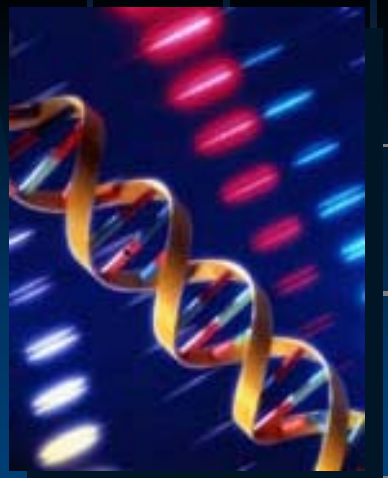

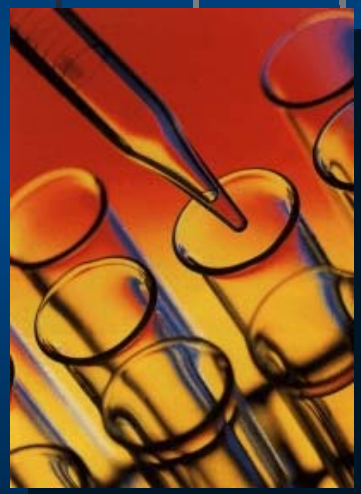

PerkinElmer™
instruments.

New Technology for Sulfur Detection

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Science and Technology Group
Otto.Prohaska@PerkinElmer.com

PerkinElmer Instruments

- Analytical Instrument Manufacturer
  - GC, GC/MS, HPLC
  - ICP-OES, ICP-MS, AA
  - UV/Vis, FTIR, FT Imaging
- Research new technologies
  - New instrument development for total and speciated sulfur monitoring
- New sulfur detection technology – patents filed

Summary of Key Technical Results

PerkinElmer™ instruments.

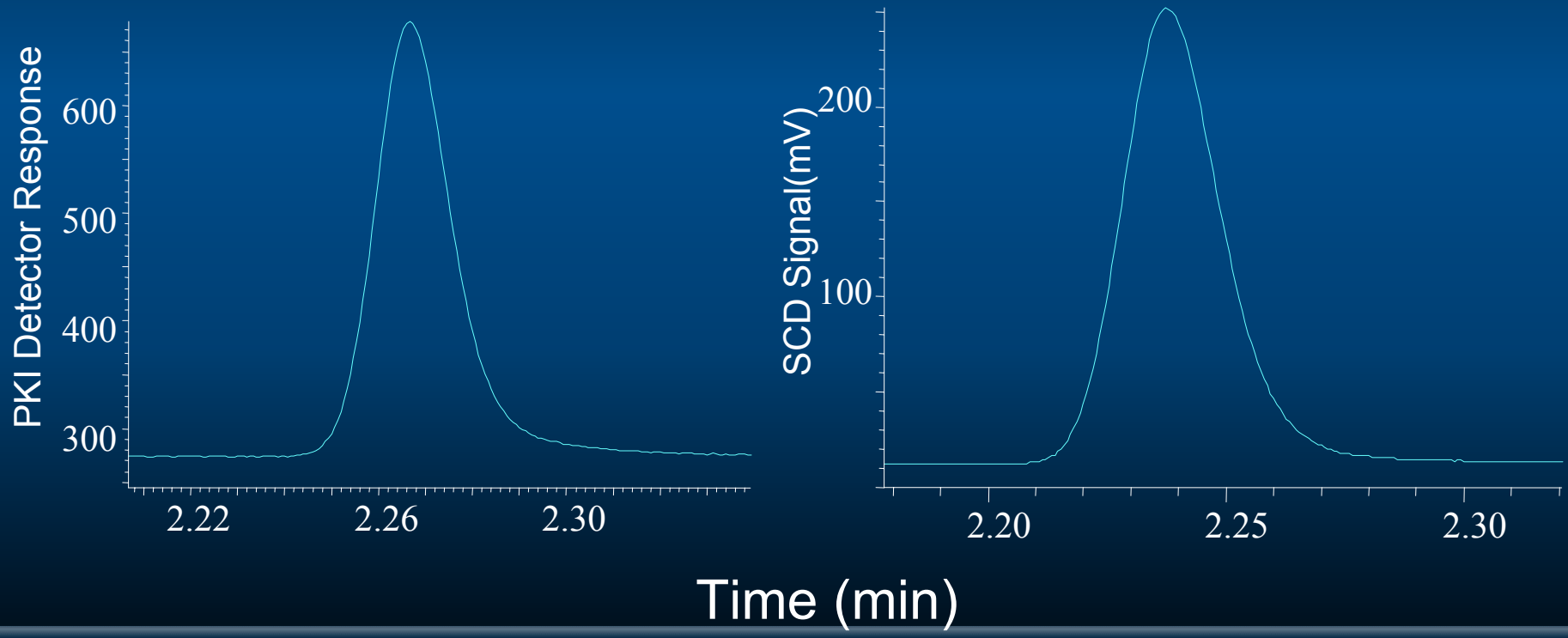
- Resolution - 0.15 pgmS/s; sample used for the study: thiophene
- Response Time - PWHM: 0.95 sec
- Selectivity - versus HCs is > 10^6
- Precision - < 3% for 10 runs
- Stability - drift < 5% per day
- Interferents - < 0.3% for nitrogen, phosphorous, chlorine compounds
- Linear Dynamic Range - 10^5 (concentration range with linear response)

