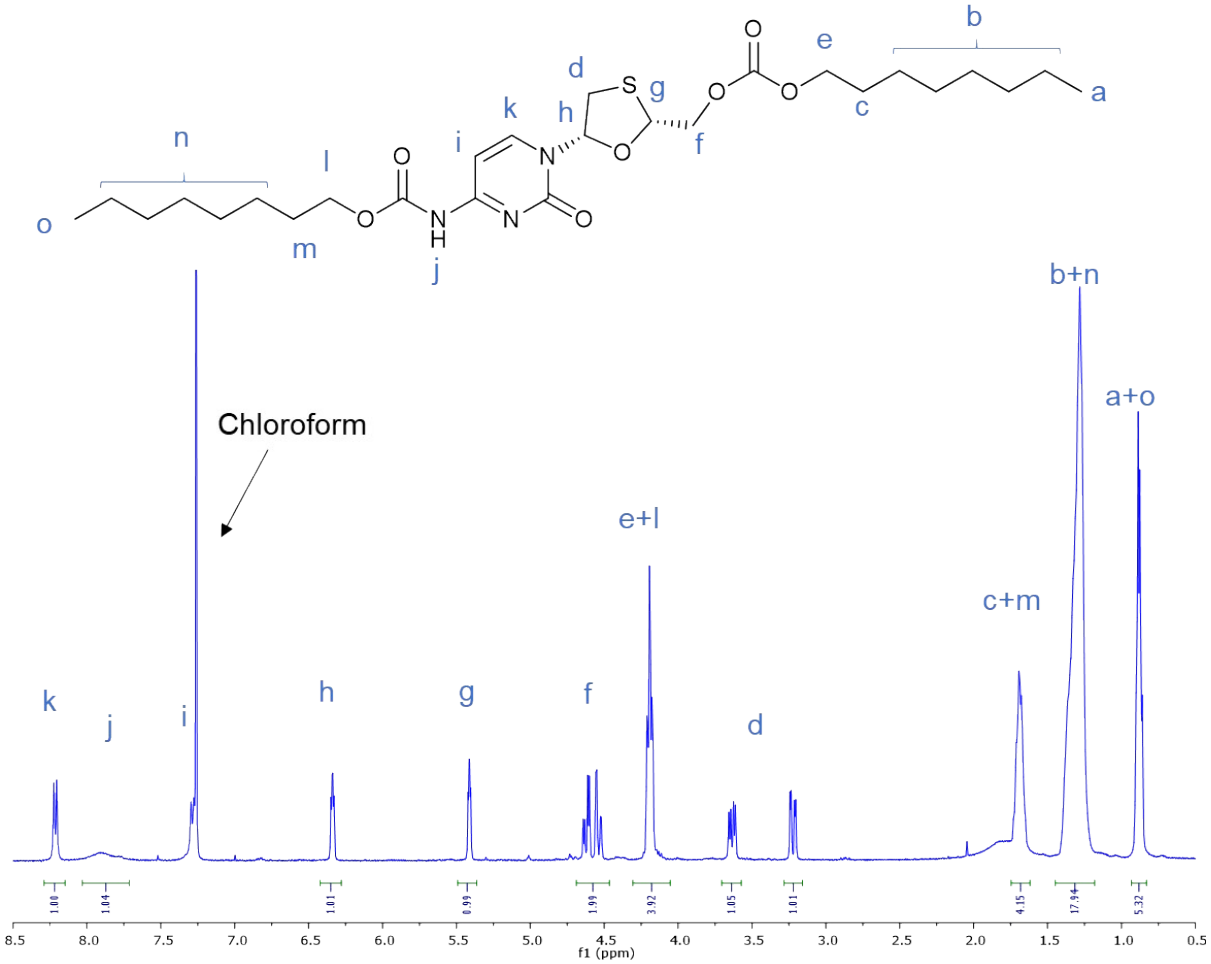

Figure 2- ^{1}H NMR (400 MHz) spectra of octyl drug analogue in CD_3Cl_3

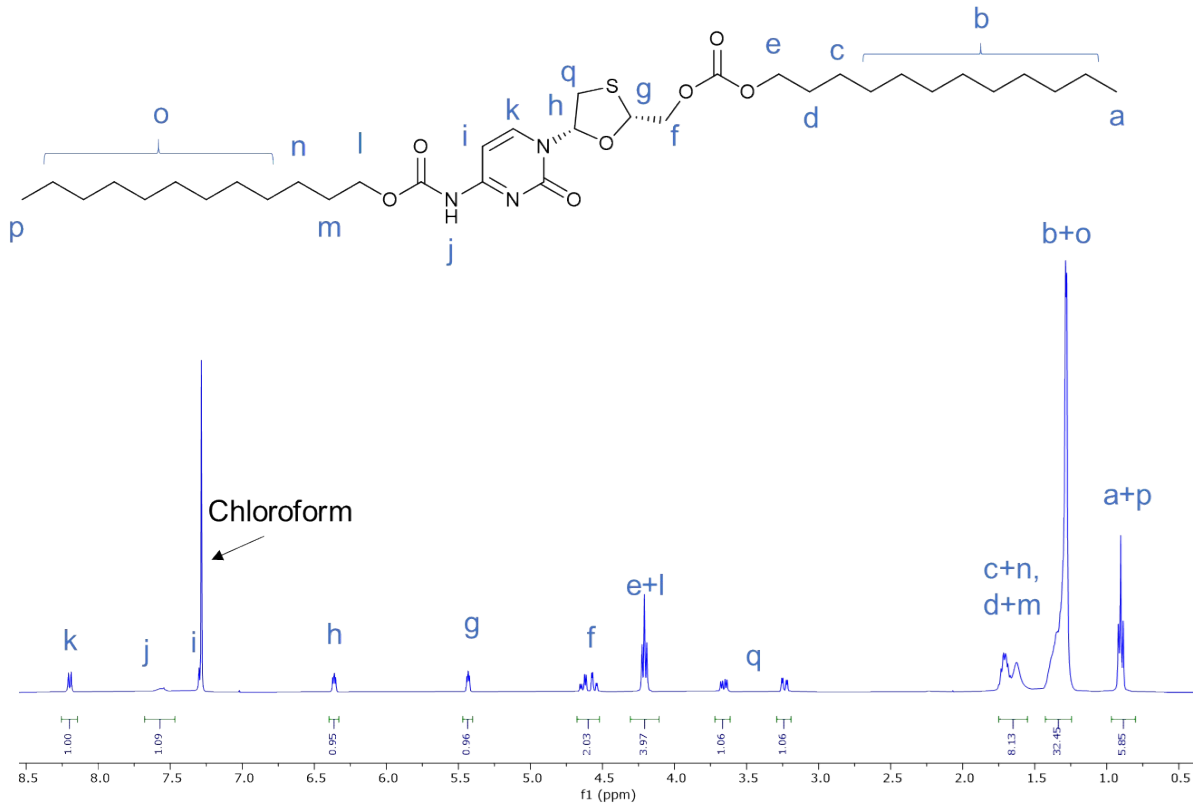

Figure 3- ^{1}H NMR (400 MHz) spectra of dodecyl drug analogue in CD_3Cl_3

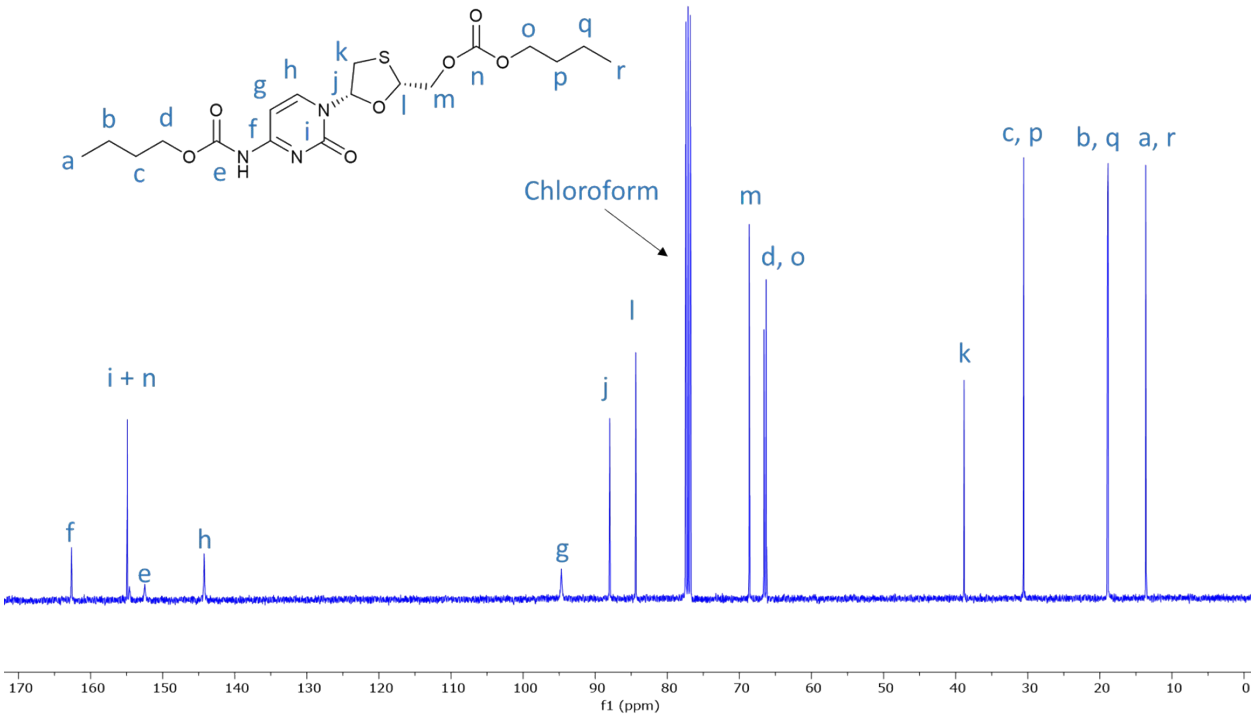

Figure 4- ^{13}C NMR (400 MHz) spectra of butyl drug analogue in CD_3Cl_3

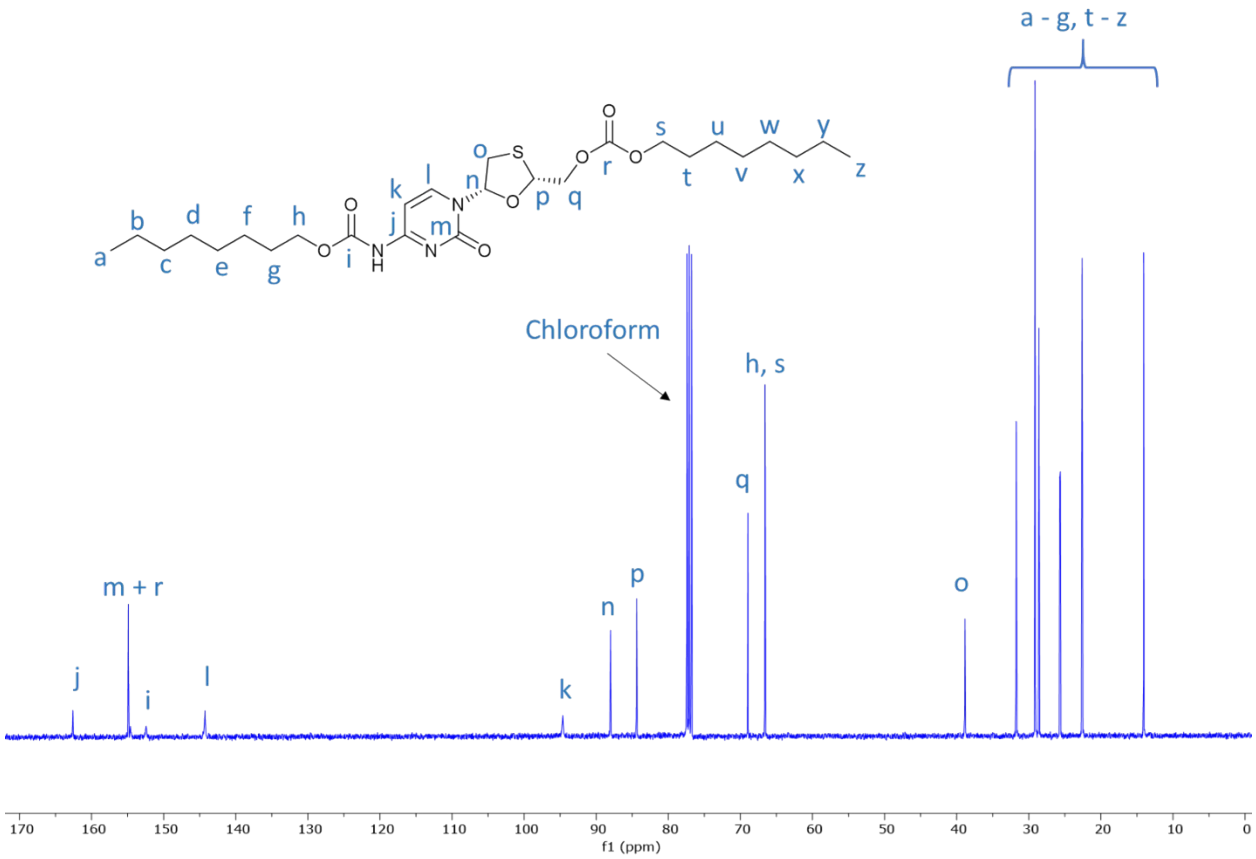

