

# HOW TO COMPARE AND SELECT A CHEMICAL INVENTORY MANAGEMENT SYSTEM

WHITE PAPER



## INTRODUCTION

Many research organizations are facing a maelstrom of increasing regulation concerning on-site chemicals and an ever-growing volume of chemical-related data to manage and report. Chemical inventory management can be time-consuming; it can hamper workflows; and – worst of all – it can trigger numerous non-compliance determinations. Laboratory efficiency is reduced. Money is wasted on chemicals that expire before use. Safety is jeopardized. Compliance is compromised.

Many of these challenges are caused by outdated methods for managing chemical inventory data, from paper-based laboratory notebooks and checklists to static standalone spreadsheets to legacy systems that are difficult to use and cannot accommodate regulatory requirements.

This guide presents a best practices solution to this dilemma; e.g., how to compare and select a digital chemical inventory management system that streamlines workflows throughout the organization and brings chemical inventory under control.

## WHAT IS A CHEMICAL INVENTORY MANAGEMENT SYSTEM?

First, let's define what a chemical inventory system is and what it should do, regardless of platform or configuration.

A chemical inventory system should accommodate all basic inventory management tasks. It should manage all the steps associated with registering a material including receipt (data entry and barcodes), sample collection, results entry, verification, approval, lot release, re-labeling, requisitioning, dispensing, storage and container deletion.

This is the basic feature set. Not every organization will need all these attributes, but a best practices solution will offer all of these features. The chemical inventory system should not require customization to perform these tasks.

## DEFINE YOUR GOALS

As with any project, you'll need to start by defining your goals and objectives. In the case of chemical inventory management, you'll probably want to streamline the associated workflows. You'll want to develop better control over the chemicals being ordered and ensure that containers are disposed of correctly, particularly in the case of hazardous materials. You'll want to ensure that chemical reports are accurate, including any internal reports, reports for customers who may audit your laboratory and, of course, regulatory reports such as chemical reports of hazardous materials.

When examining your workflows, follow the existing AS IS process from start to finish, tracing what happens to chemicals from the time of ordering to disposal in every department that plays a part. Then you can assess the desired TO BE process that will streamline these workflows and hopefully lower costs.

Most of the problems associated with poor chemical inventory management are the result of inconsistent chemical tracking, inefficient chemical-related processes and inaccurate chemical reports. Take a close look at the following requirements when defining your goals.

### Chemical Inventory Management Goals

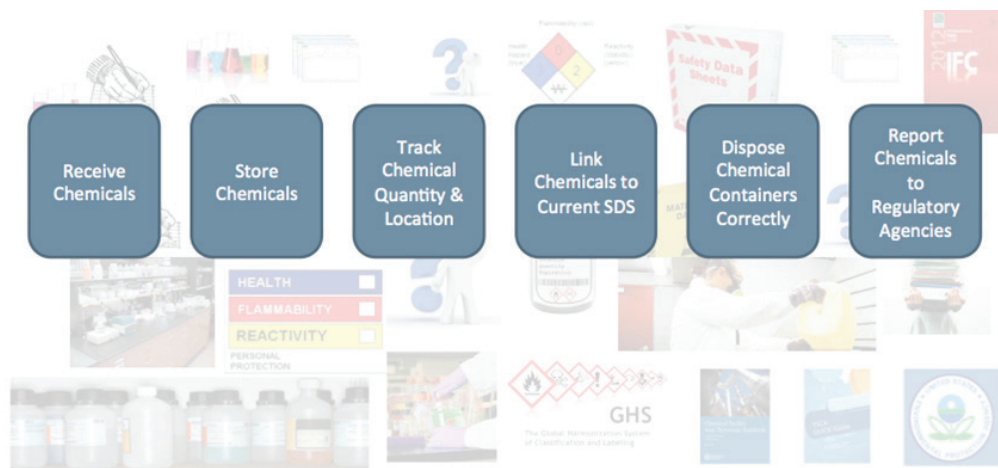
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| Track chemicals in real-time                       | Centralize all chemical purchases                     |
| Monitor chemical shelf life                        | Mitigate chemicals on site                            |
| Track chemical ownership                           | Ensure compliant chemical storage and location        |
| Track chemical quantities                          | Streamline lot tracking and qualification             |
| Maintain SDS's in the same system                  | Automate Tier II, Fire Code, SARA reporting           |
| Reduce chemical disposal costs                     | Automate audit trails                                 |
| Achieve accurate material costing                  | Reduce inventory management costs                     |
| Eliminate transcription errors                     | Increase reconciliation accuracy                      |
| Reduce time spent managing and reporting chemicals | Address regulatory requirements, such as OSHA and EPA |

## SET OUT YOUR REQUIREMENTS

Once you know how you are managing your chemicals and lab materials now, you will be able to set out requirements for the digital system that will replace your current process and better understand the options that are available.

One of the first questions is build versus buy. If the system is a fundamental requirement of doing business, a build decision might deliver a competitive advantage. However, chemical inventory management is rarely a core competency for an organization; rather it is a business process that is performed to fulfill mission-critical corporate objectives. Thus, it makes better business sense to leverage a software vendor's product investment, expedite the implementation time, optimize internal development resources and minimize ongoing maintenance costs.

