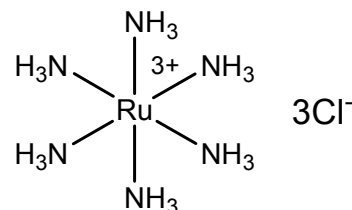


STREM Hexaammineruthenium(III) Chloride as an Electron Mediator for Rapid Whole Blood Glucose Detection

metals · inorganics · organometallics · catalysts · ligands · custom synthesis · cGMP facilities · nanomaterials

Catalog

44-0620 Hexaammineruthenium(III) chloride, 99%
CAS# [14282-91-8]



The Properties of Hexaammineruthenium(III) Chloride

Hexaammineruthenium(III) chloride, $[\text{Ru}(\text{NH}_3)_6]\text{Cl}_3$, is a powdery, pale yellow, air stable, water-soluble powder.

Hexaammineruthenium(III) chloride and hexaammineruthenium(II) chloride are readily interconverted via electrochemical reduction and oxidation, respectively. As a result, hexaammineruthenium(III) chloride is often used as the analyte in cyclic voltammetry demonstrations. This property also makes $[\text{Ru}(\text{NH}_3)_6]\text{Cl}_3$ highly useful in various biochemical analyses as an indicator of the occurrence of one-electron reactions.

The Need for Rapid and Accurate Blood Glucose Detection

As diabetes has become an increasing health problem around the world, demand for tools that enable the self-monitoring of blood glucose (SMBG) levels has also increased. Advances in the miniaturization of electronics and sensor fabrication techniques have enabled the development of accurate testing systems that require smaller blood sample volumes and provide results fairly rapidly.

Most systems are enzyme assays based on some form of glucose oxidase (GOD) or glucose dehydrogenase (GDH) and involve the use of artificial electron mediator.

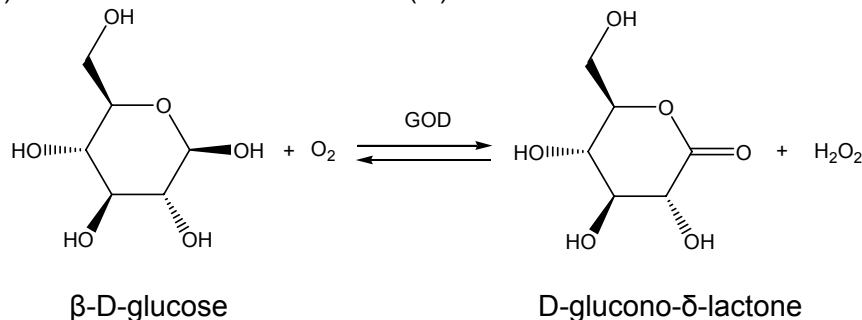
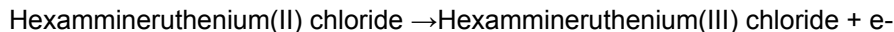
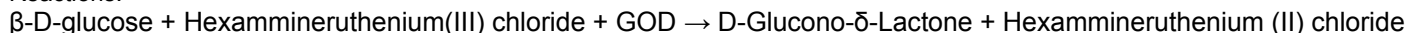
Hexaammineruthenium(III) Chloride as an Electron Mediator for Glucose Detection

Glucose monitoring systems use hexaammineruthenium(III) chloride as an electron mediator. In one commercial blood glucose monitoring system, β -D-glucose reacts with GOD and hexaammineruthenium (III) chloride in the test strip, generating β -D-glucono- δ -lactone and hexaammineruthenium (II) chloride. (Ref 1) The amount of hexaammineruthenium (II) chloride that is produced is directly proportional to the amount of glucose in the blood sample. Oxidation of the hexaammineruthenium(II) chloride back to hexaammineruthenium (III) chloride then generates an electric current. The meter is used to convert the current into the value of the glucose concentration.

