

---

## Chemistry “Laboratory Hands” in Portugal in the Nineteenth Century: Aspects Of An Evolution

*Isabel Cruz;\* Sandra Lopes\**

The present document approaches the question of a specific professional area (so to speak) –the laboratory hand– and his role in the development of Chemistry and the teaching of the subject in Portugal. The objective is to outline the general points of evolution within the perspective of their work with the Chemistry lecturer, professor or investigator, and thus provide a better understanding of the historic process of Chemistry and its development in the educational institutions of the XIX century.

The text “*Preparadores de Química da Escola Politécnica (1837-1856)*”, already showed that these “laboratory collaborators” were receiving very little recognition.<sup>1</sup> Certain official sources (yearly publications, reports and directives) plus archived documentation however provides information in a number of cases as to who the hands were, the regulations and the tasks related to their work in the laboratory and makes it possible to evaluate aspects of their role in the field of Chemistry in Portugal.

### **Chemistry laboratory hands and Educational Institutes in Portugal in the XIX century (some examples)**

In both the polytechnic scientific institutes created in 1837 in Lisbon and in Oporto, respectively called “Escola Politécnica” and “Academia Politécnica” a space, which was called a laboratory, was allocated right the beginning for the practice of Chemistry; <sup>2,3</sup> here are to be found the lecturers of the subjects (or subject) of Chemistry, those men totally responsible for the subject, the lecturers who were to substitute them and the preparers (translated in this text as laboratory hands). Although relatively ignored in the various scenarios history recreates

---

\* CICTSUL, Centro Interdisciplinar de Ciência, Tecnologia e Sociedade da Universidade de Lisboa, Instituto de Investigação Científica Bento da Rocha Cabral, 14, 1250 – 047 Lisboa. [isabelnevescruz@netcabo.pt](mailto:isabelnevescruz@netcabo.pt)  
[sandra.lopes.3@netvisao.pt](mailto:sandra.lopes.3@netvisao.pt)

about the past of the XIX century institutes in Portugal, the laboratory hands were in fact extremely important in ensuring the normal functioning of the laboratories and the teaching of Chemistry.

In spite of fundamentally employed to assist the lecturer and relieve him of the so called minor preparatory tasks necessary for the practical classes and investigation, the laboratory hand would, when needed, alternate between a mere laboratory assistant helper to practically an assistant lecturer. It is clear however that a barrier existed that prevented lecturer and hand –each with a totally independent professional situation– from being confused one with the other.<sup>4</sup>

Research carried out, particularly in these two institutes, shows that as a rule the laboratory hand was recruited from within the pharmaceutical class<sup>5,6</sup> –less clear however and difficult to evaluate with accuracy was their level of qualifications– a “Grade I” Classification signified having completing the School of Pharmacy course which was attached to the School of Medicine and Surgery. A “Grade II” Classification signified having spent a number years of practice under the supervision of a pharmacist or an apothecary.<sup>7</sup>

The first answer to the next question, why pharmacists were recruited for laboratory hands, is based on investigations of a substantive nature, carried out by two learned individuals on the History of Pharmacy in Portugal (XVIII and XIX centuries). In 1991 the work of José Pedro Sousa Dias refers to the fact that apart from the Galenic-Hippocratic remedies for bleeding and purging, which were very dominant in the XVI a XVIII centuries, new therapeutic remedies were being introduced in Portugal, for example, treatment with chemical medicines such as metallic salts, mainly antimony and mercury, other medicinal substances obtained from distilling vegetable drugs and the use of drugs coming from the New World. As a result, a group of individuals appeared, although still very small, associated with practising Pharmacy and skilled in preparing chemical medication, a practice that required firm knowledge of a set of techniques used to obtain pure active substances as opposed to complex mixtures obtained using the Galenic method.<sup>8</sup> An identical perspective, but for a subsequent period including the first half of the nineteenth century and focused on the teaching of pharmacy at Coimbra university, is presented by Rui Pita, 1995: “It must be remembered however that the chemical knowledge of the apothecaries was practical and not theoretical, preparations were obtained solely by means of practice. On the other hand, the fact that the young apprentice apothecaries came into contact with the techniques and the chemical processes in a place exclusively dedicated to these procedures, quite obviously provided them with a level of knowledge and a certain sensibility regarding the chemical question which

