



THE LEADER IN ENVIRONMENTAL TESTING

Pitfalls of Using Non-Standard Standards

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Desired standard characteristics

- Correct compound or mixture
- Known & high purity
- Or known concentration
- No interfering components
- Form compatible with test method
- Readily available
- Acceptable cost
- Certified provider
- Good match between primary and second source

What happens when you don't get what you expect?



What scenarios make us more vulnerable?

- New analyte, not widely determined by commercial labs
 - ~ Emerging contaminant of interest
 - ~ Degradation product of known contaminant
 - ~ Site specific chemical

Examples

- Metals species
 - ~ methyl mercury
- Pharmaceuticals
 - ~ testosterone
- PTFE containing products
 - ~ perfluorocarbons
- Industrial use chemicals
 - ~ 4-methylcyclohexane methanol

Methyl Mercury - issues

- Availability
 - ~ Pure material available (H&S handling concerns)
 - ~ Custom dilute standard(s)
- Identity (concentration calculated as ...)
 - ~ Mercury (FW 201)
 - ~ methyl mercury (FW 216)
 - ~ methyl mercury chloride (FW 251)
 - ~ methyl mercury hydroxide (FW 233)

Methyl Mercury - issues

- Raw material sources
 - ~ Primary from Company A
 - ~ Secondary from Company B
 - ~ Both used raw material from Company C

Pharmaceutical products

- Large commercially available supply
 - ~ Not standards grade
- Higher purity standards
 - ~ Small quantity (5-50 mg)
 - ~ Academic or startup lab, not available long term
 - ~ No Certificate of Analysis
 - ~ Significant impurities even when >96% purity claimed

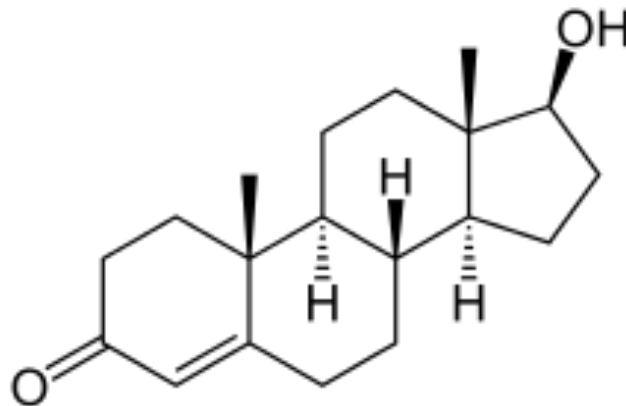
Pharmaceutical products II

- Primary source
 - ~ Small quantity, temporary supply
- Second source
 - ~ Good luck with that
- Isotopically labeled analogues
 - ~ Method requirement 1694/1698
 - ~ Hard to justify synthesis costs



Pharmaceutical products III

- Testosterone
 - ~ Law is concentration dependent
 - ~ Drug Enforcement Administration License – pure material
 - ~ Available – dilute solutions