In another system reported in the literature, the thermostable FADGDH glucose-dehydrogenase complex, rather than GDH, was used as the enzyme and deposited' along with hexaammineruthenium (III) chloride, onto a screen-printed carbon electrode (SPCE) (Ref 2). The sensor was shown to measure the whole-blood glucose level within 1 sec using a 150-nL whole-blood sample with both high precision and reproducibility. Importantly, the sensor reading was stable for more than 60 days, even at 70 °C.

In these systems, the hexaammineruthenium (III) chloride must be of consistent purity and quality to ensure consistent and accurate test results.

Reactions:



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Strem Chemicals, Inc.

7 Mulliken Way
Newburyport, MA 01950-4098
U.S.A.
Tel.: (978) 499-1600
Fax: (978) 465-3104
Email: info@strem.com

Strem Chemicals, Inc.

15, rue de l'Atome
Zone Industrielle
67800 BISCHHEIM France
Tel.: (33) 03 88 62 52 60
Fax: (33) 03 88 62 26 81
Email: info.europe@strem.com

Strem Chemicals, Inc.

Postfach 1215
77672 KEHL
Germany
Telefon: 0 78 51/ 7 58 79
Email: info.europe@strem.com

Strem Chemicals UK Ltd.

Newtown Hall, Town Street
Cambridge, England CB22 7ZE
Tel.: 0845 643 7263
Fax: 0845 643 7362
Email: enquiries@strem.co.uk

Similar Applications for Hexaamineruthenium(III) Chloride

Hexaamineruthenium(III) chloride has been shown by the Whitesides group (Ref 3) to be effective as an electron mediator in inexpensive referenced *Electrochemical Paper-based Analytical Devices* (rEPADs). These devices are used for direct and accurate voltammetric measurements that are referenced by an electrode with a constant, well-defined potential. Such rEPADs may be used in SMBG systems.

An assay for the high-throughput screening of drug candidates that inhibit telomerase has also been reported (Ref 4). This rapid electrochemical method, based on chronocoulometry coupled with hexaamineruthenium chloride, is an alternative to methods based on the polymerase chain reaction and gel electrophoresis and can discriminate between the direct binding of inhibitors to telomerase and indirect inhibition via binding to the quadruplex generated by telomerase.

References:

1. 510(k) SUBSTANTIAL EQUIVALENCE DETERMINATION, DECISION SUMMARY, ASSAY AND INSTRUMENT COMBINATION TEMPLATE, US FDA, www.accessdata.fda.gov/cdrh_docs/reviews/K073416.pdf. Accessed 12/31/2013.
2. (a) H. Yamaoka, K. Sode. "SPCE based glucose sensor employing novel thermostable glucose dehydrogenase, FADGDH: blood glucose measurement with 150nL sample in one second." *J Diabetes Sci Technol.* **2007** 1(1), 28-35. (b) H. Yamaoka, K. Sode. "A Disposable Electrochemical Glucose Sensor Using Catalytic Subunit of Novel Thermostable Glucose Dehydrogenase." *The Open Biotechnology Journal*, **2007**, 1, 26-30.
3. W.J Lan, E. J. Maxwell, C. Parolo, D. K. Bwambok, A.B. Subramaniam, G. M. Whitesides. "Paper-based electroanalytical devices with an integrated, stable reference electrode." *Lab Chip*, **2013**, 13, 4103-4108.
4. S. Sato, S. Takenaka. "PCR-Free Telomerase Assay Using Chronocoulometry Coupled with Hexaamineruthenium(III) Chloride." *Anal. Chem.*, **2012**, 84 (3), 1772-1775.

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Strem Chemicals, Inc.

15, rue de l'Atome
Zone Industrielle
67800 BISCHHEIM France
Tel.: (33) 03 88 62 52 60
Fax: (33) 03 88 62 26 81
Email: info.europe@strem.com

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Postfach 1215
77672 KEHL
Germany
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