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Editorial

Johnson Matthey Technology Review and the International Year of the Periodic Table 2019

2019 was proclaimed the "International Year of the Periodic Table of Chemical Elements (IYPT2019)" by the United Nations General Assembly and United Nations Educational, Scientific and Cultural Organization (UNESCO) (1). Johnson Matthey celebrated this significant milestone by looking at the ways in which the company has used the periodic table to understand the inter-relationships of elements, help promote sustainable development and solve some of the world's biggest challenges (2–4).

The *Johnson Matthey Technology Review* included a whole year of special themed issues devoted to using resources more efficiently: encapsulating active ingredients to make more from less; the need for accurate sensors to enable new technologies; efficiency gains from continuous manufacturing replacing batch style processes; and efficient materials design for the energy applications of the future.

Elements for Life

Certain elements such as the platinum group metals (pgms) have unique qualities with which regular readers of this journal will be familiar. The top ten downloaded articles from the *Johnson Matthey Technology Review* and *Platinum Metals Review* archives over the past 12 months reflect these qualities and their relevance to solving the challenges faced in industrial science and technology today.

The elements featured, which include the pgms, lithium and nitrogen among others, are indispensable for applications in catalysis and the control of harmful emissions. They have enabled

Top Ten Downloaded Articles from Archives July 2018–July 2019

R. Price, 'The Platinum Resistance Thermometer', *Platinum Metals Rev.*, 1959, **3**, (3), 78

O. T. Holton and J. W. Stevenson, 'The Role of Platinum in Proton Exchange Membrane Fuel Cells', *Platinum Metals Rev.*, 2013, **57**, (4), 259

M. Ryan, "The Story of Platinum", *Platinum Metals Rev.*, 2010, **54**, (2), 120

J. H. Jones, 'The Cativa™ Process for the Manufacture of Acetic Acid: Iridium Catalyst Improves Productivity in an Established Industrial Process', *Platinum Metals Rev.*, 2000, **44**, (3), 94

P. Miller, 'Automotive Lithium-Ion Batteries', *Johnson Matthey Technol. Rev.*, 2015, **59**, (1), 4

K. K. Kasem, 'Platinum as a Reference Electrode in Electrochemical Measurements', *Platinum Metals Rev.*, 2008, **52**, (2), 100

J. Pignon, 'Diesel Engines: Design and Emissions', *Platinum Metals Rev.*, 2005, **49**, (3), 119

A. F. S. Gouldsmith and B. Wilson, 'Extraction and Refining of the Platinum Metals', *Platinum Metals Rev.*, 1963, **7**, (4), 136

A. Cowley and B. Woodward, 'A Healthy Future: Platinum in Medical Applications', *Platinum Metals Rev.*, 2011, **55**, (2), 98

J. Brightling, 'Ammonia and the Fertiliser Industry: The Development of Ammonia at Billingham', *Johnson Matthey Technol. Rev.*, 2018, **62**, (1), 32

advances in medical treatments, human nutrition, improved energy devices and other improvements to human life. Furthermore, there has long been interest in using precious metals as efficiently as possible, from their extraction to their use and end-of-life recycling. These principles of sustainable resource use connect with the theme of this issue: the circular economy.

Circular Economy: A Way Forward?

The circular economy is a conceptual framework that aims to rethink sustainability by designing from first principles. In recent years the number of publications on this topic has vastly increased as discussed in this issue (5). The principles of circular economy are wide ranging and there is no single agreed definition, but discussions tend to include design for circularity, resource reduction, reuse or recycling, rethinking materials and renewable energy (5). Misconceptions and barriers are discussed (6) along with the potential of new technologies to facilitate new ways of thinking about sustainability (5, 7). Many studies link the idea of circularity to biological cycles and design innovation for both products and processes is a thriving area of research (8, 9).

Recycling of both precious and base metals has of course long been established. Recycling plays an important part in replacing linearity with circularity that goes beyond metals. The recent attention being given to plastics, with their damaging environmental consequences, has led to projects investigating the feasibility of recycling these ubiquitous materials (10). The principles of circular economy can be applied across many industries: from consumer goods to the petrochemicals, automotive and pharmaceutical industries.

The possibilities offered by new technologies to enable sustainable practices, and the impact of circular economy thinking on innovation, represent exciting opportunities to enhance human life, challenge preconceptions and use science to solve the recurring problems of our times. We hope you will enjoy reading the thought-provoking articles in this issue.

SARA COLES

Editor, *Johnson Matthey Technology Review*
Johnson Matthey, Orchard Road, Royston, Hertfordshire, SG8 5HE, UK

Email: sara.coles@matthey.com

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