Thiophene Response with PKI and SCD Detectors

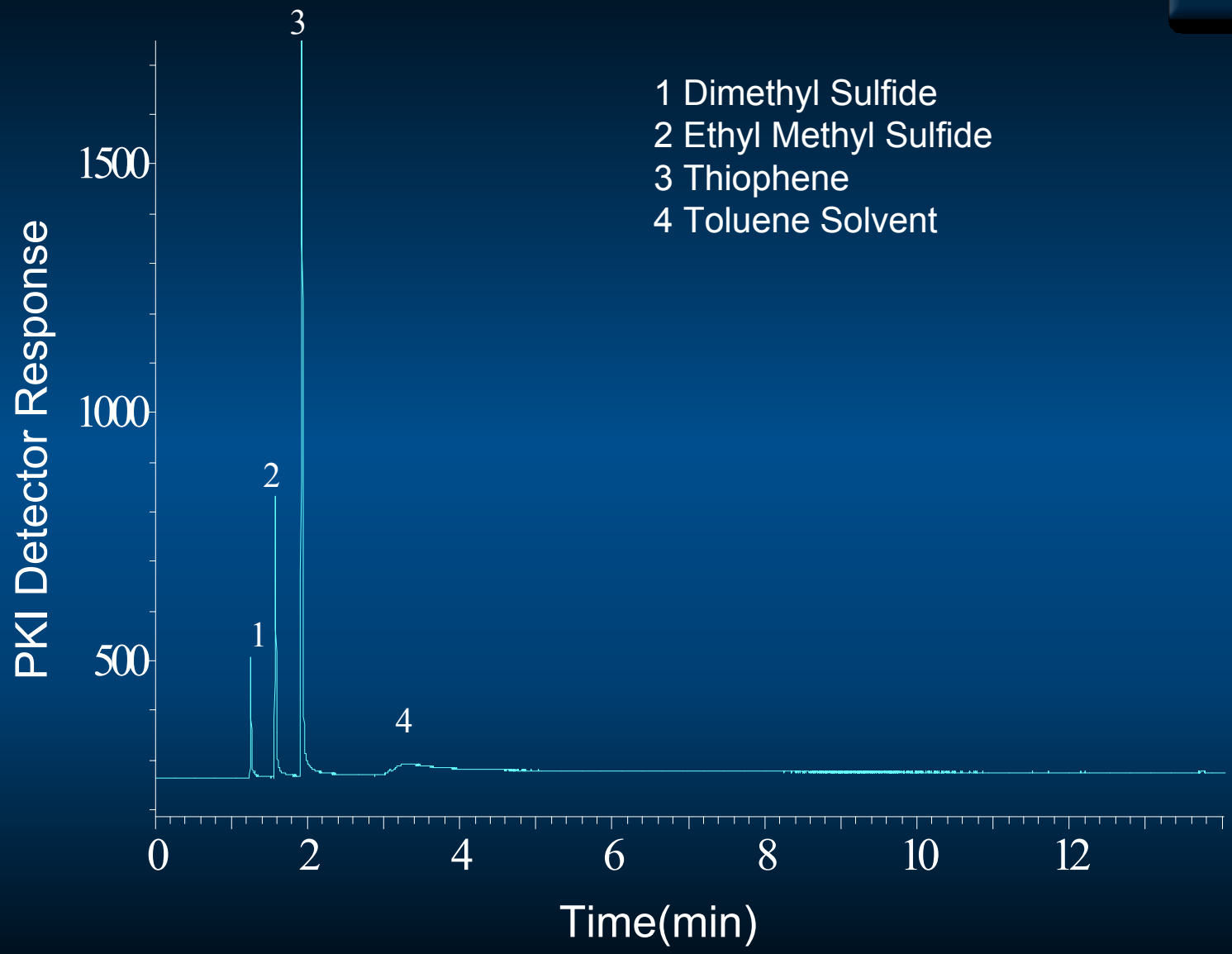
PerkinElmer™ instruments.

