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Elements with Synthetic Inorganic Perspectives and its Real Time Applications

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Abstract

A chemical compound is made up of atoms of different elements joined together by a chemical bond. The bonds are so strong that the compound acts as if it were a single substance. The joined atoms form molecules and the molecules connect together to make the compound. A chemical formula is a notation used by scientists to show the number and type of atoms present in a molecule using atomic symbols and numeric subscriptions. A chemical formula is a simple representation, in writing, of a three-dimensional molecule that exists. A chemical formula describes a substance, down to the exact atoms that make it up. There are three basic types of chemical formula, the empirical formula, the molecular formula and the structural formula.

Keywords: Inorganic Compounds, Inorganic Chemistry, Inorganic Applications Dimensions

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Introduction

A chemical compound is made up of atoms of different elements joined together by a chemical bond. The bonds are so strong that the compound acts as if it were a single substance. The joined atoms form molecules and the molecules connect together to make the compound. A chemical formula is a notation used by scientists to show the number and type of atoms present in a molecule using atomic symbols and numeric subscriptions. A chemical formula is a simple representation, in writing, of a three-dimensional molecule that exists. A chemical formula describes a substance, down to the exact atoms that make it up. There are three basic types of chemical formula, the empirical formula, the molecular formula and the structural formula.

Industrial inorganic chemistry includes subdivisions of the chemical industry that manufacture inorganic products on a large scale such as the heavy inorganics (chlor-alkalis, sulfuric acid, and sulfate derivatives) and fertilizers (potassium, nitrogen, and phosphorus products) as well as segments of fine chemicals that are used to produce high-purity inorganics on a much smaller scale. Among these are reagents and raw materials used in high-tech industries, the pharmaceutical industry, and the electronics industry, for example, as well as in the preparation of inorganic specialties such as catalysts, pigments, and propellants. Metals find a variety of uses without being incorporated into salts. They are manufactured from ores and purified by many of the same processes as those used in the manufacture of inorganics. However, if they are commercialized as alloys or in their pure form such as iron, lead, copper, or tungsten, they are often considered products of the metallurgical rather than products of the inorganic chemical industry.

Organometallic Chemistry, an interdisciplinary science in Inorganic Chemistry, has grown at a phenomenal pace during the last three to four decades. On the academic plane, efforts to elucidate the nature of bonds in the ever increasing list of exciting organometallic compounds have led to a clearer understanding of the nature and variety of chemical bonds. Organometallic

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compounds are primarily used as homogeneous catalysis agents in industries. The topics covered in this book offer the readers new insights in the field of organometallic chemistry. Organometallic chemistry is an organometallic compound study. Because many compounds without these bonds are chemically identical, an alternative may be compounds containing metallic bonds of a mostly covalent nature. Organometallic chemistry blends elements of inorganic chemistry with organic chemistry.

Transition Elements

A transition element may be defined as one which possesses partially filled d-orbitals in its penultimate shell. This conceptual definition is useful as it enables us to recognize a transition element merely by looking at its electronic configuration. This definition excludes zinc, cadmium and mercury from the transition elements as they do not have a partially filled d-orbital. However, they are also considered as transition elements, because their properties are an extension of the properties of transition elements in inorganic chemistry. In fact, the zinc group serves as a bridge between the transition elements and the representative elements.

The most notable characteristics shared by the 24 elements concerned are that they are all metals and that most of them are hard, solid and lustrous, have high melting and boiling points and are good conductors of heat and electricity. The range in these properties is considerable; hence, the statements are comparable to the general properties of all the other elements.

Coordination Chemistry

Coordination compounds found their applications long before the establishment of inorganic chemistry. A systematic investigation of structure and bonding in coordination chemistry began with the inquisitiveness of Tassaert which was extended by distinguished chemists like Wilhelm Blomstrand, Jorgensen and Alfred Werner until the end of the nineteenth century. In the events, Werners coordination theory became the base of modern coordination chemistry.

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P-Block Elements

The elements placed in group 13 to group 18 of the periodic table constitute the p-block. The properties of inorganic chemistry p block elements like that of other block elements are greatly influenced by their atomic size, ionization enthalpy, electron gain enthalpy and electronegativity. The absence of d–orbitals in the second period and presence of d- or f-orbitals in heavier elements has a significant effect on the properties of the elements and therefore, heavier p-block elements differ from their lighter congeners.

