High Throughput Drug Profiling

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Pharmaceuticals & Agrochemicals

Introduction

- Since more than 80% of the drugs are solid dosage forms, the *physicochemical characterization* of new drug candidates is mandatory at very early stages of the development (preclinical research).
- *Solubility* and *permeability,* as well as *stability and compatibility* are driving forces for a successful drug development.
- Pre-formulation studies (determination of physicochemical properties) need a lot of time and large amounts of drugs.
- The capability of dealing with a large array of conditions (variety of solvents, excipients, and temperatures) and the ability to handle small amounts of solids and liquids increase the efficiency of pre-formulation studies.

Objective

➢ Increase in throughput, reproducibility, and safety for e.g. drug solubility studies by automation.

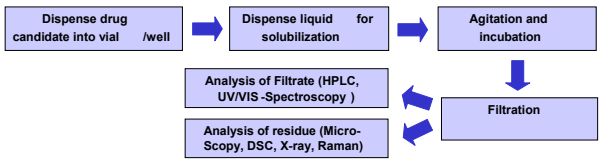

Figure 1: Solubility workflow. Similar workflows apply for stability and compatibility studies.

- Modular platform (Fig. 2): a variety of functionalities are available (solid and liquid dispensing, shaking, heating/cooling, and filtration)
- More than 95% of all catalogue chemicals can be handled with the solid & liquid dispensing units
- Easy integration of third-party devices and easy connection to analytical instruments

The Chemspeed Solution

Accelerator VLT100 – an „All-in-One" robotic platform

Solid dispensing (mg to g)

- Unique overhead balance (Fig. 3B) dispensing of even small amounts (1 – 200 mg, 0.1 mg precision) of drug candidates and excipients into any kind of vial (small tubes, 96-well MTPs, etc.)
- Up to 80 different powders without manual intervention („one-to-many", many-to-one" and „many-to-many")
- Self-contained controlled atmosphere for toxic and/or sensitive compounds

Figure 2: Accelerator VLT100.

- Full tracking of dispensed solids allows for subsequent liquid dispenses to be normalized against the powder weight.

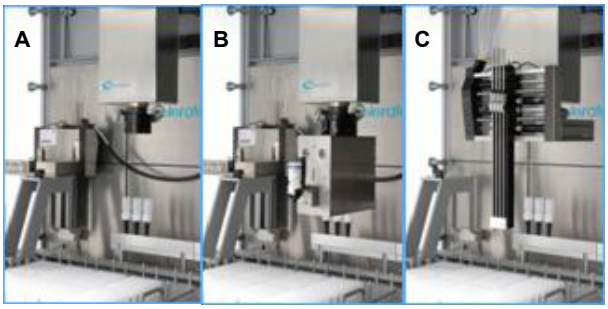

Figure 3: Tool exchange interface of the Accelerator platform. The robotic arm (A, unloaded) takes up the Solid Dispensing Unit (B), or the 4-Needle-Head (C) and moves them over the destination vials/tubes.

Liquid dispensing (ml to ml)

- Rotatable 4-needle-head for combinatorial dispensing
- Variable needle spacing from 9 mm (MTP format) to 54 mm

Agitation & Incubation

- Vortex shaking for MTPs and other tubes/vials available
- Platform prepared for integration of a heating/cooling system

Filtration

- Easy integration of commercially available filtration systems and plates (from Millipore, for example)

Result

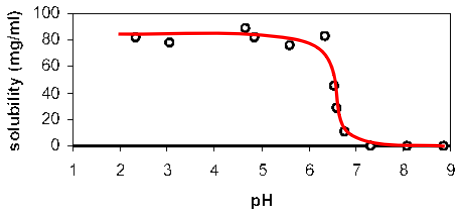

Figure 4: Typical pH-solubility profile of a drug candidate.

Conclusion

- Full automation of pre-formulation workflows for solubility, stability, and compatibility studies on a single platform
- Increase in throughput, different assay conditions can be tested in parallel, speeding up the early drug discovery process
- Increase in safety, non-exposure to hazardous chemicals
- Increase in reproducibility and traceability through automation
- Accurate and precise solid micro-dispensing, use of minimum amounts of drug candidates synthesized