Amount Injected 0.5 uL
Concentration: 200 ppm Thiophene
Split Ratio: 100:1
PWHM=1.2 s
Signal/Noise = 5400
Peak Asymmetry factor at 5 %=1.3

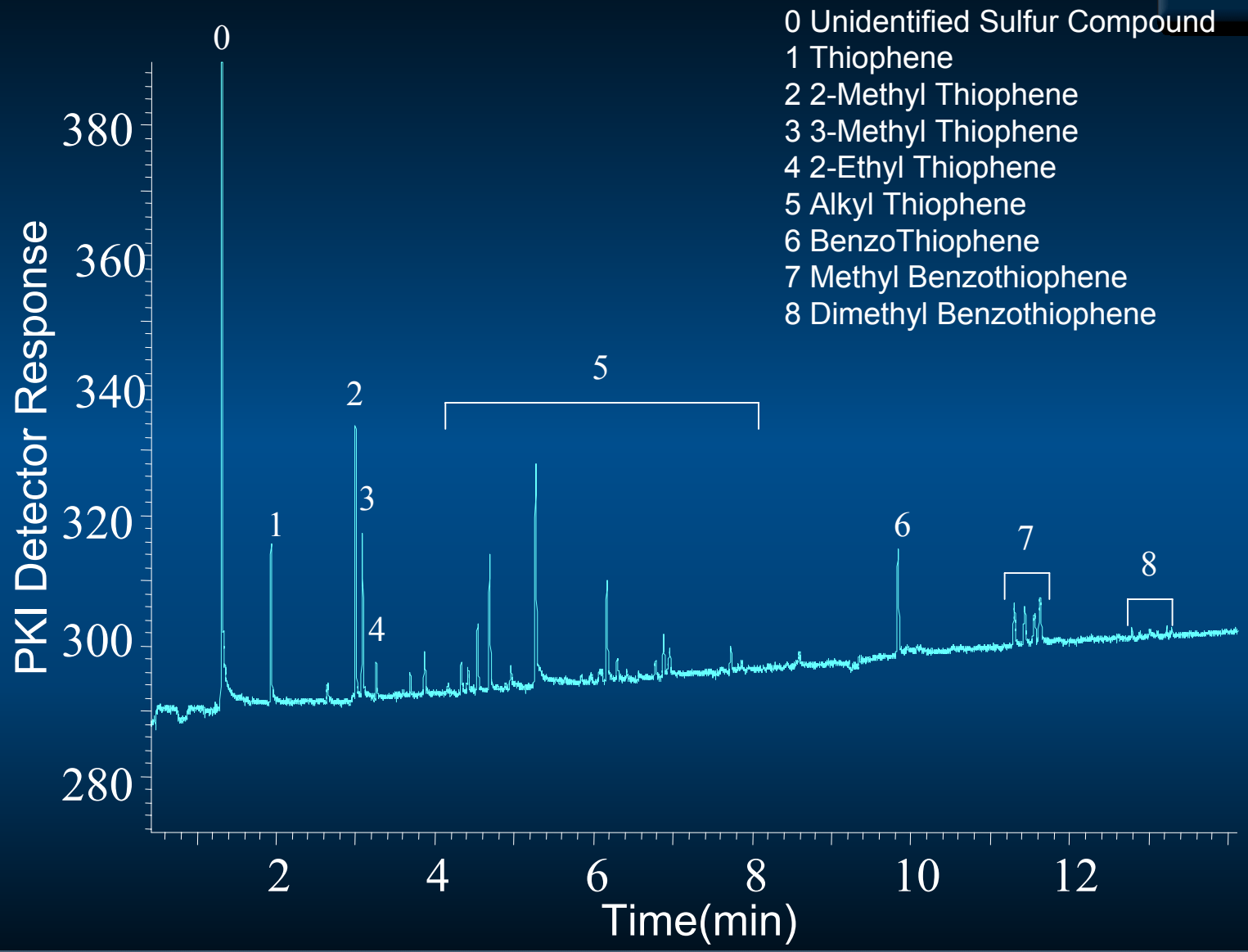
Amount Injected 0.5 uL
Concentration: 200 ppm Thiophene
Split Ratio: 100:1
PWHM=1.4 s
Signal/Noise = 4700
Peak Asymmetry factor at 5 % =1.22



