



detergent development & testing solutions

Dilutables and Single Unit Dose

Next Generation Disruptive Technology to Reduce Environmental Impact

Introduction to d-labs

d labs



Product development and performance testing consultancy.



Established 2007.



Head office currently in Melbourne, Australia.



Servicing detergent companies globally.



Specialising in all types of detergent development and performance testing.



Team of chemists specialising in formulating with surfactants and performance testing of detergents.



Team developed to have an excellent understanding of latest technologies, trends and “green” formulating.



d-labs Services

- Detergent formulation development (traditional and environmentally friendly).
- Performance testing.
- Claims support.
- Regulatory advice.
- Advice on various green certifications.
- Plant trials and implementation support.
- Stability.
- Guidance on optimisation of formulations to improve margin for equivalent performance.
- General advice on the detergent market, formulations, materials and manufacturing.
- Fill the role of internal R&D providing any technical support needed.
- Customers in Australia, New Zealand, Singapore, Thailand, Malaysia, Italy, Belgium, USA, Brazil.



Client	Services Most Utilised
Start-ups	Complete service. Act as R&D and quality teams, product development, claims support testing, QA, label claims assessment, customer support.
SME's	As for Start-ups although often customer support is not required.
Multinationals	Often work with internal R&D to fill gaps in knowledge or time. Full development services as an external contractor. Performance testing and benchmarking to competitors.
Consumer groups	Comparative performance testing, analysis of detergents, provide advice on differences in technology.
Supermarket chains	Comparative performance testing and analysis of detergents to support selection of suppliers and check quality.

Who do d-labs work for?

Provide a novel service that is variable to suit the client



detergent development & testing solutions

Introduction to Pods & Dilutables

What are they?

Dilutables

- Any concentrated product that is diluted (usually with water) before use.
- Most commonly liquid products that are more easily dispersed.
- Historically, dilutable products used for fabric softeners but growing.



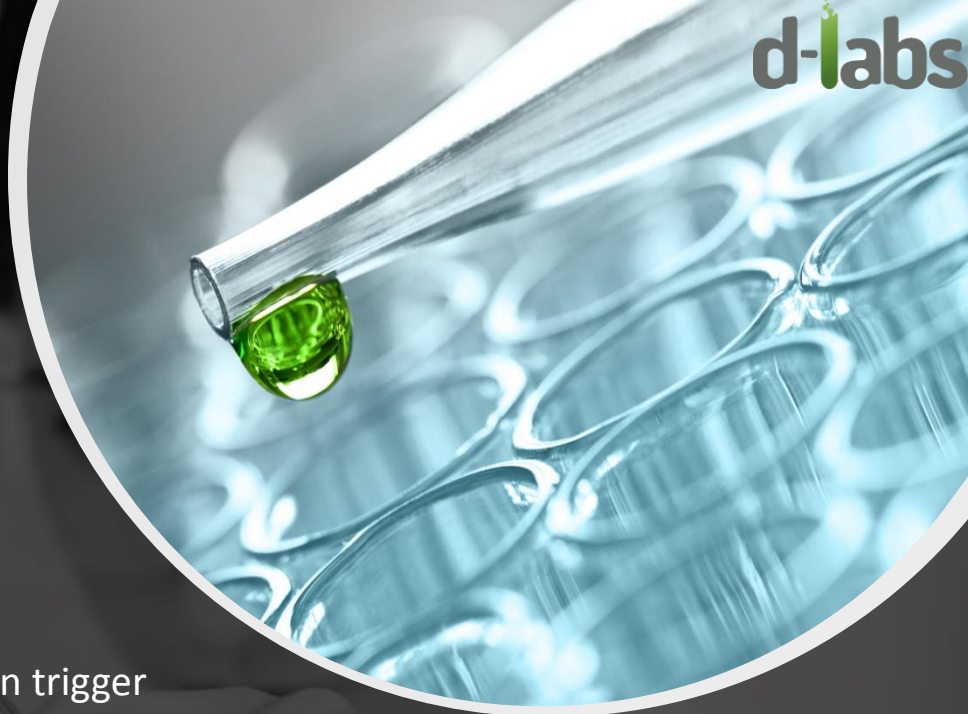
Pods

- Water soluble sachets containing concentrated products.
- Major applications currently in auto dish washing and laundry.
- Mainly contain liquids although powders and gels are also possible.
- Simplifies dosage as each pod is a single dose (Single Unit Dose).
- Will focus mainly on application for laundry but potential application is endless.



