



Guest Editorial

Rubies and Gold – a wonderful combination

It is a pleasure to write a brief introduction to this issue – the Ruby Anniversary of Gold Bulletin. Gold and rubies have been associated together in jewellery and works of art for millennia, so what is new? In the forty years since its inception Gold Bulletin has witnessed a revolution in gold chemistry that has overturned the traditional view of the metal as typified over a hundred years ago by Kipling:

*“Gold is for the mistress – silver for the maid –
Copper for the craftsman, cunning at his trade.
‘Good!’ said the Baron, sitting in his hall,
‘But iron – cold iron – is ruler of them all’.”*

from *Cold Iron*
Rudyard Kipling

Kipling wrote of the traditional view of gold in Victorian Britain, a country at the peak of its world power. Gold was highly prized, but was only used as currency and jewellery; for Kipling iron was the most valuable material, since it created and underpinned the industrial revolution that led to empire. This traditional view of gold persists in many minds; it is a beautiful metal that is immutable and ductile and retains its beauty for millennia. Gold has fuelled great art and literature, as well as being at the heart of many wars and bloodshed. For chemists, and scientists in general, gold has been of little interest since it has been perceived to be non-reactive. Indeed, the chapters dealing with the metal in inorganic chemistry text books are always the shortest and generally the duller. Copper and silver, the elements with which gold shares its triad in the periodic table, always displayed far more interesting general chemistry.

All this has changed. For now we know that when gold is subdivided to the nanoscale, to a collection of a few tens of atoms, it becomes remarkably reactive as a catalyst for a whole range of oxidation and reduction reactions. These revelations were triggered by the separate, but contemporaneous,

discovery that gold could be the catalyst of choice for the oxidation of carbon monoxide and the hydrochlorination of acetylene. Many discoveries have been made since, indeed gold seems to catalyse every reaction that is tried. Of course this display of general activity overstates its importance in some people's eyes, for often palladium and platinum remain superior in many applications. However, recent discoveries of gold catalysed alcohol oxidation again find gold to be the best catalyst by far. Also it displays unique hydrogenation activity. The allure of gold for the catalyst chemist is the general amazement that an element, long considered as unreactive, can display such remarkable and unsurpassed reactivity. Why wasn't this discovered earlier?

Perhaps if you are steeped in traditional thinking it is difficult to break out and think the unthinkable. It is twenty five years since it was predicted that cationic gold had to be the best catalyst for hydrochlorination of acetylene. Now there is an amazingly rich homogeneous catalyst based on cationic gold complexes for the reactions of alkynes.

In many respects the field of gold catalysis has many practitioners, but many are still looking under the same stones others turned over years ago! This, I fear, will not advance our knowledge. The field now needs to break out again as I am convinced that many new discoveries remain, and to achieve this we need to embrace a new vision for gold catalysis. Gold Bulletin has published many key papers charting these new features for gold chemistry. In this its Ruby Anniversary year we stand at the point where gold chemistry has been transformed beyond recognition. What I hope is that when we read the Golden Anniversary issue in ten years time, we will have witnessed even greater advances. I do hope so. For now though, we should reflect on the beauty of gold in the colours it portrays in colloidal form, greens, reds and blues. Opals are also prized for such colours:

“There is in them a softer fire than the ruby, there is the brilliant purple of the amethyst, and the sea green of the emerald – all shining together in incredible union. Some by their splendour rival the colors of the painters, others the flame of burning sulphur or of fire quickened by oil.”

About the opal
Pliny

...but gold just does it better!

Graham J. Hutchings

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