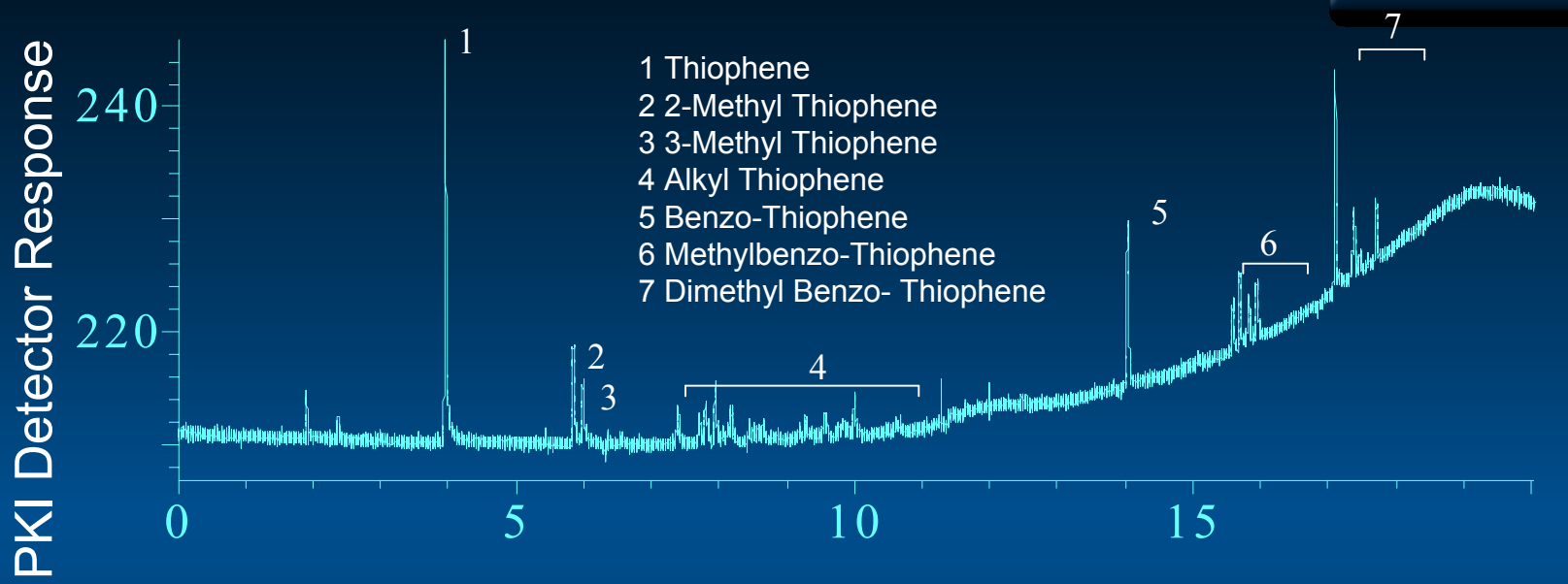
Sulfur Compound Standard from Sievers: Results with PKI Detector