The question then becomes: what system should you purchase? If your lab or site has more than 5,000 different chemical containers on site, it should be a digital system that is commercially available. Spreadsheets are not designed to provide real-time information in a format or system for this volume of data. You will also need to start bar-coding all chemicals in order to accurately track them in your system. All other systems will fail to meet your goals. The key then is to create a short list of available vendors and their solutions and to compare those solutions to your system requirements.



Chemical inventory management is complex. While the steps to perform chemical management appear simple, underneath every basic step are numerous requirements to store, track and report chemicals in a safe and compliant manner.

## REVIEW SYSTEM FEATURES

Any well-designed inventory system should enable the organization to avoid duplicate ordering and high disposal costs. Features like barcode labeling and tracking, remote inventory control and automatic e-mail notifications enable the organization to know exactly, real-time, where materials are and what they are, as well as when those materials are set to expire, regardless of how many users and material classes the system must accommodate.

A robust system will keep track of where chemicals are and how much are available. The system should also generate reports listing chemicals by location, vendor, name, CAS number, formula, etc., and quickly access hazard information during an emergency. The best systems can track materials by site, building, room and shelf, down to the drawer level.

The system should provide a wide range of functionality including the capabilities to: list expired materials for a user (owner) and for a site; delete individual containers or a series of scanned containers; create, edit and delete permissions for various operations in the system; accommodate parent/child or split container relationships; and manage duplicate materials clean-up. In addition, because raw material lots are typically only approved for certain periods, the system should automatically initiate re-sampling and re-testing prior to materials going out of date.

Some organizations, particularly those engaged in Good Laboratory Practices (GLP) or Good Manufacturing Practices (GMP), will need the capability to search the chemical inventory system for material that has been approved for use. All material usage should be logged into the system, so that the system is always current and can reflect exact amounts of any specific material in inventory.

## ACCOMMODATE SYSTEM USERS

It is important to consider who will be using the system. A large production line will utilize a dedicated production system with a dedicated team of users. A laboratory, however, typically does not have the luxury of staff that perform only one function.

The optimal chemical inventory system for a lab is thus a versatile solution usable by anyone in the lab or Environmental Health & Safety (EHS) department based on various defined permission levels. For instance, the system should be able to define a general user who can view all screens and write/edit requisition screens; an analytical user who can view all screens and have permission to perform write/edit requisition, result and verification screens; container owners who can manipulate containers they own; and higher level groups (e.g. raw material groups) with the ability to manipulate containers under their group control.

Obviously, a web-based solution that utilizes familiar web browser screens and resembles typical work processes would entail the least amount of training and easiest adoption. The downfall of many customdesigned chemical inventory management systems is that they are so difficult to use that only a few people in the company have the knowledge and patience to use them. Accuracy and timeliness of the chemical inventory data suffer. Valuable time may be lost when experiments must be stopped because the necessary chemicals are not on hand. In a research organization, EHS and lab personnel should both be able to interact directly and intuitively with the system.

**ADDRESS REGULATIONS**

With regard to regulatory issues, the frequency of federal, state and local safety regulation updates is not only increasing, but the regulations are also growing in number and complexity, making it confusing and difficult to ensure compliance. When the regulations concern chemicals, it is vital therefore that the system enable the organization to easily comply with the regulations, ensure safe chemical management and produce accurate chemical inventory reports. Most laboratories today must be operated in accordance with a variety of government regulations; thus it is important to avoid noncompliance situations caused when chemical inventory management is inconsistent or ineffective.

The image shows a list of regulations on the left, including:
 

- Environmental Protection Agency
  - 40 CFR 355
  - 40 CFR 356
  - 40 CFR 371
  - 40 CFR 357
  - 40 CFR 358
- EPA Risk
  - Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
  - Clean Water Act, Section 106
  - EPCRA (Emergency Planning, Notification, and Response)
  - Emergency Release Notification
  - Hazardous Chemical Inventory
- 312
  - Toxic Chemical Release Inventory
  - EPA guidelines
  - Health and Safety
  - U.S. Department of Labor
  - 40 CFR 171.10
  - U.S. Department of Justice
  - 48 CFR Part 37
- Department of Energy
  - 10 CFR 833
  - 20 CFR 121
  - 20 CFR 122
  - 20 CFR 123
  - 20 CFR 124
  - 20 CFR 125
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  - 20 CFR 199
  - 20 CFR 200

 A large red 'X' is placed over this list. To the right of the list are logos for ANSI, OSHA, EPA, and NFPA. Below the list is the text "Hundreds of state and local agencies" followed by an equals sign and an image of a man looking stressed at a desk.

**MEET SAFETY REQUIREMENTS**

Any time chemicals are in use, safety is an issue. In the event of an accident, the correct Safety Data Sheet (SDS) needs to be available on the spot. A chemical inventory system should provide details about exactly what chemicals are available and where they are. Safety information about those chemicals should be readily available, whether as an SDS or as customized handling instructions.

