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**Re: Consideration of PVOH as part of the solution to achieve circular economies for plastics**

Plastics are amazing materials that have impacted and transformed most sectors of the economy with a huge diversity of products. One of the major sectors where plastics have had a profound and beneficial effect is in product packaging, which has established linkages between suppliers and consumers that now sustain many local and global markets.

The beneficial properties of plastics that make them extremely useful, inexpensive to produce, and inherently extremely stable also become their greatest liability, as their mismanagement at end-of-life has led to their accumulation as pollutants in the environment. Although some plastics are recycled, the vast majority currently follow a linear economic model whereby plastic production and use is followed by disposal and accumulation in landfills or incineration (UNEP 2018). It is therefore not desirable to promote a linear economy for any plastic material as the ultimate outcome is the loss of these valuable materials from future use. A particular issue of the current linear model is that approximately 2-4% of all plastics produced annually are accidentally or deliberately released into the environment (Jambeck et al 2015; Bucknall 2020).

Addressing the issues of plastics fits directly within the key tenets of the European Green Deal that include development of circular economies improved sustainability, reduction of pollution, and preservation of ecosystem and human health (EC 2020a). The environmental/human health issues of plastics have captured public attention, and because of lack of evidence, misinterpretation, or mis-representation of evidence effective communication of the realistic risks of plastics can be difficult to disentangle (Catarino et al., 2021).

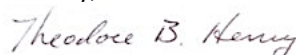
Heriot-Watt University (HWU) has established a Consortium of Plastics and Sustainability (COMPASS; [compass.hw.ac.uk](http://compass.hw.ac.uk)) for unbiased, evidence-based, exploration of the global and societal challenges that will help map the future direction of plastics in the environment and world economy. This consortium provides the broad range of enabling knowledge and expertise necessary to underpin the drive towards a circular economy for plastics. Experts across our global campus work closely together and with external partners to provide solutions towards the global goals of recovering waste plastics, re-using, re-purposing, and recycling those waste plastics at the same time as reducing plastic use through product re-design and replacing where appropriate with better performing and more sustainable alternatives.

Investigating the potential environmental impacts of plastics including PVOH across their life cycle is important and it is critical that this is done within the broad context of alternative materials as well. Considerable work is needed to understand how to establish genuine circular economies for all of these materials and put the mechanisms in place to have these realized.

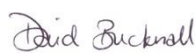
Polyvinyl alcohol (PVOH) is a polymer with unique properties that has the potential to contribute to the future direction of plastics within a circular economy and reduction of environmental impacts. Results of our investigations of the environmental implications of dissolved PVOH are consistent with previous reports that this material is innocuous to aquatic life for the variety of organisms that have been tested.

Further investigation into the decomposition of PVOH within the environment by abiotic and biotic factors is ongoing to establish rates and processes. These analyses will enhance understanding of how the attractive properties and unique opportunities of PVOH could be part of the solution to achieve circular economies for plastics.

Sincerely,



Theodore B. Henry, PhD  
Professor of Environmental  
Toxicology



David Bucknall  
Professor of Materials  
Chemistry



Tony Gutierrez  
Assoc Prof of Environmental  
Microbiology & Biotechnology

## References

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