Figure 5- ^{13}C NMR (400 MHz) spectra of octyl drug analogue in CD_3Cl_3

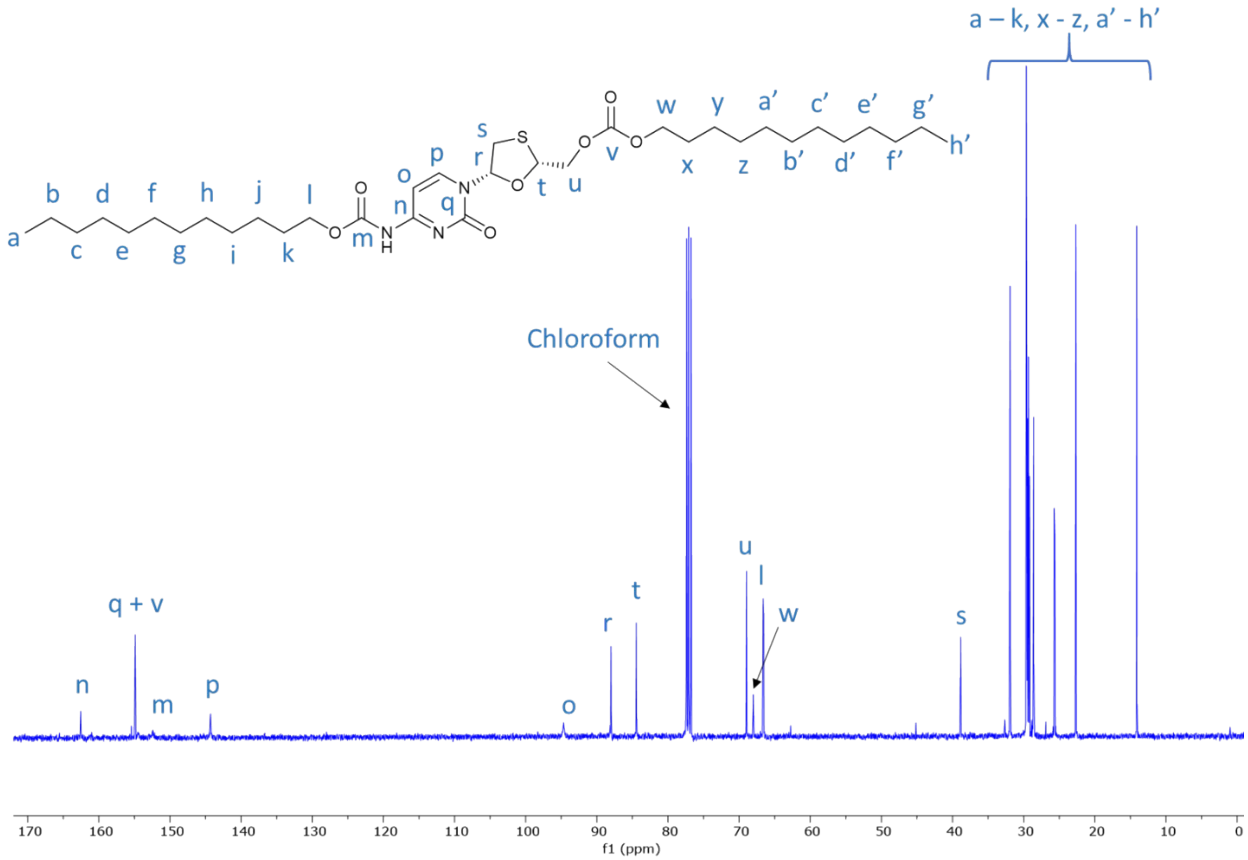

Figure 6- ^{13}C NMR (400 MHz) spectra of dodecyl drug analogue in CD_3Cl_3

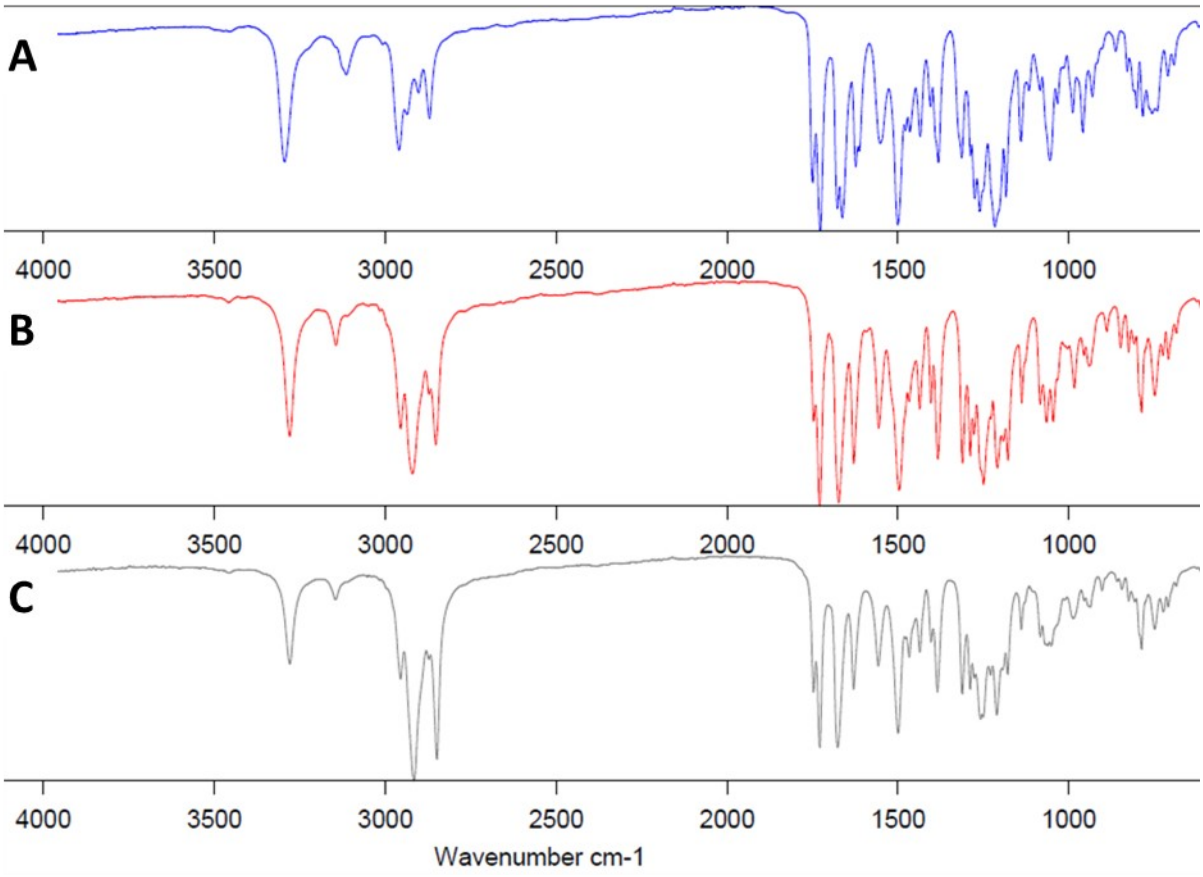

Figure 7- FTIR data of drug analogues; A) Butyl B) Octyl C) Dodecyl

Table 1- CHNS elemental analysis data for butyl, octyl and dodecyl drug analogues.

		Calculated				Measured			
Sample	**Empirical formula**	% C	% H	% N	% S	% C	% H	% N	% S
Butyl prodrug	$C_{18}H_{27}N_3O_7S$	50.34	6.34	9.78	7.46	50.36	6.35	9.9	7.22
Octyl prodrug	$C_{26}H_{43}N_3O_7S$	57.65	8.00	7.76	5.92	57.74	8.04	7.94	5.97
Dodecyl prodrug	$C_{34}H_{59}N_3O_7S$	62.45	9.09	6.43	4.90	62.37	8.98	6.26	5.00

Table 2- Electron spray mass Spectrometry data for butyl, octyl and dodecyl drug analogues

	Calculated (m/z)		Measured (m/z)	
Sample	**(M+H)+**	**(M+Na)+**	**(M+H)+**	**(M+Na)+**
Butyl prodrug	430.1642	452.1462	430.1634 (-0.0008)	452.1463 (+0.0001)
Octyl prodrug	542.2894	564.2714	542.2890 (-0.0004)	564.2709 (-0.0005)
Dodecyl prodrug	654.4146	676.3966	654.4142 (-0.0004)	676.3962 (-0.0004)

