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Joseph was born on 6 November 1914, in Horden, County Durham, England, and died on 19 May 1994, in Hove, England. There have been few chemists who have exerted such a profound influence on the development of the science, and even fewer in the twentieth century. He was a modest man who came from a very modest background, but with a strong belief in himself, in the value of science, and in the community of scientists. He was rarely disappointed in any of them.

His contribution was recognised by many awards and honours: he was made an FRS in 1961 and a CBE in 1978; he was a Fellow of the Indian and Portuguese Academies; he had honorary degrees from Paris, Sussex, and UEA; he obtained numerous medals, lectureships, and visiting professorships. Yet he remained an unassuming and outgoing man, who always expected that anyone he was addresssing had the same enthusiasm for, and the same understanding of, science that he had. Research students often found this disconcerting!

I have recently published [1] in this journal the account of an interview with Joseph, which contains a short description of his life and career, and many of his

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views on chemistry and his life. I do not intend to repeat all that here. However, it appears from conversations I have had with many chemists, some of whom should have been better informed, that the breadth and significance of his achievements are not universally recognised. I am therefore taking this opportunity to list what I consider to be outstanding discoveries or innovations for which he was primarily responsible. Others may disagree in detail, but not, I hope, in my assessment.

(1) Chatt established the currently accepted model for the binding of olefins to transition metal ions. This is often referred to as the Chatt–Dewar model and there is no doubt that both these chemists made significant contributions to the understanding of the bonding, and Chatt never hid his recognition of Dewar's contribution in this matter [2].
(2) Chatt was one of the first to use IR spectroscopy in evaluating bonding in inorganic compounds. In fact, ICI hired a spectroscopist to build a machine for this purpose, because there were no suitable commercial models available at that time [3].
(3) The description of the acceptor properties of metal ions as class A and class B, which laid the foundations for the widely used hard–soft concepts so successfully developed by Pearson [4].
(4) The use of tertiary phosphines to stabilize complexes of metal ions in low oxidation states [5].
(5) The systematic synthesis and rationalization of the structures of alkyls and aryls of the later transition metals. This constitutes an epic series of papers, based on work which began at a time when it was generally believed that transition meta! alkyls were only stable under exceptional circumstances [6].
(6) The isolation and characterization of a volatile hydride of platinum without any supporting c ligands, at a time when such compounds were also reckoned to be very unstable [7].
(7) One of the first kinetic investigations of the reaction of square planar complexes, in a paper which bore the names of Basolo, Gray, Pearson and Shaw as coauthors [8].
(8) One of the first reports of nitrido complexes [9].
(9) The discovery of the first extensive series of dinitrogen complexes, of osmium. When the second such series, of rhenium, was established, a referee unkindly remarked that this was 'just another series of dinitrogen complexes' [10].
(10) The first reported reaction of a well-defined dinitrogen complex to yield a defined complex product, in this case containing a nitrogen–carbon bond [11].
(11) The first report of the protonation of coordinated dinitrogen to yield coordinated hydrazide(2–) [12].
(12) A very early report of the synthesis of thionitrosyl complexes [13].
(13) The first report of the protonation of mono-coordinated dinitrogen to form ammonia in a protic environment [14].
(14) The first mechanistic study of the alkylation of coordinated dinitrogen, as well as the discovery of the alkylation reactions in the first place [15].
(15) The quantitative evaulation of structure–redox potential relationships in an extensive series of phosphine complexes [16].

Joseph retired in 1980, and his last paper was published in 1985 [17]. In 1984 he published the eleventh and last paper in the series "The Nature of the Co-ordinate Link" [18]. The first appeared in 1950 [19]. The intervening years, during which he published 371 papers and 2 patents, saw an explosion in transition metal chemistry and, later, in dinitrogen chemistry, much of which had its beginnings in his work. His ideas and his contribution have become such an integral part of organometallic and coordination chemical thinking that their origin in the two major laboratories which he set up, the ICI laboratory at The Frythe and the Unit of Nitrogen Fixation at the University of Sussex, is often overlooked. That is perhaps a measure of the man and his achievement.

The laboratory at The Frythe was closed in the early 1960s. The world-wide renown of the "Unit", as it is still referred to in many quarters, would be memorial enough for many scientists. It takes a person of unusual sensitivity and ability to build a research group spanning a range of expertise from fundamental microbial genetics through biochemistry to inorganic coordination chemistry and to organize it so that the group is still functioning as a single entity, with work at the forefront of science in a wide range of disciplines, 15 years after that person has retired. He will be remembered with affection and respect.

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