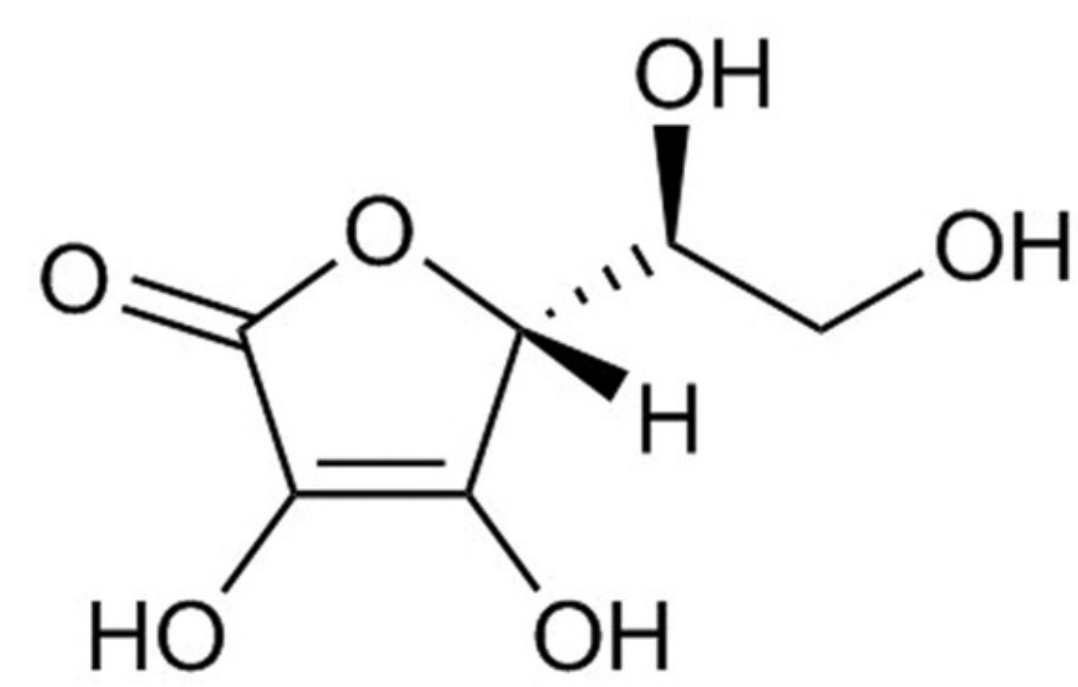


Determination of Ascorbic Acid in Vitamin Supplements by Ion-Pair HPLC

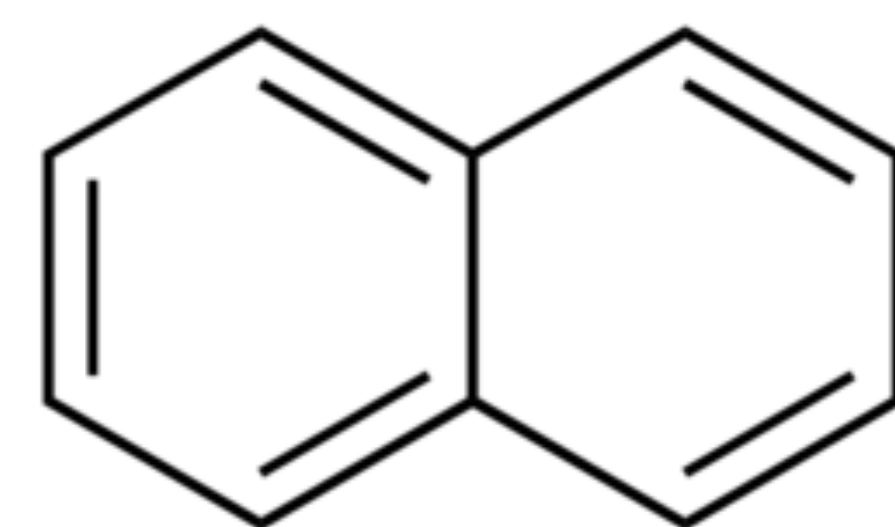
Jonathan Webb

ABSTRACT

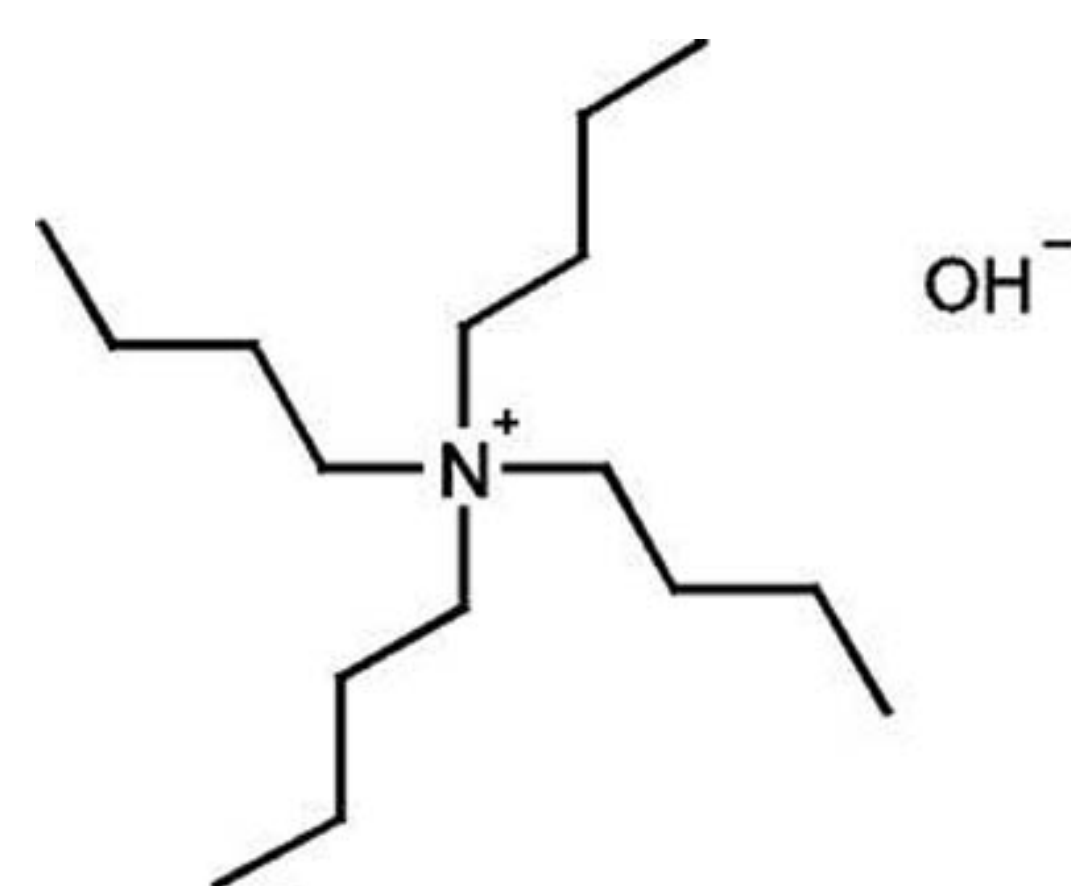
This paper is concerned with the quantification of ascorbic acid in commercially available multivitamins. The motivation for this experiment was skepticism of supplement industry quality control; Vitamin C is of particular interest because of its various, essential roles in the human body and its symptoms of deficiency. The multivitamin's ascorbic acid content was determined using reverse-phase HPLC with UV-vis detection. The mobile phase was comprised of 20% methanol and 80% phosphate buffer with 0.005 mol/L tetrabutylammonium hydroxide present as an ion-pair reagent; the relative concentrations of the mobile phase components were varied through individual trials. The pH of the mobile phase was approximately 6 (1). A calibration curve was developed using ascorbic acid standards, and the multivitamin's ascorbic acid content was quantified using the relationship generated by the curve. The data corresponded to there being 65 mg of ascorbic acid per pill, as opposed to the advertised 120



