



Curriculum Units by Fellows of the Yale-New Haven Teachers Institute  
2020 Volume II: Chemistry of Food and Cooking

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## How Do We Use Electromagnetic Waves to Cook Food?

Guide for Curriculum Unit 20.02.04  
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This curriculum unit is designed for 9th-grade students to learn about electromagnetic waves. The unit uses microwave and conventional ovens as examples to illustrate how electromagnetic waves are applied in daily life. In this two-week unit, students will learn the physics and chemistry behind how a microwave oven uses microwave radiation and a conventional oven uses infrared radiation to make their food hot. The students will first learn what heat is by discussing kinetic energy and molecular motions that include translational, rotational, and vibrational motions. Then, the unit will focus on how food is heated up in a microwave oven. Students will learn about rotational motion of water and the frequency of the rotational motion. Finally, the students will explore how a microwave oven works differently from a conventional oven with an emphasis on identifying the microwave and infrared regions in the electromagnetic spectrum and noticing their relative difference in energy. To engage students in exploring these questions, the unit will include three activities: (1) measuring the wavelength of microwaves, (2) discovering what actually is heated up in the microwave, and (3) modeling how the heating process in the ovens happens at the molecular level.

(Developed for PhyChem, grade 9; recommended for Electromagnetic Waves, grades 9-12)

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