Potential Applications

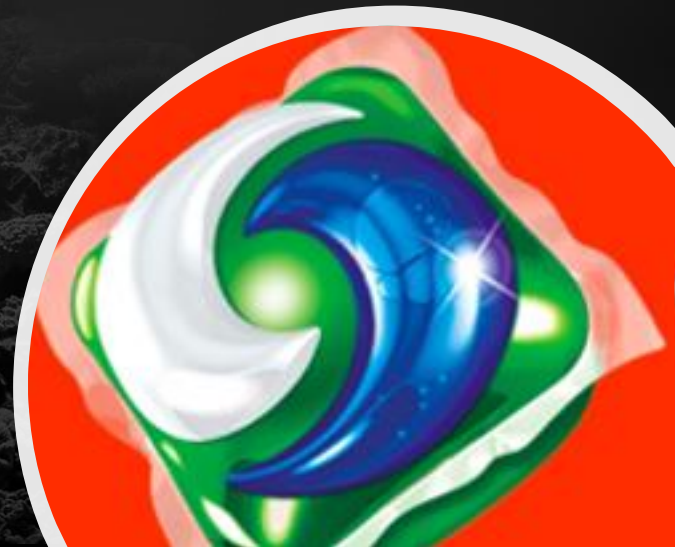
- Current:
 - Laundry
 - Auto dish washing
- Application to most detergents:
 - Hard surface cleaners – small pod dissolved in trigger spray bottle.
 - Manual dishwashing liquid – single pod thrown in sink for washing.
 - Laundry/nappy soakers – pod to provide both cleaning and antibacterial effect.
 - Laundry boosters – add various effects to wash by dosing in a specialty pod.
 - Fragrance boosters – add your preferred fragrance to the wash.
 - Pretty much anything you can think of!



Environmental Benefits

- No overdosing – reduced environmental chemical load.
- Significant reduction in packaging/no packaging remaining.
- Reduced energy usage.
- Reduced water usage.
- Fewer emissions from transport.
- Lower carbon footprint.

d-labs



Consumer Benefits

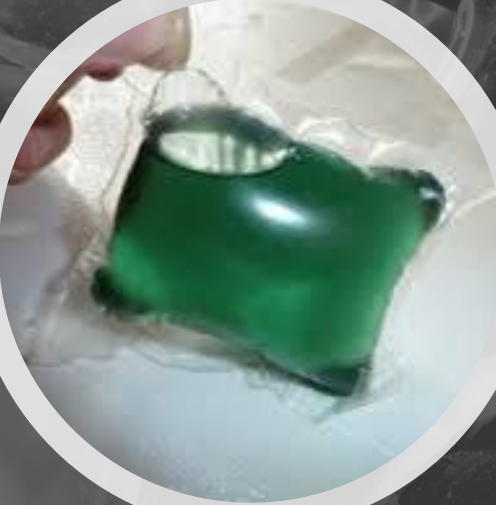
- Compact – light for transport, small storage.
- Simple to use.
 - No overdosing.
 - No mess.
- Reduced/no waste from packaging.
- Potential to purchase individual washes – single sachet/pod hang cell?
- Reduced transport emissions – health effects.



Manufacturing Benefits

- Significant reduction in packaging costs – potentially higher margin.
- Often higher on-shelf price – higher margin.
- Smaller batch sizes/larger number of units per batch.
- Reduced water usage in manufacturing.
- Reduced manpower costs.
- Reduced manufacturing power usage (e.g., pumping water, shorter runs, smaller batch size).
- Reduced warehousing space required.
- Lower shipping costs per unit (more units per container).
- Potential for adding unique, recognisable design.
- Another opportunity for branding.





Examples





detergent development & testing solutions

Formulating

How?

Standard Liquid	Liquid for Pod
High water – low solvent	Low water – higher solvent
Medium builder level	Low to no builder
Low to no polymers	Higher polymer level
Water soluble ingredients	Solvent soluble ingredients
Often high sodium/potassium salts (builder, anionic surfactant)	Low to no sodium/potassium salts (tend toward MEA/TEA)
Lower levels of enzymes	Higher enzyme levels
Lower level non-ionic surfactant	High non-ionic surfactant level
All materials used for performance	Extra materials sometimes required to support the film (e.g., polymers)