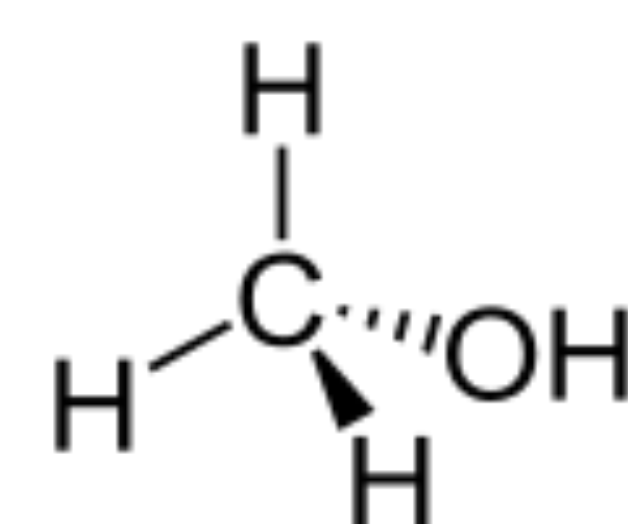
Ascorbic acid



Naphthalene

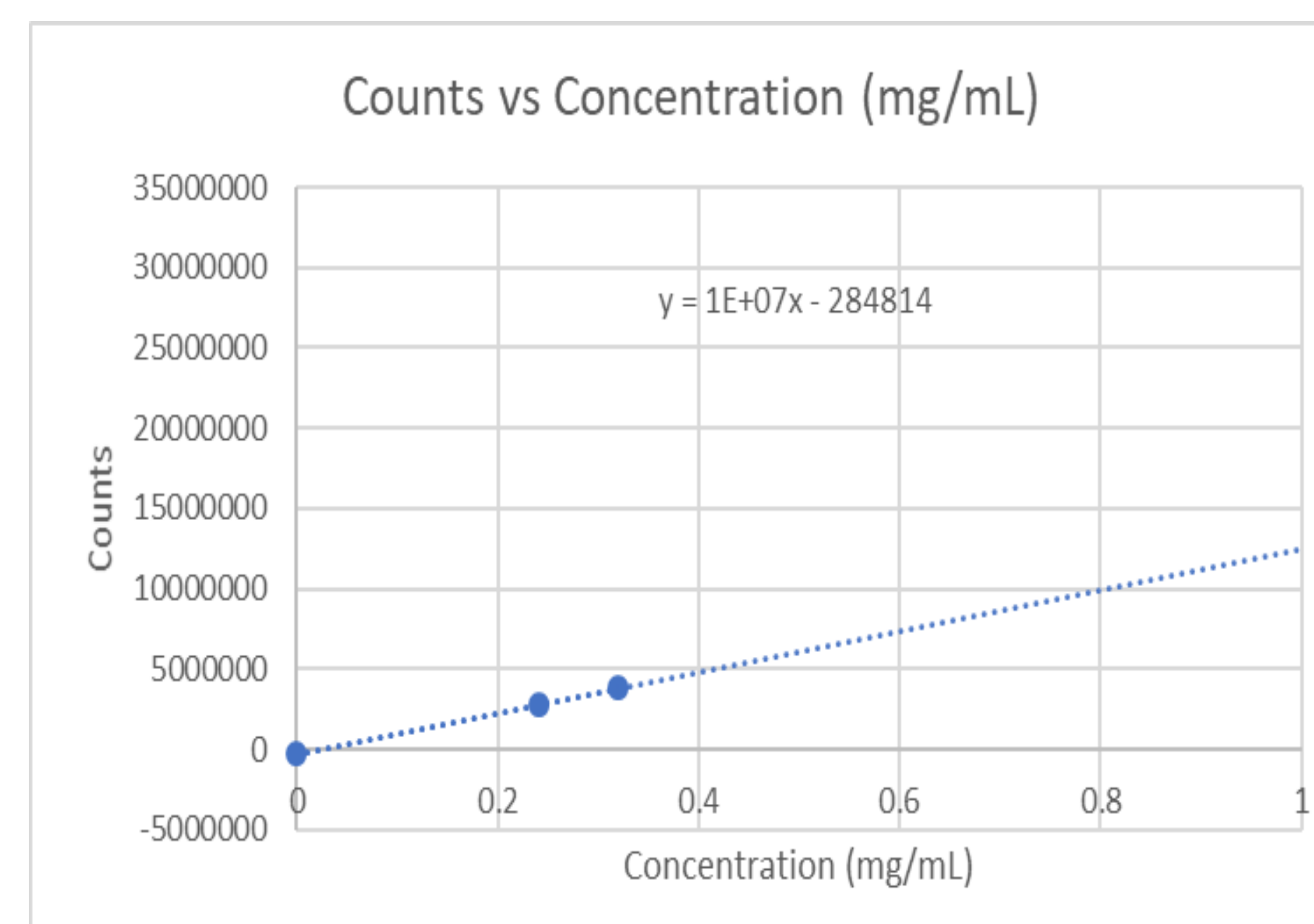
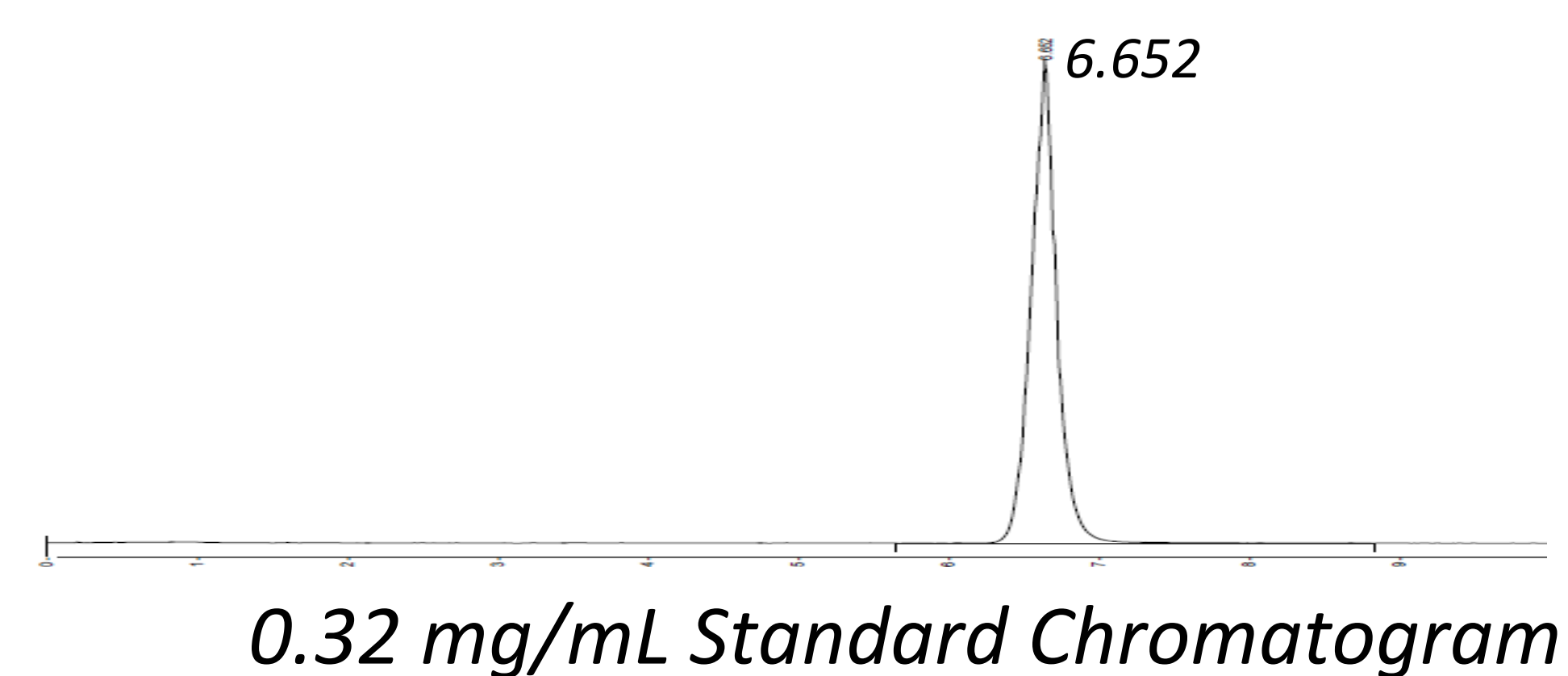
