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CHEMISTRY EDUCATION FOR UNDERGRADUATE AND HIGH SCHOOL STUDENTS: USING BIOFUEL ANALYSIS TO LEARN THEORY FROM EXPERIMENTAL

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UNESCO recommended introduction of Education for Sustainable Development, at high school and undergraduate levels. Consequently, educators introduced new syllabi and innovative teaching through a problem oriented approach. The latter dwells on current, socio economically important themes, especially those related to green chemistry and sustainability. Increasingly, educators are shifting to student centered active learning teaching where the students work in groups to solve relevant problems. Active learning should be extended to high school students. On all levels, we should link the experimental results to theory. We used active learning to present diverse topics to high school and undergraduate students. Examples are experiments on chemical kinetics to teach reaction mechanism; dyeing and SEM microscopy to explain the reason for consumer

preference for natural fibers, and different methods of analysis of bioethanol and biodiesel and their blends with petroleum based fuels (gasoline and diesel oil). Methods for the latter analysis include the use of natural or synthetic dyes that show solvatochromism (UV Vis) and simple instrumental analysis, e.g., to measure the densities and refractive indices of fuel blends. Qualitative and quantitative analysis of fuel composition was done using simple gas chromatography–flame ionization detector (GC/FID) and advanced equipment, gas chromatography–mass spectrometry (GC/MS). The positive answer of the students to our approach is stimulating; the contact between high school and the university is both demanding and rewarding.

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