

## ***The Periodic Table - Primo Levi***

The evidence that I had indeed read this book previously eventually came to light in the form of an old paperback with a well creased spine. (Sally would not do such a thing). Curious, I had no recollection of the book on re-reading. I had it confused in my mind with Oliver Sacks's *Uncle Tungsten*.

It takes some *chutzpah* to open with such a Chapter 1. I rather feared the book would be beyond my intellectual horizon. But the rest was not at all in the same vein. The book consists mostly of a series of autobiographical sketches, more or less in chronological order. The stories are quite charming, and certainly more uplifting than the notoriously grim, though brilliant, *If This Is A Man* (concerning Levi's survival of Auschwitz). The chemistry is liberatingly free of all health and safety considerations. I was rather relieved that he failed to synthesise alloxan. Quite apart from being made from shit, which would be mere squeamishness, the use of a permanent dye as a lipstick is, perhaps, a valid case for a spot of health and safety precaution. Be alarmed though, ladies. A close reading reveals Levi's failure was due to the Turin zoo having already a lucrative contract to supply python shit to a cosmetics manufacturer.

Levi's naivety with metallic potassium suggests that it is rather remarkable that he survived a long working life as a chemist at all. (Given Auschwitz too, he clearly had a charmed life). My favourite chapters were probably the two that were not autobiographical: lead and mercury. I presume both were docudramas, based on historical fact. My only complaint is, Primo, what about the other 77 elements available on Earth? My OCD is feeling cheated. *The Periodic Table* was voted the best science book of all time by the Royal Institution in 2006. Given the opposition (Darwin, Dawkins, Peter Medawar, Konrad Lorenz, Bertolt Brecht, James Watson, Oliver Sacks, etc.) that's some accolade. I will not demur though I would not regard the book as a science book so much as a book about people and events. The chemistry is by way of being thematic glue. What Levi was attempting is best conveyed by this extract, "*...in this book I would deliberately neglect the grand chemistry, the triumphant chemistry of colossal plants and dizzying output, because this is collective work and therefore anonymous. I was more interested in the stories of the solitary chemist, unarmed and on foot, at the measure of man, which with few exceptions has been mine: but it has also been the chemistry of the founders, who did not work in teams but alone, surrounded by the indifference of their time, generally without profit, and who confronted matter without aids, with their brains and hands, reason and imagination*".

I am happy to give it a 9 out of 10, noting that 9 is as high as anyone will ever get - unless Moses descends again from Mt Sinai.

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You will find this hard to believe, I know, but as a boy I was something of a chemistry nerd myself (stop sniggering at the back there). In due course I would discover the more numinous allure of physics. This was decades before the internet, of course, and I cannot recall having any chemistry texts at the time. So how did I discover that there is nothing special about the lichen litmus which makes it an indicator of pH? In fact vegetable pigments appear generically to be indicators. The sensitivity of the colour of hydrangeas to pH is well known to gardeners. Other familiar examples are red cabbage and red grape juice. A free alternative to litmus paper can be made by dipping a filter paper in a little water boiled with rose petals.

Similarly, it is lost to my memory how I came to be interested in nitrogen dioxide. NO<sub>2</sub> is not to be confused with nitrous oxide, N<sub>2</sub>O (laughing gas) nor with nitric oxide, NO, which is of biological significance (not least in vasodilation and hence erections). The

interesting feature of nitrogen dioxide to a young boy is that it liquifies at a convenient temperature just a little below room temperature. Consequently, when prepared in the gaseous form, as it invariably is, it can nevertheless be liquified very easily by passing it through crushed ice. Again I cannot recall why I thought of extracting  $\text{NO}_2$  from fertiliser, but fertilisers are virtually defined by their fixed nitrogen content so this would be the obvious domestic source. The attraction was that  $\text{NO}_2$  is a violent orange-brown colour and smells very strongly of bleach. It therefore provided an excellent opportunity for a bit of mother-bothering. Having obtained a few cc in a cooled test tube, make the victim aware of your intention to pour the evil looking and vile smelling liquid onto the new carpet. Proceed to execute the threat. Said mother emits a most satisfying screech as the offensive brown liquid vaporises in mid trajectory, half-way to the precious carpet. Lounge smells of newly cleaned toilet. It's not *very* toxic.

However, my alchemical *pièce de résistance* was carried out at school. It was Dr Powrie's own fault really. To be falsely accused was not the issue. Such things one accepts as the norm at school. What annoyed me was the implied insult that I would misbehave with such lack of finesse as to tamper with a sulphur dioxide cylinder. Did he think I was unaware of its characteristic smell? Clearly the true culprit was to be found amongst the non-cognoscenti. (The true culprit was shortly to become an extremely wealthy stock trader, proof if you needed it that stupidity and moral turpitude are no barriers to worldly success - yes, A--- F----, I mean you). My revenge was served cold.

On this occasion I remember whence came the recipe: it was from our standard A-level text. No doubt such interesting snippets have long since been excised from books intended for school pupils. Hydrogen isocyanide is legendary. Technically, it is the smell. I say "technically" because isocyanide transcends smell in the usual sense. Whilst it is perceived via the olfactory faculty, it presents itself not so much as a smell as a sudden onset of utter revulsion. Of all the simple substances I know, isocyanide is the one which is most closely analogous to something out of Harry Potter. I am proud (with some reservations, below) to have cast this smell in 1971.

And yes, hydrogen isocyanide is perhaps a little toxic, but far less so than its isomeric cousin, hydrogen cyanide. Like words, the order of the letters is crucial. Hydrogen isocyanide, HNC, is very different from the more familiar isomer, also known as prussic acid, HCN.

It may be that I gave a detailed description of the preparation of HNC to a number of classmates. It may be that I made sure that B---- P--- was amongst them, a boy with enough chemical knowledge to carry out the procedure - and also bold enough to do so. It may be that I seeded this thought in his mind shortly after he had been given a dressing down by Dr Powrie. These things may be so, but I admit nothing. But synthesise the molecule he did - in the very next chemistry practical. The lab was cleared in short order, and that was the end of that lesson. Dr Powrie was rather put out. *Excelsior!*

I am pleased to report that the culprit was not identified, thus sparing me the pangs of conscience that would undoubtedly have preceded my abandoning of B---- P--- to his fate. I am also pleased to report that no one died. I say this because I am now aware of a rather important fact that escaped me at the time. HNC, being of higher energy than HCN, is unstable and converts to the isomeric poison spontaneously. I believe the equilibrium ratio is about 50:50. Oops. The class was saved by the extreme vileness of the isocyanide which ensured that we got the hell out of there very quickly indeed.