would, without doubt, be extremely useful in their professional activities. Furthermore: even this very incipient chemical knowledge, compared with the knowledge that existed at the time, which was virtually non-existent, or which remained in the hands the master apothecaries who instructed their apprentices, was in all truth quite relevant".<sup>9</sup>

The second answer is of a socio-professional nature. As the job of laboratory hand is viewed by the lecturing community as being subordinate, in truth an "unqualified" position in an educational perspective, (for this same reason, right from the start an insurmountable gap separates the two), the professional group of pharmacists –those of which could master the daily regime of the Chemistry laboratory– were the ones best suited to the position.

However, we notice that not all pharmacists had the right profile for the position, indeed of all the cases of laboratory hands in the 1st half of the XIX century that we researched, only one left us in doubt as to whether or not he had in fact studied Chemistry. Therefore, and in conclusion, pharmacists were accepted as laboratory hands if they had accumulated a certain amount of scientific knowledge in the area of Chemistry.

Names of some of these individuals to be found in the records are: Francisco Mendes Cardoso Leal Júnior the former laboratory hand in the Chemistry laboratory of the "Escola Politécnica" (The Polytechnic School of Lisbon) who attended Luis da Silva Mouzinho de Albuquerque's Physics and Chemistry Course at the Chemistry Laboratory of the "Casa da Moeda de Lisboa" (The Lisbon Mint); José António de Aguiar (1812-1850), Francisco Pereira Amorim de Vasconcelos (1812-1859) and Manuel Nepomuceno (1830-1911), all laboratory hands at the Chemistry laboratory of the "Academia Politécnica" (The Polytechnic Academy of Oporto): the first was a interim laboratory hand, and after completing his course at the Polytechnic Academy was given the post of substitute lecturer; the second was a temporary laboratory hand who attended Chemistry classes at the Polytechnic Academy of Oporto and the last (and the first to be nominated for the position) as a pharmaceutical student at the School of Medicine and Surgery in the same city, also studied Chemistry at the same institute.

During the 2<sup>nd</sup> half of the XIX century other educational institutes start to appear in these cities: the Industrial School in Oporto and the Industrial Institute in Lisbon, and also the Agricultural Institute, in Lisbon only. Although we cannot yet be certain, we are of the opinion that some of the basic differences between these new Schools, whose main objective was to train professionals at a less qualified level, and the other already existing Schools (Coimbra University,

Polytechnic Academy and Polytechnic School), could have facilitated a certain approximation between the lecturers of Chemistry and their laboratory hands, an approximation that also came to have an affect on some of the most elite orthodox schools.

We can quite safely state therefore that the role of the laboratory hand was undergoing transformation. On one hand, a tendency is arising in the industrial institutes where individuals are working in the laboratory and are called “assistants”. These individuals are certainly well qualified and can be closely compared to laboratory assistants in the rest of Europe, namely France, Britain or Germany. In this category we find the German Carl von Bonhorst (?-1918), previous assistant to Remegius Fresenius who occupied right from the start the position of assistant created in 1872 by António Augusto de Aguiar in the Chemistry laboratory at the Industrial (and now) Commercial Institute of Lisbon.<sup>10,11</sup>

