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Treball Final de Grau

**Assessment and improvement of the resources quality
management system of the teaching laboratories of the Faculty of
Chemistry**

**Diagnòstic i millora del sistema de gestió de qualitat dels recursos
materials dels laboratoris docents de la Facultat de Química**

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Sin laboratorios, los hombres de ciencia son como soldados sin armas.

Louis Pasteur

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REPORT

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1. SUMMARY

Following the Bologna Process, the European Higher Education Area (EHEA) was created, which is a set of international agreements in which 48 countries participate. Their purpose is to develop a sequence of standards and guidelines in order to ensure the concurrence and quality of the different university studies that take place in the countries that are part of this educational and quality framework. Although proposed in 1999, its total implantation didn't end until 2010.

Because of the establishment of the EHEA, all the university institutions involved such as the University of Barcelona (UB, Universitat de Barcelona), have been forced to modify and unify their systems of higher education and quality management. This way, the Internal Quality Assurance System (SAIQU, Sistema d'Assegurament Intern de la Qualitat) was created. The SAIQU is a common system at the Faculty of Chemistry that governs for the evaluation and the continuous improvement of teaching quality. The SAIQU was imposed to the Quality Management System in the Teaching Laboratories (SGQLD, Sistema de Gestió de la Qualitat en els Laboratoris Docents), which is the system that the Faculty of Chemistry implanted in 1996 to carry out the laboratory practices of the official degrees and master's degrees with the maximum teaching efficiency.

With this work, the process of revision of the system of quality management of material resources in the Faculty's laboratories will begin, making first an assessment of the current situation of the laboratories to evaluate the current state of the laboratories, detecting this way the deficiencies and needs.

Once the assessment is made, a set of improvement proposals will be presented to deal with the disconformities detected and it will begin to work on some of the proposals.

Keywords: SAIQU, SGQLD, quality management system, basic laboratories, assessment, dissatisfaction, proposal for improvement.

2. RESUM

A partir del Procés de Bolonya, es va establir l'Espai Europeu d'Educació Superior (EEES), que és un conjunt d'acords internacionals, en els que participen 48 països, que tenen com a finalitat desenvolupar una sèrie d'estàndards i directrius, per tal d'assegurar la concordança i la qualitat dels diferents estudis universitaris presents als països que formen part d'aquest marc educatiu i de qualitat. Tot i ser proposat l'any 1999, la seva total implantació no va finalitzar fins a l'any 2010.

Com a conseqüència de la instauració de l'EEES, les institucions universitàries implicades, com ara la Universitat de Barcelona, s'han vist obligades a modificar i unificar els seus sistemes d'educació superior i de gestió de qualitat. D'aquesta manera, es va crear el Sistema d'Assegurament Intern de la Qualitat (SAIQU), un sistema comú a la Facultat de Química que regeix per l'avaluació i la millora contínua de la qualitat dels ensenyaments. El SAIQU, es va sobre imposar al Sistema de Gestió de la Qualitat en els Laboratoris Docents (SGQLD), que és el sistema que va implantar la Facultat de Química, a l'any 1996, per tal de dur a terme les pràctiques de laboratori de les titulacions oficials de grau i de màster amb la màxima eficàcia i eficiència docents.

Amb aquest treball, per una part, s'iniciarà el procés de revisió del sistema de gestió de qualitat de recursos materials als laboratoris de la facultat, fent un diagnòstic de la situació actual dels laboratoris bàsics de la Facultat de Química, per tal d'avaluar l'estat actual del laboratoris, tot detectant les mancances i necessitats materials.

Un cop fet el diagnòstic, es plantejarà un conjunt de propostes de millora per fer front a les disconformitats detectades i es començarà a treballar en algunes de les propostes.

Paraules clau: SAIQU, SGQLD, sistema de gestió de qualitat, laboratoris bàsics, diagnòstic, disconformitat, proposta de millora.

3. INTRODUCTION

Due to the rapid expansion of higher education around the world, there is a growing interest in aspects related to quality and specifically in quality assurance of higher education.

For this reason, in the Communiqué of the Conference of Ministers responsible for Higher Education in Berlin on 19 September 2003, the ministers of states that signed the Bologna Process urged the European Association for Quality Assurance in Higher Education (ENQA, formerly the European Network for Quality Assurance in Higher Education) and other organization's members to agree and develop a series of standards and procedures to ensure the quality of higher education [18].

This entire process remains in the establishment of a series of values, expectations and good practices in relation to the quality and the assurance of the quality of the agencies of the European Higher Education Area (EHEA) and to explore the more appropriate methods for external evaluation of quality assurance and/or accreditation organisms. The EHEA is a set of international agreements in which 48 countries participate [20, 21, 22]. Its purpose is to develop a sequence of standards and guidelines, to ensure the quality of the different university studies that take place in the countries that are part of this initiative [19].

Before these agreements took place, the Faculty of Chemistry was already carrying out, since 1996, the Quality Management System in the Teaching Laboratories (SGQLD), which was mainly created to introduce the students to the quality management systems, to the continuous improvement and to the sustainability that the faculty defined in its Quality, Environment and Safety Policy [1, 2, 16].

Even so, since the creation of the new degrees and master's degrees as the Bologna Process proposed, a new quality management system was implanted at the Faculty, the Internal Quality Assurance System (SAIQU), a common system to the entire Faculty applicable to all its official degrees. The SAIQU is based on the EHEA standards and its principal objective is the continuous improvement of teaching quality to ensure the achievement of the established objectives [2, 17].

Next, these organizations' objectives and functions will be explained in greater detail.

3.1. BOLOGNA PROCESS AND EUROPEAN HIGHER EDUCATION AREA (EHEA)

The Bologna Process was created in 1999 after the meeting of some European countries' education state ministers at Bologna, Italy [26]. First, it was an initiative of 29 European countries' ministers [25] but over time, many more European countries have joined the Bologna Process. Nowadays, a total of 48 countries follow the Bologna Process [24].

With the objective to establish a homogeneous higher education system, ensuring this way the comparability in the standards and quality of higher education qualifications, more meetings have taken place between the interested state ministers, setting up this way the document that meets the objectives of the Bologna Process, which is known as the Bologna Declaration [24]. Furthermore, each meeting has produced a communiqué based on the ministers' deliberations. These include the Prague communiqué (2001), the Berlin communiqué (2003), the Bergen communiqué (2005), the London communiqué (2007), the Leuven & Louvain-la-Neuve communiqué (2009) and more recently the Paris communiqué (2018), among others [24].

