

A Technical Evaluation of a Chemistry Laboratory: A Step Forward For Maintaining Safety Measures

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ABSTRACT

Chemistry laboratories have been classified as dangerous workplaces as many hazardous chemicals are used within. Some of these chemicals have a high risk score and dealing with them without taking into considerations any potential damage to properties/people is absolutely unprofessional and irresponsible. In this regard, in order to offer a reasonable protection for people and facilities, we deduce a feasible safety practice based on our thorough evaluation for one of the chemistry laboratories in our academic institution (Department of Chemistry, College of Education for Women, Baghdad University, Iraq). This evaluation revealed that safety precautions must be always adopted within any chemistry laboratory and safety officer must regularly inspect laboratories to check their compliance with safety standards. Herein, we present our evaluation, and observations as well as thoughts to promote this chemistry laboratory in terms of safety measures.

KEYWORDS: Safety measures, Laboratory, Maintaining, Hazardous.

INTRODUCTION

Safety Practices and Observations in the Laboratory

There is no doubt that following safety rules in laboratories at all times will lead to a very minimum risk. In this case, there must be a strict monitoring and inspection procedures to all laboratories in industrial or educational amenities¹⁻⁴. In this concern, we summarize here some of the observations, and safety practices that we believe in their importance to maintain laboratory safety¹⁻⁵.

Providing fumehood cabinets to ensure dealing with toxic/ dangerous chemicals with minimum risk possible.

One of our observations during a basic laboratory inspection is that these fumehoods were used to keep chemicals inside (Figure 1). Consequently, the space within will not be adequately used for performing reactions and dealing with other chemicals.

Another two important observations worth noting is that the presence of some electrical cords inside fumehood, and connecting ventilation ducts with only one common outlet, as shown in Figure 1 (2, and 3). Connecting ventilation ducts with only one common outlet might be extremely dangerous as chemical fumes can go from one fumehood into another in case the other one is off. Additionally,

ventilation outlets must be reasonably away from footpaths and not as they were initially installed as in Figure 1 (3).

Installing multiple gas outlets on benches which facilitate performing low risk experiments on these benches. However, the gas supplied using gas cylinders (as shown in Figure 2) which is completely unsafe. It is highly recommended to place these gas cylinders outside the laboratory in a safe area under the shade and the gas flow is regulated inside the laboratory via installing suitable regulators with gauges⁶⁻⁹.

Here we would like to add an important point, we believe that using naked flames in this laboratory should be minimized or even banned to

avoid any possible fire accidents. In this case, hot plates, and heating mantles are good alternatives.

It is also worth mentioning that there was a drinking water bottle on the bench (Figure 2) which is also against safety measures as drinking/ eating is forbidden at all times.

Safety instructions

The laboratory was provided with suitable safety instructions. Nevertheless, the instructions were absolutely too wordy and unhelpful for the vast majority of people in the laboratory as shown in Figure 3a. To take the advantage of using instructions in the laboratory, we used different safety instructions which are supported with readable, and helpful signs and figures as depicted in Figure 3b.



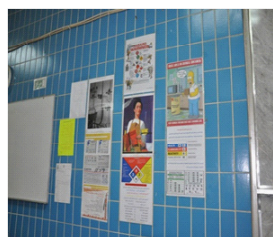
Fig. 1: Fumehood cabinets in the laboratory



Fig. 2: Unsafe gas cylinder position in the laboratory



(a)



(b)

Fig. 3: a) Previous safety instructions with no signs and figures
b) Current safety instructions supported with figures, signs



Fig. 4: The current emergency eye washer and shower

Providing an eye washer, and a shower for emergency. Based on the necessity for these equipment in case of any accidents to eyes or bodies, the senior laboratory demonstrator provided a man-made eye washer and a shower as displayed in Figure 4.

These equipment can satisfy the need at the moment. Nonetheless, we strongly recommend installing more convenient equipment which comply with international standards as represented in Figure 5.

Adding first aid kit (Figure 6) for simple injuries, e.g. wounds, and burns. There must be some instructions included to assist in offering help to injured people in the laboratory.

Fire extinguishers were available in the laboratory (Figure 7). Albeit, placing them on a stool

is not safe *et.all*. Our recommendation is to hang them on walls (at least two inside the laboratory), and there should be one outside the laboratory as well.

It was also observed that the laboratory has no emergency exit (as shown in Figure 8) which is against the standard safety protocols. That is why we suggest adding an emergency exit to the laboratory with a door opens outward¹⁰⁻¹².

Conclusion and Recommendation

In the light of the present case study, we highly recommend maintaining safety measures inside this facility and all other similar facilities. This can be achieved via developing this workplace and keep maintaining safety conditions to ensure safety of people and properties. In this concern, we also suggest that safety officer must be aware of all maintenance and development procedures to make



Fig. 5: Left, a standard eye washer. Right, a shower with an easy to use handle



Fig. 6: The first aid kit mounted on the wall



Fig. 7: A fire extinguisher improperly placed on a stool



Fig. 8: The absence of an emergency exit in the laboratory

sure that all of them were achieved according to international safety standards.

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