The position “Head of Practical Work” also appeared in the laboratory field (in Polytechnic School, more precisely),<sup>12,13</sup> and fitted, but not for long, Charles Lepierre (1867-1945), one of the first students to graduate from the Municipal School of Industrial Physics and Chemistry of Paris. Lepierre was persuaded by José Júlio Bettencourt Rodrigues (professor in the Industrial and Commercial Institute of Lisbon and also in the Polytechnic School of Lisbon) in a meeting at Roberto Duarte Silva’s house to leave Paris and come to Portugal to take up the post of laboratory hand for the subject of Chemical Technology.<sup>14,15</sup> This was a variation of the subject introduced in 1884 in the Industrial and Commercial Institute of Lisbon and which Bettencourt intended to be a true innovation in the field of technical teaching in Portugal, directed mainly at those individuals who graduated in Commerce with a specialized knowledge in commercial chemistry.<sup>16</sup>

The introduction in the Chemistry Laboratory of a position, a working relationship, between the laboratory hand, as he was still known, and the lecturer or professor—a process taking place in Portugal during the decades of 1870/1880—is evident by the appearance not only of terms such as “assistant”, but also “head of practical works” or “head of chemistry services” in laboratory regulation terminology.

It is also evident that not only the pharmacists were applying for the job of laboratory hand as happened for example 20 to 30 years previously. Applications are being presented by those individuals who studied at the Chemistry laboratory of the Industrial and Commercial Institute of Lisbon<sup>17</sup> or the Chemistry laboratory of the Agronomy and Veterinary Institute (the former Agricultural Institute), very often possessing extra knowledge acquired during technical working visits

abroad, or with extra working experience acquired under the orientation of foreign lecturers; as an example, we quote the case of the agronomist César Justino de Lima Alves who worked during a certain period (2 years more or less) in two chemical-agricultural laboratories, one in Paris and the other in Berlin;<sup>18,19</sup> he was later given the position of laboratory hand of "Organic Chemistry" at the Polytechnic School, and also laboratory hand of the 6<sup>th</sup> subject, "Inorganic Chemistry", at the same institution.

These individuals are now professionally recognised as competent analysts and as a result the profile of the laboratory hand starts to undergo change. Perhaps due to this or because the mentality of the Portuguese scientific elite adapted to new influences, is the reason why not only do their names appear together with that of the lecturer in scientific works published under the auspices of the Academy of Sciences, but their own articles of renowned value are duly recognised –the case of Miguel Ventura da Silva Pinto (during many years the Physics and Chemistry laboratory hand in the Industrial and Commercial Institute of Lisbon), or Emílio Dias (Organic Chemistry laboratory hand at the Polytechnic School)<sup>20</sup> –specializing in the areas of scientific and technical instrumentation.

With the approach of the end of the XIX century, some of these laboratory hands, practical chemistry supervisors, laboratory assistants, were given an opportunity to follow a teaching career, as for example Manuel Nepomuceno, who began as a laboratory hand at the Industrial Institute of Oporto (as well as at the Polytechnic Academy), and later became a Chemistry professor at the same Institute;<sup>21</sup> Carl von Bonhorst who had been practical chemistry assistant for over a decade at the Industrial and Commercial Institute of Lisbon, later moved to the Marquês de Pombal Industrial School, to become its Chemistry professor;<sup>22</sup> Charles Lepierre, who rapidly moved from the laboratories of the Polytechnic School and the Industrial and Commercial Institute of Lisbon to the Brotero Industrial School in Coimbra, where he too was responsible for the subject of Chemistry,<sup>23</sup> and also Luís António Rebelo da Silva, who as an agronomist could apply for the position of head of the chemistry services at the General Institute of Agriculture in 1884 and in 1887 became professor of Chemistry at the same Institute, by that time already named The Agronomy and Veterinary Institute.<sup>24,25</sup>

### **The laboratory hand in the tradition of Fremy**

Historically, in the first laboratories, the laboratory hand was a trainee chemist, learning how to manipulate and carry out the most elementary chemical prepara-

tions. This was a process that began as being very exclusive, as Edmond Fremy said in his *Les Laboratoires de Chimie: le Laboratoire de Chimie Inorganique au Museum* – “for a long time, professors would not allow anyone into their laboratories except their own laboratory hand”– supervised by a great chemist, whom he hoped to succeed in the future. Thus, the laboratory hand although assisting the Master was a disciple not an employee.