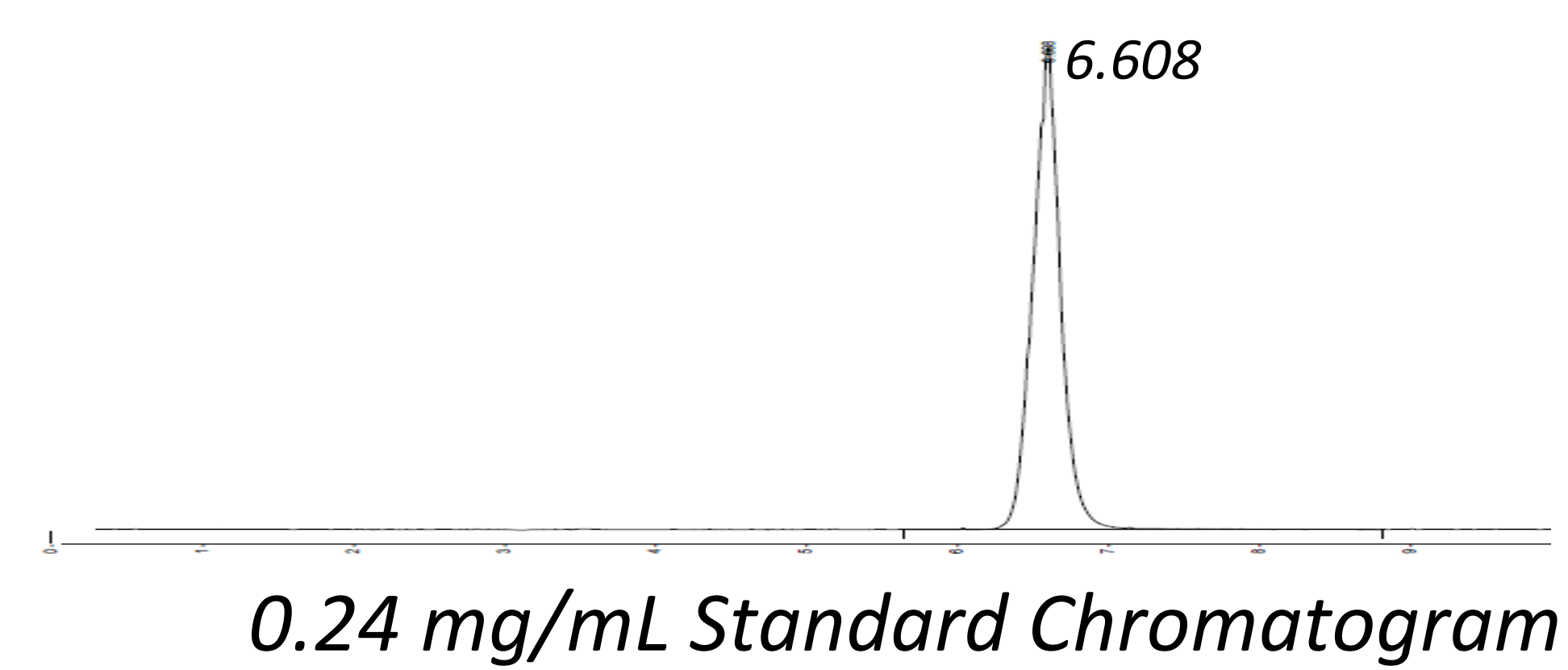
