automation of assay optimisation studies: efficient and rapid set-up for a wide range of biological applications

Wendy Gaisford, Joby Jenkins, Gary Cochrane

sptlabtech

introduction

With the escalating complexity of molecular biology and biological assays, assay configuration is becoming increasingly challenging.

Assay optimisation requires the simultaneous study of multiple parameters to maximise assay performance. Parameters for study may include reagent concentration and volume, pH and source. As a result the determination of the optimal conditions can be a costly and time consuming process requiring the set-up of multiple studies to analyse each individual parameter. Often, such studies are limited by manual pipetting.

The employment of multi-factorial or matrix style assays enables optimisation of experimental parameters and the study of more biologically relevant questions. This saves resources and reduces the potential for hidden replication of conditions. This also overcomes the problems incurred in the standardisation and calibration of multiple runs.

SPT Labtech's dragonfly is a compact, affordable addition to assay optimisation workflows. It provides rapid non-contact dispensing where each tip can dispense any volume into any well with no cross-contamination. This eliminates the tedium and complication of plate set-up in matrix optimisation assays, ensuring repeatable and reliable results.

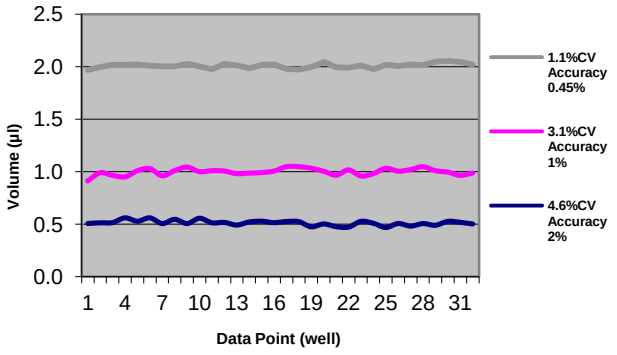
1. optimising the set-up of multiple factor experiments

SPT Labtech are perfectly placed to understand and develop solutions for automating the set-up of multi-parameter biological applications.

With appreciation of and experience in the provision of accurate, reliable automated low volume sample dispensing, the dragonfly assay optimiser applies SPT Labtech's positive displacement, disposable tip pipetting technology for non-contact dispensing. With intuitive software it is easy to set up a range of combinatorial biological assays across a wide range of volumes (0.5 µL to 4 mL) and plate types. dragonfly is available with either 5 or 10 pipetting heads, with completely independent X, Y and volume control for each individual channel.

2. accuracy and performance

dragonfly has an impressive dispensing performance. It offers CVs of < 5% for a vast range of liquid types without any liquid classification being necessary.



Pipetting data for 100% Glycerol (measured by absorbance of Tartrazine)

3. dragonfly: optimisation optimised

dragonfly provides a low cost, bench top, automated pipetting system, enabling the rapid generation of microplates containing multiple reagents across individual concentration ranges in less than 5 minutes.

With its novel pipetting technology, automated non-contact, positive displacement dispensing from disposable tips directly into microplates eliminates the risk of cross-contamination .

Fast, simple and accurate dispensing of multiple combinations of sample volumes from 0.5 µL upwards and a 10 mL reservoir enables automation of a wide range of high throughput chemical and biological screening assays.

4. rapid set-up of concentration dependent matrices

Examples of combinatorial assays

- Determination of optimal conditions for enzyme kinetic studies
- Cell-based assays for compound combination screening
- Set up of DNA microarrays allowed for massively parallel gene expression analyses
- Identification of anti-inflammatory molecule combinations
- Synergistic toxicity studies

Results from a multi-factorial screen set-up using SPT Labtech's dragonfly for 20 µL dispensing.

4. set-up and running

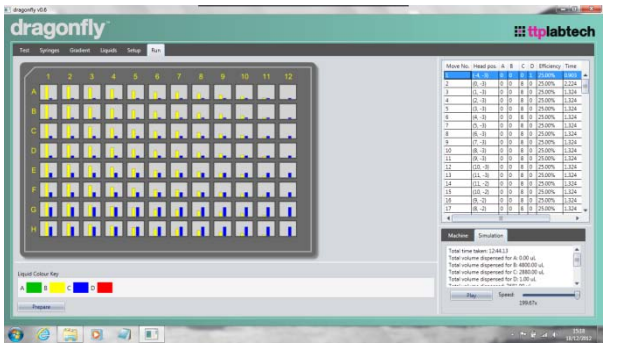


Image showing software set-up of a two-component assay matrix

Setting up dragonfly to dispense multiple reagents over a concentration range directly into a microplates could not be easier:

set-up...

Select the plate type, enter the individual reagents and assign them to the dispense heads – all from an intuitive graphical menu. Fill the reservoirs direct from standard storage tubes and the dragonfly will aspirate directly when required – no need to load bottles or fill syringes.

design...

Via a graphical display just click and drag to design the required gradient profile for each reagent or just select a pre-defined design, such as the 2-component method as shown above.

run...

Just press go and watch the live feedback of the plate make-up as it happens (see above screenshot)

With its intuitive interface, dragonfly's software enables the user to set-up multi-factorial studies rapidly, and easily determine their own conditions for efficient studies.

dragonfly is a fast, simple and accurate solution for the set-up of multi-factorial experimental studies and PCR

conclusion

SPT Labtech's low cost assay optimiser, dragonfly, offers easy automated set-up of a wide range of concentration-dependent matrices and optimisation studies:

- reliable, accurate, non-contact dispensing and auto-aspiration is ensured by positive-displacement pipetteing from easy to fill reservoirs
- zero cross-contamination is ensured and slow wash cycles eliminated using disposable pipettes
- dragonfly fills a 96-well plate in less than 5 minutes using up to 10 independent, modular liquid channels
- dispense an extensive viscosity range from alcohols through to glycerol without classification
- large volumetric range (0.5 µL – 4 mL).

any volume, any liquid, any well