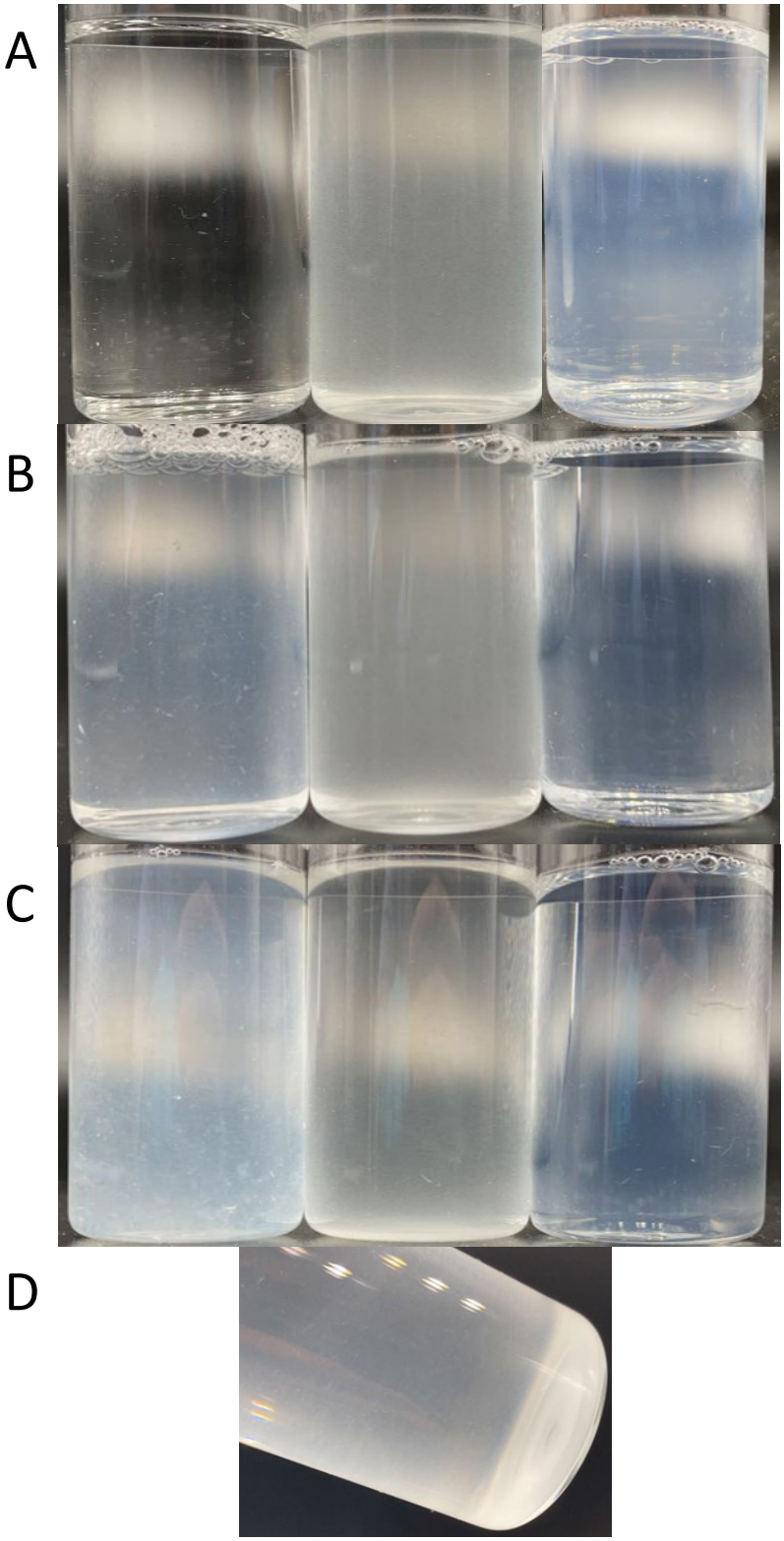

Figure 8- From left to right photos of Butyl, Octyl and Dodecyl drug analogue formulations A) Day 0 after 1 hour, B) Day 2 after removal of THF, C) Day 6 short term storage at 4 °C . Overtime butyl drug analogue formulation completely crystallised upon removal of thf resulting in the formation of visible needles on day 2 which grow and are highly noticeable on day 6; octyl drug analogue formulation is turbid after one hour with a notable