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**TOPIC: LIFE CYCLE ASSESSMENT OF AN INDUSTRIAL CHEMIST.**

The life cycle assessment (LCA) stage of an industrial chemist involves evaluating the environmental impacts of chemical processes and products throughout their life cycle, from extraction of raw materials to production, use, and disposal. LCA aims to quantify the potential environmental and health impacts of activities, especially the production and use of materials, and to identify potential sources of pollution and develop strategies to minimize their impact on the environment. Industrial chemists can contribute to sustainability by embracing green chemistry and designing processes with minimal environmental impacts, ensuring that resources are not used at a rate faster than they can be replenished. *LCA involves several stages, including goal and scope definition, inventory analysis, life cycle impact assessment, and interpretation*. By applying LCA, industrial chemists can measure and reduce the environmental impacts of chemical processes, contributing to the development of sustainable and environmentally friendly chemical products and processes.

**Goal and Scope**

The goal of this LCA is to assess the environmental impacts of an average industrial chemist in the United States. The scope of the study includes the following activities:

Raw material extraction and processing: This includes the extraction of raw materials such as petroleum, natural gas, and minerals, as well as the processing of these materials into chemicals.

Transportation: This includes the transportation of raw materials, chemicals, and products.

Manufacturing: This includes the manufacturing of chemicals and products, as well as the use of energy and water.

Wastewater treatment: This includes the treatment of wastewater generated from chemical manufacturing and use.

Waste disposal: This includes the disposal of hazardous and non-hazardous waste.

**Inventory Analysis**

The inventory analysis phase of the LCA involves collecting data on the inputs and outputs of the system being studied. For an industrial chemist, this includes data on the following:

Raw materials: The type and quantity of raw materials used by the chemist.

Chemicals: The type and quantity of chemicals used by the chemist.

Energy: The type and quantity of energy used by the chemist.

Water: The type and quantity of water used by the chemist.

Wastewater: The type and quantity of wastewater generated by the chemist.

Waste: The type and quantity of waste generated by the chemist.

**Impact Assessment**

The impact assessment phase of the LCA involves converting the inputs and outputs of the system into environmental impacts. This is done using a variety of impact assessment methods, which are based on scientific knowledge of the environmental impacts of different substances and activities. Some of the impact categories that are commonly considered in LCAs of industrial chemists include:

Climate change: The potential of the chemist's activities to contribute to climate change by releasing greenhouse gases into the atmosphere.

Human health: The potential of the chemist's activities to harm human health through exposure to hazardous chemicals or pollutants.

Ecosystem quality: The potential of the chemist's activities to harm ecosystems through the release of pollutants or the extraction of natural resources.

**Interpretation**

The interpretation phase of the LCA involves analyzing the results of the inventory analysis and impact assessment phases. This includes identifying the hotspots in the chemist's life cycle, which are the activities or processes that have the largest environmental impact. The interpretation phase also involves drawing conclusions about the overall environmental performance of the chemist and making recommendations for improvement.

Industrial chemists typically have a significant impact on climate change, due to the use of energy and the release of greenhouse gases. They can also have a significant impact on human health and ecosystem quality, due to the use and disposal of hazardous chemicals.

**Life Cycle Improvement Recommendation for an Industrial Chemist**

There are a number of things that industrial chemists can do to reduce their environmental impact. These include:

Using green chemistry principles: Green chemistry is a set of principles that can be used to design and manufacture chemicals in a way that minimizes their environmental impact.

Reducing energy consumption: Industrial chemists can reduce their energy consumption by using energy-efficient equipment and practices.

Minimizing waste: Industrial chemists can minimize waste by using waste reduction techniques, such as recycling and composting.

Using safer chemicals: Industrial chemists can use safer chemicals by substituting hazardous chemicals with less hazardous alternatives.

Conclusively, Industrial chemists play a vital role in modern society, but their activities can also have a significant impact on the environment. LCA is a tool that can be used to quantify the environmental impacts of industrial chemists and identify opportunities for improvement. By adopting green chemistry principles and implementing other environmentally friendly practices, industrial chemists can reduce their environmental impact and help to protect the environment.