With the arrival of the Bologna Process, the European Higher Education Area (EHEA) was created. The EHEA is a set of agreements in which the 48 countries that follow the Bologna Process participate. In order to join the EHEA, a country must sign and ratify the European Cultural Convention treaty. As part of the Bologna Process, these 48 countries have implemented a system with three cycles of higher education qualifications based in the European Credit Transfer and Accumulation System (ECTS), to ensure more comparable, compatible and coherent systems of higher education in Europe. This framework's three levels are bachelor's, master's and doctoral degrees [24].

These cycles have been progressively implemented since the 2008-2009 academic year, while the previous qualifications have been extinguished, so that in the 2010-2011 academic year new places will not be offered for Licentiate's degrees, Diplôme, Architect, Engineer, Technical Architect and Technical Engineer. Also, that students who have obtained their degrees by the previous system will not be affected by this new implementation [27].

3.1.1. Bachelor's degree

This is the first education level of the EHEA's framework. Students can access it with high school or equivalent.

It is a study program with a total of 180 – 240 ECTS credits, and a minimum of 60 ECTS per academic year. In Spain, it usually has a duration of four years, equivalent to 240 ECTS credits, and ends with the preparation and presentation of a final degree's project with a minimum of 6 ECTS and a maximum of 30, these included in the total 240 [27]. Even so, there are so many exceptions that affect mostly to regulated professions. The program and the ECTS of this type of professions are defined and controlled to guarantee equality. In Spain, some examples are Pharmacy, Medicine and some Engineering studies, that are regulated by a European directive [28].

3.1.2. Master's degree

Once completed a bachelor's degree, the next higher education level is the master's degree. This is a specialized training that complements the bachelor's degree with a duration of one or two years, equivalent to 60 or 120 ECTS respectively [27].

The master's degree can form the students to be able to exercise a concrete profession, or to be able to do a Doctoral degree, which is based on a specific research. As the bachelor's degree, the master's degree concludes with the elaboration and presentation of a final master's project that have a minimum of 6 ECTS and a maximum of 30 ECTS [27].

3.1.3. Doctoral degree

The Doctoral degree was defined at the 2003 Berlin Ministerial communiqué, as the third cycle of the EHEA's framework, after completing at least 60 ECTS of a master's degree and completing a total of 300 ECTS between the bachelor's and master's degree. Its duration is usually from three to four years, since its projects may vary in length, and its aim is to provide the students an advanced training in research technicians, and it includes the preparation and presentation of the corresponding doctoral thesis [27].

3.2. QUALITY MANAGEMENT SYSTEM IN THE TEACHING LABORATORIES (SGQLD)

The Faculty of Chemistry has been working on the establishment and implementation of the Quality Management System in the Teaching Laboratories (SGQLD) since 1996, and through the Quality Committee (CQ, Comitè de Qualitat), which is a commission whose objective is the improvement of the quality management of the laboratories in the Faculty of Chemistry of the University of Barcelona [1, 2].

The SGQLD was created due to the importance that the Faculty of Chemistry gives to the practical training that is offered to the students and it aims to the accomplishment of a maximum teaching efficiency when the laboratory practices are carried out [1, 2].

The documentation that is part of the SGQLD include the Quality, Environment and Safety Policy, the Quality Manual (MQ, Manual de la Qualitat), some Specific Quality Procedures (PEQ, Procediment Específic de Treball), the corresponding Standard Operating Procedures (SOP and PNT, Procediment Normalitzat de Treball) and Work Instructions (IT, Instruccions de Treball), some external documents necessary for the correct control of the involved processes and the registers that collect the results obtained from the different activities developed.

3.3. INTERNAL QUALITY ASSURANCE SYSTEM (SAIQU)

Due to the new high education studies based on the Bologna Process and despite the existence of the SGQLD, it was mandatory for all the high education organizations to have a Quality Management System of all the teaching set. For this reason, the Internal Quality Assurance System (SAIQU) was created [18]. The SAIQU is a quality management system that involves all the activities related to the quality assurance of the bachelor's degrees and the official masters of the Faculty and its main purpose is to guarantee the achievement of the objectives associated with the training and its continuous improvement [29].

The SAIQU is involved in all the processes that relate to the approval, monitoring and evaluation of University of Barcelona's degrees, in accordance with the current legislation and in the Verification, Monitoring, Modification and Accreditation (VSMA, Verificació, Seguiment, Modificació i Acreditació) framework. The VSMA framework establishes the four processes corresponding to the letters of its acronym, interrelated for the evaluation, management and quality assurance of the degrees. These processes are regulated by the AQU Catalunya (Agència per a la Qualitat de Sistema Universitari de Catalunya), from the current legislation [30].

The Faculty of Chemistry, through the Quality Commission (the successor of the Quality Committee), carries out the monitoring, revision and improvement of the SAIQU. To this end, the Faculty has implemented surveys, indicators and a complaints system [31].

3.4. CURRENT SITUATION IN THE FACULTY OF CHEMISTRY OF THE UB

Nowadays, both the SGQLD and the SAIQU coexist at the same time at the Faculty of Chemistry.

In addition, it is necessary to say that the Faculty of Chemistry, through this project, intends to improve the material resources management system of the teaching laboratories and, in order to do so, it will begin by the revision of the basic laboratories of the Faculty.

4. OBJECTIVES

The main goal of the work is to start the process of reviewing the material resource quality management system with regard to teaching laboratories.

First, an assessment of the current situation of the material resources of the basic laboratories of the Faculty of Chemistry will be done, detecting this way the possible disconformities that may exist. The material resources include the facilities, the laboratory glassware and equipment, the laboratory apparatus, the safety elements, the laboratory waste disposal containers, the chemical reagents and dissolutions and the Standard Operating Procedures (PNTs) and Work Instructions (ITs).

Finally, a list of improvement proposals from the disconformities detected at the diagnostic stage will be made, with the aim of starting some of the improvement proposals.

5. METHODS

In order to carry out the process of reviewing the material resource quality management system of the basic laboratories, two different work methods have been used: the search of information and specific training on the quality systems of the Faculty of Chemistry of the University of Barcelona and the accomplishment of meetings with the project tutors and the responsible of the laboratories involved.

5.1. SEARCH OF INFORMATION AND SPECIFIC TRAINING

This stage, through various documents provided by the project tutors and bibliographic research, was the first contact with quality management issues. The basic documents for the correct training in this subject were the following ones.

5.1.1. Manual of the Quality of Practical Teaching (MQ, 2006)

This version of the MQ was written in 2006 [1]. It is necessary to say that there are currently more up-to-date versions of the MQ.