A certain intensification in laboratory training which marked the transition of these “modest” laboratories into “investigation laboratories” (both terms used by Fremy), an evolutionary process, led above all by Justus Liebig, the creator of the process, but where others, many of them his pupils, also played an important part in spreading the concept, for example, Wurtz, Hofmann, Bunsen or Fresenius, must have modified to a certain extent the routines of a chemist in training. A comment of Fremy throws light on the problem. With the new teaching methods used to form chemists not enough time was given to consolidating the elementary practices of manipulation and preparation, thus young investigators threw themselves into research without having mastered certain fundamental procedures, that is, and using Fremy’s words: “students terminated without concluding their chemical studies and were not sufficiently qualified to prepare a course”.

With the development of another laboratory concept, the teaching laboratory, and in particular the Laboratory at the *Museum*, established by Fremy in 1865, the importance of the basic qualifications of chemists assumes greater proportions in as much as the “préparateurs” are equal to “true chemists”, that is, those individuals who studied during four years the different areas of Chemistry – general, organic and mineral - in permanent confrontation between theory and practice. After qualifying with a bachelor degree in Science, the Fremy laboratory assistants, the “préparateurs”, could work in the scientific or industrial laboratories. Some of them managed to reach top positions in teaching and were known as “true scientists”. It is therefore important to point out that whatever the point of view adopted abroad (France and Germany in particular), the laboratory hand is a chemist. Within the context of teaching he is responsible, inclusively, for accompanying the students; but above all, he has exclusive and preferential access to the lecturer’s laboratory where, assisting the master in his investigations (sometimes even directly cooperating) captures the legacy of the Art this master transmits to him and once again we see - the laboratory hand is a chemist in the line of succession.

## In Portugal

More in Oporto than in Lisbon, and more in the "technical" institutes (industrial, agricultural, commercial) than the elite polytechnics, the 2<sup>nd</sup> half of the XIX century sees, in our opinion, an opening in the scientific and technical areas of teaching which allowed the laboratory hand to be viewed as much more than a mere performer of minor tasks in the practical classes.

In a certain way, it could have narrowed the differences between the national situation and the foreign concept; we remember that in 1892 Alfredo Bensaúde, refers very clearly to the role of the laboratory hand in the development of scientific teaching in his project for the reform of technological teaching –the embryo document of the previous reform which created the I.S.T. (The Technical Superior Institute), the first institution totally dedicated to preparing civil (not military) engineers in Portugal– when he relates what he very impressively observed in Germany:

"The laboratory preparer or assistant has a very important role (...) They are in great part responsible for explaining and orientating the practical exercises of the technological courses, tasks that require in most if not in all cases, an amount of knowledge as vast as that of the lecturer himself, because the explanation of an industrial process is often no more than the theory of the same process".<sup>26</sup>

Whether with greater or lesser incidence and efficiency, and certainly affected by the unreceptive mentalities of the time we even so consider that this "democratization" or opening, did in fact take place and did bear fruit. We are also of the opinion that the importance attributed to the laboratory hands and other posts that in the meantime started to appear within the *spectrum* of the laboratory, apart from the lecturers and professors did contribute very positively towards consolidating groups of chemists in Portugal, and perhaps even helped to develop "a school". The next step is to discover if and how this could have happened.

## References

<sup>1</sup> Isabel Cruz, "Preparadores de Química da Escola Politécnica (1837-1856)", *Atalaia/Intermundos*, 10 – 11 (2002): 177 – 96, on 178.

<sup>2</sup> Isabel Cruz, *Química, laboratórios de química e valorização do ensino prático: a Escola Politécnica, a cadeira de química e o seu laboratório (1837-1859)*, (Lisboa, CICTSUL: Comunicação privada, 2000).