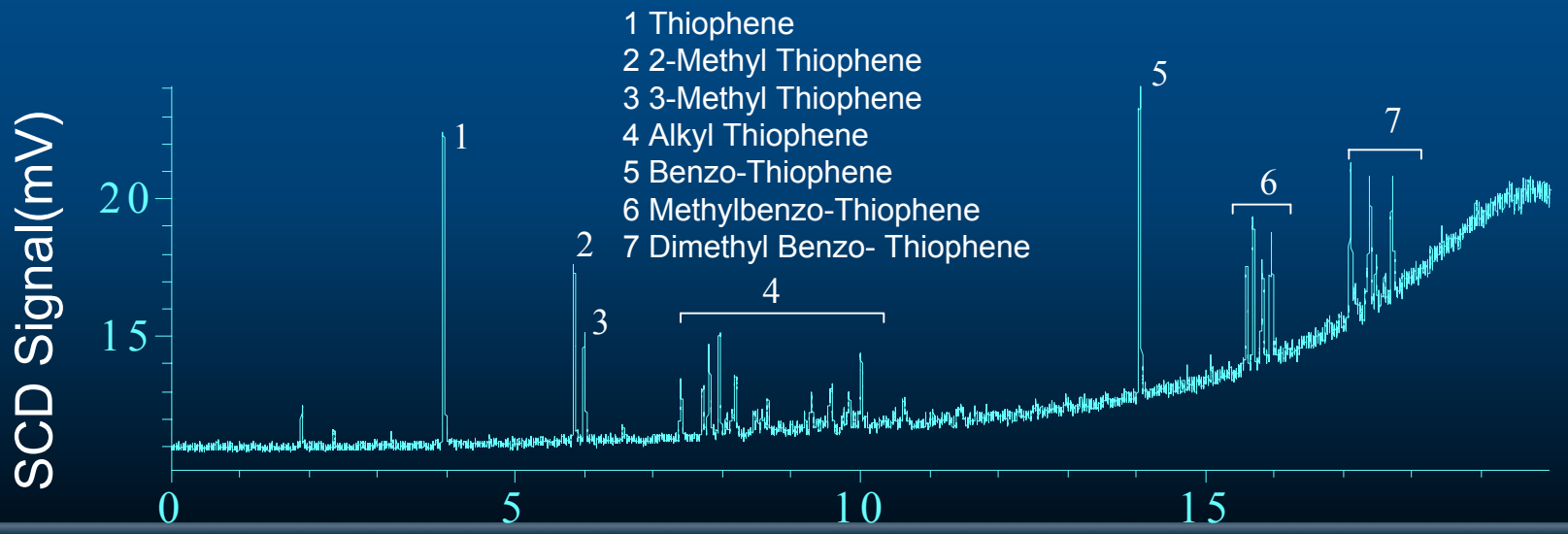


Gasoline Sample



