1.3: Case Study

The LeBlanc Case

The Leblanc process industrial factories were very damaging to the local environment. It was an early industrial process for producing *soda ash* (sodium carbonate) that was named after its inventor. It required two stages: sodium sulfate (salt cake) produced from sodium chloride (salt, we just discussed this!) followed by reaction with coal and calcium carbonate to produce sodium carbonate. It eventually became obsolete after development of the Solvay process. The process of generating salt cake involved reacting salt with sulfuric acid which released hydrochloric acid gas, an acid that was industrially useless in the early 19th century and therefore vented into the atmosphere. Also, an insoluble, smelly solid waste (CaS, *galligu*) was produced. The inefficiency of the process was horrific! Each ton of *soda ash*, the process produced ~1.5 tons of hydrogen chloride and >1 ton of calcium sulfide, the useless waste product! *Galligu* had no economic value so it was piled in heaps and spread on fields where it weathered to release
hydrogen sulfide (what a smell!).

Leblanc soda works then became targets of lawsuits and legislation. A lawsuit from 1839 alleged that, “the gas from these manufactories is of such a deleterious nature as to blight everything within its influence and is alike baneful to health and property. The herbage of the fields in their vicinity is scorched, the gardens neither yield fruit nor vegetables; many flourishing trees have lately become rotten naked sticks. Cattle and poultry droop and pine away. It tarnishes the furniture in our houses, and when we are exposed to it, which is of frequent occurrence, we are afflicted with coughs and pains in the head ... all of which we attribute to the Alkali works.”

Therefore, in 1863, the British Parliament passed the first Alkali Act, a precursor to the first modern air pollution legislation. This Act dictated that no more than 5% of the hydrochloric acid produced by alkali plants could be vented. To comply, soda works passed it up a tower packed with charcoal where it was absorbed by water flowing in the other direction. Unfortunately, the chemical works usually dumped the resulting solution into nearby bodies of water where it promptly ended up killing fish and other aquatic life.