<sup>3</sup> Isabel Cruz, "A Química na Academia Politécnica do Porto (1837 a 1868)", *Atalaia/Intermundos*, 8-9 (2001): 257 – 92, on 262-263.

<sup>4</sup> Cruz, "Preparadores de Química da Escola Politécnica (1837 – 1856)", 177.

- 
- <sup>5</sup> Cruz, “Preparadores de Química da Escola Politécnica (1837 – 1856)”, 186-187.
- <sup>6</sup> Cruz, “A Química na Academia Politécnica do Porto (1837 a 1868)”, 262-264 and 291 (endnote 18).
- <sup>7</sup> Américo Pires de Lima, *Subsídios para a História do Ensino de Farmácia em Portugal*, (Porto: edição do autor, 1933), 11-12.
- <sup>8</sup> José Pedro Sousa Dias, *Inovação técnica e sociedade na farmácia da Lisboa setecentista*, (Lisboa: Faculdade de Farmácia, Universidade de Lisboa, 1991).
- <sup>9</sup> João Rui Couto da Rocha Pita, *A Farmácia na Universidade de Coimbra (1772 – 1836)*, (Coimbra: Faculdade de Farmácia, Universidade de Coimbra, 1995), 325-326.
- <sup>10</sup> António Augusto de Aguiar, *Estatutos do Laboratório de Química Prática*, (Lisboa: Tipografia de Castro Irmão, 1872), 6-7.
- <sup>11</sup> “Carl von Bonhorst. Necrologia”, *Revista de Química Pura e Aplicada*, 7-8 (1918): 243-44, on 243.
- <sup>12</sup> José Júlio Bettencourt Rodrigues, “Projecto sumário de regulamento dos trabalhos e serviços do Laboratório de Química Mineral da Escola Politécnica de Lisboa; posto em execução, como experiência e sob responsabilidade do respectivo director no ano lectivo de 1889 a 1890”, in *The Mineral Chemistry Laboratory of the Polytechnic School of Lisbon (1884 – 1894)*, eds. Ana Luísa Janeiro, Maria Elisa Maia, Pilar Pereira (Lisboa: Livraria Escolar Editora, 1996), 151 – 70, on 165-166.
- <sup>13</sup> José Júlio Bettencourt Rodrigues, *Exposição ao Conselho da Escola Politécnica sobre o ensino e mais serviços da 6.ª cadeira*, (Lisboa: Tipografia Universal, 1885), 9-10.
- <sup>14</sup> António Herculano de Carvalho, “O Instituto Superior Técnico”, in *A Universidade Técnica de Lisboa e os seus mestres: notas biobibliográficas*, dir. Moses Amzalak (Lisboa: Universidade Técnica de Lisboa, 1956), 707 – 876, on 783.
- <sup>15</sup> Charles Lepierre, “Os grandes homens de ciência: Roberto Duarte Silva”, *Técnica*, 13 (1928).
- <sup>16</sup> José Júlio Bettencourt Rodrigues, *Exposição a propósito dos concursos ao lugar de preparador da cadeira de Tecnologia; lida ao conselho do Instituto Industrial e a ele endereçada*, (Lisboa: Tipografia Universal, 1884), 13 and 20.
- <sup>17</sup> Emílio Dias, “Índigo ou anil, a sua extracção em terrenos de África – António Augusto de Aguiar, Alexandre Bayer e Carlos von Bonhorst, no ensino da química prática”, *Revista de Química Pura e Aplicada*, 1 a 4 (1919): 43 – 61, on 49-52.
- <sup>18</sup> César Justino de Lima Alves, *Relatório apresentado à Direcção Geral de Agricultura, por César Justino da Lima Alves, sobre o seu tirocínio no laboratório de Química-Agrícola do Instituto Agronómico de Paris*, (Lisboa: Imprensa Nacional, 1892), 3.
- <sup>19</sup> Luís António Rebelo da Silva, “Duas palavras em resposta ao artigo “Os químicos em Portugal”, publicado pelo dr. H. Mastbaum na Revista Químico Farmacêutica do Porto”, *Revista Agronómica*, 12 (1904): 329 – 39, on 335.
- <sup>20</sup> Emílio Dias, *Aos Ex.<sup>mos</sup> Srs. Accionistas da Companhia Lisbonense de Iluminação a Gás*, (Lisboa: Tipografia Elzeviriana, 1885).
- <sup>21</sup> António Joaquim Ferreira da Silva, *Breve notícia sobre o ensino da química na Academia Politécnica do Porto e sobre os regulamentos do laboratório e dos trabalhos práticos dos alunos*, (Porto: Tipografia Ocidental, 1893), 15.
- <sup>22</sup> Emílio Dias, “Índigo ou anil, a sua extracção em terrenos de África”, 51.
- <sup>23</sup> Charles Lepierre, *Despedida (Ao público sensato de Coimbra)*, (Coimbra: Tip. França Amado, 1911), 5.
- <sup>24</sup> Luís António Rebelo da Silva, *Relatório da análise dos vinhos apresentados nas exposições de Berlim e de Paris em 1888 e 1889*, (Lisboa: Imprensa Nacional, 1890), 3.