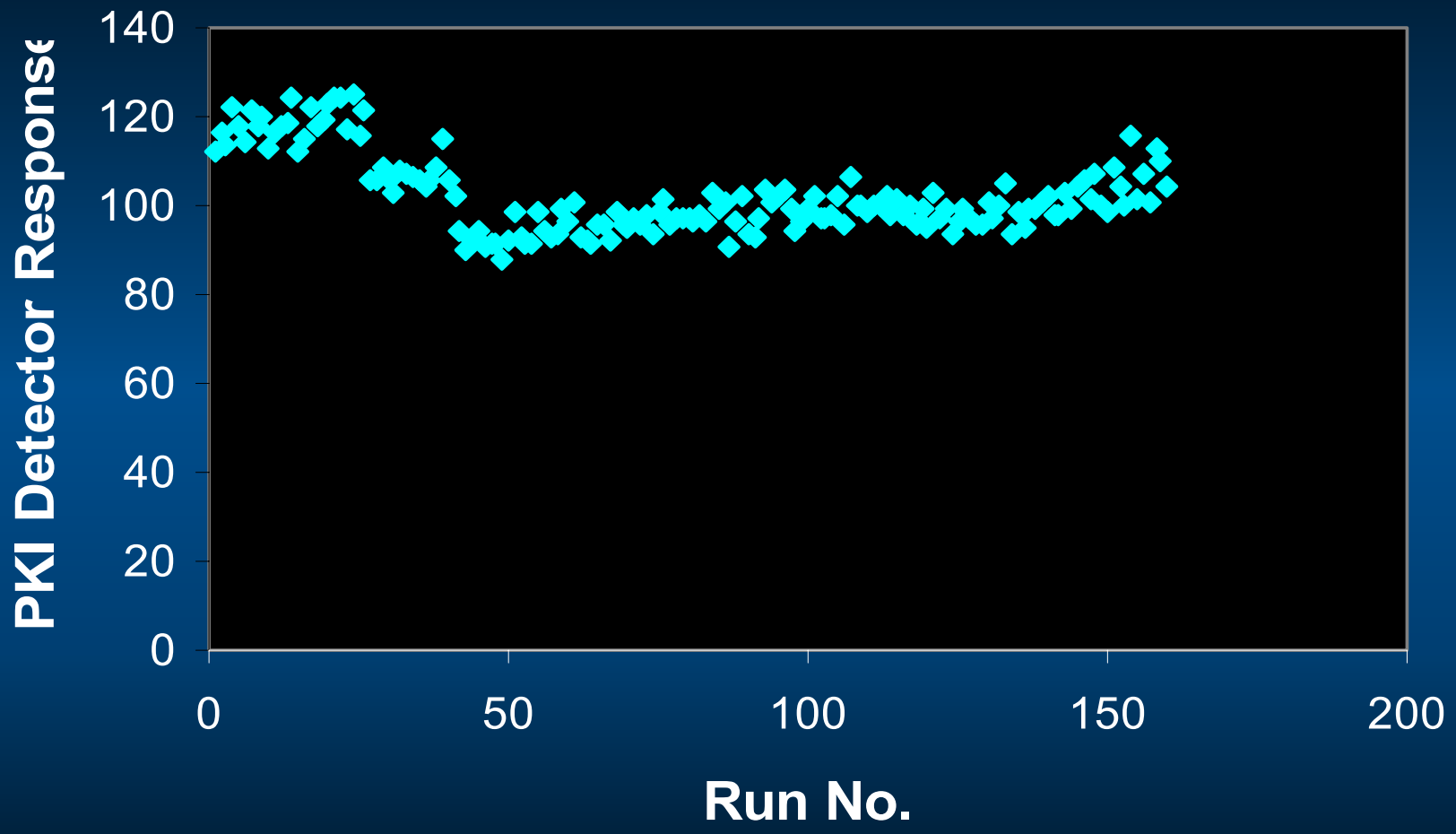
Gasoline Response with PKI and SCD Detector





