

CARBON - THE GOOD, THE BAD AND THE UGLY.

Years ago I never thought that the name of this element would be broadcast in the media every day, usually in a rather critical, negative way. Today we hear about zero carbon or zero net carbon or even just net zero (without any qualifying subject), usually in the context of one gas, carbon dioxide (CO₂) and its role in global warming/climate change and water acidification. It gives the impression that, not just the carbon in CO₂ but any carbon is bad, when, actually, not even the carbon in all CO₂ emissions is equally bad.

Coal
Diamond
Graphite
Graphene
Buckyballs

The element carbon was formed in the early years of the universe and exists in a number of remarkably diverse forms (as listed here). The most recently-discovered form (graphene) can even be worn as part of your footwear, giving a different slant to the Paul Simon song “Diamonds on the soles of your shoes”.

Before photosynthesis got going with the cyanobacteria about 3.5 billion years ago, the Earth's atmosphere was close to 100% CO₂, rather more than the current 0.042%. If we had no CO₂ in the atmosphere, it's reckoned by NASA scientists that the earth's temperature would be about -20°C so be grateful for this little bit of CO₂.

A few months ago, I gave a talk at U3A Cockermonth's Science & Technology Group on “Life of a Carbon Atom”, loosely based on the last chapter of Primo Levi's book “The Periodic Table”, which describes what happens to a single carbon atom over a timescale of a 100 years or so. This book, published in 1975, mentioned CO₂, but there was nothing about global warming or acidification.

When I did the talk (October 2021), we were in a period when the UK government was paying a chemical company to keep open a manufacturing plant in the North-East because of the high cost of natural gas (methane, another carbon compound). Why? (the ultimate irony), because we were running out of commercial CO₂, which is used as a refrigerant and for carbonation of soft drinks. So, do remember that you are responsible for emitting fossil fuel-CO₂ when you next have a Coke (or Pepsi).

My talk also looked at those wonderful carbon compounds, plastics (mainly derived from fossil fuels) and those even more wonderful carbon stores, trees which can be used as a renewable fuel by recycling the CO₂ carbon (but best to keep the rotation cycle as short as possible). The talk took about an hour, during which one person in the audience would have expired about 70g of CO₂, but is this good or bad CO₂? Of course, this depends on what you're eating, hopefully not from fossil fuels, but plant-based?, meat? - that's where it gets complex and not for this article, I'm afraid.

And the ugly? There's no ugly carbon and the range of its chemistry is truly astonishing and rather important for any life on Earth.

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