Example:$CaCl_2$ (aq) + 2$AgNO_3$ (aq) → $Ca(NO_3)_2$ (aq) + 2 AgCl (s)

Because the class of inorganic compounds is vast, it's difficult to generalize their properties. However, many inorganics are ionic compounds, containing cations and anions joined by ionic bonds. Classes of these salts include oxide, halides, sulfates, and carbonates. Another way to classify inorganic compounds is as main group compounds, coordination compounds, transition metal compounds, cluster compounds, organometallic compounds, solid state compounds, and bioinorganic compounds.

Many inorganic compounds are poor electrical and thermal conductors as solids, have high melting points, and readily assume crystalline structures. Some are soluble in water, while others are not. Usually, the positive and negative electrical charges balance out to form neutral compounds. Inorganic chemicals are common in nature as minerals and electrolytes.

Inorganic chemists are found in a wide variety of fields. They may study materials, learn ways to synthesize them, develop practical applications and products, teach, and reduce the environmental impact of inorganic compounds. Examples of industries that hire inorganic chemists include government agencies, mines, electronics companies, and chemical companies. Closely related disciplines include materials science and physics.

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Becoming an inorganic chemist generally involves gaining a graduate degree (Masters or Doctorate). Most inorganic chemists pursue a degree in chemistry in college.

An example of a government agency that hires inorganic chemists is the U.S. Environmental Protection Agency (EPA). The Dow Chemical Company, DuPont, Albemarle, and Celanese are companies that use inorganic chemistry to develop new fibers and polymers. Because electronics are based on metals and silicon, inorganic chemistry is key in the design of microchips and integrated circuits. Companies that focus in this area include Texas Instruments, Samsung, Intel, AMD, and Agilent. Glidden Paints, DuPont, The Valspar Corporation, and Continental Chemical are companies that apply inorganic chemistry to make pigments, coatings, and paint. Inorganic chemistry is used in mining and ore processing through the formation of finished metals and ceramics. Companies that focus on this work include Vale, Glencore, Suncor, Shenhua Group, and BHP Billiton.

Conclusion

Inorganic chemistry deals with the synthesis and behavior of inorganic and organometallic compounds and covers all chemical compounds except the myriad organic compounds (carbon-based compounds), which are the subjects of organic chemistry. Inorganic chemistry has applications in every aspect of the chemical industry, including catalysis, materials science, pigments, surfactants, coatings, medications, fuels, and agriculture.

References

[1] Wells, A. F. (2012). Structural inorganic chemistry. Oxford university press.
[2] Bailar, J. C., & Trotman-Dickenson, A. F. (Eds.). (1973). Comprehensive inorganic chemistry (Vol. 3, p. 1387). Oxford: Pergamon press.Brauer, G. (Ed.). (2012). Handbook of Preparative Inorganic Chemistry V2 (Vol. 2). Elsevier.
[3] Lee, J. D. (2008). Concise inorganic chemistry. John Wiley & Sons.

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[4] Orvig, C., & Abrams, M. J. (1999). Medicinal inorganic chemistry: introduction. Chemical Reviews, 99(9), 2201-2204.

[5] Hay, R. W. (1984). Bio-inorganic chemistry (p. 130). Chichester: Ellis Horwood.

[6] Hughes, M. N., & Wiley, J. (1981). The inorganic chemistry of biological processes 2nd edn. FEBS LETTERS.Damhus, T., Hartshorn, R. M., & Hutton, A. T. (2005). Nomenclature of inorganic chemistry: IUPAC recommendations 2005. Chemistry International.

[7] Mjos, K. D., & Orvig, C. (2014). Metallodrugs in medicinal inorganic chemistry. Chemical reviews, 114(8), 4540-4563.

[8] Pratt, J. M. (1972). Inorganic chemistry of vitamin B12. London, UK, Academic Press Inc.(London) Ltd..

[9] Guo, Z., & Sadler, P. J. (1999). Medicinal inorganic chemistry. In Advances in inorganic chemistry (Vol. 49, pp. 183-306). Academic Press.

[10] Brown, I. D. (2016). The chemical bond in inorganic chemistry: the bond valence model (Vol. 27). Oxford University Press.