Standards Alignment

TOPS Chemistry labs are designed for students to learn that “scientific progress is made by asking meaningful questions and conducting careful investigation” as specified by the California State Science Standards. The TOPS experiments are designed to integrate into a teacher’s current curriculum, and employ a biochemical focus to enhance and bridge the biology and chemistry curricula. The experiments utilize modern technology including computer driven instruments of the type used in local industrial laboratories as well as commercially available data analysis software.

Esterification:
• Synthesis of isopentyl acetate (banana oil) and study of the product by gas chromatography. Comparison to natural product isolated by extraction from bananas.
• Uses analytical balance, microscale glassware kits, hot plates, gas chromatograph

Standards 2a*, 2b*, 3a*, 10b

Investigation and Experimentation Standards:  1 a*, b*, c, d, e, f*, j, m, l


Assessment of TOPS Chemistry Labs for 2011-12

Direct assessment using release questions drawn largely from the California Standards Test (CST Chemistry 2005, 2008, & 2009) shows the following effect on student conceptual understanding of topics associated with the hands on activity:

Topic: Ester Synthesis, Organic Chemistry
Number of Participating Students: 1102
Change in Score: 6% Increase (post-pre)
Analysis of variance shows this change is statistically significant (F(1,1102) = 43.3, p<0.001, η² = 0.04) with a small-medium effect size of the activity on student scores.