1. Basis for Detection Specificity

Clinical chemistry assays are generally performed on complex clinical matrices, such as serum, plasma, whole blood, urine, CSF, pleural fluid, etc. We are typically trying to detect compounds at low concentrations, nM – µM, in the context of hundreds (if not thousands) of competing substances. Therefore, each assay must have an analytical basis for "specificity" of the final compound detection. In chromatography assays, specificity derives from three generic sources: (1) sample preparation, (2) chromatographic separation, and (3) the detector. Listed below are a number of chromatographic assays performed in the Clinical Chemistry Laboratory. For each, review the methodology involved, and identify the origin for the specific detection of the desired compounds.

a) Serum alcohols by headspace gas chromatography

b) Whole blood immunosuppressants by LC/MS/MS.

c) [optional] Urine drug of abuse confirmation by either TLC or GC/MS.

2. The All Important Internal Standard.

Chromatographic assays always include one or more internal standards, which serve two critical functions. Briefly describe both of these. As a hint, consider that a generic chromatographic peak has two critical characteristics: (1) retention time/volume and (2) intensity/area.

3. Common Immunoassay Interferences.

Immunoassays are widely used in the Clinical Chemistry Laboratory because they are ***rapid*** and ***automatable***, allowing a high throughput of critical STAT testing. Unfortunately, like all clinical diagnostic assays, they are subject to unpredictable interferences. In general, interfering substances either inappropriately ***increase*** or ***decrease*** the apparent analyte concentration.