The war in Iran is disrupting the supply of sulfuric acid, the world's most common chemical

Shortages or price spikes could rattle industries across the economy

by **Matt Blois**

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Piles of elemental sulfur at a facility in Bahrain. Much of the world's sulfur comes from the Persian Gulf, but the war in Iran is disrupting production and trade. | Credit: Mike Hill

Sulfuric acid is the most widely produced chemical in the world. It's used to make fertilizers, metals, batteries, paper, pigments, and countless other products. The Persian Gulf is a key source of the sulfur used to make sulfuric acid. But now the war in Iran is causing chaos in the flow of sulfur, threatening to increase prices across the economy.

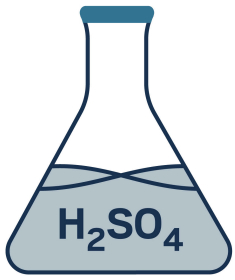
How it’s made

Oil and gas refining

Most industrial sulfur is generated during the refining of oil and gas, which naturally contain sulfur impurities. Refineries typically use an alkylamine solution to remove hydrogen sulfide; then catalytic oxidation converts the H_2S into water and elemental sulfur.

Metal refining

Almost a third of sulfuric acid comes from metal refineries that process sulfur-containing copper, zinc, and lead ores. Roasting those ores releases sulfur dioxide, which can be converted into the acid.

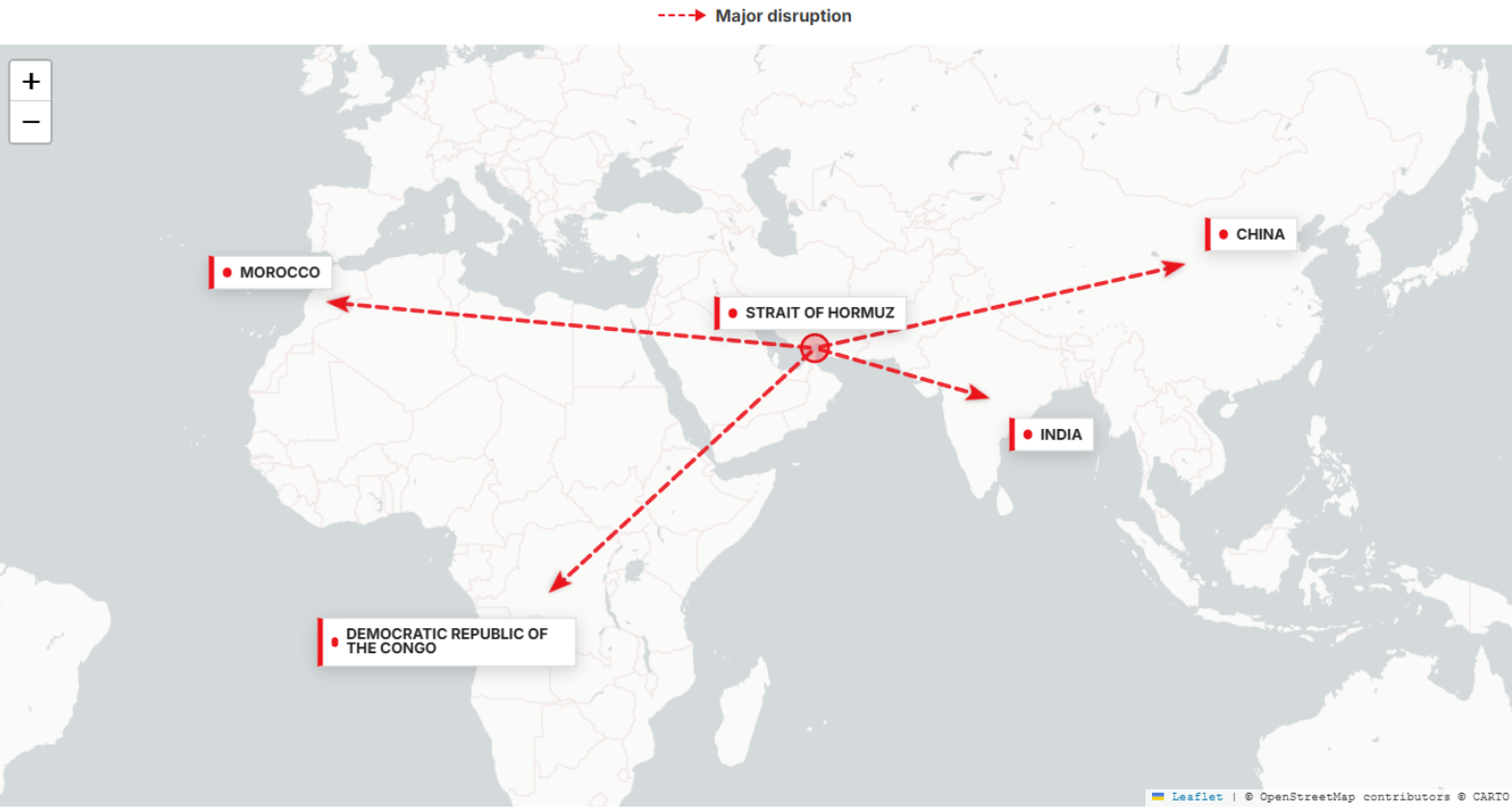


Sulfuric acid

Burning elemental sulfur generates sulfur dioxide, which can be oxidized to sulfur trioxide. Sulfur trioxide is mixed with an existing source of sulfuric acid and then diluted with water to make sulfuric acid.