This is the document that describes all the aspects related to the SGQLD, including its objectives, its application field, its organizational chart, the responsibility of the management towards the system, the provision of resources for its correct operation, the operation processes that take place and finally, the stage of analysis and improvement [1].

This document was the introductory basis to the quality system of the Faculty of Chemistry in teaching laboratories.

5.1.2. Manual of the Quality of Practical Teaching (MQ, 2018)

This version of the MQ was written in 2018 and is its most up-to-date version [2].

It is similar to the 2006 version, with the difference that, although it has not yet been approved, the SAIQU is included in this version as a quality system, which was created with the arrival of the Bologna Process [2].

This manual was accompanied by another document, which described the ordinary tasks of SAIQU [3].

5.1.3. Specific Quality Procedures (PEQ)

The PEQs are procedures that allow to control, update, identify and distribute the documentation that define and generate the quality system [32].

Three different PEQs were provided by the tutors, two of them in one single version and the other one in two different versions: a valid version in process of substitution and a preliminary version, which will be valid when appropriate. In this case, most representative version for the work is the preliminary one, since the other will no longer be valid.

5.1.3.1. PEQ 110 (PEQ 63)

As said, this PEQ is available in two different versions. The valid version in process of substitution is the PEQ 63 [7], while the preliminary one is the PEQ 110 [4].

The title of the PEQ 110 is "Management and improvement of the material resources and the facilities and equipment of the teaching laboratories" and the PEQ 63 title is "Planning of practical subjects".

The objective of the two versions is "to establish the necessary actions in order to correctly manage the material resources necessary for the development of the teaching activity, including the management of the quality of the facilities and the equipment of the teaching laboratories, and all the staff involved" [4, 7].

5.1.3.2. PEQ 150

Its title is "Drafting, distribution and revisions of the Standard Operating Procedures (PNT) and the Work Instructions (IT)" and its main objective is "to establish the standards and criteria for the elaboration, review and distribution of the SOPs and ITs of the teaching laboratories of the Faculty of Chemistry with the main objective of establishing clear guidelines that guarantee the homogeneity and control of PNTs and ITs" [5].

5.1.3.3. PEQ 652

It's called "Safety instructions to explain to students at the beginning of a group of internships" and its purpose is to describe the safety information that has to be explained to the students in the practical subjects [6].

5.1.4. General Quality Procedures (PGQ/ADR)

The PGQ (Procedimientos Generales de Calidad) are operational documents that describe, clearly and in detail, each of the stages to develop a process or activity considered critical for the maintenance of quality [11].

The PGQ involved in the work are the PGQ/ADR 001, the 002, the 003, the 004 and the 005.

These PGQs describe, together, the classification, structure, and coding (001), elaboration (002), distribution (003) and revision, modification and substitution (004) of the PNT and PGQ.

The PGQ 005 describe the elaboration, revision, distribution and modification of the IT [8, 9, 10, 11, 12].

5.1.5. Internal audit questionnaires

As it is explained in the following section, in the first meeting that took place with the project tutors it was decided to perform interviews with the technical staff to evaluate the current situation of the basic laboratories. These three questionnaires, which are quality, environment, health and safety questionnaires, were used as an inspiration to formulate the interview questions [13, 14, 15].

5.1.6. Web pages

There are two important web pages where information of great importance related to the quality systems of the faculty of chemistry is indicated.

The web pages are the website of the Quality System of the Faculty of Chemistry and the website of the UQMAS (Unitat de Qualitat, Medi Ambient i Seguretat).

5.2. MEETINGS WITH THE PROJECT TUTORS AND THE BASIC LABS' RESPONSIBLE

During the course of the project, a lot of meetings were arranged with the project tutors and the basic laboratories responsible. The different stages of the project were decided at these meetings. Next, the meetings that have been most important in deciding the stages of the work are described.

5.2.1. February 25's meeting

At this meeting, it was decided to do interviews with the two technicians of the basic laboratories, in order to evaluate the fulfillment that is being carried out. First, interview questions were decided and later, the interviews were executed.

5.2.2. March 19's meeting

At this meeting, it was also decided to do interviews with the responsible laboratory, the coordinator of the practical subject 'Applied Chemistry II' and two of the teachers of the subject. As it was done with the technicians' interviews, the interview questions were first decided and then, the interviews were conducted.

5.2.3. April 3's and April 8's meetings

Here, it was decided to summarize the information obtained in the interviews in a structured way to be able to extract conclusions and priority actions. The set of the resulting documents is the result of the assessment of basic laboratories, which was one of the main objectives of the project. Furthermore, it allowed moving forward in order to start working later in some of the improvement actions, which also was one of the targets of the work.

5.2.4. May 7's meeting

The main decisions taken at this meeting are the following: to write a PNT describing how to carry out the tasks of the basic laboratories, to perform a checklist of the elements of the laboratories to check, and finally to create an Excel® document in a common SharePoint® accessible to all the personnel involved in the laboratories, in order to register the revisions in an efficient way. The tasks that have been used to write the PNT are the same as those included in the old documents of the basic laboratories. Once done the PNT and the checklist they will be sent to the basic laboratories to be reviewed. It is convenient to say that some examples of checklists provided by the tutors have been used as an inspiration to make the checklist.

5.2.5. Inquiry

To close the work, it was decided to make a brief survey about the satisfaction with the practical subjects in the laboratories. The survey had to be focused on the students and the teachers and it had to replace the old already existing survey, that was used as an inspiration [33].

6. RESULTS AND DISCUSSION

Here the obtained results of the assessment are analyzed. Basically, it was decided to make a list of the strengths and the disconformities detected (section 6.1), an analysis of the disconformities (section 6.2) and a table with improvement proposals for each disconformity (section 6.3).

6.1. LIST OF STRENGTHS AND DISAGREEMENTS

6.1.1. Strengths detected in the general laboratories

The management of the reagents and the dissolutions of the laboratories together with their registration are actions carried out by the laboratory technicians in a correct way. This is because they have some sheets where all the inputs and outputs of reagents from the reagent warehouse are noted. These sheets are essential when making reagent orders. This strong point has been detected in question 1 of the interviews made with the technicians of the laboratories, Ms. Mercedes Barrera and Ms. Silvia Soriano.

The management of the laboratory material together with its registration is also carried out effectively, so the technicians, which are the responsible of this task, also have registration sheets to control the material that enters and leaves the material warehouse. The reference of this fortress is the question 2 of the interviews conducted with Ms. Mercedes Barrera and Ms. Silvia Soriano.

