

Commercialisation

AuTEK has developed a plant to produce significant quantities of AUROLite™ gold catalysts in a form suitable for use in a range of applications. We are ready to collaborate with end-users to design gold based catalysts for their specific needs.



Custom Made Catalysts

A variety of gram to kilogram quantities of AUROLite™ gold catalyst may be ordered, the typical AUROLite™ range includes: Al₂O₃, Fe₂O₃, TiO₂, ZnO.

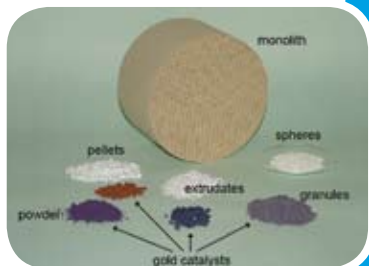
These materials are available in a variety of forms. Furthermore, other support materials and gold loadings are available on request.

Product Design

Cost vs. performance must be optimised – AuTEK is capable of offering a full suite of services to an end-user:

Catalyst development

– optimum support type, physical form, gold loading.



Product testing – final in-product performance under relevant conditions.

Catalyst production – kilogram quantities are available in-house - AuTEK is aligned with a world class catalyst producer should larger quantities be required.

Precious metal recovery – recovery of gold from spent material.

AUROLite™ Al₂O₃



AUROLite™ Fe₂O₃



AUROLite™ TiO₂



AUROLite™ ZnO



For further information contact

AuTEK Catalysis

Advanced Materials Division, Mintek

200 Hans Strijdom Drive, Randburg

Private Bag X3015, Randburg 2125, South Africa

Email: catalysts@autek.org

Web: www.autek.org

Tel: +27 (0) 11 709 4918

Fax: +27 (0) 11 709 4480

Catalysis in Brief



Who Are We?

AuTEK is a highly successfully joint venture formed between Mintek, a science council based in Randburg South Africa, and the three major South African gold mining houses - AngloGold Ashanti, GoldFields and Harmony Gold. The main focus is to research and develop novel industrial applications for gold. AuTEK, housed at Mintek, involves research in the fields of catalysis, biomedical and nanotechnology.

The project AuTEK catalysis research and development unit (R&D) was created in 2000. Since AuTEK is trying to bridge the gap between research and commercialisation a scale-up and commercialisation unit specifically focussing on the research outcomes of project AuTEK catalysis was formed in 2004.

Background

Traditionally, gold metal was thought to be too inert and noble to provide active surfaces for catalysing chemical reactions. However, it has been shown that if gold metal is highly dispersed as clusters of 2 – 10 nanometers in size (1nm = 10⁻⁹m), containing 250 – 31000 gold atoms, and the dispersed gold is supported on a variety of materials (e.g. metal oxides), very potent catalysts are formed for several reactions.

