CLEANING LABORATORY EVALUATION SUMMARY

SCL #:	2019
DateRun:	06/24/2019
Experimenters:	Ross Goding
ClientType:	Chemical Company
ProjectNumber:	Project #1
Substrates:	
PartType:	Part
Contaminants:	Thickener
Cleaning Methods:	Immersion/Soak
Analytical Methods:	HSPiP
Purpose:	Determine a safer alternative for cleaning applications to remove solvent-based coatings using Hansen Solubility Parameters in Practice (HSPiP).

Experimental Procedure:

Small pieces of the client's thickener were immersed in each solvent vial for five minutes. A rating system of zero to five was developed to the efficiency of the solvent in its ability to dissolve the substrate. If little to no soil was dissolved, the solvent would receive a zero (0), and if most or all soil was dissolved, the solvent would receive a five (5). The ratings were entered into the HSPiP software, and a sphere was generated from that data. The table below is the rating system used for each of the twenty-two chemicals.

Rating	Description
5	Soil dissolved completely
4	Most of soil was dissolved
3	Soil was partially dissolved/ seems removable
2	Not much soil dissolved, soaked up liquid
1	Barely any change from beginning and end soil
0	No change at all

*F = Soil floated to the top of the liquid after 24 hours

The HSPiP sphere has size parameters that associate with its solubility. These parameters were entered into the Database of Safe Solvents (DOSS.turi.org), with a tolerance of +/- one value to create a range for identifying a safer solvent. DOSS provided a list of solvents that were within the values given and exported into the HSPiP optimizer option. The optimization evaluation found solvents and solvent blends that were closest to the parameters of the coating HSPiP sphere.

HSP Chemicals:

(1) Dimethyl Carbonate, (2) Xylenes, (3) Benzyl Alcohol, (4) Ethylene Glycol, (5) Methyl Acetate, (6) Undecane, (7) Ethyl Lactate, (8) Acetone, (9) Ethyl Acetate, (10) Methanol, (11) Ethanol, (12) 1,3-Dioxolane, (13) Diethyl Carbonate, (14) 1-Propanol, (15) Iso-Propanol, (16) Propylene Carbonate, (17) Thiophene, (18) 1-Methoxy-2-Propanol, (19) Dimethyl Sulfoxide (DMSO), (20) 1-Butanol, (21) Dimethyl Glutarate, (22) Anisole

Results:

HSP Results:

#	Solvent	Adhesive
		Thickener
1	Dimethyl Carbonate	2 F
2	Xylenes	0 F
3		0 F

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	Benzyl Alcohol	
4	Ethylene Glycol	0 F
5	Methyl Acetate	1
6	Undecane	1
7	Ethyl Lactate	1 F
8	Acetone	1
9	Ethyl Acetate	1
10	Methanol	0
11	Ethanol	1
12	1,3-Dioxolane	2 F
13	Diethyl Carbonate	1 F
14	1-Propanol	1
15	Iso-propanol	1
16	Propylene Carbonate	0 F
17	Thiophene	3 F
18	1-Methoxy-2-Propanol	2 F
19	DMSO	3 F
20	1-Butanol	2
21	Dimethyl Glutarate	1 F
22	Anisole	3 F

Results from HSPiP:

The sphere determined by the HSPiP software was defined as the following:

Contaminant	D-value	P-value	H-value
Thickener	12.01	-0.22	10.01

Summary:

Conclusion: Further testing will be needed to include more solvents for a more stable sphere in HSPiP software.