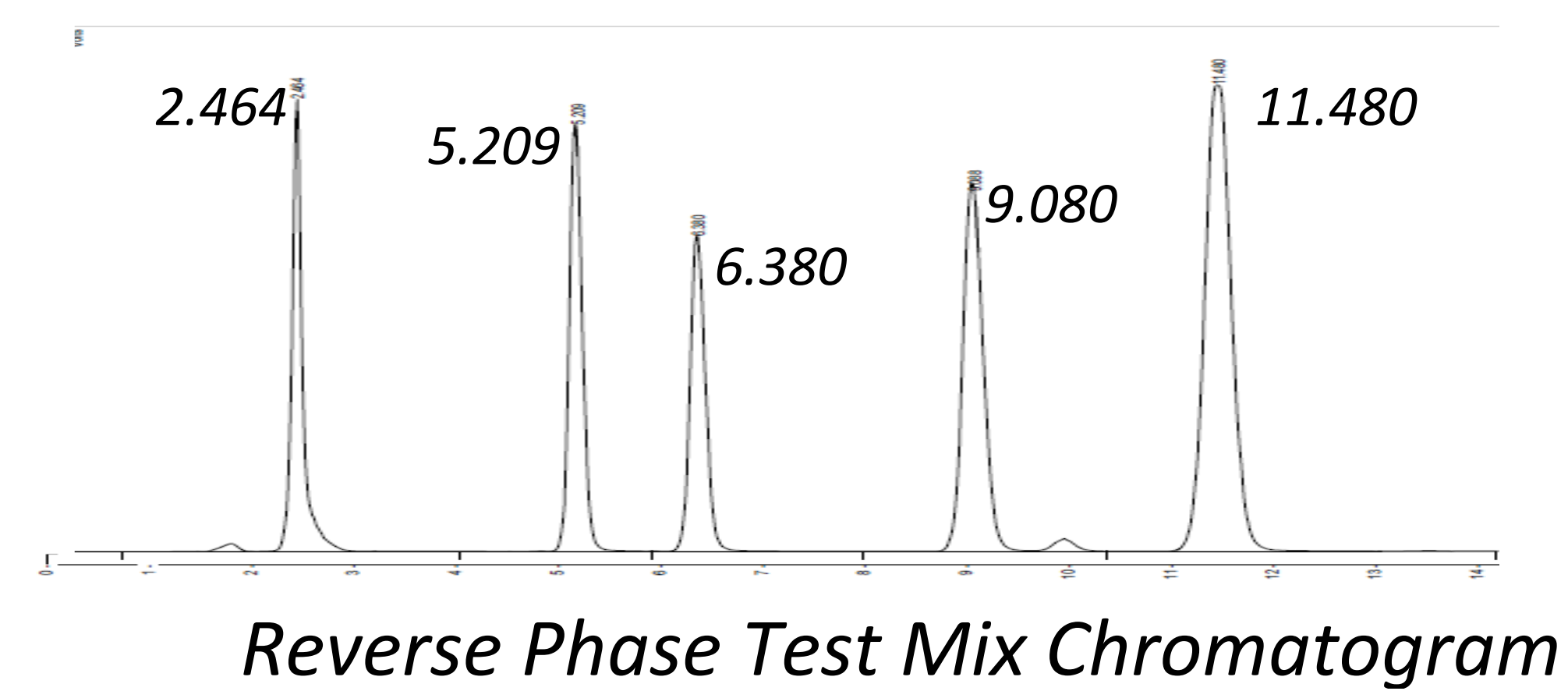
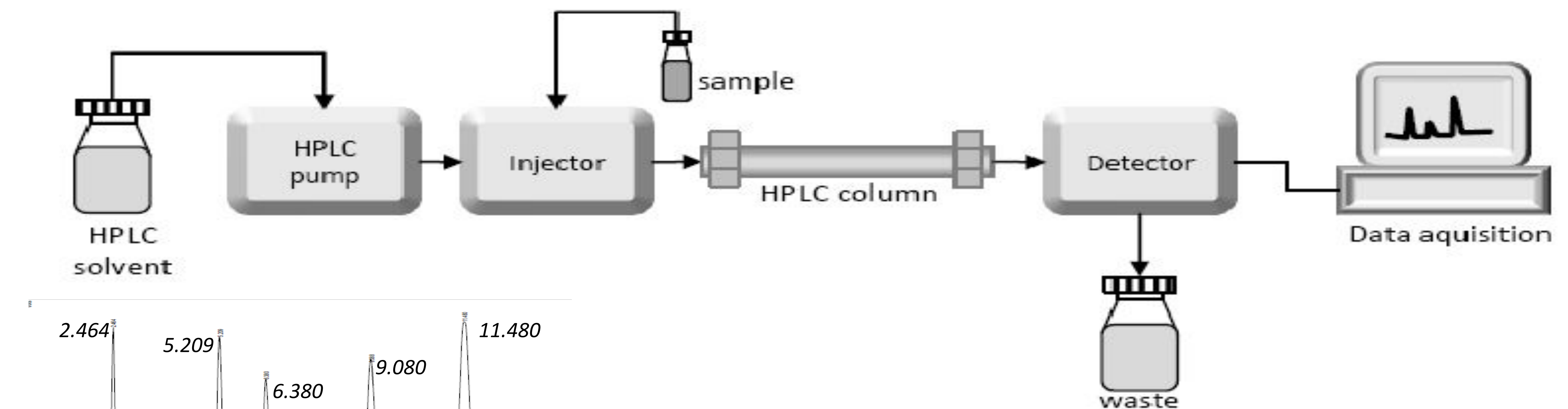