ISO 9001 ■■■■
QUALITY
MANAGEMENT SYSTEM

ISO 14001 ■■■■
ENVIRONMENTAL
MANAGEMENT SYSTEM

ISO 17025 ■■■■
TESTING AND CALIBRATION
LABORATORY

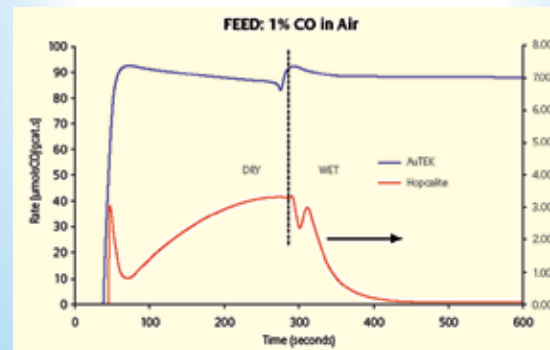
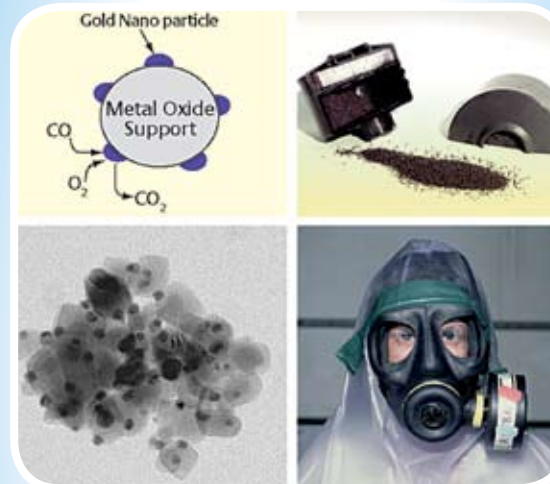
OHSAS 18001 ■■■■
OCCUPATIONAL HEALTH AND
SAFETY MANAGEMENT SYSTEM

Research

AuTEK is active in the following areas:

CO oxidation

- *Low Temperature Air Purification* – environmental purification/personal protection (gas masks) – AuTEK catalysts are significantly more active than the commercially employed hopcalite and show increased activity in the presence of moisture.

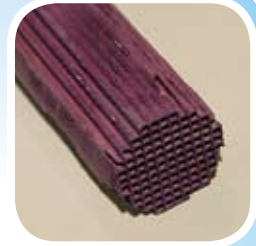


- *Hydrogen Economy*

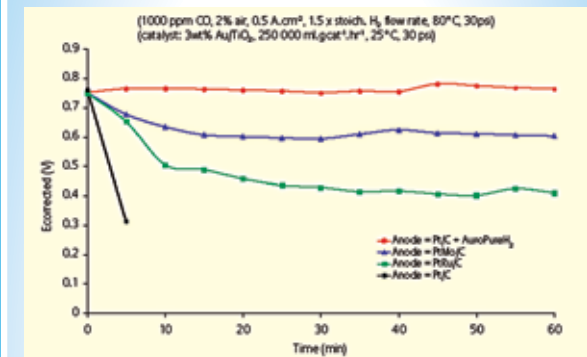
PROX – removal of CO from hydrogen rich fuel cell feed-streams.

Fuel Cells/Electro-catalysts – development of CO tolerant anodes using Pt/Au rather than the conventional Pt/Ru, Pt/Mo systems.

AUROPureH₂TM – clean-up of dirty hydrogen (<2000ppm CO) by the use of a guard bed.



This system has been proven to outperform the current CO tolerant anode technologies.



Water Gas Shift – the production of hydrogen, gold catalysts offer the possibility of lower operating temperatures and improved activities.

Photocatalysis

The addition of gold to traditional photocatalysts increases activity, research focuses on the photodegradation of organic pollutants.

Chemical Processing

Reaction Type	Species of interest	Examples	Advantage of gold
Oxidation/Selective Oxidation	Alcohols/diols/polyols Carbohydrates Aminoalcohols Dicarboxylic acids	- Glycerol (by-product of biosustainable fuel source) to chemical intermediates - Glucose to gluconic acid (pharmaceutical/food industry) - Cyclohexane to nylon precursors	- Direct activation of oxygen. - No polluting by-products. - Cleaner and more selective than current enzymatic processes.
Hydrogenation/Selective Hydrogenation	Dienes, trienes, alkynes	- Diene and alkyne removal from C ₆ to C ₈ polymer feedstocks.	- More selective than current Pt,Pd,Ag,Ni systems.
Epoxidation	Alkenes	- Alkene to Epoxides - Propene to Propene oxide	- Eliminates the use of organic peracids which are unsafe, corrosive, and costly and produce large amounts of waste.
Hydrodechlorination	Trichloroethane (hazardous ground water contaminant)	- ClCH=CCl ₂ to alkanes, alkenes, HCl	- Pd/Au more active than other PGM systems