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Van Loon Chemical Innovations



About Us

- Founded in November 2008 by Sander van Loon, CEO.
- Provides **innovative R&D Services** and **practical solutions** to the formulation industry.
- **Number 1** formulation centre in Europe; combines applied state-of-the-art formulation science with **High Throughput** screening.
- Offers knowledge and faster R&D (3-8) with cost savings of up to **20-30%**.



Unique Selling Points





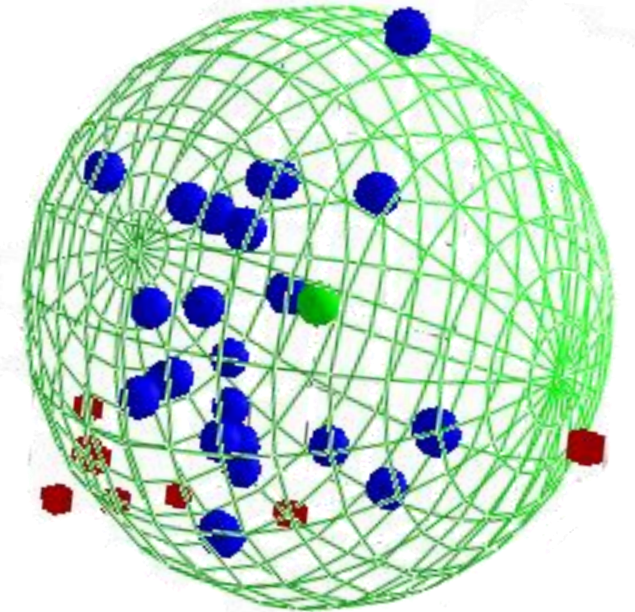
Hansen Solubility Parameters (HSP)



Hansen Solubility Parameters (HSP)

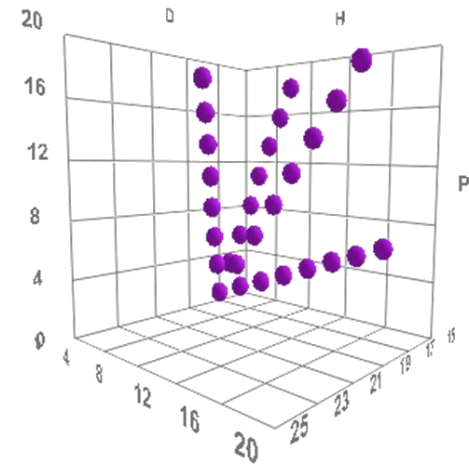
- **Certified** and **worldwide** centre for the determination of HSP.
- Strong collaborations with **Dr. Charles Hansen** and **Prof. Steven Abbott**.
- Powerful and practical way to understand, predict and improve: **solubility, compatibility, stability, efficacy...**

...But also **dispersibility** !

