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.

96% of U.S. goods are manufactured using Chemical Sector products.

The U.S. chemical industry is the world’s second-largest chemical producer, with 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.
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.

### Components of the Chemical Sector

- **Agricultural Chemicals**
- **Basic Chemicals**
- **Specialty Chemicals**
- **Consumer Products**

### Functional Areas of the Chemical Sector

- **Manufacturing Plants**
  - Convert raw materials into intermediate and end products

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

- **Warehousing/Storage**
  - Provide downsized repackaging and bulk storage

- **End Users**
  - Typically consume the chemical purchased

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

### 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.

- **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.**

- **68%**
  - of chemical manufacturing facilities are owned and operated by small and medium enterprises (employ <500 people)
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**

  - **Fungicides: $1.4 billion**
  - **Fumigants: $0.14 billion**
  - **Insecticides: $2.2 billion**
  - **Herbicides: $5.1 billion**

Fertilizers

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

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

  - **Nitrogen: 59%**
  - **Potash: 22%**
  - **Phosphate: 19%**

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 total value of shipments distributed**
- **$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**
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

### 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

### 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

### 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
- 2% Hydrofluoric acid
- 10% Metal processing
- 6% Phosphates
- 5% Fibers

### Industrial Gases
The global industrial gas market is worth **$96.8 billion**

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

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

Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

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

Transportation Security Administration
Rail Transportation Security Final Rule
46 key urban areas covered by secure chain-of-custody inspections

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

U.S. Coast Guard

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

Department of Labor
Occupational Safety and Health Administration

423 enforcement inspections of chemical manufacturing facilities in 2020

Environmental Protection Agency

800,000 regulated facilities

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

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Page 2: Components of the Chemical Sector

Page 3: Agricultural Chemicals and Consumer Products

Page 4: Basic Chemicals

Page 5: Specialty Chemicals
APPENDIX (cont.)


Page 6: Regulatory