glittery effect, until day 6 where crystals sediment. Dodecyl drug analogue formulation virtually clear. And remains unchanged over time. D) Octyl drug analogue formulation DAY 6 alternative angle showing sedimented material

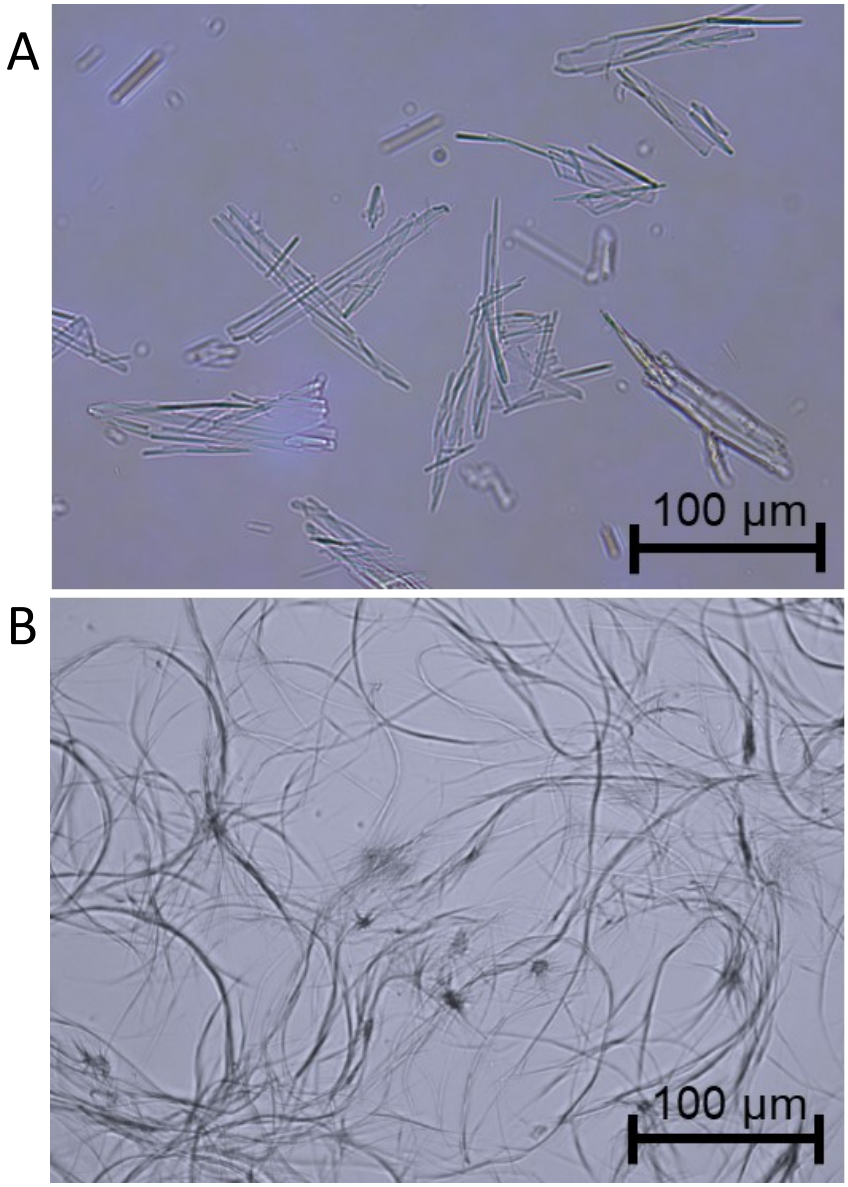

Figure 9- Optical Microscopy image A) Confirming the presence of anisotropic crystals of octyl drug analogue indicating poor stability due to Ostwald ripening DAY 6. B) Butyl drug analogue formulation DAY 6.