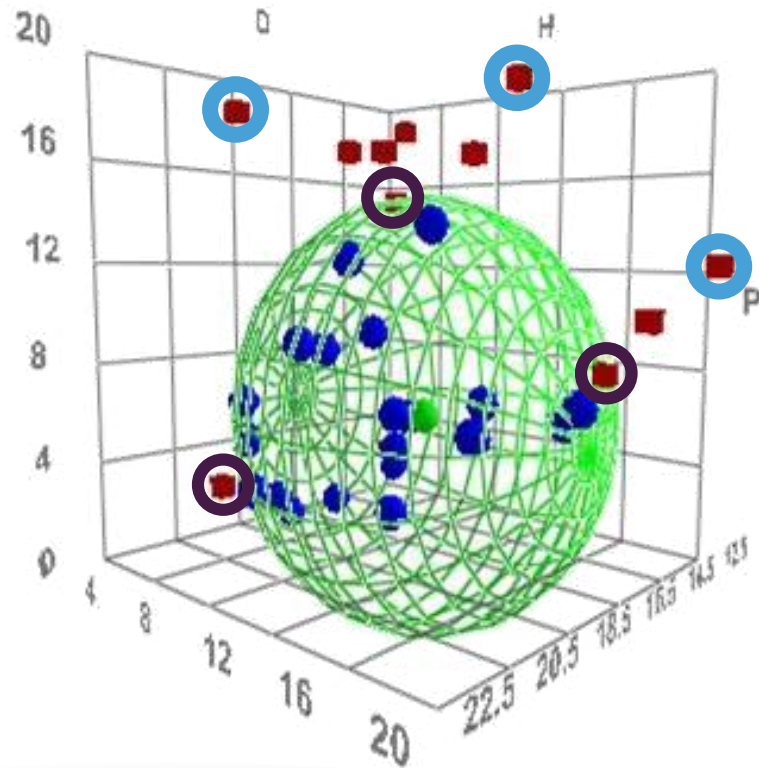


HSP Measurement – Simple Dissolution

- Solubility is ranked by eye, from **1** (excellent) to **6** (very poor).
- Scores are entered into **HSPiP** to generate the solubility sphere of the test product(s).
- Extra solvents and solvent blends can be used in order to define better the boundaries of the sphere.



Smart solvent selection for more effective HSP



Distant solvents give little useful information and are wasteful samples.

Our Approach:

Focus efforts around sphere boundaries, through smarter selection of solvents and blends

This means better HSP data accuracy, with fewer samples.

Hansen Solubility Parameters (HSP) Methods

Method	Suitable for
Dissolution Method	Simple solutes, mixtures
Quantitative Swell Test	Crosslinked and insoluble polymers
Sedimentation Method	Insoluble particles, e.g. pigments
Liquids Method	Low molar volume liquids, e.g. solvents

Of course, we can use several methods within one project...

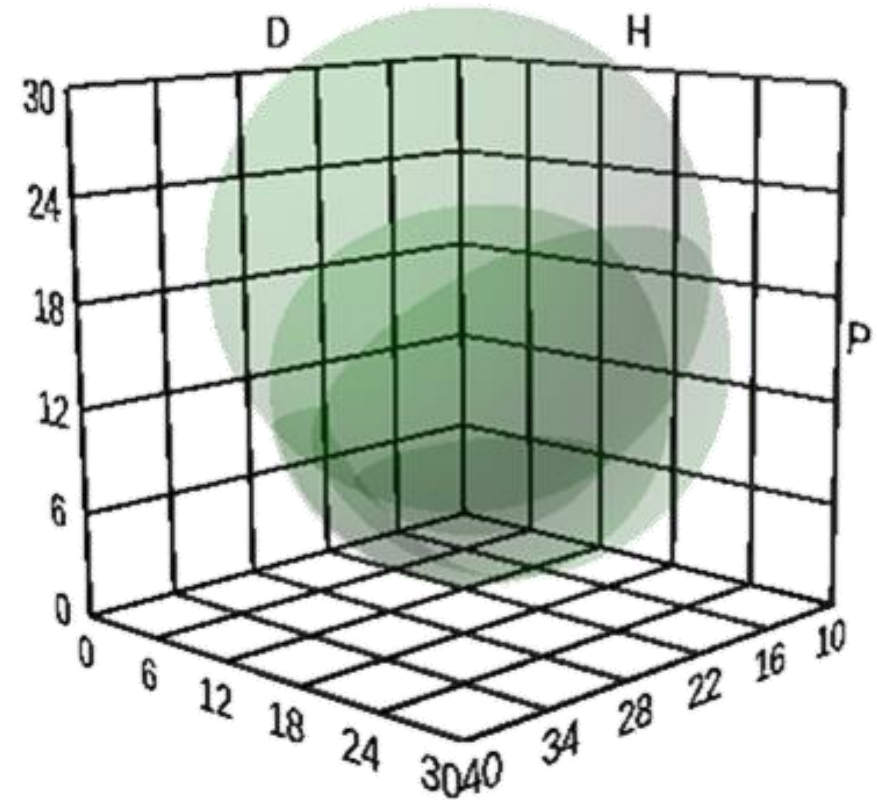
Multiple Sphere Solvent Optimisation

HSP gets even more powerful when formulating for a complete system.