A choke point in global sulfur trade

About half of the seaborne trade in sulfur normally passes through the Strait of Hormuz, off the coast of Iran, according to the International Energy Agency. Since the start of war in Iran, sulfur shipments have almost completely stopped.



Sources: International Energy Agency, OpenStreetMap contributors, CARTO.

01

CHINA

China imports large amounts of sulfur from the Middle East to make sulfuric acid for fertilizer production. The country also generates sulfuric acid as a by-product of copper smelting. Between these two sources, China was the world's largest exporter of sulfuric acid, according to the intelligence firm CRU. The country is now restricting exports to ensure domestic industries have the acid they need, says Freda Gordon, director at the sulfur-focused analysis firm Acuity Commodities.

02

MOROCCO

More than half of the world's sulfuric acid is used to make phosphoric acid for fertilizers, and Morocco is a major fertilizer producer. Moroccan firms rely heavily on both elemental sulfur from the Persian Gulf and sulfuric acid from China.

03

DEMOCRATIC REPUBLIC OF THE CONGO

Miners in the Democratic Republic of the Congo use sulfuric acid to leach copper out of mined ore. Many source sulfur from the Persian Gulf and make sulfuric acid on-site. But miners are burning through their stockpiles of sulfur and could soon face shortages, Gordon says.

04

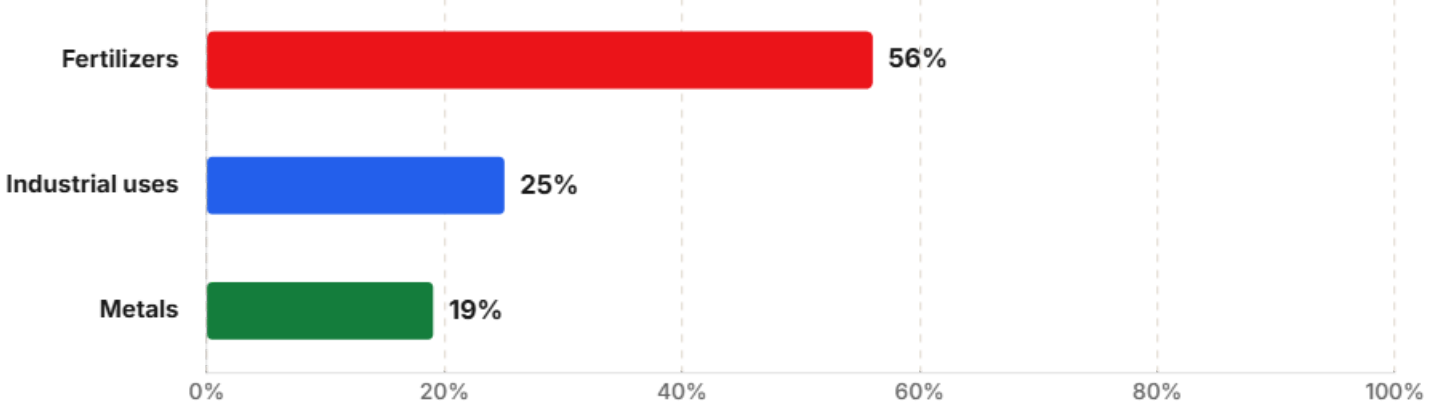
INDIA

India's agricultural sector depends on phosphate fertilizers made with imported sulfur. In 2023, the country sourced 87% of its sulfur from the Middle East.

Gordon calls sulfuric acid the king of chemicals because it's used in so many different applications. The biggest use is the production of phosphoric acid for fertilizer, but she says growing demand for batteries has made the mining and metallurgy industries important consumers as well.

Sulfuric acid is used to make a huge variety of products

Some of the chemical's industrial uses include water treatment, dyes, glue, textiles, paper, and firefighting foam.



Portion of global sulfuric acid demand in 2022

Source: Sulphuric Acid Supply Study (PDF), CRU.

How shortages ripple through affected industries

56%
OF GLOBAL DEMAND

FERTILIZERS

In March, the Food and Agriculture Organization of the United Nations warned that the disruption of sulfur trade caused by the war in Iran could break phosphate fertilizer supply chains. If the war continues, food prices could rise globally, especially in countries that depend on imported fertilizer.

25%
OF GLOBAL DEMAND

INDUSTRIAL

The Brazilian pulp and paper firm Suzano told Reuters in April that paper prices could increase, in part because of the cost of sulfuric acid. The chemical is used to control pH during paper manufacturing.

