

The Chemistry Behind Steelwork and Humanity

In many areas of the world, cheap labor is used, yet the average consumer is unaware of the effects of manufacturing. In Xinjiang, a region of China, Uyghurs, a Muslim ethnic group, are detained and their labor is used to make products we Americans use daily. Along with cotton, steel is fabricated by Uyghurs and the effects of the harsh work they endure is alarming. Due to the effects of working in unsafe steel mines, the Uyghur people are put in danger by the Chinese government who force them to work and also the Americans who buy products using their labor.

Many companies that sell in the US use Uyghur labor, mainly steel-work. PVC building materials and solar panels use steel that is Uyghur-made. Additionally, an investigation from the British University of Sheffield Hallam records, "The world's largest steel and aluminum producers have moved to the Uyghur region thanks to Chinese government subsidies and incentives" and "If you bought a car in the last five years, some of its parts were probably made by Uyghurs, forced to work". Car brands especially guilty of using this steel are Tesla, Volkswagen, Mercedes-Benz and Toyota, which are found to be acquiring their steel from Uyghur factories. The Uyghur region alone represents 10% of the world's aluminum manufacturing and is the world's largest steel supplier. Car frames, wheels, brakes, interiors, batteries and windshields are manufactured using Uyghur labor and used in American cars. Data from the Metallurgical Industry Information Center, Xinjiang's Iron and Steel Co. explain that the Uyghur Region has a year-on-year increase of 62.3% of material which indicates growth and production of steel around the world. The development of steel in the Uyghur region of Xinjiang will increase and consequently so will the suffering of the innocent group.

In order to make steel, this reaction must be used: $\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}_2$ and $2\text{C}_{(\text{s})} + \text{O}_{2(\text{g})} \rightarrow 2\text{CO}$. The oxygen would rather be partnered with the carbon than the iron. And

because neither element has its preferred number of bonds, carbon and oxygen are extremely reactive. Periodic trends further support the high reactivity. Metallic character increases as you go down a group and the ionization energy increases when you go up a group, making the ability to lose electrons higher, therefore creating reactivity.

There are two methods for performing the process of steel-work: basic oxygen process, otherwise known as the BOP and the electric arc furnace route. The BOP is a steelmaking process where pure oxygen (O) is blown into a bath of molten blast-furnace iron ($\text{Fe}_2\text{O}_3 + 3\text{CO} \rightarrow 2\text{Fe} + 3\text{CO}$). This reaction works because of the instability of the carbon monoxide. Carbon monoxide is extremely unstable and reactive because its triple bond contains a charge separation. Then, oxygen starts an exothermic reaction, the oxidation of various impurities like manganese, phosphorus, silicon and carbon. An electric arc furnace works differently, manufacturing steel using the following steps: first, the charge is put into the furnace, where an electric current jumps between electrodes which produces heat. The charge then melts and chemical reactions produce steel, and lastly alloying materials are added. Molten steel is finally produced and the furnace is tipped to pour it out.

The effects of steel-making are severe and dangerous. The Uyghur workers must endure exhausting hours in many strenuous conditions, which could lead to harsh muscle pain and often fractures. Additionally, dangerous chemicals may result in blindness and lung damage. Asbestos exposure is a chemical hazard present in steel mills in Xinjiang. Carbon monoxide leaks are regular, leading to poisoning. Because it binds to hemoglobin in the bloodstream, reducing the blood's ability to carry oxygen, carbon monoxide leaks can be fatal. Due to the health challenges Uyghurs face, the life expectancy in this region is 70, about 7 years less than the life expectancy of the US. Xinjiang province has the highest incidence and also mortality rate of cervical cancer and also other diseases such as lung cancer, colon cancer, stomach cancer, leukemia and benzene. Uyghurs have a higher risk of mesothelioma because stainless steel welding fumes contain chromium compounds, seen in lung carcinogens.

Forcing a group of people to work is unfair, moreover forcing a group of people to work in dangerous conditions with risk of illness is inhumane, and ultimately basing the working group on their religion and race is considered by the Biden Administration to be religious genocide. Chinese government documents have been leaked, revealing that Uyghurs can work for their release, which is ultimately a lie because there is no documentation of free Uyghurs who have been released due to labor. Experts say that the forced labor laws imposed by the Chinese government is an attempt to fully assimilate the Uyghurs, breaking their cultural, Muslim bonds.

Why is the US contributing to Uyghur suffering by firstly, using their labor in products, and moreover buying from the brands who do so? A total of 83 major US companies use Uyghur-made products, while around 18 of them use steel from factories operated by the Chinese government, forcing Uyghurs to work. Boycotts and papers should be signed, banning the trading of goods using Uyghur labor and demanding that they use a different form of labor. The US should cut off ties with Chinese companies sourcing Uyghur labor. Regarding domestic policy, Americans should become more aware of where their products are being created, and should not buy the products using Uyghur labor. Petitions must be signed boycotting US companies who use the unfair work of Uyghurs so that change can happen first domestically, and then internationally. The US must follow suit with Mexico and Canada, who have signed onto the Uyghur Forced Labor Prevention Act.

Steel work and detainment not only affect the Uyghurs physically, but also emotionally. Isolation from families is a result of forced labor which can lead to depression, PTSD, drug dependency, and other mental health issues. Emotional numbness is a protective response to emotional pain that is similar to an unconscious disassociation from the state that one is in. While working effortlessly for no pay, without contact from their families, many Uyghurs experience emotional numbness.

Both China, by enslaving the Uyghur people, and America, by using and selling

Uyghur-made products, are guilty of contributing to the genocide of Uyghurs. Forced steel work has drastic effects on the physical health of the Uyghur people, and also the mental health. Conditions and toxins of working in the steel mines can lead to cancers and other severe illnesses. In order to combat this issue, which is hundreds of miles away from the United States, domestically we can research which companies use Uyghur-made products and limit their sale. Internationally, we must sign petitions against companies that are aware of their negative impact, and care more about their profit than human lives.

Sources

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