

# FUN AND GAMES AT ZERO WASTE SYSTEMS

While running ZWS during the seventies, some very rewarding events took place, as well as the day to day hard work. I have detailed these elsewhere but here I pull them together for your delectation.

One day I got a call from a Dr. White, a professor at UC Berkeley, in Physics. He had been running an experiment whereby he needed a very large refrigerator so he had built his own, out of a compressor and a large amount of Freon that he purchased from DuPont.

Now he was finished and he was dismantling his equipment. But what to do with the Freon? He called DuPont and they told him to just discharge it into the air. But he knew better.

The Montreal Protocol on Greenhouse Gases In The Air had already been signed, so telling Dr. White to simply put the freon into the air was technically something like an international crime. Had he followed their advice, he would likewise have committed a criminal act. Instead, he called up ZWS and I spoke to him.

He proposed running the freon through a coil in a bath of acetone and dry ice, a common cooling bath in universities. Could we then take the liquified freon into drums and resell it? "You betcha!" I assured him. Freon was worth about ten dollars a gallon or more and he was proposing handing us about three hundred gallons.

We actually had a lot of clean, empty, bright green freon drums from our work with the microfab shops. On the appointed day, I brought six drums over to Dr. White's lab and he was ready with the cooling bath. I ran the liquid freon into the drums and sealed them up. We soon sold them to an air conditioning shop for a nice markup (from free!).

And we kept about three thousand pounds of dangerous, highly active greenhouse gas out of the atmosphere.

Another time, I got a call from a Chevy dealer named Good Chevrolet in Alameda. It seems that he had accidentally added twenty gallons of ammonia solution to five hundred gallons of gasoline. Now he couldn't use it and needed to get rid of the mixture. Could we help him, he was wondering. "You betcha!" I told him and told him that would cost him \$500 to get rid of the mixture. He gladly accepted so I took over ten empty drums and filled them up with his ammonia/gasoline mixture.

What I knew, and he didn't, was that ammonia is hellishly soluble in water. It was not going to hang around in an organic solvent like gasoline if there was water it could dissolve in. Since water is heavier than gasoline, and sat in the bottom of the drums, we added some water to each drum and we just pumped it out of the bottom of the drums with a long tube and gave it to a cleaning outfit who were willing to put up with a trace of gasoline smell in their free ammonia. Then I added a bit of water to each drum, stirred it a bit and allowed the small amount of remaining ammonia to dissolve in that. When I pumped out that slightly ammoniacal water, the gasoline was essentially free of the ammonia. So what could I do with ten drums of gasoline? Why we drove our truck around on free gasoline for three or four months. There are reports in the automotive literature showing that some added water actually improves the efficiency of combustion of gasoline.

Problem solved nicely.

While these stories are fun to recount, they carry a serious message. What saved the day here was chemical knowledge. The only way to address questions of waste intelligently is to employ trained scholars and technicians to develop and carry out the detail work. In this country, all waste is considered to be treatable as generic "waste" and therefore fungible as mere "waste". Garbage companies with no special expertise or knowledge are put to work to solve problems. Of course they will never come up with any solutions worthy of the name. All they know how to do is incinerate or bury. Similarly with recyclers who have no technical knowledge. In a Zero Waste world, new designs for products will come from technical research by experts.

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