The management of the waste generated in the laboratories is also done in a correct and organized way: in the laboratories there is a Waste Management Plan that includes some sheets next to the chemical waste containers that indicate the container where each product waste generated must go. The containers are also correctly labeled. When filled, they are immediately brought to the Chemical Waste Transfer Center (CTRQ, Centre de Transferència de Residus Químics), where large-scale waste management and classification takes place. This strength was detected in question 3 of the interviews with Ms. Mercedes Barrera and Ms. Silvia Soriano.

The planning of the practices of Applied Chemistry II by the coordinator of the subject and the teaching staff is done effectively. Among all of them meetings take place, where topics corresponding to the planning of the practices are treated. However, it would be necessary to register these meetings. One way to do this is through the realization of meeting acts, which summarize the aspects treated in the meetings. This point has been observed in questions 1 and 2 of the interview with the coordinator of the subject, Dra. Núria Escaja.

6.1.2. Disconformities detected in the general laboratories

The communication about the tasks and processes that take place in the laboratory is deficient, because the changes in the laboratories are usually done without consulting them with

Dr. Albert Figuerola, the responsible of the laboratories. This disagreement has been observed in questions 1 and 4 of the interview with Dr. Albert Figuerola and in the question 15 of the interview with Dr. Raimundo Gargallo, one of the teachers of the subject Applied Chemistry II, which is done at the laboratories.

Documentation regarding laboratories management have little accessibility. As a possible solution to this, a shared online folder (SharePoint®) accessible to all the staff involved could be created. In addition, a system of notifications or alerts when modifying or adding a document to the folder could be also a good option. This deficiency has been detected in the question 5 of the interview with Dr. Albert Figuerola.

The general bad condition of laboratory facilities. However, as incidents related to the facilities are reported to the maintenance company correctly, it is concluded that this discrepancy stems from an economic issue. This problem has been found in the question 7 of the interview with Dr. Raimundo Gargallo and in questions 7 and 15 of the interview with Dra. Núria Escaja.

The lack of revision of the security elements. This fact is evident since it has been detected that not either is known if the security elements work. This disagreement has been detected in the question 5 of the interviews realized with Ms. Mercedes Barrera and with Ms. Silvia Soriano and in the question 8 of the interview made to Dr. Albert Figuerola.

The lack of maintenance and supervision of laboratory equipment. A lot of apparatuses are in poor condition because of that cause. This disagreement has been observed in the question 9 of the interview with Dr. Albert Figuerola.

The lack of control and updating of relevant documents in the laboratory such as PNTs and ITs. Although they are still used and some of them are written in a correct way, most of them are obsolete and not updated. The evidences are the question 8 of the interviews with Ms. Mercedes Barrera and Ms. Silvia Soriano and the question 11 of the interviews with Dr. Albert Figuerola and with Dr. Raimundo Gargallo.

The lack of registration of the revisions that are carried out on some of the aspects of the laboratory, such as facilities, security elements, equipment and documentation. The revisions of all these aspects are not recorded. In fact, neither the revisions of some of them, such as the security elements, are made. This disagreement has been detected in questions 4, 5, 6, 7 and 8 of the interviews with Ms. Mercedes Barrera and Ms. Silvia Soriano, in questions 8, 9, 10 and 11

of the interview with Dr. Albert Figuerola and in questions 9 and 10 of the interview with the Dra. Nuria Escaja.

The lack of registration, communication and monitoring of incidents. The laboratories do not have any incident notebooks or tracking system. For this reason, the corrections of some incidents are not carried out correctly and they happen constantly despite having been detected. References to this anomaly are the questions 9 and 10 of the interviews with Ms. Mercedes Barrera and Ms. Silvia Soriano, the question 12 of the interview with Dr. Albert Figuerola, question 13 of the interview with Dra. Nuria Escaja and the question 13 of the interview with Dr. Raimundo Gargallo.

The inexistence of procedures, either internal or external, about how tasks must be carried out by the different personnel in charge. This is one of the reasons of why some of the tasks are not carried out with the appropriate efficiency. In addition, this fact leads to the lack of rigor and application of the tasks that must be carried out. This point was observed in the question 13 of interviews with Ms. Mercedes Barrera and Ms. Silvia Soriano, in the question 15 of the interview with Dr. Albert Figuerola, in the question 3 of the interview with Dra. Nuria Escaja and in the question 3 of the interview with Dr. Raimundo Gargallo.

The nonexistence of checklists. During the laboratories' reviews, everything that is observed should be noted, both the elements that are in good condition and those that require special attention. The checklist is, therefore, an essential document for performing the registers of the laboratories' reviews correctly. This disagreement has been detected in the question 3 of the interview with Dr. Albert Figuerola.

The economic deficiency in the improvement of the state of the laboratories' facilities. There are parts of the facilities that should be conditioned in order to avoid future accidents or the aggravation of the current situation. The reference to this issue is the question 15 of the interviews with Dra. Núria Escaja and with Dr. Raimundo Gargallo.

6.2. ANALYSIS OF THE DISCONFORMITIES

DISAGREEMENT	SOURCE OF INFORMATION	RESPONSIBLE OF THE AREA	DOCUMENTARY REQUIREMENT	SEVERITY LEVEL
Inefficient general communication among the staff involved in the laboratories	Interview with Dr. Albert Figuerola (questions 1 and 4) Interview with Dr. Raimundo Gargallo (question 15)	All staff related to laboratories	Non-existent	Medium
Reduced accessibility of the documentation of the laboratories (registers and checklists)	Interview with Dr. Albert Figuerola (question 5)	Responsible and technicians of the laboratories	PEQ 110 (Section 2. Development)	Low
Poor general condition of laboratories facilities (economic problem)	Interview with Dra. Núria Escaja (questions 7 and 15) Interview with Dr. Raimundo Gargallo (question 7)	Deanship, Administration of the Centre, Department Management	PEQ 110 (Section 2. Development)	Low

DISAGREEMENT	SOURCE OF INFORMATION	RESPONSIBLE OF THE AREA	DOCUMENTARY REQUIREMENT	SEVERITY LEVEL
Lack of revision of the security elements. It is not known whether some of them work because of lack of use and revisions	Interviews with the technicians (question 5) Interview with Dr. Albert Figuerola (question 8)	Laboratory technicians	PEQ 110 (ANNEX I)	High
Lack of maintenance and supervision of the laboratory equipment	Interview with Dr. Albert Figuerola (question 9)	Laboratory technicians	PEQ 110 (ANNEX I)	Medium
Lack of control and updating of pertinent documents in the laboratory: PNTs and ITs	Interviews with the technicians (question 8) Interview with Dr. Albert Figuerola (question 11) Interview with Dr. Raimundo Gargallo (question 11)	Laboratory technicians	PEQ 110 (ANNEX I)	Medium