Fluorinated Compounds

- Perfluorooctanoic Acid



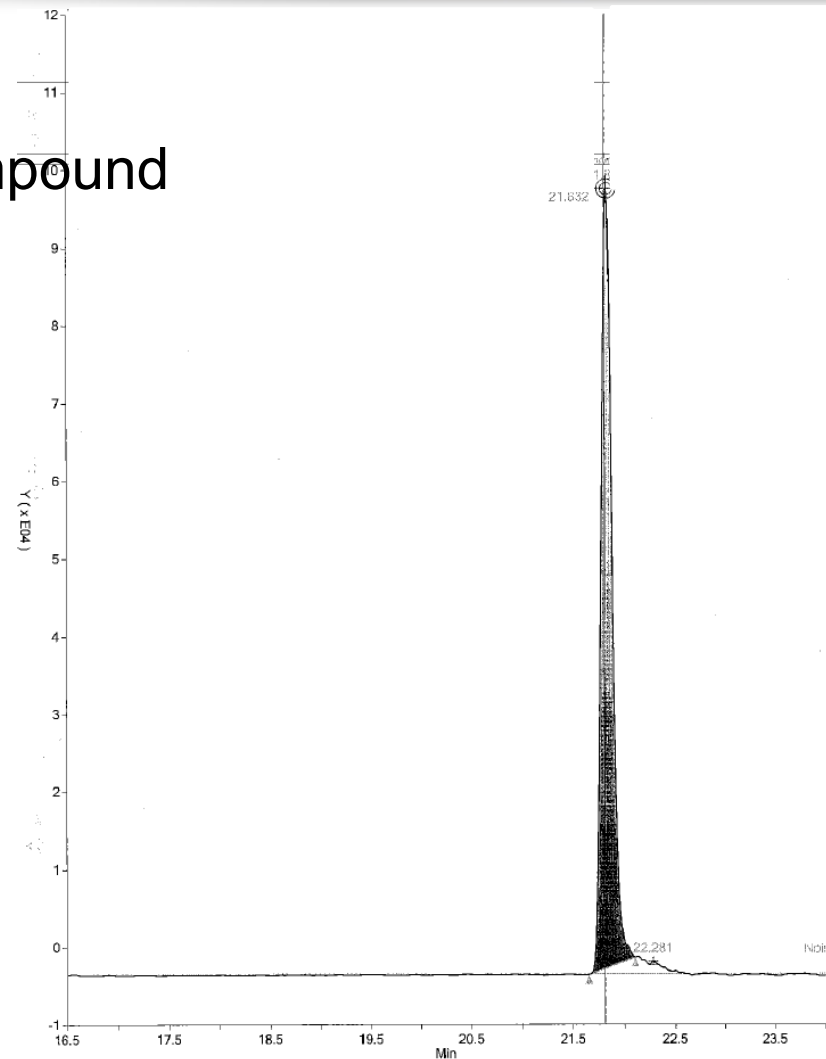
- Perfluorooctanesulfonic acid



- Quantitation mismatch due to isomer differences

Fluorinated Compounds

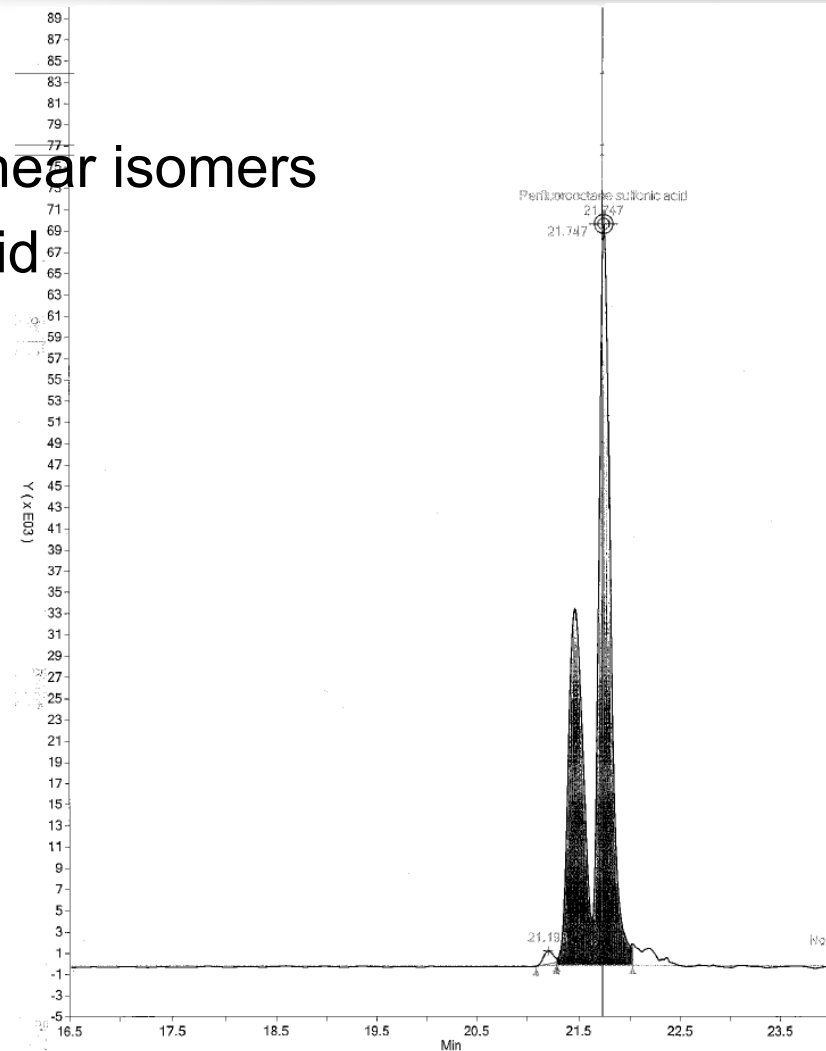
- High purity standards
 - ~ Linear or normal chain compound
 - ~ Perfluorooctanoic Acid



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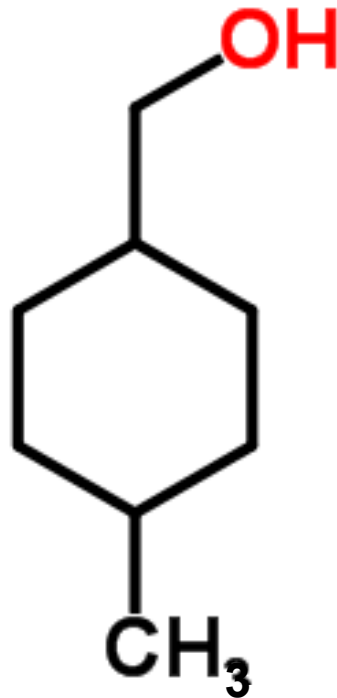
Fluorinated Compounds

- Manufactured materials
 - ~ Mixture of branched and linear isomers
 - ~ Perfluorooctanesulfonic acid



Industrial use chemicals

- 4-methylcyclohexane methanol



4-MCHM

- Freedom Industries' Charleston facility
- Up to 7,500 gallons of crude MCHM
- Elk River
- 1 mile upstream from Charleston drinking water intake
- 300,000 residents without normal drinking water supply
- Time is critical



- Standards grade material
 - ~ Few (one?) suppliers
 - ~ Limited supply quickly consumed by interested parties
 - ~ Second source?
- Kept adding analytes as project progressed
 - ~ Intentional minor components
 - ~ Impurities

- We want
 - ~ Correct compound or mixture
 - ~ Known & high purity
 - ~ Or known concentration
 - ~ No interfering components
 - ~ Form compatible with test method
 - ~ Readily available
 - ~ Acceptable cost
 - ~ Certified provider
 - ~ Good match between primary and second source

We don't always get what we want because

- Emerging contaminant of interest
- Degradation product of known contaminant
- Site specific chemical
 - ~ Emergency response

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