



# ENVIRONMENTAL CATALYSIS

Catalysts are part of the solution to protecting the environment – developing new catalytic technologies with nanoscale materials provides for a promising tomorrow.

Students learn what a catalyst is, gain an idea of the scope of catalysis research today, and become aware of the effect of catalysis on environmental protection. Advances in nanotechnology are also discussed as a solution to eliminate environmental pollutants. Students are challenged to design an original solution to an environmental problem of their choice.

By incorporating everyday materials into science lessons, the Materials World Modules (MWM) program at Northwestern University has found the solution to getting students excited about learning science while helping teachers meet national and state education standards.

The modules are easy to organize and inexpensive to use. They can be incorporated into any science class because of the breadth of subjects covered in the Activity and Design Project sections. Each module is a supplemental science unit that takes 1-3 weeks of class time (approximately 10 hours) to complete.



## Module At-a-Glance:

### Activities

- Catalyzing with Platinum Black
- Searching for Catalysts
- Using a Heterogeneous Acid Catalysis
- Using a Metal Catalyst to Degrade an Air Pollutant
- Using Photocatalysis to Degrade a Water Pollutant

### Design Project

- Designing a Catalytic System to Degrade a Pollutant
- Conceptual Design for Environmental Catalysis



MWM will give students an opportunity to understand the world around them in a way they have never experienced before. The modules promote an awareness of the roles science and technology play in society and guide students to take increased control of their work.

**MWM is designed to improve STEM education**

Science • Technology • Engineering • Math

**Interdisciplinary**  
Integrates science & non-science subjects

**Flexible**  
Can adapt to your teaching style, students' ability and class time

**Hands-on**  
Contains activities that lead up to inquiry-centered design projects

**Cutting-edge**  
Examines issues on the forefront of technological research

## Chemistry

- Structure and Properties of Matter
- Conservation of Matter ■ Oxidation-Reduction Reactions ■ Catalysts ■ Activation Energy ■ Reaction Kinetics ■ Biochemical Reactions ■ Combustion ■ Thermodynamics

## Biology & Life Sciences

- Photosynthesis ■ Enzymes ■ Biochemistry

## Mathematics

- Measuring ■ Graphing (Making, Reading, and Interpreting) ■ Computing ■ Averages ■ Rates

## Physics & Physical Sciences

- Properties of Matter ■ Physical and Chemical Changes ■ Heat Energy ■ Light Energy ■ Energy Transformations

## Geology & Earth Science

- Metals ■ Use of Natural Resources ■ Environmental Pollution Issues

## Technical Education

- Designing ■ Building Prototypes ■ Communications

## Language Arts

- Writing a Report ■ Public Speaking

## Materials World Modules

An Inquiry & Design Based STEM Education Program  
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