



# CHEMISTRY AT THE CORE OF Canada's Pharmaceutical Success

Chemistry forms the backbone of Canada's pharmaceutical sector, driving research, development, and manufacturing of life-saving medicines. From the synthesis of complex molecules to the creation of advanced drug delivery systems, chemistry enables **pharmaceutical innovators** to transform basic compounds into effective treatments.

Without chemistry's foundational contributions, the pharmaceutical sector would not be able to meet the growing health needs of Canadians or respond to emerging health challenges with agility and precision.

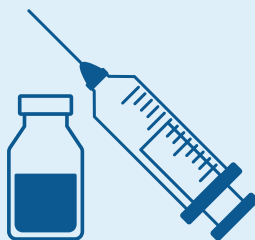


## THE IMPACT OF THE PHARMACEUTICAL SECTOR ON CANADIANS AND THE ECONOMY

Canada's pharmaceutical sector plays a vital role in supporting public health and economic prosperity. The Pharmaceutical Sector provides:



More than **100,000 high-quality jobs** in research, manufacturing, and distribution, while also stimulating innovation across related sectors such as biotechnology and advanced materials.



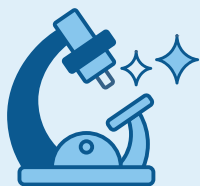
For Canadians, the pharmaceutical sector ensures access to **new therapies** and **vaccines** that improve quality of life and extend longevity.



The sector is responsible for **\$18.4 billion** in economic activity, strengthening Canada's global competitiveness, and attracting up to **\$3.4 billion** in research and development.

**In short, a thriving pharmaceutical sector is essential to both the health of Canadians and the resilience of the national economy.**

## How Chemistry is Used in the Development of Pharmaceuticals



### DRUG DISCOVERY AND DESIGN

- Chemists identify and design new molecules that can target specific biological pathways or disease processes.
- Medicinal chemistry optimizes the structure of these compounds to improve effectiveness and minimize side effects.



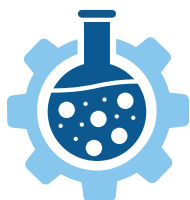
### SYNTHESIS OF ACTIVE PHARMACEUTICAL INGREDIENTS (APIs)

- Organic and inorganic chemistry are used to develop methods for synthesizing APIs in a safe, scalable, and cost-effective way.
- This includes creating complex chemical reactions to build molecules with precise structures.



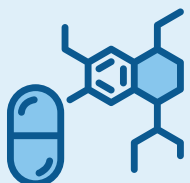
### FORMULATION DEVELOPMENT

- Chemistry helps determine how a drug is combined with other substances to create tablets, capsules, injections, or topical preparations.
- Physical chemistry ensures the active ingredient is stable and released at the right rate and location in the body.



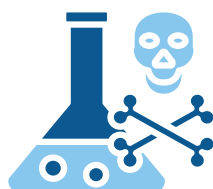
### PROCESS DEVELOPMENT AND SCALE-UP

- Chemical engineering and industrial chemistry translate lab-scale synthesis into large-scale manufacturing processes.
- This work includes optimizing reaction conditions, yields, and waste management.



### BIOPHARMACEUTICALS AND BIOTECHNOLOGY

- Chemistry supports the development of complex biologic drugs, including monoclonal antibodies and vaccines.
- Techniques such as conjugation chemistry and purification processes are vital to producing biologics.



### ENVIRONMENTAL AND SAFETY MANAGEMENT

Following the ethic and principles of Responsible Care®, Canada's chemistry sector helps ensure safe and sustainable practices in the pharmaceutical sector, including:

- Green chemistry principles are applied to reduce hazardous substances, minimize waste, and improve environmental sustainability in manufacturing.
- Chemical safety protocols protect workers and communities.