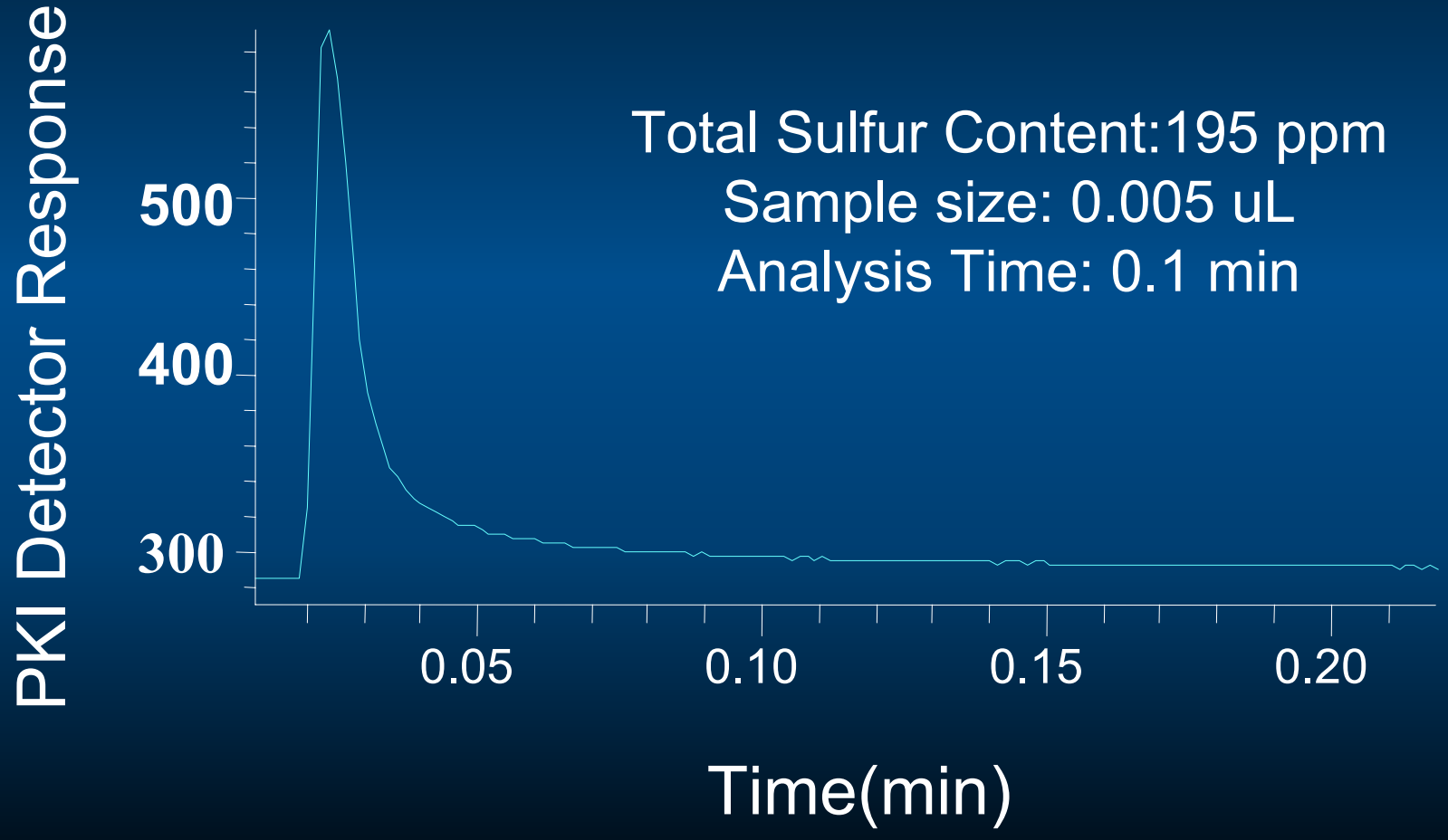
Time(min)

Long –Term Stability - Gasoline



Total Sulfur Measurement in Gasoline

PerkinElmer™ instruments.



Total Sulfur Content:195 ppm
Sample size: 0.005 uL
Analysis Time: 0.1 min

Summary of Key Technical Results

PerkinElmer™ instruments.

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- Precision - < 3% for 10 runs
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