Tetrabutylammonium hydroxide

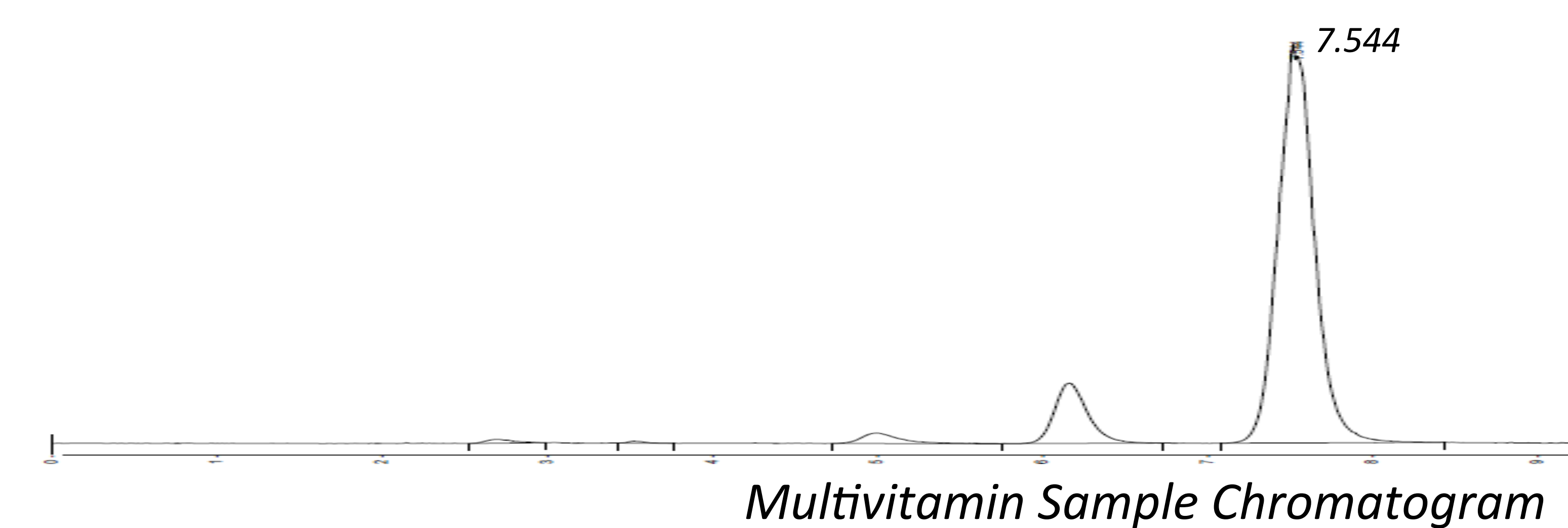


Methanol

PROCEDURE



DATA AND CONCLUSION



Analyte	Average Counts	Average Retention Time (minutes)
0.24 mg/mL Standard	2,782,026 ($\pm 2.0\%$)	6.605 ($\pm 1.4\%$)
0.32 mg/mL Standard	3,804,306 ($\pm 1.9\%$)	6.803 ($\pm 1.7\%$)
Multivitamin Sample	1,522,691 ($\pm 2.2\%$)	7.118 ($\pm 2.4\%$)

Analyte Data Table

The data suggests that the multivitamin contains about half of its advertised ascorbic acid content (65 mg instead of 120 mg per pill). This indicates a deficiency in the quality control efforts of the vitamin's manufacturer, Pfizer, although the current data is limited only to Vitamin C and not the product's other contents. Centrum, the multivitamin's vendor, was contacted with concerns regarding their product's quality however they have not provided batch records or any information pertinent to quality control.

Reference (1) - Hu, L., Li, L., Luo, Z., Yang, J., & Liu, W. (2012). Determination of Trace Vitamin C by Ion-Pair HPLC with UV Detection in Calcium Gluconate and Vitamin C Compound Oral Solution. *Journal of Chromatographic Science*, 50(2), 102-107. doi:10.1093/chromsci/bmr035