

A Modular Solution for Storage of Biological Samples

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Introduction

The physical and chemical composition of biological samples is more diverse than the libraries of medicinal compounds used for drug discovery research. Types of samples include proteins, nucleic acids, blood and serum samples, cell suspensions, tissue biopsies, and antibodies. Thus any storage system must be flexible to accommodate the differing storage requirements of each sample type base upon its biochemical composition, stability and where appropriate, solvent.

The comPOUND sample store (TTP LabTech) is a modular system that can be installed almost anywhere and offers a range of solutions from manual, front of store retrieval, through remote delivery, and walk away overnight processing. This fully scalable approach to biological sample storage provides flexibility for different inventory sizes and allows storage capacity to increase in-line with sample acquisition.

comPOUND® provides a safe, efficient and flexible environment for the safe storage of biological samples.

Conclusion

comPOUND® offers the following benefits for biological storage:

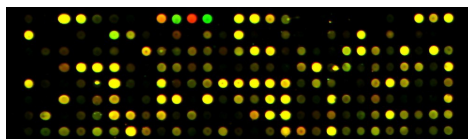
- can cherry-pick any sample out of 100,000 on request
- arrays samples in a user-specified format, ready for further processing
- storage is in inert conditions at a specified temperature from Ambient to -20°C
- each microtube is barcoded and tracked for full sample traceability.

comPOUND® stores are proven to be compatible with the storage requirements of:

- purified DNA
- TaqMan probes and primers
- antibodies and proteins.

1 Purified DNA

Opinion is divided on the best conditions for the long term storage of nucleic acids. For the short term, purified samples of genomic and cDNA appear stable at 4°C, which avoids freeze/thaw cycles (depending on the medium used). Other important storage factors include solvent selection, a dark environment free of UV radiation, and 100% sample traceability to comply with data protection requirements. Finally, an ability to retrieve only the individual samples required for analysis helps maintain integrity.



2 RT-PCR and TaqMan

Real-time PCR (RT-PCR) is a powerful and rapid technique for nucleic acid amplification and quantitation. The simplest and most commonly used type of probe is the Taqman-type probe which requires -20°C for long term storage. Laboratories performing analysis on a broad spectrum of gene targets require safe storage of their TaqMan primer and probes sets. In addition, rapid random access to all samples is essential. Each gene-specific reagent set has 3 separate components (2 PCR primers and a fluorescent reporter probe) and picking this manually is a huge source of error.

3 Proteins and antibodies

Purified proteins and antibodies are used extensively for homogeneous biochemical assays and immunoassays, respectively. Generally, -20°C storage is regarded as best for such reagents with little or no benefit gained from storage at lower temperatures. Suppliers of antibodies demand rapid access of pre-labelled microtubes for efficient order despatch.

4 comPOUND store for biologics

A comPOUND® storage module holds up to 100,000 samples, any one of which can be accessed in an average of 5 seconds – giving very fast access to exactly the samples required.

Samples are cherry-picked using pneumatic technology, and can be retrieved into user-specified formats to allow assay plates to be made up easily – for TaqMan screening, having the primers delivered in a pre-described format means "dialled up" sets can go straight onto robots in 96-well format, ready for running projects.

Each comPOUND® module is entirely self-contained and provides storage in the dark, in an inert nitrogen atmosphere. Modules can be set to a user-defined temperature between Ambient and -20°C. This provides the sample security and flexibility required to store a range of biological samples – for example, DNA at +4°C or TaqMan probes at -20°C.

Every storage tube has a 2D barcode, which is read on the way into and out of the comPOUND store, making it almost impossible to retrieve the wrong sample. This is a



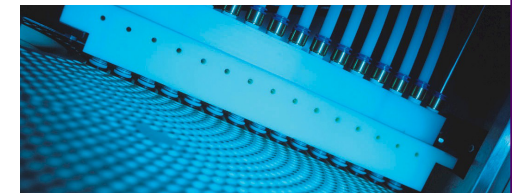
key requirement for DNA storage due to the data protection requirements surrounding human tissue. If a subject withdraws from a study, the company or institution must be able to identify and remove all related samples and data.

5 Cherry-picking capability

When a comPOUND store retrieves a sample, it doesn't fetch and defrost an entire rack or plate. Instead, each individual microtube is cherry-picked from the hermetically sealed storage chamber using pneumatics. Retrieved tubes can be arrayed in user-specified formats in the rack to simplify subsequent plate creation.

comPOUND achieves high density storage and high-speed retrieval by holding microtubes in concentric circles of holes in a moulded carousel. Twenty six carousels are mounted on a central shaft. Retrieving a tube simply involves selecting the carousel with the target tube, and rotating it so that the tube is in line with delivery holes in the other carousels. Applying a burst of compressed air to the bottom of this temporary 'pipe' lifts the tube to the turntable at top of the module.

This unique delivery system is high speed, and ensures the majority of moving parts are outside the temperature-controlled chamber for easy maintenance access.



6 Self-contained store can go anywhere

comPOUND stores are self-contained and compact modules, so investment in special services or custom rooms can be avoided. The modularity of the system also means that relocation is straightforward if your laboratory processes change.

comPOUND's pneumatic transport also allows it to deliver samples remotely. Storage modules can be located up to 15m away from the microtube delivery point, in a different room – or even on a different floor.