The HSP Diagram depicts the overlapping spheres of 5 materials:

2 Binders, 1 Plasticiser & 2 Additives

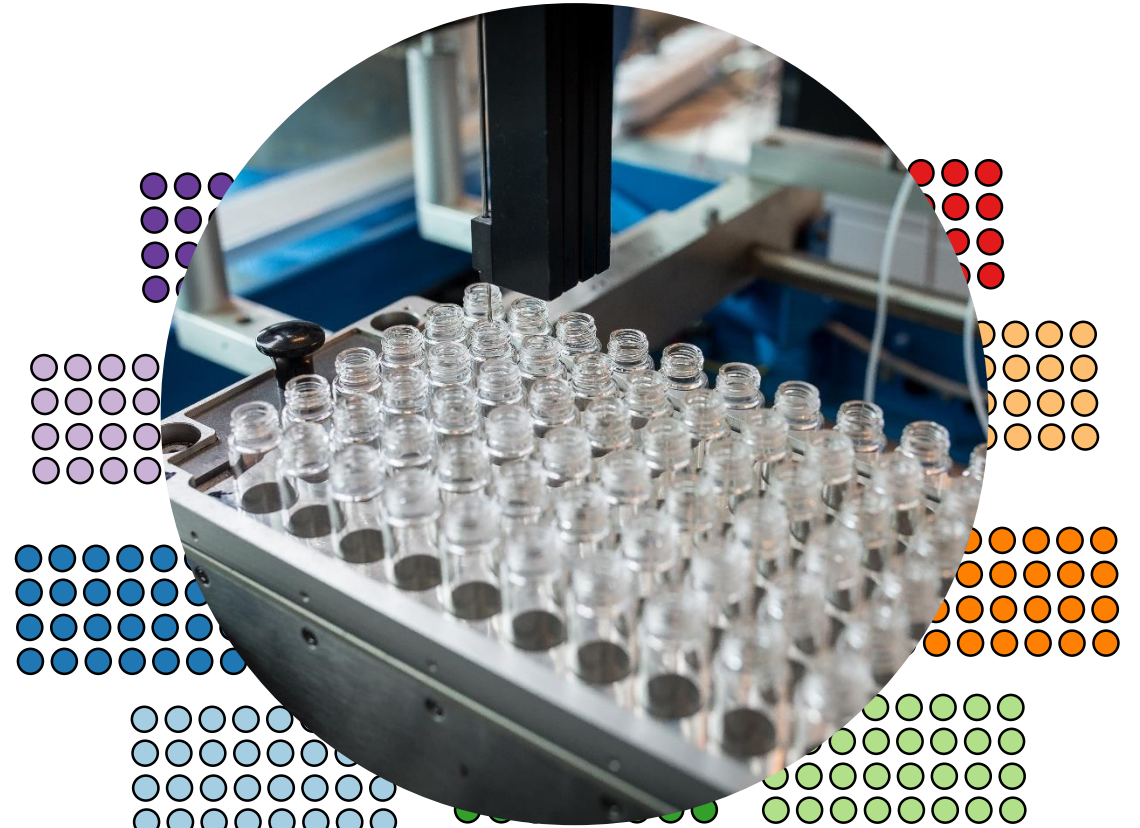
The model successfully predicts compatible solvents for the dissolution of all ingredients simultaneously.



Formulations may contain more than 10 ingredients

Measuring the HSP of **every** one requires hundreds of samples to be made

Manual sample preparation on this scale isn't really practical...



**High-throughput
is the answer!**





High Throughput (HT)



High Throughput (HT) Advantages

- **Speeds up R&D** (3-8 times).
- **Saves costs:** 20-30%.
- Used as an **extension** of the lab, not meant to replace staff.
- **Free your mind to increase knowledge!**
- Tap into our HT expertise.