DISAGREEMENT	SOURCE OF INFORMATION	RESPONSIBLE OF THE AREA	DOCUMENTARY REQUIREMENT	SEVERITY LEVEL
Lack of registration of revisions of the following laboratory elements: installations, security elements, equipment and documentation (documentation for students, PNTs and ITs)	Interviews with the technicians (questions 4, 5, 6, 7 and 8) Interview with Dr. Albert Figuerola (questions 8, 9, 10 and 11) Interview with Dra. Núria Escaja (questions 9 and 10)	Laboratory technicians	PEQ 110	High
Lack of registration and communication of incidents. Corrections to some incidents are not carried out correctly	Interviews with the technicians (questions 9 and 10) Interview with Dr. Albert Figuerola (question 12) Interviews with Dra. Núria Escaja and Dr. Raimundo Gargallo (question 13)	Responsible of the laboratory	PEQ 110 (Section 2. Development and ANNEX III)	High

DISAGREEMENT	SOURCE OF INFORMATION	RESPONSIBLE OF THE AREA	DOCUMENTARY REQUIREMENT	SEVERITY LEVEL
Inexistence or ignorance of procedures carrying out tasks of the involved personnel in the laboratories. Also lack of their application	Interviews with the technicians (question 13) Interview with Dr. Albert Figuerola (question 15) Interviews with Dra. Núria Escaja and Dr. Raimundo Gargallo (question 3)	All staff related to laboratories	PEQ 110	Medium
Inexistence of laboratory checklists	Interview with Dr. Albert Figuerola (question 3)	Laboratory technicians	PEQ 110 (Section 2. Development)	High

6.3. IMPROVEMENT PROPOSALS FOR THE DISCONFORMITIES

DISAGREEMENT	PROPOSAL IMPROVEMENTS	RESPONSIBLE OF THE IMPROVEMENT	PRIORITY
Inefficient general communication among the staff involved in the laboratories	Create an online SharePoint® accessible to the staff involved with the laboratory	All personnel involved in laboratories	High
	Establishment of a minimum of effective physical meetings	All personnel involved in laboratories	High
Reduced accessibility of the documentation of the laboratories (registers and checklists)	Create a SharePoint® with shared accessibility via online	Laboratory responsible and technicians	Low
Poor general condition of laboratories facilities (economic problem)	Increase in the budget allocated to basic laboratories	Deanship, Administration of the Centre, Department Management	Medium
Lack of revision of the security elements. It is not known whether some of them work because of lack of use and revisions	Preparation of the checklist containing the security elements and register their revisions	Responsible of the laboratories	High
Lack of maintenance and supervision of the laboratory equipment	Do a review of all the equipment and replace those that do not have a shelf life (it also includes the replacement of damaged pieces)	Responsible of the laboratories	Low
	Elaboration of controlled procedures for the equipment revisions (calibrations, maintenance and verifications) and its registration	Responsible of the laboratories	Medium

DISAGREEMENT	PROPOSAL IMPROVEMENTS	RESPONSIBLE OF THE IMPROVEMENT	PRIORITY
Lack of control and updating of pertinent documents in the laboratory: PNTs and ITs	Review the PNTs and the ITs and update the obsolete ones	Laboratory technicians and the responsible for writing the SOPs	Medium
	Ensure that the PNTs and ITs are included in the periodic reviews and in the laboratory checklist	Responsible of the laboratories	High
Lack of registration of revisions of the following laboratory elements: installations, security elements, equipment and documentation (documentation for students, PNTs and ITs)	Preparation of the checklist of the laboratory items and register the revisions according to what is established in the PEQ 110	Responsible of the laboratories	High
Lack of registration and communication of incidents. Corrections to some incidents are not carried out correctly	Establishment of meetings of the responsible of the laboratories with the coordinator of the subject and the teaching staff to inform them about how to manage incidents	Responsible of the laboratories, coordinator of the subject and teaching staff	High
Inexistence or ignorance of procedures on realization of the tasks of the involved personnel in the laboratories. Also lack of their application	Review of the existing procedures and preparation and implementation of those that are necessary to comply with the PEQ 110 and the disconformities of this assessment	Responsible for writing internal documents	Medium
Inexistence of laboratory checklists	Preparation and implementation of the laboratories' checklists	Responsible of the laboratories	High

7. CONCLUSIONS

First of all, it must be said that the objectives of this work have been achieved correctly, since the assessment has been carried out adequately and the current deficiencies and disagreements have been detected in the basic laboratories. In addition, some of the proposed improvement actions have also begun to work to reduce or eliminate the effect of the nonconformities detected. Despite this, the Excel® document accessible to all the personnel involved in the laboratories via SharePoint® could not be done due to the lack of time.

This work has been a first step in improving the quality management system of the material resources of the basic laboratories, but there is still a lot of work to do: little by little, the improvement actions that are still to be done must be incorporated, as well as guidelines for all the personnel involved in laboratories must be established.

It is also important to say that the evaluation process that has been carried out at the basic laboratories can also be applicable to the other laboratories of the Faculty of Chemistry, as long as the responsible or the departments consider it appropriate.

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9. ACRONYMS

EHEA	European Higher Education Area
SGQLD	Sistema de Gestió de la Qualitat dels Laboratoris Docents
SAIQU	Sistema d'Assegurament Intern de la Qualitat
EEES	Espai Europeu d'Educació Superior
ENQA	European Network for Quality Assurance
ECTS	European Credit Transfer and Accumulation System
CQ	Comitè de la Qualitat
MQ	Manual de la Qualitat
PEQ	Procediments Específics de Qualitat
SOP	Standard Operating Procedure
PNT	Procediment Normalitzat de Treball
IT	Instrucció de Treball
VSMA	Verificació, Seguiment, Modificació i Acreditació
AQU	Agència per a la Qualitat del Sistema Universitari de Catalunya
PGQ	Procediments Generals de Qualitat
ADR	Ajuts de formació en Docència i Recerca
UQMAS	Unitat de Qualitat, Medi Ambient i Seguretat
CTRQ	Centre de Transferència de Residus Químics

APPENDICES

APPENDIX 1: PREGUNTES DE LES ENTREVISTES PEL PERSONAL TÈCNIC DELS LABORATORIS BÀSICS

1. Reactius i dissolucions. Com es gestionen els reactius del laboratori? I les dissolucions? Queden registrades aquestes activitats?

