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**Why systems thinking made a chemist worry  
about separations**

**ABSTRACT:**

As a chemist, I used to concern myself with chemical syntheses, and only worried about separations when the post-synthesis work-up was troublesome. Whether that work-up was green wasn't my problem – I could let the engineers worry about it. I call it “synthetic chemist's myopia”. Since I've become a green chemist, I can no longer afford that myopia. The opposite of myopia is Systems Thinking, which tells us that a major flaw in any part of a system is a problem for the whole system. How does that affect me as a chemist? I worked hard to make greener conversion of biomass to useful products, until I found out that the conversion step isn't the biggest problem! The greatest economic and environmental cost of biomass conversion is not the synthesis step, it's the removal of water. Post-reaction separation of organic products from water is so energetically costly that biomass-derived products struggle to compete against petrochemicals. That situation must change if we are to attain a sustainable society in the future. I will describe several new processes by which CO<sub>2</sub> chemistry can help separate organic products from water, including high pressure switchable water (HPSW) and solvent-assisted switchable water (SASW).

We all suffer from myopia as scientists, as consumers, and as educators. Recognizing our myopia and fixing it can help us make our research and education more effective and our lives greener.

**BIO:**

Dr. Philip Jessop is the Canada Research Chair of Green Chemistry at Queen's University in Canada and the Executive Research Director of Forward Water Technologies Inc. His research interests include green solvents, biomass conversion and CO<sub>2</sub>-responsive materials. Distinctions include the NSERC Polanyi Award (2008), Canadian Green Chemistry & Engineering Award (2012), the Eni Award (2013), NSERC Brockhouse Prize (2019), and Fellowships in the Royal Society of Canada and the Royal Society of Chemistry. He is the Chair of the Editorial Board for the journal *Green Chemistry*, has chaired three major international conferences and helped create two spin-off companies and GreenCentre Canada, a centre for the commercialization of green chemistry technologies. His Tiktok video series “Jessop's Which Is Greener?” reaches tens of thousands of viewers.