Manufacturing Antimicrobial Silver-Coated Wound Dressings: Chemistry Practicum with Exciton Technologies

Chemistry Internship Practicum (CHEM 497)

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Exciton Technologies and My Position

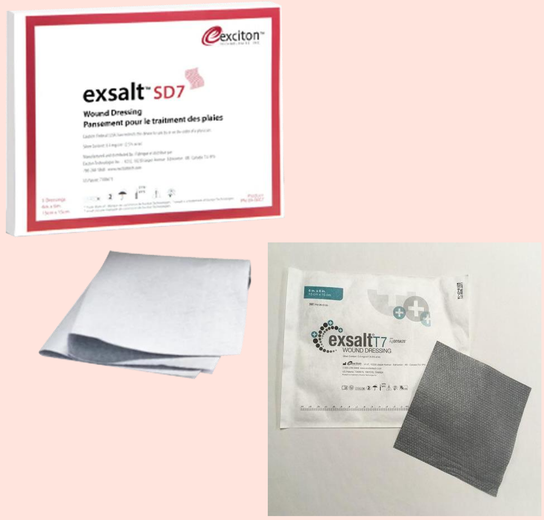
Exciton Technologies is a manufacturing and research company that harnesses the mechanisms of higher oxidation state silver technologies. Their mission is to develop advanced material technologies and cost-effective solutions to prevent infection and the spread of disease. Exciton manufactures silver oxysalts (Ag_7NO_{11}), which they use to coat different wound dressings. Once the dressings are placed on a wound, the fluids interact with the oxysalts to release Ag^{3+}, Ag^{2+}, and Ag^{1+}, which interacts with microbial DNA, proteins, and lipids, and scavenges electrons from the bacteria to prevent metabolic processes and cause cell death[1,2,3]. It also releases oxygen which promotes wound healing and decreases inflammation[4,5].

My position at Exciton Technologies was as an intern quality control analyst. I was tasked with assisting in the quality control laboratory functions, which included:

- Performing standard analytical laboratory work following standard operating procedures
- Maintaining the cleanliness and safety of the lab
- Assisting with instrument calibration and maintenance activities
- Performing analytical tests and documenting, interpreting, and recording the testing results
- Managing and controlling sample handling

Integration of Academia and Industry

During my time at Exciton, I was able to apply a variety of skills and knowledge that I have attained throughout my university degree. Many of the test methods I ran throughout my internship interfaced with the chemistry I learned at MacEwan. We learned about elements with different oxidation states, and this was applied when determining the percent of silver for the oxysalts because the titration results could be used to qualitatively determine the silver species (oxidation state) present in the sample. We learned about precipitation reactions, which were used to determine the presence of chloride in the water and conclude the effectiveness of the deionization column and prevent contamination. We were taught the importance of blanks and standards, and I was able to see the different kinds of blanks and standards and how to troubleshoot the equipment if the blanks and standards had unexpected results. Additionally, common chemistry practices such as personal protective equipment, solution preparation, calculations of reagent amounts, dilution factors, data collection and analysis, and maintenance of clean laboratory notebooks, concepts reinforced in many chemistry courses, were frequently employed.



***Upper image*:** exsalt® SD7 wound dressing (https://healthcaresolutions.ca/products/exsalt-sd7-wound-dressings-5-bx-2)

***Lower image*:** exsalt® T7 wound dressing (https://bayshoreprorx.myshopify.com/collections/swc_antimicrobial-dressings/products/exsalt-t7-wound-dressing-6-x-6-15cm-x-15cm)

***Upper image*:** Halogen moisture analyzer (https://www.fishersci.ca/shop/products/hc103-halogen-moisture-analyzer/01914060)

***Lower image*:** Auto-titrator with Rondo sample changer (http://2-lab.ru/files/catalog/7/632d0512bf55f53c253a04695f04a31c.pdf)

Skills Learned

- Refinement of Good Laboratory Practices (GLP) in a professional laboratory setting, such as proper chemical storage, PPE, handling chemicals, chemical spills, waste disposal, etc.
- Refinement of Good Documentation Practices (GDP) to ensure good record-keeping and the accuracy of data
- Gained greater confidence in performing quality control tasks and working in a laboratory
- Learned how to calibrate, verify, and maintain laboratory equipment such as analytical balances, auto-titrator, electronic pipettes, and moisture analyzers
- Acquired skills to problem-solve and troubleshoot any issues with the laboratory equipment
- Performed various analytical tests on different materials (chemicals, substrate, packaging, products in process, finished products, etc.)
- Interpreted results from the various analytical tests
- Completed mathematical calculations and statistical analysis necessary to complete reports and update control charts
- Development of verbal and written communication skills through working with many professionals and communicating results and problems in various ways (meetings, emails, etc.)
- Development of self-management and time management skills through completing tasks with deadlines
- Enhancement of teamworking skills through working in tandem with fellow employees
- Improvement of planning and organization skills

Benefits of the Internship

I feel very fortunate to have participated in the Chemistry Internship Practicum course. As I am scheduled to graduate in June, I was nervous about how I would transition from school to the workforce. I did not know how to condense my educational experiences into my resumé, nor did I know how to write a proper cover letter. As part of the course, the Career Office taught us how to write an appropriate resumé and tailored cover letter, and how to prepare for job interviews. These are fundamental skills that I can apply throughout my career. The internship allowed me to use the knowledge and skills obtained throughout my degree in a career setting. It provided a safe environment to gain valuable work experience. Throughout my internship, I gained greater confidence in my abilities, developed technical and practical skills necessary in every aspect of my life, and networked with industry professionals. Overall, this course has been essential in advancing my future in the chemistry industry.

References

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