

R.E.A.G.E.N.T.

7 Step Guide to Storing Laboratory Reagents

Reagents are one of the key components of laboratory operations, and the quality assurance of these reagents allows modern technology to run efficiently. Before the advent of such technologies, manual procedures employed testing different samples which required these laboratory chemicals and substances to serve as catalytic agents to generate results with a high level of accuracy.

Clinical, public health, research, and reference labs should treat reagents in a similar manner and value of to the samples they receive for testing. Unfortunately, many lab members are initially trained to focus on how to perform the test procedures with the use of specific reagents in their laboratories, with less attention given to the proper handling and storage of the reagents used.

This laboratory guide will provide advice for scientists, researchers and lab managers regarding the practical ways of reagent storage and management. Rather than providing specific guidelines for simply “storing” reagents, this guide will provide you with an outline of how to shift your view from the typical “use-and-store” activities to a “use-and-care” approach. While doctors and nurses provide bedside care for their patients, it is good to know that laboratorians can express concern for these patients and clients by giving appropriate attention to their reagents, too.

R **Read and review reagents' MSDS**

Laboratorians often miss the significance of those folded sheets inside the packaging of reagents that they use: just like medicines with “inserts”, laboratory chemicals and substances also have their own version. As the acronym implies, Material Safety Data Sheets or simply MSDS contains a lot of information about how to use and handle a certain reagent. Different physical, chemical or biological hazards are highlighted in these MSDS.

So what does it have to do with proper storage? Knowing a reagent's possible hazards such as its reactivity, fire or explosion hazards, and its toxic ingredients will guide you on how to store them appropriately. Highly hazardous chemicals and substances must be placed in a more secure location within the laboratory and must only be accessed by authorized personnel. When it comes to storing and handling these high-risk chemicals, access should be limited to laboratory managers or designated lab personnel.

Additionally, other than just securing access and storage, it is through the use of MSDS that scientists and researchers were able to administer and apply both preventive and first-aid measures when incidents happen in the laboratory. Often in the field, lab staff admit that they usually ignore the MSDS and leave it inside the boxes. A good recommendation for this problem is to regularly file MSDS of all reagents in a designated area available to all staff. Do not get rid of these papers, get them read!



E Ensure you follow FIFO and FEFO

FIFO means “first in first out” policy while FEFO stands for the “first expired first out”. These terms are applied generally in supply and logistics departments and should be implemented in your own laboratory too. Unfortunately, many lab scientists store reagents without considering these principles. What usually happens is that old reagents get outdated, which then becomes a waste of resources and is a significant indicator of laboratory inefficiency.

Storage solutions for reagents following the FIFO principle include regular monitoring of the physical arrangement of the chemicals in the laboratory. When you receive new reagents, record the time and date of receipt, any lot/reagent numbers, and the expiration date. Please be aware that your laboratory procedures may request you assign expiration dates that are tighter than those given by the manufacturer, always use whichever expiration date comes soonest. Make old or “stock” reagents more accessible than the reagents you just received today. However, be aware that using the stock reagents before newly received ones may not always be the case. In other instances, you may also encounter receiving reagents with nearer expiry dates than those with your stock. If this happens, implement FEFO instead of FIFO. It may seem confusing or surprising to lab staff that storage of reagents is not static, in fact, it is rather dynamic! Record, monitor and arrange reagent storage monthly or at least weekly; if needed, devise a Rota for lab staff to ensure this task is always completed. As a result, the regular upkeep of your reagents by applying both FIFO and FEFO principles will then foster efficiency of laboratory services.

A Assure good QC (quality control)

Reagents have lot numbers to ensure that they were manufactured and monitored by the companies from which they come from. But when a reagent reaches your laboratory, you cannot be complacent regarding its quality, and in these cases, it then becomes necessary to perform internal quality control for these reagents.

Doing a check for reagents can basically start by observing its physical form. When opening a new reagent bottle, for example, try to check if the content matches the packaging or the box itself. No matter how much you try not to expect discrepancies, some incidences do occur (for example, different expiration dates in the box and on the reagent bottle). Record and report incidents immediately to designated personnel and inform the manufacturer.