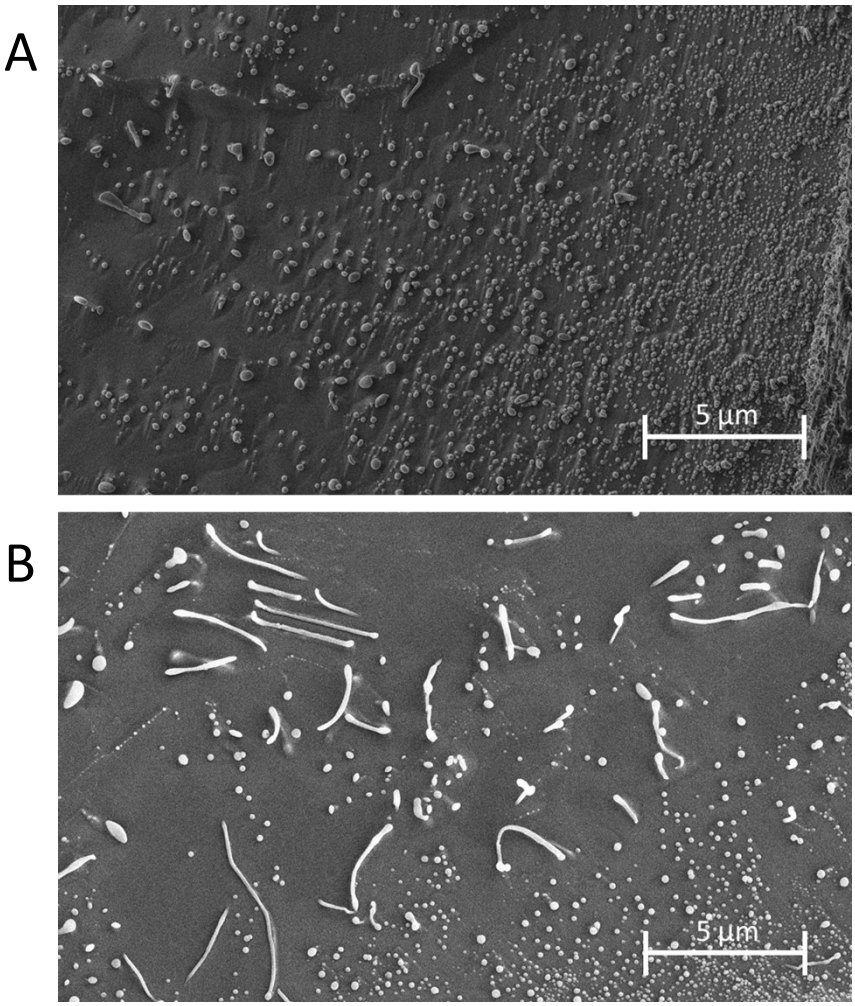

Figure 10- Cryo SEM images of A) dodecyl SDAN formulation displaying a large number of spherical shaped objects deemed to be nanoparticles B) brij 78 solution control displaying evidence of large string like and some small spherical artefacts created by the brij 78 surfactant.

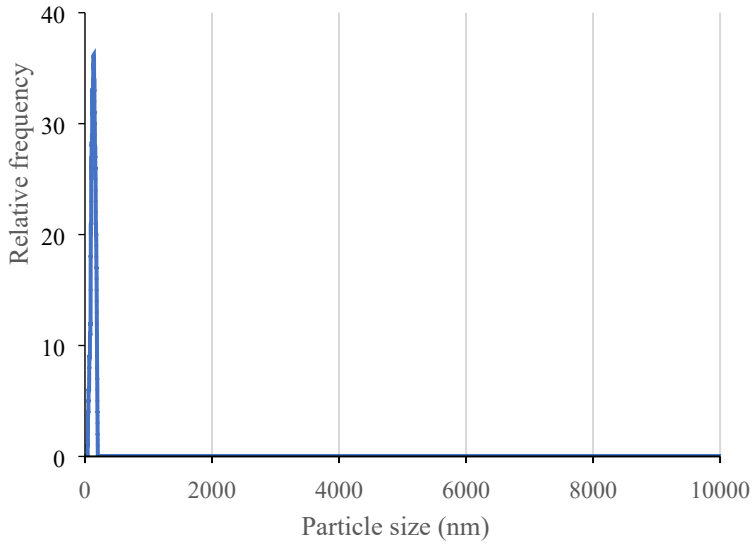

Figure 11- Size distribution graph using data calculated by ImageJ for dodecyl drug analogue nanoparticle formulation

