CHEMICAL SECTOR PROFILE

The U.S. Chemical Sector converts raw materials into more than 70,000 diverse products essential to modern life and distributes those products to more than 750,000 end users throughout the Nation. Several hundred thousand U.S. chemical facilities—ranging from petrochemical manufacturers to chemical distributors—use, manufacture, store, transport, or deliver chemicals along a complex, global supply chain. End users include critical infrastructure sectors, making **the uninterrupted production and transportation of chemicals essential for national and economic security**.

Impact on U.S. Economy

The U.S. chemical industry is responsible for more than a quarter of the U.S. GDP, supports the production of almost all commercial and household goods, and is essential to economic growth.

The U.S. chemical industry is a
$486 billion enterprise that supports more than → **25 percent** of total U.S. GDP

of U.S. goods are manufactured using Chemical Sector products

The U.S. chemical industry is the world's **second-largest chemical producer** → **13%** of the world's chemicals come from the United States

Generation of U.S. Employment

From research and development to manufacturing, the U.S. chemical industry employs 529,000 people, while creating jobs in the many other industries it touches.

529,000 directly employed by the U.S. Chemical Sector →

Every job created by the business of chemistry generates **6.8 jobs elsewhere** →

More than **4.1 million** U.S. jobs created

Contribution to U.S. Exports

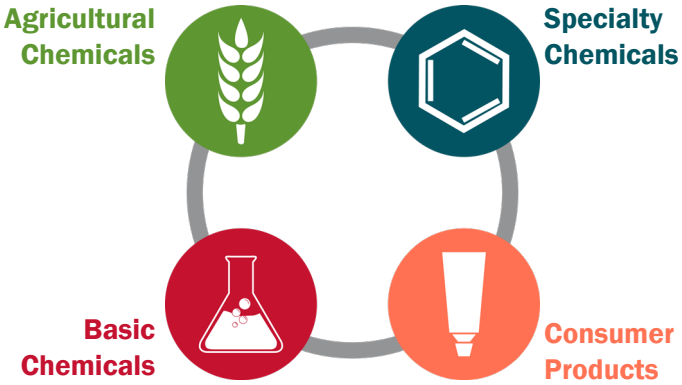
The business of chemistry is America's largest exporting sector, accounting for more than 9 percent of U.S. exports.

Total value of U.S. chemical exports in 2020:
$125.3 billion

Chemicals and related products make up
10 cents of every $1 of U.S. exports

Components of the Chemical Sector

The U.S. Chemical Sector is made up of four distinct components: agricultural chemicals, basic chemicals, specialty chemicals, and consumer products. Each component supports a specific and integral part of America's chemical needs.



Functional Areas of the Chemical Sector

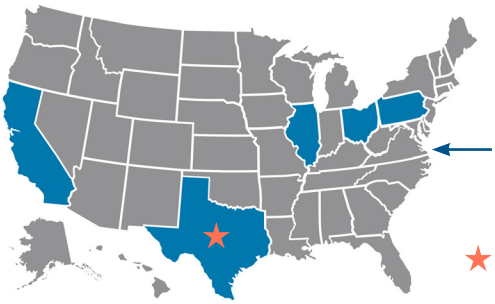
Manufacturing Plants
Convert raw materials into intermediate and end products

Warehousing/ Storage
Provide downsized repackaging and bulk storage

Transportation Systems
Transport chemicals to/from manufacturing plants, warehouses, and end users

End Users
Typically consume the chemical purchased

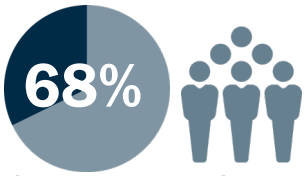
Chemical distributors deliver more than **31 million tons** of Chemical Sector products **every 6 seconds**



11,128
U.S. chemical manufacturing facilities

States with the greatest concentration of facilities: California, Texas, Ohio, Illinois, and Pennsylvania