Most of the sentinel clinical laboratories only open and check all reagents when they are about to use it for testing. In laboratory networks, reference laboratories with the help of supervising labs or “quality assurance centers” can implement thorough reagent checks (e.g. staining kit evaluation, reagent batch inspection) prior to its distribution into the peripheral labs under its jurisdiction.



G Get your reagents a “dangerously safe zone”

Traditionally, reagent storage is addressed by designating a separate room for all supplies and reagents in the laboratory, which provides a “central supply”. Nowadays, a chemical hygiene officer can be assigned to monitor all reagent management related activities in the laboratory. Regular updating of the inventory makes it easier to identify reagent shortage or excess. A safe reagent means it is in a safe place, under the care of the right person at all times.

Practical tips in the storage of reagents: consider the weight of the reagent (for example, the heavier the reagent, the lower its location in storage to prevent accidents); consider reagent compatibility (for example, acids, bases, organic and inorganic carcinogens, are stored separately); look at the duration of use (for example, the more frequently used, the more accessible is the reagent than others). Veer away from storing and arranging reagents ‘alphabetically’ like a library - reagents are definitely different from books! When you prepare your own reagents, do not forget correct labeling before storage.

Special considerations are an important factor in maintaining reagent quality. Reagents which require less exposure to light must be stored in darker rooms, and flammable ones are secured to prevent fire and explosion. Inhibiting frequent changes in the temperature prevents altering reagent quality. Additionally, remember that laboratory hoods and biosafety cabinets are not good storage for chemicals.

E Explore trends in reagent management

Look for modern and updated ways of storing your reagents. It is not just the type or quality of reagents that is evolving, but also the novel ways to manage them in the laboratory. Whether you work in a public or private sector, you can access and learn about relevant information on improving your reagent management skills.

If you are working in a large facility (e.g. reference and research labs) and are used to managing lots of reagents, I advise you to think about shifting from a manual inventory of reagents and supplies to a software package which is specifically designed to track your reagents 24/7. With the help of this technology, you can also minimize or prevent waste from outdated and unused reagents. But then, using software or computer-based inventory for your reagent does not totally spare you from generating a hard copy. Have your updated inventory printed at regular intervals and keep it on a separate file, this will save you when your computer suddenly goes down.

On the other hand, if your laboratory is not quite that complex and you seem to use a relative number of reagents, rediscover new ways of storing them manually. Try sorting out reagents in a different and more effective manner and see if it works. Group those which are frequently used and make them more accessible to the testing area, group those which have the same expiration dates and group them according to the type of reagent. You might be able to think more creatively and more effectively than before!



N Note all reagent-related incidents

The laboratory is not always a safe place for individuals, especially if you are laboratorians, scientists and researchers. This is particularly true when dealing with situations where there is inappropriate storage of reagents, therefore recording and reporting of possible accidents and injuries is very important. Frequent accidents encountered by staff while in the storage area signify a red flag that needs attention. This could be a damaged storage cabinet, or it could be due to incorrect placement and arrangement of reagents and supplies. Access can be compromised especially when accidents with reagents are associated with unauthorized personnel. A reagent can explode due to high temperatures brought about by a faulty air-conditioning system which can happen suddenly. These are just some of the incidents that could arise, therefore, taking notice of the environment is imperative. Develop incident forms which are easy to fill out and compile reports which can be monitored on a regular basis.

T Take it to the next level

Realizing the important points about storage of laboratory reagents gives you a sense of the actual scenarios that could take place if these tips are not implemented. Thinking about it at this level is not complete unless certain actions can be done right away. Start now and begin in small steps to organize the reagent storage in your laboratory. I recommend that you start by analyzing the current status of how you manage reagents; there's a high chance that you will be able to discover more problems. If that's the case, try to prioritize what's the most important and pressing, and try to address it appropriately. In labs with more staff, designating a person (or two or three) for reagent management can be really helpful. However, there are also labs manned by just a few members of staff. If this is your case, believe that you can do it yourself. Otherwise, you can ask your lab manager or other colleagues from another department to assist you as necessary.

For as long as there is a member of lab staff, a scientist, or a researcher, who would be willing to take the initiative of leveling up your work in reagent management and storage, your lab is heading in the right direction.

References for further reading:

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