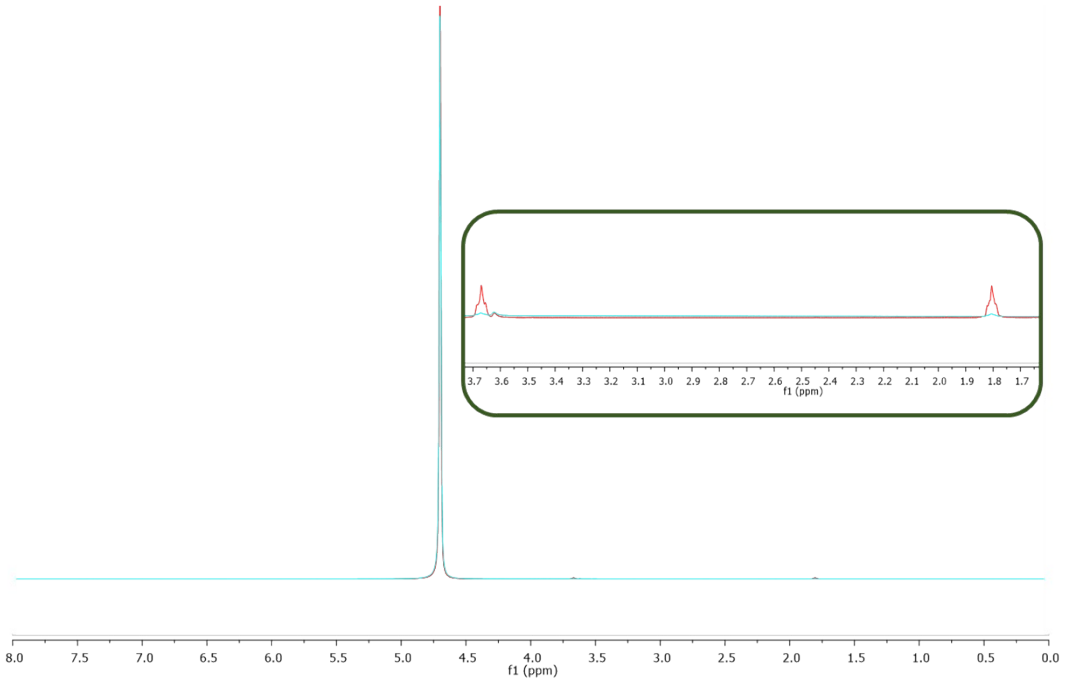

Figure 12- 1H NMR overlay of day 0 (red) and day 2 (cyan) showing disappearance of peaks for tetrahydrofuran (THF) at approximately 1.85 and 3.7 ppm indicating complete evaporation of THF for the 100 % dodecyl drug analogue nanoparticle formulation

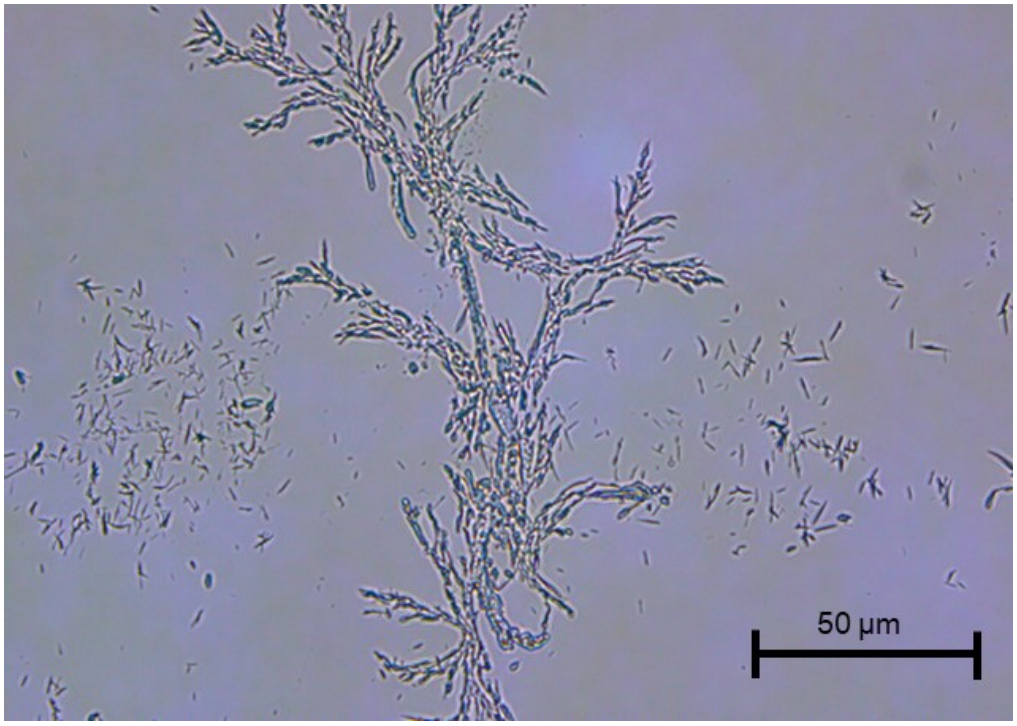

Figure 13- Optical Microscopy image confirming the presence of anisotropic crystals of Imwitor 900k indicating poor stability between day 6 and day 28