19%
OF GLOBAL DEMAND

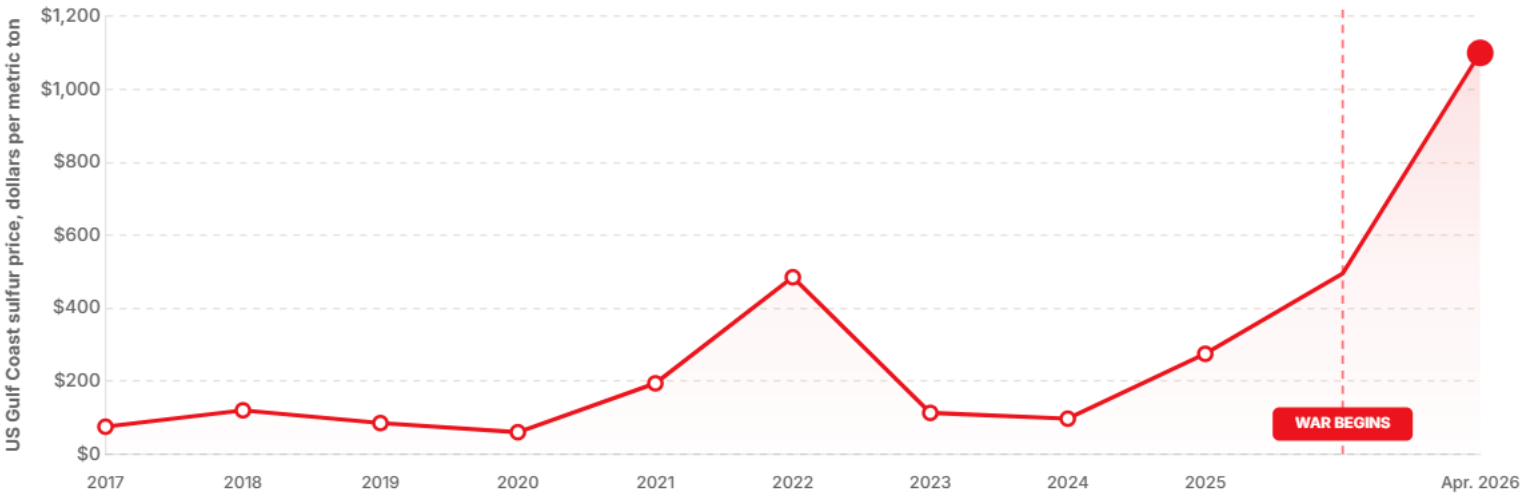
METALS

The research firm Benchmark Mineral Intelligence reports that the price of lithium carbonate rose 8% in just 1 week in April because of the increasing cost of sulfuric acid, which is used to make the battery chemical.

In April, the Chinese miner Huayou Cobalt announced that it would cut nickel production at a site in Indonesia because of the high price of sulfur, according to a report from the research firm Argus. Miners in Indonesia often import sulfur from the Persian Gulf to make acid.

The price of sulfur has quadrupled over the last year

Sulfur prices were already above historical averages before the war began in Iran, partly due to increasing demand from growing industries such as batteries. Since the war began, prices have increased by an additional 122%, according to Acuity Commodities.



Source: Acuity Commodities.

Lingering impact

The impact of the Iran war on sulfuric acid production and trade threatens to ripple across the globe and raise prices for all kinds of products, warns Freda Gordon, director at the sulfur-focused analysis firm Acuity Commodities. The war will first squeeze the places that depend on sulfur imports from the Middle East, such as Indonesia and the Democratic Republic of the Congo. Gordon says miners in these countries may have a few months of stockpiled sulfur but could soon run low.

They will have a hard time finding alternative sources now that Congo's neighbor Zambia, Russia, and most importantly China have restricted exports of sulfur or sulfuric acid to protect supplies for their domestic industries. These export bans could drive a second wave of disruptions for sulfuric acid importers, such as Chilean copper miners and Moroccan fertilizer plants.

Gordon warns that it will take time before consumers start seeing the impact of this chaos on the products they buy. Farmers cutting back on fertilizer now won't harvest their crops until later this year. Manufacturers may try to absorb higher acid costs, in hopes that the conflict will end and prices will drop. But eventually those costs will creep into the final products. "We're not really feeling it yet," Gordon says. "We're going to have inflation. . . .

When is that going to be realized? Will it be in 6 months, 12 months? That remains to be seen."

> "We're not really feeling it yet."
>
> Freda Gordon, director, Acuity Commodities

Sources: Acuity Commodities; Sulphuric Acid Supply Study, CRU; International Energy Agency; UN Food and Agriculture Organization; Benchmark Mineral Intelligence; Argus Media; Reuters; World Bank WITS; American Chemical Society, Molecule of the Week.
Credit: Shea Murphy/C&EN

Matt Blois is a food, ag, and cleantech reporter at C&EN.

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