Review Article

Chemical Review and Letters
journal homepage: www.chemrevlett.com
ISSN (online): 2645-4947 (print) 2676-7279

Transition Metal Complexes with HIV/AIDS Inhibitory Properties

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ARTICLE INFO

Article history:
Received 11 May 2020
Received in revised form 12 June 2020
Accepted 16 June 2020
Available online 9 July 2020

Keywords:
Metal Complexes
HIV/AIDS activity
viral inhibition

ABSTRACT

The management of HIV in the human body has been a major research area in the quest to find either the cure or the preventative scientific measure. The quest to manage the virus has been successful using some organic molecules that target one or more of the stages of the replication cycle of HIV rendering it inhibited to continue infecting other host cells. However, the approach is now moving to use of transition metal complexes to manage the HIV infection in the host cells and this review highlights the relevant contributions of such as HIV/AIDS inhibitors. There have been increasing number of reports on the trends for transition metal complexes with anticancer and antimicrobial activity hence this probed the need of such a review. Complexes of vanadium, manganese, iron, copper, cobalt, nickel, zinc, ruthenium, platinum and gold have been reported to be active against HIV-1 virus. The complexes discussed in this review showed anti-viral activity compared to the vehicle control.

1. Introduction

Transition metal complexes exhibit quite a variety of applications ranging from catalysis to materials synthesis, photochemistry, and biological systems. They also display diverse chemical, optical and magnetic properties. They can enhance the electrochemical reactivity of important biomolecules and can promote the electron-transfer reactions of biomolecular systems.

Transition metals show variable oxidation states and can interact with several negatively charged molecules. Transition metal can also interact with neutral molecules, such as NH_3 in cis-platin. This activity of transition metals showed potential in the development of metal-based drugs with promising pharmacological application and it offers unique therapeutic opportunities. Transition metal complexes are used as drugs to treat several human diseases like carcinomas, lymphomas, infection control, anti-inflammatory, diabetes, and neurological disorders [1]. Gold (III), platinum (II), ruthenium (II, III, IV), iron (II) and vanadium (IV) complexes for anti-cancer, anti-HIV treatments and as enzyme inhibitors for potential therapeutic applications have been reported [2,3]. The anticancer activity of cisplatin and other closely related platinum compounds arises from their ability to damage DNA in cancer cells, leading to cell death. Compounds containing platinum with a 4^+ charge (non- toxic) must be converted to platinum 2^+ compounds using a directed fine beam of (laser) light before they kill cells. The bicyclam AMD3100 (a potent anti-HIV agent) has an unusual mechanism of action being active at the fusion/uncoating step. The transition metals complexes therefore hold a great promise as other sources of therapeutic drugs and this review intends to look at their role in HIV/AIDS with emphasis on their inhibitory properties.

2.0 Trends for metal complexes with anti-AIDS activity

Medicinal inorganic chemistry [4] is a field of increasing prominence as metal-based compounds offer possibilities for the design of therapeutic agents not readily available to organic compounds. The wide range of coordination numbers and geometries, accessible redox states, thermodynamic and kinetic characteristics, and the intrinsic properties of the cationic metal ion and ligand itself offer the medicinal chemist a wide spectrum of reactivities that can be exploited.

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