2. Material. Com es gestiona el material del laboratori? Queda registrat el procés de la seva gestió?

3. Contenidors de residus. Com es gestionen els residus generats al laboratori? Queda registrada aquesta activitat?

4. Instal·lacions. Com es gestionen les instal·lacions del laboratori? Es registra aquest procés de gestió?

5. Elements de seguretat. Com es gestionen els elements de seguretat del laboratori? És registrada aquesta acció?

6. Equips. Com es gestionen els equips del laboratori? Queda registrat el seu procés de gestió?

7. Documentació per consulta. Com es gestiona el material de consulta i didàctic del laboratori? Queda registrat aquest procés?

8. Documentació de gestió: PNTs i ITs. Com es gestionen els PNTs i els ITs del laboratori? Queden registrades aquestes accions?

9. Si es detecta alguna deficiència o necessitat durant la revisió, com es du a terme la seva correcció? Les correccions es duen a terme segons algun tipus de document? Queden anotades i registrades aquestes deficiències junt amb la seva correcció?

10. Si succeeix una incidència durant l'ús del laboratori (p. ex.: pràctiques), com es du a terme la ràpida correcció que caldria fer per tal d'assegurar el bon funcionament del laboratori? Es fa un seguiment d'aquestes incidències? Com es du a terme aquest seguiment?

11. Si hi ha incidències detectades però que queden sense resoldre's, quan i com es procedeix a la seva solució?

12. Com us organitzeu la feina descrita anteriorment? Quan es realitza cada etapa de revisió i comprovació?

13. Se segueix algun tipus de document, intern o extern, que indiqui com s'ha de dur a terme la gestió dels aspectes tractats amb anterioritat?

14. Voldries comentar algun aspecte addicional?

APPENDIX 2: PREGUNTES DE LES ENTREVISTES PER A PROFESSORS, RESPONSABLES I COORDINADORS

Bloc 1. Planificació de les pràctiques.

1. Com es planifiquen les pràctiques de laboratori? Té lloc alguna reunió per dur a terme aquesta planificació? Amb qui? Queda registrada aquesta planificació?

2. Quins elements o aspectes es tenen en compte de cara a la planificació per assegurar el bon funcionament de les pràctiques?

3. Se segueix algun tipus de document, intern o extern, que indiqui com s'ha de dur a terme la planificació de les pràctiques?

Bloc 2. Gestió del material del laboratori.

4. Reactius i dissolucions. Com es gestionen els reactius del laboratori? I les dissolucions? Queden registrades aquestes activitats?

5. Material. Com es gestiona el material del laboratori? Queda registrat el procés de la seva gestió?

6. Contenidors de residus. Com es gestionen els residus generats al laboratori? Queda registrada aquesta activitat?

7. Instal·lacions. Com es gestionen les instal·lacions del laboratori? Es registra aquest procés de gestió?

8. Elements de seguretat. Com es gestionen els elements de seguretat del laboratori? És registrada aquesta acció?

9. Equips. Com es gestionen els equips del laboratori? Queda registrat el seu procés de gestió?

Bloc 3. Gestió del material per consulta.

10. Documentació per consulta. Com es gestiona el material de consulta i didàctic del laboratori? Queda registrat aquest procés?

11. Documentació de gestió: PNTs I ITs. Com es gestionen els PNTs I els ITs del laboratori? Queden registrades aquestes accions?

Bloc 4. Gestió d'incidències.

12. Si succeeix una incidència en un laboratori, obtens alguna informació sobre aquesta? Quines accions prens com a responsable/coordinador? A qui et dirigeixes? Es registren les incidències? Com?

13. Es fa un seguiment d'aquestes incidències? Com es du a terme aquest seguiment? Les llibretes d'incidències s'actualitzen i revisen amb freqüència?

14. Si hi ha incidències detectades però que queden sense resoldre's, es prenen mesures per corregir-les?

Bloc 5. Aspectes addicionals.

15. Voldries comentar algun aspecte addicional?

APPENDIX 3: PNT PELS LABORATORIS BÀSICS

Títol: ORGANITZACIÓ DE LES TASQUES DE MANTENIMENT I VERIFICACIÓ DE LES INSTAL·LACIONS I EQUIPAMENTS DELS LABORATORIS BÀSICS.

1. OBJECTIU

Establir la sistemàtica que s'ha de seguir per dur a terme l'organització de les tasques de manteniment i verificació de les instal·lacions i equipaments dels laboratoris bàsics de la Facultat de Química de la Universitat de Barcelona.

2. ÀMBIT D'APLICACIÓ

L'aplicació d'aquest procediment recau a tot el personal que procedeixi a la comprovació i verificació dels elements dels laboratoris bàsics de la Facultat de Química de la Universitat de Barcelona. Aquesta aplicació correspon, d'aquesta manera, a qualsevol activitat relacionada amb les comprovacions i verificacions realitzades als laboratoris bàsics de la facultat, que corresponen a:

- Laboratori bàsic A, situat a la planta 1 de la facultat.
- Laboratori bàsic B, situat a la planta 1 de la facultat.

3. DEFINICIONS

PEQ: Procediment Específic de Qualitat.

PNT: Procediment Normalitzat de Treball.

IT: Instruccions de Treball.

4. PROCEDIMENTS RELACIONATS

PEQ 5745 110: Gestió i millora dels recursos materials i de les instal·lacions i equipaments dels laboratoris docents.

5. RESPONSABILITATS

Responsable/s dels laboratoris d'aplicació del procediment:

- Assegurar i verificar el grau de compliment de les tasques descrites al PNT.

Tècnics/ques dels laboratoris d'aplicació del procediment:

- Realitzar les activitats descrites al PNT, seguint les instruccions que s'indiquen.

6. INSTRUCCIONS

Abans de l'inici d'unes pràctiques docents, en aquest cas dutes a terme als laboratoris bàsics, s'ha de comprovar i verificar el bon estat d'un llistat d'elements mínims i necessaris per dur a terme les pràctiques, corresponents als laboratoris involucrats, segons s'estableix al PEQ 110.

A més, per garantir un òptim manteniment dels laboratoris i dels seus elements, no només s'han de fer revisions abans de l'inici d'un torn de pràctiques, sinó que s'han de realitzar de manera contínua, segons estableixin els coordinadors i responsables dels laboratoris. Qualsevol revisió de les instal·lacions i equipaments dels laboratoris bàsics s'efectuarà segons la planificació de tasques exposades a continuació i es registrarà en el formulari del "checklist" (vegeu annex 1).