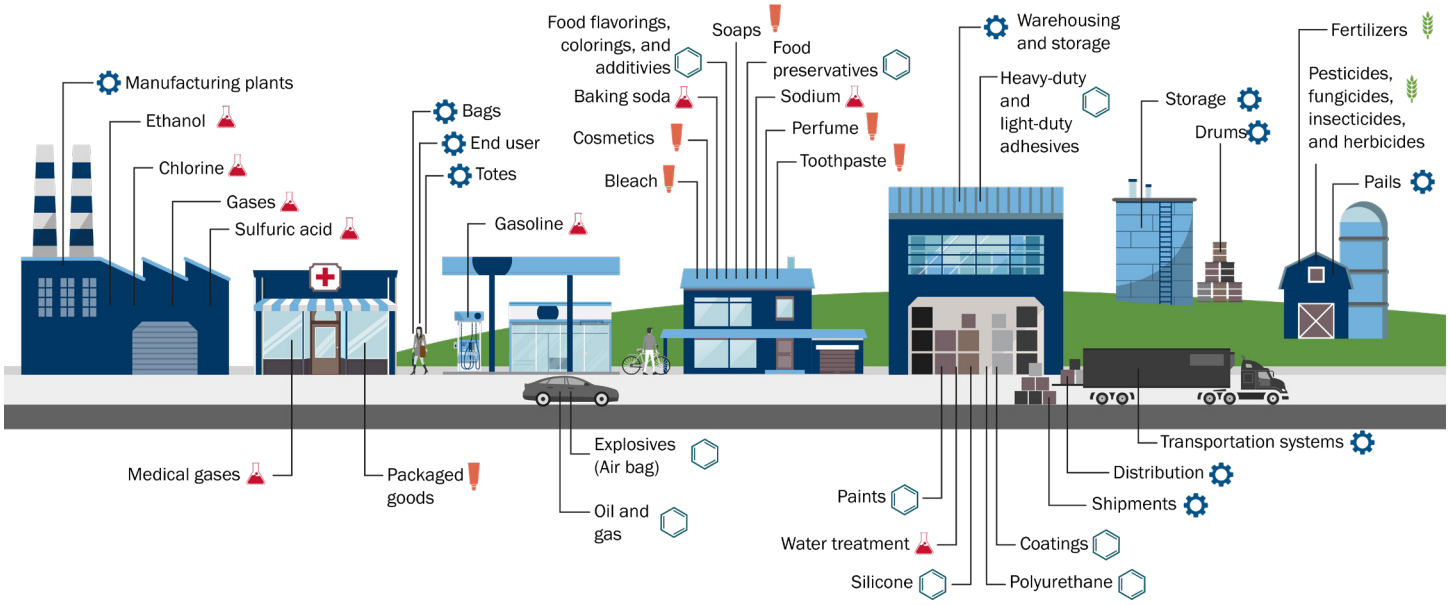
★ Texas is the top exporter of chemicals in the U.S. accounting for 30% of all chemical exports.



of chemical manufacturing facilities are owned and operated by **small and medium enterprises** (employ <500 people)

The Chemical Sector: Integral to Everyday Life

Nearly all goods in use every day in the United States are manufactured using Chemical Sector products. These goods are found in homes, offices, drug stores, and farms across the Nation.



AGRICULTURAL CHEMICALS

The agricultural chemical industry supplies farmers and home gardeners with fertilizers, herbicides, pesticides, and other agricultural chemicals. The segment includes companies involved in the formulation and preparation of agricultural and household pest control chemicals, as well as companies responsible for manufacturing and storage.

$16.8 billion
in chemical sales to the agriculture industry in 2019

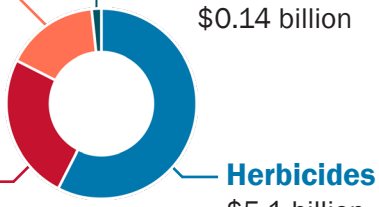
991 facilities

$30.7 billion
total value of shipments distributed

33,754 employees

Pesticides

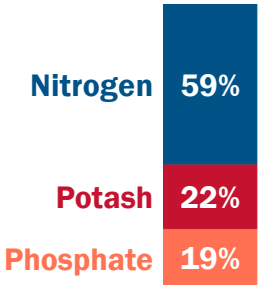
U.S. agricultural producers spend nearly **$9 billion** on pesticides



Fertilizers

U.S. agricultural producers spent **$66.7 million** on fertilizer in 2018

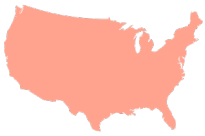
The United States consumes more than **22 million** tons of fertilizer



CONSUMER PRODUCTS

Consumer products include packaged products often referred to as "household products." This segment includes soaps and detergents; oral hygiene, hair, and skin care products; and personal care products (e.g., cosmetics, deodorants).

The U.S. consumer goods market is the **largest in the world**.



$635 billion

$90.9 billion
total value of shipments distributed

In 2020 the average U.S. consumer spent **$75.53** on soaps and detergent.

Types of Products

Soaps | Detergents | Bleaches | Toothpaste | Cosmetics | Perfume | Paints

Soap, Cleaning Compounds, and Toilet Preparation

2,356 facilities

104,691 employees

BASIC CHEMICALS

The basic chemicals segment produces both inorganic and organic chemicals. Organic chemicals are used in the production of other chemicals and to make products such as dyes, plastics, and **petrochemical products**. Inorganic chemicals usually are used to make solid and liquid chemicals and **industrial gases**; sodium, **sulfuric acid**, and **chlorine** are some of the most common. Inorganic chemicals also serve as catalysts in the manufacture of chemicals (used to speed up or aid a reaction).

2,446 facilities

155,488 employees

$288.4 billion
total value of shipments distributed in 2020

Bulk Petrochemicals & Intermediates
$148.8 billion
Plastic Resins
$81.2 billion
Inorganic Chemicals
$47 billion
Synthetic Rubber
$6.1 billion
Manufactured Fibers
$5.3 billion

Petrochemical

There are **459 refineries** and petrochemical facilities across **39 states**.