The features described above list the minimum functionality for an effective real-time chemical inventory system. However, a robust comprehensive solution should also manage the material lifecycle from "cradle-to-grave."

**MANAGE THE MATERIAL LIFECYCLE**

The material lifecycle starts with receipt and tracks material quantities, analysis and disposition, as well as controlled use (where used and when). This capability is important because it allows the organization to have better accountability and visibility for their chemical inventory. By knowing and being able to track this aspect of operations, the organization is better able to estimate the material demands by department.

Going beyond the minimal requirements for a chemical inventory system frees the organization to focus time and energy on better managing their products and processes rather than on managing their inventory. A lifecycle-oriented system thus provides numerous additional benefits, not the least of which are a higher level of material data lifecycle and approval processes, automatic retesting, permission controls levels and complete archiving and versioning.

After ease of use, perhaps the most important capability of all is regulatory compliance. Most labs must be operated in accordance with a variety of government regulations; the lab should not be noncompliant because a system isn't effective or used properly.

## EVALUATE AVAILABLE SYSTEMS

There are a limited number of chemical inventory management system vendors. Many of these vendors say they offer a solution, but upon close examination the system actually handles only a portion of the end-to-end chemical inventory management functions. For instance, the system may handle chemical tracking but does not link those chemicals to their Safety Data Sheets or provide regulatory reports.

Don't become the test bed for a vendor who promises to create a custom system designed for your needs that they will then roll out commercially. Either the vendor knows how to do this and has done it, or they don't. There are several solutions right now that are still going through this process. Knowledge of other laboratory software systems does not automatically bless the vendor with knowledge of how to develop and maintain a specialized chemical inventory management system.

You can search online for "chemical inventory systems" or check the directories in industry publications to develop a short list of vendors.

Another option is to not perform chemical inventory management yourself, but to outsource the activity to a managed services organization. The managed services vendor will take responsibility for on-site chemical inventory management and perform either a portion or all of the logistics associated with chemical inventory. VWR and Thermo Scientific both offer popular managed services solutions.

## SAAS VS ON-PREMISES

There is a move away from on-premises chemical inventory solutions toward the on-demand, Software-as-a-Service (SaaS) delivery model. This move is largely the result of dissatisfaction with the costs, complexities and length of time that it takes to realize value from on-premises application investments.

An on-premises solution may make the most sense for a large company with many users in multiple facility types and locations. In this case, you would be seeking a comprehensive chemical inventory management system that tracks chemical containers from receipt to disposal while ensuring safe and efficient chemical management organization-wide. On the other hand, the rapid scalability and flexibility of the SaaS model eliminates the risk of obsolescence associated with traditional on-premises software implementations while providing immediate access to required functionality. A SaaS system should provide the same features as an on-premises solution, but often at a lower cost.

## COST VS ROI

Chemical purchases and management are often perceived as constituting a small percentage of overall operating costs, while in reality they can have a significant impact. Every company incurs quantifiable costs for equipment, materials, labor, liability, safety training and compliance efforts at every stage in the chemical inventory management lifecycle. Putting a monetary value on each of these items helps you to quantify and thus to understand the actual costs and the true impact of chemical inventory within the organization.

A best practices chemical inventory system will increase the efficiencies and reduce the costs attributed to managing and supporting the chemical inventory. When chemicals are properly managed in the inventory system, they are more efficiently used by the organization. This translates into reduced chemical spend, inventory space and waste generation.



Ask the system vendors for proof statements about the return on investment (ROI) that their customers have received as a result of implementing their systems. With that information in hand, you will then be able to better assess the true cost of the system and the anticipated ROI.

## WHY SYSTEMS FAIL

Systems fail because they aren't easy to use. This touches on two issues: internal compliance and regulatory compliance. Internal compliance is driven by usability. If users find it difficult to use the system, they may use it incorrectly or only occasionally, so that material could be exceeding limits or be so far out of compliance it impedes workflows. And the organization might not discover this until an external audit takes place – a poor time to find out.

With regard to regulatory compliance, a difficult-to-use system can generate numerous problems. Not only should it be easy to receive material into the system, it should be easy to remove material and empty containers. If material and/or hazardous waste are not disposed of properly, the facility will be out of compliance.

## BEST PRACTICES IN CHEMICAL INVENTORY MANAGEMENT

It is not only important to ensure that the chemical inventory management system is used properly and effectively. You also need to determine if the system can perform auditing and what types of audit control it provides. The chemical inventory system should support inspections by the fire department, EPA, FDA and OSHA by providing tools for compliance. The system should accurately track chemical inventory and allow the design and generation of reports that document compliance at any time. The system should assist you in the preparation of OSHA audits or SARA and Tier II reports by producing accurate, thorough reports quickly and easily.

A best practices chemical inventory system will provide end-to-end assurance that your organization manages chemicals safely, in compliance with regulations, and takes advantage of opportunities to control chemical costs and streamline chemical workflows.

To learn more about BIOVIA chemical inventory management solutions, please visit [accelrys.com/cispro](http://accelrys.com/cispro).

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