Formulating – Standard vs. Pod

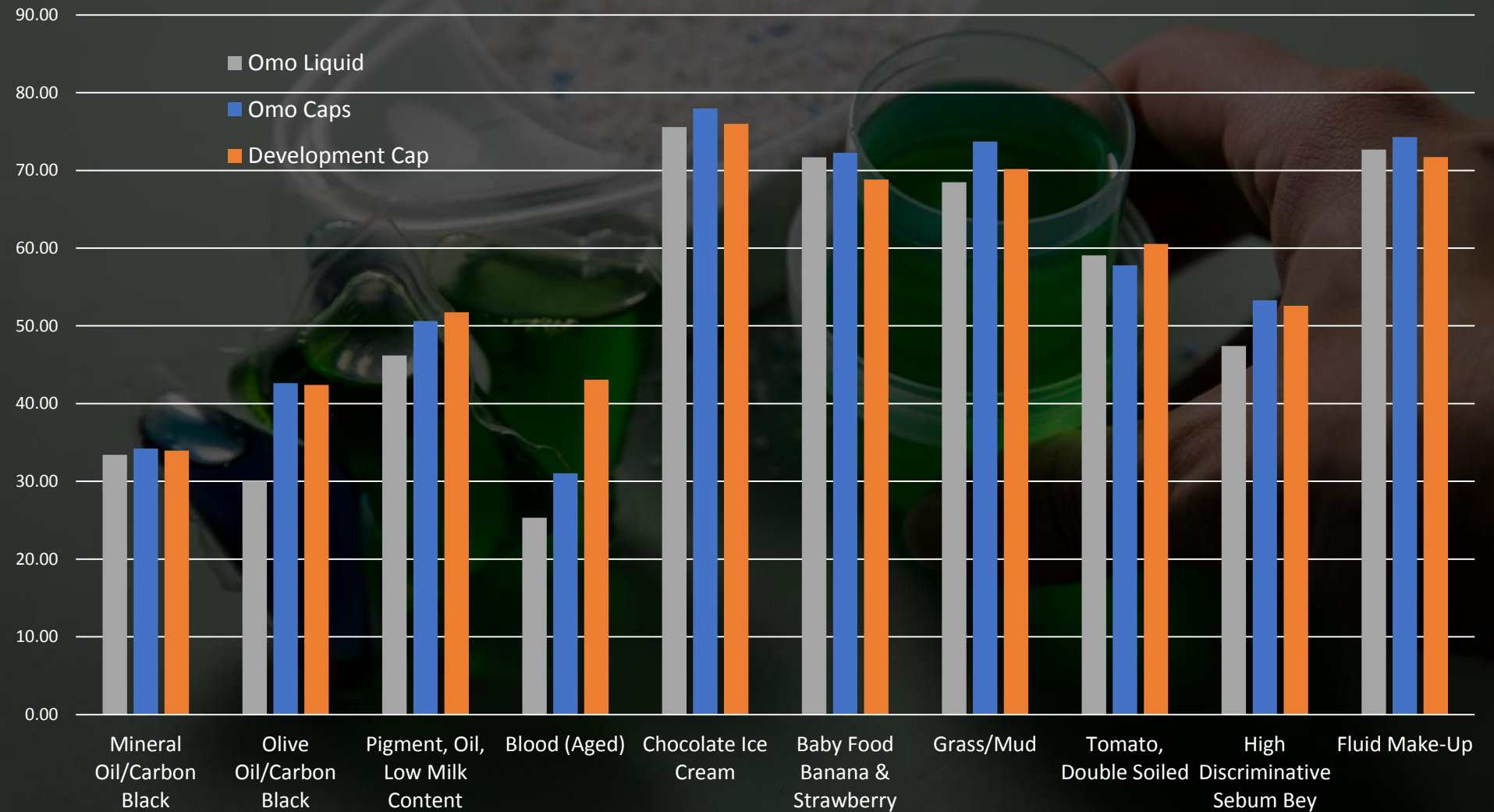
Water activity is key

Omo Standard Liquid	Omo Pod
Sodium dodecylbenzenesulfonate	MEA-dodecylbenzenesulfonate
TEA-cocoate	MEA-hydrogenated cocoate
Propylene glycol	Propylene glycol
C12-C15 Pareth-7	C12-C15 Pareth-7
	Glycerin
	Polyvinyl alcohol
Sodium diethylenetriamine pentamethylene phosphonate	Pentasodium ethylenediamine tetramethylene phosphonate
Water	Water
	Ethoxylated polyethylene imine
Styrene/acrylates copolymer	Aziridine homopolymer ethoxylated
	Ethanolamine
Protease/Amylase/Mannanase	Protease/Amylase/Mannanase
Disodium distyrylbiphenyl disulphonate	Disodium distyrylbiphenyl disulfonate
Sodium laureth sulfate	MEA-sulfate
Benzisothiazolin-3-one	Denatonium benzoate
Dye	Polymeric colours
Fragrance	Fragrance

