



YALE NATIONAL INITIATIVE

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Curriculum Units by Fellows of the National Initiative
2017 Volume IV: Chemistry of Cooking

Being Corny: Using Popcorn to Explore Thermodynamics

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This unit address the Next Generation Science Standards, NGSS, for middle school as it pertains to matter and its interactions. Although created for sixth graders, this three week unit is applicable to seventh and eighth grade as well. Starting with the phenomenon of popcorn, students will explore the relationship between heat energy and change of state. Through investigations, they will discover that popcorn kernels explode due to increased pressure inside the hull as the liquid water is transformed into water vapor when the seed is heated. They will then look at other changes of state, due to the addition or removal of heat energy, with the focus being on water and its properties. Transformation of energy is also discussed as students learn how electrical energy is transformed into heat of conduction, convection and radiation. This inquiry based unit uses all of the eight science practices of the NGSS as they ask questions, develop and use models, plan and carry out investigations, analyze and interpret data, use mathematics and computational thinking, and engage in argument from evidence. It also incorporates several key math and English language arts' Common Core standards.

(Developed for Integrated Science, grade 6; recommended for Transformation of Energy, grades 6-8; Water, grade 3; and States of Matter, grades 3-5)

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