<sup>25</sup> “Luís António Rebelo da Silva; Professor da cadeira de Química Agrícola” [Nota biobibliográfica], in *Anais do Instituto Superior de Agronomia*, ed. Instituto Superior de Agronomia (Lisboa: Instituto Superior de Agronomia, 1920), 28 – 30, on 28.

<sup>26</sup> Alfredo Bensaúde, *Projecto de reforma do ensino tecnológico para o Instituto Industrial e Comercial de Lisboa*, (Lisboa: Tipografia da Academia Real das Ciências, 1892), 14.

### **Additional bibliography**

- António Joaquim Ferreira da Silva, “Para a história da química; O Dr. R. Fresenius”, *Revista de Química Pura e Aplicada*, 12 (1911): 347-50.
- Camilo Castelo Branco, *O meu condiscípulo. Cavar em Ruínas*. (Lisboa: Livrarias de Campos Júnior – Editor, 1866).
- Francisco da Fonseca Benevides et al., *Projecto de reorganização do Instituto Industrial e Comercial de Lisboa, elaborado pelo Conselho Escolar do mesmo Instituto, em cumprimento da Portaria de 13 de Fevereiro de 1892*, (Lisboa: Tipografia Universal, 1892).
- Isabel Cruz, “O laboratório de Química do Instituto Industrial de Lisboa: conflitos entre ensino e produto da ciência aplicada (1852 – 1864)”, in *Divórcio entre cabeça e mãos? Laboratórios de Química em Portugal (1772 – 1955)*, eds. Ana Luísa Janeira; Maria Estela Guedes; Raquel Gonçalves, (Lisboa: Livraria Escolar Editora, 1998), 83-89.
- Isabel Cruz, “From the Industrial and Commercial Institute of Lisbon to the Technical Superior Institute – what transition? (1892 – 1922)”, in *5th International Conference on History of Chemistry – Chemistry, Technology and Society; Proceedings*, eds. Isabel Malaquias, Ernst Homburg, M. Elvira Callapez, (Lisboa, Sociedade Portuguesa de Química, 2006), 626 - 36.
- Joaquim de Santa Clara Sousa Pinto, *Oração fúnebre que na ocasião das Exéquias do Ill.<sup>mo</sup> Sr. José António de Aguiar, lente da Academia Politécnica da cidade do Porto, recitou na sala dos Actos, onde se colocou o seu retrato, o seu colega e amigo Joaquim de Santa Clara Sousa Pinto, lente da mesma Academia, no dia 13 de Março de 1850*, (Porto: Tipografia Comercial, 1850).
- José Pereira Salgado, “A Química na Academia Politécnica do Porto”, in *O Ensino na Academia Politécnica. Primeiro Centenário da Fundação da Academia Politécnica e da Escola Médico-Cirúrgica, 1837 – 1937*, (Porto: Universidade do Porto, 1937).
- Luís Albano de Andrade Morais Almeida, *A memória do Ill.<sup>mo</sup> Sr. José António de Aguiar, lente substituto das aulas da Academia Politécnica da cidade do Porto*, (Porto, 1850).
- Luís Porfírio da Mota Pegado, *Relatório sobre o Instituto Industrial e Comercial de Lisboa; Ano lectivo de 1888 – 1889*, (Lisboa: Imprensa Nacional, 1890).
- Pedro José da Cunha, *A Escola Politécnica de Lisboa; Breve notícia histórica*, (Lisboa: Faculdade de Ciências da Universidade de Lisboa. Primeiro Centenário da Fundação da Escola Politécnica, 1937).
- Virgílio Machado, *O ensino da química no Instituto Industrial e Comercial de Lisboa*, (Lisboa: Imprensa Nacional, 1892).