32 or 96 vial
sample racks



Formulation vessels with
temperature control

High
Throughput
Platform

Shaking upto 1400rpm



Addition of products and solvents
by weight or by volume



HSP & HT Combined



While High-throughput is the obvious answer to preparing HSP samples rapidly, HT platforms are **expensive** and **require expertise** to operate.



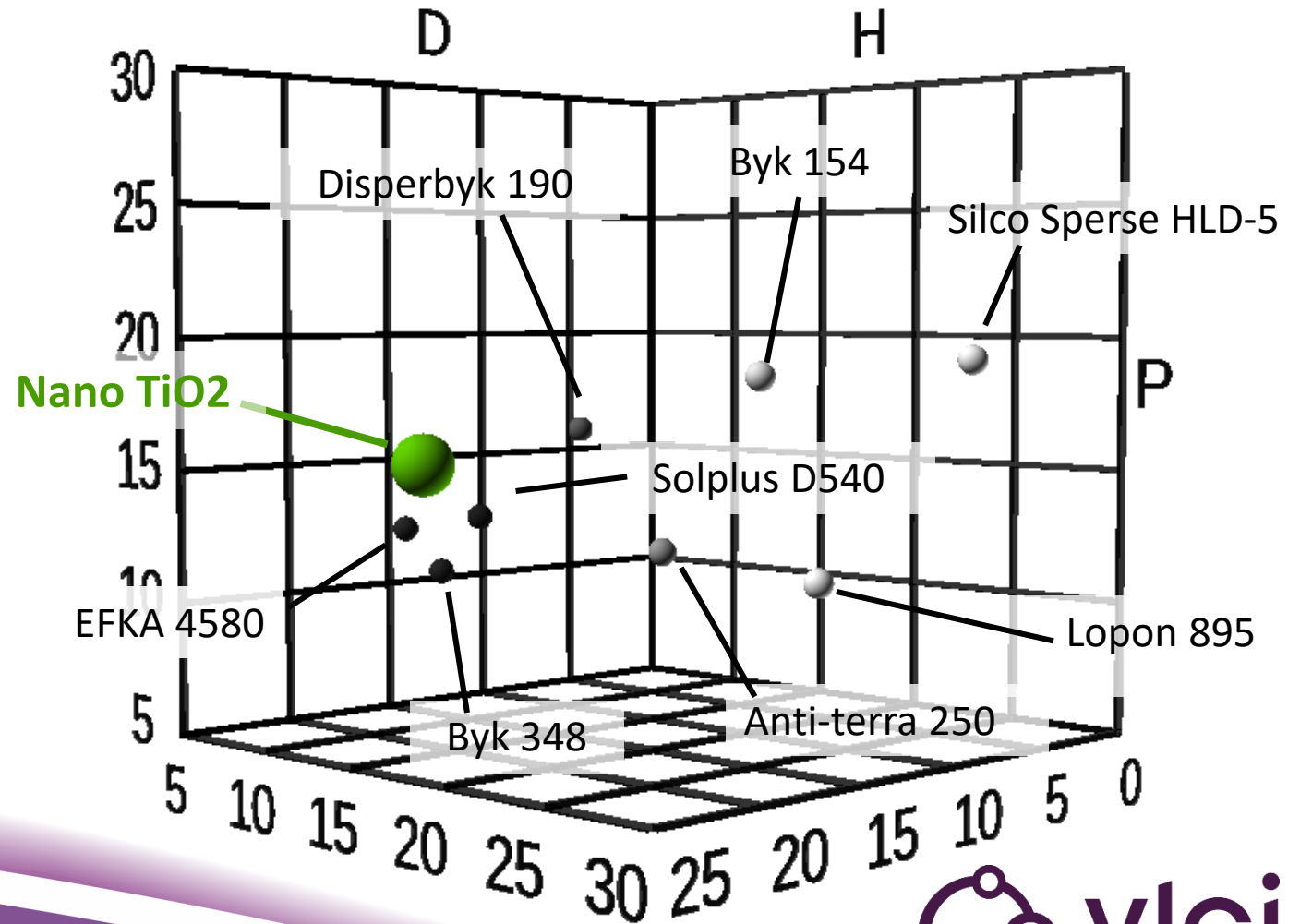
Furthermore, the various types of ingredients may require different methods of evaluation, ranking and analysis for HSP determination.