Ingredients – Omo - Unilever

<https://www.unilever.com.au/brands/home-care/omo.html>

Performance





Formulation Challenges and Opportunities

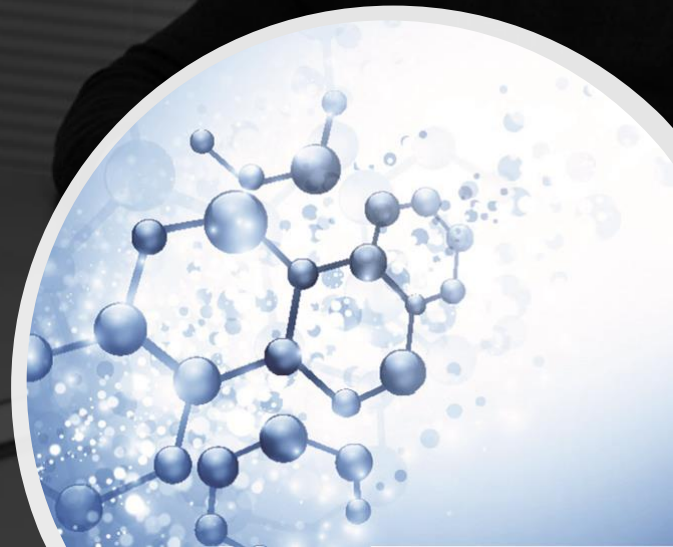
Formulating Challenges

- Water soluble film is very sensitive to water activity (internal & external).
- Balancing act depending heavily on an optimum water level:
 - Too little water —————> brittle, unstable film
 - Too much water —————> soft, unstable film
- Reducing water activity impacts inclusion of other performance boosting materials (e.g., enzymes, builders, etc.).
- Solvent soluble materials can be expensive.
- Creativity required to balance aesthetics, film stability and performance (GLDA/glycerine, high actives/glycols, enzymes, thickeners).
- Green formulations can be difficult to develop:
 - Fewer naturally derived solvent available.
 - APG's have high water content making them difficult to include.
 - Lower solubility of materials in some green solvents.



Formulating Opportunities

- Incorporation of water insoluble materials.
- Fragrances easily incorporated - no hydrotropes/solubilisers.
- Low water stability materials may be incorporated more easily (e.g., reduced/no stabilisers for enzymes).
- Preservative free formulations are achievable.
- Ability to separate components potentially enabling inclusion of incompatible materials (e.g., enzymes and H_2O_2).



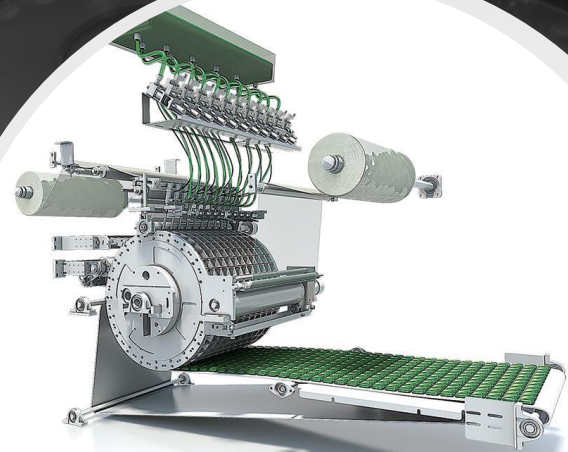
Conclusion

- Pods deliver:
 - Reduced environmental impact of detergents.
 - Reduced total carbon footprint - cradle to grave analysis & global environmental responsibility.
 - Consumer demand for novel products - easy transportation, simple use, no waste.
 - Cost reduction and improved margin.
- Pods used for single unit dose and dilutables are likely to be the next disruptive detergent technology and a major influence on next generation detergents.



Take Home Points

- Focus on low water formulations, <10% (at the moment).
- Apply methods to reduce water activity (e.g., polymers).
- Investigate solvent soluble builders/surfactants/etc.
- Optimise performance using other methods (enzymes, surfactant blend optimisation, polymers).
- Keep track of technology globally, new solvents, surfactants and materials crop up in different regions and industries.
- Speak with suppliers about any issues or if having difficulty sourcing, often have options.
- Be creative – Think outside the box.
- Or...call d-labs first and save the stress!





detergent development & testing solutions

Thank You

Questions?