6.1. Abans de començar un semestre

➤ 6.1.1. Comprovació dels reactius i dissolucions

- Comproveu la disponibilitat i l'estat dels reactius de les primeres pràctiques que es faran.

- Comproveu els reactius del magatzem.

➤ 6.1.2. Comprovació de les instal·lacions

- Feu la sol·licitud de neteja de vidres de les vitrines.

- Comproveu el funcionament dels becs Bunsen.

- Comproveu el funcionament i l'estat de tots els endolls, aixetes i desguassos de totes les piques.

➤ 6.1.3. Comprovació dels equips

- Comproveu el funcionament de les balances, estufes, banys d'aigua, mantes calefactores i agitadors.

6.2. Abans de començar un torn de pràctiques

➤ 6.2.1. Comprovació dels reactius i dissolucions

- Prepareu i estandarditzeu, si s'escau, les dissolucions patró.

- Comproveu i prepareu les solucions problema amb les etiquetes adients, les barreges i els reactius necessaris per a les pràctiques que es faran.

- Feu un inventari dels reactius als magatzems i als laboratoris.

➤ 6.2.2. Comprovació del material

- Feu un inventari dels reactius i el material als magatzems i als laboratoris.

- Comproveu, netegeu i prepareu el material general de les pràctiques que es faran.

- Avalueu les necessitats del material auxiliar en els equips: tubs de colorimetria i capil·lars de punt de fusió.

- Comproveu el material de les taquilles dels alumnes.

➤ 6.2.3. Comprovació dels contenidors de residus

- Prepareu i col·loqueu els contenidors i etiquetes de residus.

➤ 6.2.4. Comprovació de les instal·lacions

- Prepareu els laboratoris, segons les indicacions del personal coordinador de pràctiques.

- Comproveu el funcionament dels becs Bunsen.

➤ 6.2.5. Comprovació dels equips

- Comproveu el funcionament i calibreu els pH-metres tenint cura dels elèctrodes, en les assignatures que ho sol·liciti el personal coordinador de pràctiques.

- Netegeu les estufes, evaporadors rotatius, banys d'aigua i dessecadors.

- Reviseu els tubs de goma dels evaporadors rotatius.

- Comproveu el funcionament de tots els aparells i equips.

➤ 6.2.6. Altres

- Demaneu els lectors de DVD o vídeo.

- Comproveu la farmaciola.

- Etiqueteu les dissolucions, equips, armaris, etc.

6.3. Mentre hi ha un torn de pràctiques

➤ 6.3.1. Comprovació dels reactius i dissolucions

- Ompliu a primera hora tots els flascons de dissolvents i els flascons de solucions.

- 6.3.2. Comprovació del material
 - En els canvis de torn, gestioneu les peticions de material i comproveu les taquilles dels alumnes.
- 6.3.3. Comprovació dels contenidors de residus
 - Gestioneu els residus generats durant el transcurs de les pràctiques.
- 6.3.4. Comprovació dels equips
 - Comproveu el funcionament dels pH-metres amb solució tamponada.
- 6.3.5. Altres
 - Ateneu les peticions del professorat de qualsevol dels laboratoris i ajudeu-lo en la seva tasca.
 - Ateneu les peticions de material específic (horari a convenir).
 - Comproveu a primera hora el paper de filtre, el paper d'alumini, el film de plàstic transparent i el paper indicador.
- 6.4. En acabar un torn de pràctiques
 - 6.4.1. Comprovació de les llibretes d'incidències
 - Controleu que les llibretes d'incidències dels laboratoris s'utilitzen i actualitzen periòdicament.
 - Reviseu totes les incidències anotades a la llibreta, tot comprovant si s'han resolt correctament.
 - En cas d'incidències no resoltes, dirigiu-vos a la persona responsable dels laboratoris per tal de realitzar les accions correctives o preventives adients.
 - 6.4.2. Comprovació dels reactius i dissolucions
 - Controleu els estocs dels reactius.
 - 6.4.3. Comprovació del material
 - Controleu els estocs del material.
 - 6.4.4. Comprovació dels contenidors de residus
 - Gestioneu el material de rebuig (paper, vidre net, vidre punxant, vidre contaminant, envasos nets, envasos contaminats, guants, etc).

➤ 6.4.5. Comprovació de les instal·lacions

- Controleu l'apertura i tancament dels laboratoris i aules.
- Controleu i feu el manteniment del mobiliari dels laboratoris i aules.
- Controleu el manteniment de les instal·lacions d'aigua, d'aigua desionitzada, d'enllumenat i de gas.

➤ 6.4.6. Comprovació dels equips

- Controleu el funcionament correcte dels equips i aparells dels laboratoris i la gestió per les reparacions al taller electrònic.

6.5. En acabar les últimes pràctiques del semestre de tardor

➤ 6.5.1. Comprovació dels reactius i dissolucions

- Comproveu els reactius del magatzem, manteniu actualitzades les seves fitxes d'inventari i feu la corresponent comanda de reactius per al proper semestre.

➤ 6.5.2. Comprovació del material

- Comproveu que el material de les taquilles estigui complet i en condicions.
- Comproveu el material del magatzem i dels laboratoris i feu el seu corresponent inventari.

- Feu la comanda de material per al proper semestre.

➤ 6.5.3. Comprovació dels equips

- Guardeu els equips del laboratori.

6.6. En acabar les últimes pràctiques del curs (semestre de primavera)

➤ 6.6.1. Comprovació dels reactius i dissolucions

- Buideu tots els flascons de les solucions.
- Controleu les altes i baixes del magatzem de reactius.
- Feu una previsió de la comanda de reactius per al proper curs.
- Feu la comanda dels reactius necessaris per al proper curs.

➤ 6.6.2. Comprovació del material

- Controleu les altes i baixes del magatzem de material.
- Controleu el material general dels laboratoris: desoxidació, pintura, engreixament.