Outsourcing to VLCI, customers benefit from our specialised equipment and expertise, for **high quality data** at **reduced cost**.

HT & HSP Combined

Nano-TiO₂ Dispersant Selection (Shyman Project)

- Nano-TiO₂ HSP found by sedimentation method
- Dispersant HSPs found by the dissolution method
- **Closest** dispersants perform the best in ODC tests



HT & HSP Combined

Pigment Dispersion Studies in 3 steps



1. Sedimentation & Stability Testing



2. Formulation of particles into coating or dispersion



3. Testing of coatings on standard protocols

HT & HSP Combined

Nano-TiO₂ Dispersant Selection

Dispersant	TiO ₂ Distance	Dist _{sep}	ODC TiO ₂	Practical TiO ₂
BYK 348	4.69	-13.51	++	
BYK 154	26.09	4.89	-	
Disperbyk 190	11.39	-6.11	+/-	
EFKA 4580	4.29	-6.41	+	
Silco Sperse HLD-5	28.12	5.62	+/-	
Anti-Terra 250	10.05	-4.65	+	-
Lopon 895	16.14	7.44	++	+
Solplus D540	4.06	-11.14	++	++



Implementation in Promethean factory



HT & HSP Combined

Conclusions

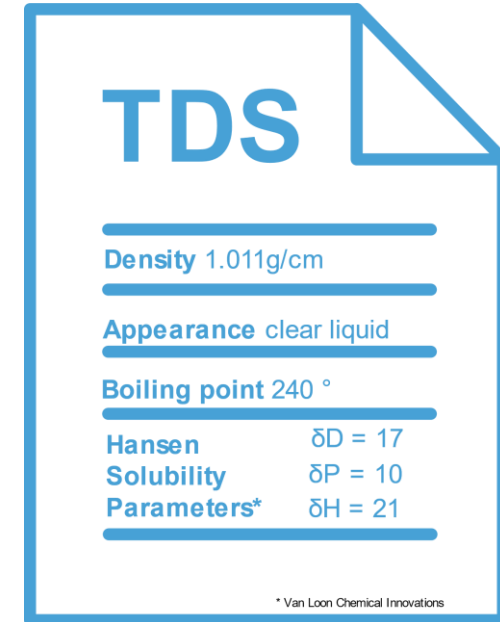
- HSP determination of 1 product takes **1.5 days**
- **Boosted** by:
 - More effective selection of solvents
 - HT Sample preparation
 - Extensive in-house knowledge
- Outsourcing HSP determination + implementation saves you time and money, and allows for knowledge on demand
- Findings from HSP help the formulation of complete products, which can also be prepared and tested by high-throughput



HSP for Formulators

Our Vision for the Future

- HSP is a very powerful tool for formulators
 - Solvent selection
 - Additive selection
 - Prediction of compatibility, etc...
- We hope to see HSPs on more raw material datasheets to help formulators make better informed choices when selecting new ingredients.



TDS	
Density 1.011g/cm	
Appearance clear liquid	
Boiling point 240 °	
Hansen	$\delta D = 17$
Solubility	$\delta P = 10$
Parameters*	$\delta H = 21$
<small>* Van Loon Chemical Innovations</small>	




vlci

HSP & HT strategies combined

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Join our HSP workshop on 21st April, VLCI – Amsterdam. Ask us or via info@vlci.biz for more details.