### **Legislation/Official documents**

- *Anuário da Academia Politécnica do Porto*; vários anos lectivos (Porto: Academia Politécnica do Porto, 1878 -1900).

- Concurso para o lugar de chefe de serviço químico na secção agrícola do Instituto Geral de Agricultura. “Diário do Governo”, N.º 104, de 8 de Maio de 1884.
- Nota de aviso sobre o único candidato admitido ao concurso para o provimento do lugar de chefe de serviço químico do Instituto Geral de Agricultura, Luís António Rebelo da Silva. “Diário do Governo”, N.º 160, de 18 de Julho de 1884.
- Nota de aviso de abertura, de 30 de Julho de 1889, de concurso público documental para selecção de dois alunos, habilitados com o curso de agronomia pelo Instituto de Agronomia e Veterinária de Lisboa para seguirem, por conta do estado e durante dois anos, as lições práticas e os exercícios de análise química nos laboratórios oficiais de França ou Alemanha. “Diário do Governo”, N.º 170, de 1 de Agosto de 1889.
- Fundo documental da Escola Politécnica – Museu de Ciência da Universidade de Lisboa. Livros de Actas das Sessões do Conselho Escolar, 1.º - 6.º.
- Arquivo da Casa da Moeda/Imprensa Nacional – Casa da Moeda: ACM/INC. Casa da Moeda. Laboratório de Química. Aula de Física e Química. Matrículas dos alunos – *Livro 1.º*, Ano de 1824 para 1825 – Parte Física.
- Arquivos da Torre do Tombo, ANTT. Ministério do Reino. 1.ª Direcção. 1.ª Repartição. Relatórios (1843 – 1894). Mç 3644.

### ***Diversa***

- “Almanaque comercial de Lisboa”, Anos: 1881 a 1890, 1892 e 1893.
- “Anuário-Almanaque comercial (ou Anuário oficial de Portugal)”, Anos: 1894 a 1899.
- “Jornal de Ciências Matemáticas, Físicas e Naturais”. Tom. I, Novembro de 1866 a Dezembro de 1867 ao Tom. VI, Fevereiro 1900 a Maio 1902.
- “Jornal de Farmácia e Ciências acessórias”, Tom. 1848 ao Tom. 1859.
- “Jornal da Sociedade Farmacêutica de Lisboa”. Tom. I, Julho 1835 a Julho de 1837.
- “Jornal da Sociedade Farmacêutica Lusitana”. Tom. 1838 ao Tom. 1848.
- José Lourenço Sousa, *Quinto almanaque comercial, fabril, administrativo, eclesiástico e militar do Porto e seu distrito, para 1860*, (Porto: Tipografia Popular de J. L. de Sousa, 1859).
- José Lourenço Sousa, *Décimo almanaque, comercial, fabril, judicial, administrativo, eclesiástico e militar do Porto e seu distrito para 1865 – 1866*, (Porto: Imprensa Popular de J. L. de Sousa, 1864).