The U.S. refining industry processes a total of **18.8 million barrels** per day of crude oil, accounting for almost 20 percent of total global capacity.

Petrochemical plants produce **resins** that are used in a wide variety of products:

- Car parts
- Water bottles
- Medical devices
- Food packaging containers

Sulfuric Acid

7.6 million tons of elemental sulfur is produced each year

90% of which is consumed in the form of sulfuric acid.

Used to make **hundreds of compounds** needed by almost every industry; **uses of sulfuric acid** include:

- **50% Phosphate fertilizers**
- **10% Metal processing**
- **6% Phosphates**
- **5% Fibers**
- **2% Hydrofluoric acid**
- **2% Paints, pigments**
- **1% Pulp, paper**
- **24% Others**

Chlorine

10 million tons of liquid chlorine
+
2 million tons of chlorine gas
=
12 million tons of chlorine produced annually

$8 billion+ in annual sales

20,000 employees

Uses of Chlorine

- **30% PVC**
- **24% Solvents**
- **13% Organics**
- **13% Inorganics**
- **5% Water sanitation**
- **5% Pulp and paper industry**
- **10% Other**

Industrial Gases

The global industrial gas market is worth **$96.8 billion**

24% accounted for by North America

60,000 employees → Each job **generates 2.1 more jobs** elsewhere in the economy, **contributing $24.3 billion to the U.S. economy**

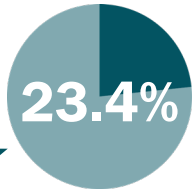
Industrial gases are used in a **wide variety of applications**, including:

- Medical
- Electronics
- Industrial
- Food & Beverage
- Manufacturing

SPECIALTY CHEMICALS

Specialty chemicals are individual molecules or mixtures of molecules (i.e., formulations) that are manufactured on the basis of a unique performance or function. Many other sectors rely on specialty chemicals for their products, including automotive, aerospace, agriculture, cosmetics, and food, among others.

The **market share** for specialty chemicals in North America is **significantly higher** than the global average.



$77.2 billion
total value of shipments distributed

Adhesives and Sealants

Acrylates/anaerobic adhesives
Adhesive used to keep nuts tight on bolts

Amino resins
Bonding of layers in plywood and of particles in particle board

Animal glue
Binding of abrasives in sandpaper and other grinding materials

Butyl rubber/isobutylene
Additive for hot-melt and pressure-sensitive adhesives and window sealants

Casein
Labels on bottles that stay on in ice water and are recyclable

Polyolefin/ethylene copolymer
Hot melts

Polyurethane
Bonding soles to the bodies of shoes; food packaging

Polyvinyl acetate
Book bindings and labels

Natural rubber
Self-adhesives (e.g., envelopes)

Paints
Vehicle paint, traffic marking paint, food paints

Silicone
Bathtub and shower sealants, car applications

Starch
Corrugated cardboard bonding

Paint, coating, and adhesive manufacturing → **64,423 employees**

Food Additives

The Food and Drug Administration currently lists nearly
1,500 food additives
approved for food use in the United States.

- **Preservatives** (e.g., propionic acid, nitrates, benzoates)
- **Flavorings** (e.g., fruit flavors, sweeteners, butter flavors)
- **Processed food additives** (e.g., potassium sorbate, propylene)

Flavors and Fragrances

$40 billion
in annual sales

Explosives

4.5 billion
tons of explosives used in the United States

- Fragmenting rock formations for oil and gas extraction
- Blasting during mining and quarry processes
- Inflation devices such as vehicle airbags

REGULATORY

As the majority of Chemical Sector assets are privately owned and operated, effective security and resilience planning requires a shared commitment between the public and private sectors to implement the most effective risk management strategies throughout the Sector.

Federal Agencies

Federal agencies regulate the **manufacturing, storage, processing, transportation, and use of chemicals*** through the following mechanisms:

Department of Homeland Security

Cybersecurity and Infrastructure Security Agency

Chemical Facility Anti-Terrorism Standards

3,280 facilities regulated

Transportation Security Administration

Rail Transportation Security Final Rule

46 key urban areas covered by secure chain-of-custody inspections

U.S. Coast Guard

21 possible shipboard emergency responses verified through annual inspections to ensure compliance with the safety management system (SMS)

Environmental Protection Agency

800,000
regulated facilities

Department of Transportation

Pipeline and Hazardous Materials Safety Administration

826,762 shippers covered by the security plan and training requirements

Department of Health and Human Services

Food and Drug Administration

$1 trillion worth of products regulated per year including drugs, cosmetics, and medical and consumer products

Department of Labor

Occupational Safety and Health Administration

423 enforcement inspections of chemical manufacturing facilities in 2020

Department of Justice

Bureau of Alcohol, Tobacco, Firearms and Explosives

9,403 active federal explosives licenses

**The regulatory scope of these agencies/programs extends beyond the domain of the Chemical Sector.*

In addition to federal regulations, **the chemical industry is subject to any regulations states might impose** on facilities doing business within their boundaries.

APPENDIX

Page 1: Chemical Sector Profile

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