



Yale-New Haven
Teachers Institute®

Curriculum Units by Fellows of the Yale-New Haven Teachers Institute
2012 Volume IV: Engineering in the K-12 Classroom: Math and Science Education for the 21st-Century
Workforce

Fostering Connections: The Elements of Nano

Guide for Curriculum Unit 12.04.01

by Karen A. Beitler

As technology advances, scientists have learned to manipulate atoms the way a cook manipulates spices for a gourmet dish. Working from an unseen world of nanoparticles that are only a few atoms in size and acting differently than would be expected, man has learned to mimic natural molecules and compounds. This unit takes the student from a review of the atom and encourages research into the vast work of polymers. By looking at a morning in a teenager's life, real-world relationships of the building blocks of plastics are explored.

Students will make connections between an everyday object and its raw material. Then they will examine the process of making a polymer, joining the atoms, repeating of molecular patterns and condensation of monomers to man's end use of materials to make objects that nature doesn't break down very well. Students will consider the reliability of the resources they use for information. The unit encourages students to do research, form opinions and defend positions they take on past and current chemical technologies.

By presenting both the risks and benefits to the health and well-being of humans, plants and animals, synthetic world processes are compared with the natural cycle of life. Students will explore new frontiers in material science and be able to make informed statements about nanotechnology. As they become more confident in the reliability of the information they gather and present scientific information individually and in small groups, students will become able to make informed decisions about the physical make-up of their world and hopefully become advocates for a sustainable future.

(Recommended for Physical Chemistry and Integrated Science, grade 9)

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