- Feu una previsió de la comanda del material per al proper curs.
- Feu la comanda del material necessari per al proper curs.
- 6.6.3. Comprovació de les instal·lacions
 - Comproveu les bombes de buit.
 - Feu el manteniment general de l'obra dels laboratoris.
- 6.6.4. Comprovació dels elements de seguretat
 - Feu el manteniment i control dels elements de seguretat dels laboratoris.
 - Feu el manteniment i control dels elements de seguretat personal (EPI's).
- 6.6.5. Comprovació dels equips
 - Contacteu amb els serveis mecànics i electrònics per al muntatge i la reparació d'equips i aparells.
- 6.6.6. Comprovació dels PNTs i ITs de laboratori
 - Controleu la disponibilitat i la validesa dels PNTs i les ITs dels laboratoris.
- 6.6.7. Comprovació del material de consulta i didàctic
 - Comproveu la disponibilitat i l'estat del material de consulta i didàctic dels laboratoris.
- 6.6.8. Altres
 - Comproveu les farmacioles.
 - Descongeleu i netegeu les neveres.
 - Feu el manteniment del material ofimàtic i la reposició dels consumibles.
 - Repareu les petites avaries elèctriques, mecàniques i de fusteria.
 - Realitzeu les fotocòpies que siguin necessàries per al desenvolupament de les activitats que es realitzin als laboratoris.

7. REFERÈNCIES

PEQ 110.

8. ANNEXOS

➤ ANNEX 1: Checklist de comprovació dels diferents elements involucrats en les tasques de manteniment descrites a l'apartat '6. INSTRUCCIONS' del PNT.

APPENDIX 4: CHECKLIST PELS LABORATORIS BÀSICS

CHECKLIST DELS LABORATORIS BÀSICS DE LA FACULTAT DE QUÍMICA DE LA UNIVERSITAT DE BARCELONA

Personal tècnic:

Data de revisió:

Llibretes d'incidències	Correcte		
	Sí	No (*)	N/A
Llibreta d'incidències del laboratori bàsic A			
Llibreta d'incidències del laboratori bàsic B			
(*) Observacions:			

Reactius i etiquetatge	Correcte		
	Sí	No (*)	N/A
Reactius del magatzem			
Reactius dels laboratoris			
(*) Observacions:			

Dissolucions i etiquetatge	Correcte		
	Sí	No (*)	N/A
Dissolucions patró			
Dissolucions problema			
Flascons de dissolvents			
Flascons de solucions			
(*) Observacions:			

Material	Correcte		
	Sí	No (*)	N/A
Material del magatzem			
Material general dels laboratoris			
Material de les taquilles dels alumnes			
Material auxiliar: tubs de colorimetria i capil·lars de punt de fusió			
(*) Observacions:			

Contenidors de residus i etiquetatge	Correcte		
	Sí	No (*)	N/A
Contenidors i etiquetes indicats al "Pla de Gestió de Residus" de l'assignatura:			
Contenidors de material de rebuig (paper, vidre, guants..)			
(*) Observacions:			

Material de consulta i didàctic	Correcte		
	Sí	No (*)	N/A
Llibre 'Principios de Química' d'en Peter W. Atkins			
Handbook de dades			
(*) Observacions:			

PNTs i ITs de laboratori	Correcte		
	Sí	No (*)	N/A
PNTs dels evaporadors rotatius			
PNTs dels pH-metres			
PNTs de les balances			
PNTs dels aparells de mesura de punts de fusió			
(*) Observacions:			

Instal·lacions	Correcte		
	Si	No (*)	N/A
Vitrines			
Becs Bunsen			
Endolls			
Aixetes			
Desguassos de les piques			
Instal·lacions d'aigua			
Instal·lacions d'aigua desionitzada			
Instal·lacions de gas			
Instal·lacions d'enllumenat			
Bombes de buit			
Obra dels laboratoris			
Farmaciola			
Portes			
Mobiliari			
Neveres			
Material ofimàtic i consumibles			
(*) Observacions:			

Elements de seguretat	Correcte		
	Si	No (*)	N/A
Rentaüls			
Mantes ignifugues			
Dutxes			
Extintors			
EPI (equips de protecció individual)			
(*) Observacions:			

Equips: manteniment, verificació i calibratge	Correcte		
	Sí	No (*)	N/A
Balances			
Estufes			
Banys d'aigua			
Mantes calefactores			
Agitadors magnètics			
Evaporadors rotatius			
pH-metres			
Dessecadors			
Aparells de mesura de punts de fusió			
(*) Observacions:			

APPENDIX 5: ENQUESTA DE SATISFACCIÓ PER A PROFESSORS I ALUMNES

Enquesta de satisfacció per a professors i alumnes

Valoreu, del 0 al 5, la vostra satisfacció en relació als aspectes tractats a les següents qüestions relacionades amb les pràctiques realitzades. Si ho veieu convenient, als espais d'observacions podeu ampliar les respostes de les qüestions.

1. En general, les condicions físiques del laboratori (infraestructura, vitrines, aixetes, il·luminació) han estat les adequades	Valoració: <input type="text"/>
Observacions:	
2. En general, les condicions ambientals del laboratori (temperatura, ventilació, soroll, olors) han estat les adequades	Valoració: <input type="text"/>
Observacions:	
3. La disponibilitat de material, productes químics i equips ha estat adequada	Valoració: <input type="text"/>
Observacions:	
4. Dins del laboratori, tant els professors com els alumnes sempre han utilitzat les ulleres de seguretat i la bata, a més d'altres proteccions en cas necessari	Valoració: <input type="text"/>
Observacions:	

5. Tant els professors com els alumnes sempre han respectat les normes bàsiques d'higiene al laboratori (no menjar, beure ni fumar)	Valoració: <input data-bbox="863 220 944 280" type="text"/>
Observacions:	

6. La manipulació i l'emmagatzematge de substàncies tòxiques i inflamables s'han realitzat en les condicions adequades	Valoració: <input data-bbox="866 453 947 513" type="text"/>
Observacions:	

7. L'estat i la disponibilitat dels contenidors de residus han estat adequats	Valoració: <input data-bbox="863 687 944 748" type="text"/>
Observacions:	

8. Saps / T'han explicat com i quan utilitzar els diferents elements de seguretat del laboratori i com actuar en cas d'incidents i accidents	Valoració: <input data-bbox="863 919 944 979" type="text"/>
Observacions:	

9. La disponibilitat i la qualitat de la informació dels PNTs del laboratori han estat adequades	Valoració: <input data-bbox="863 1158 944 1219" type="text"/>
Observacions:	

10. La informació sobre seguretat al laboratori, emergències, gestió de residus i altres conceptes generals de medi ambient donada a la sessió inicial ha estat clara, completa i entenedora	Valoració: <input data-bbox="826 201 908 261" type="text"/>
Observacions:	
11. L'ambient de treball ha sigut bo i l'espai de treball per persona ha sigut suficient	Valoració: <input data-bbox="826 440 908 501" type="text"/>
Observacions:	
12. Creus que cal millorar algun aspecte de les instal·lacions i equipaments del laboratori	Valoració: <input data-bbox="826 671 908 732" type="text"/>
Observacions:	

