

Side-by-Side Comparison of Eight Field Test Methods with ASTM Reference Tests

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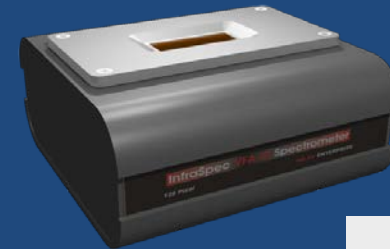
Purpose of Study:

- Many field-test instruments becoming available:
 - Portable
 - Fast
 - Convenient
 - Cost effective
- How comparable are the results to the reference ASTM/EN procedures?

- InfraCal (Wilkes)- Mid-IR Spectrometer



- InfraSpec (Wilkes)- Mid-IR Spectrometer



- Irox Diesel (Grabner)- Mid FT-IR Spectrometer



- MiniDis (Grabner)- Atmospheric Distillation



- PetroOXY (Petrotest)- Rapid Small Scale Oxidation test



- QTA (Cognis)- Mid FT-IR Spectrometer

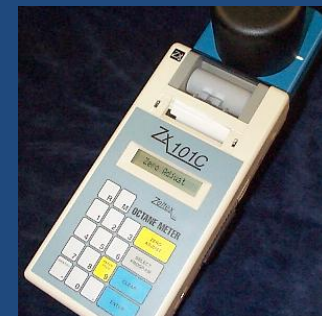


- QTA Mini (Cognis)- “QTA Lite”

- Sulfur Express (Antek)- UV Fluorescence Spectrometer



- ZX-101C (Zeltex)- Near-IR Spectrometer

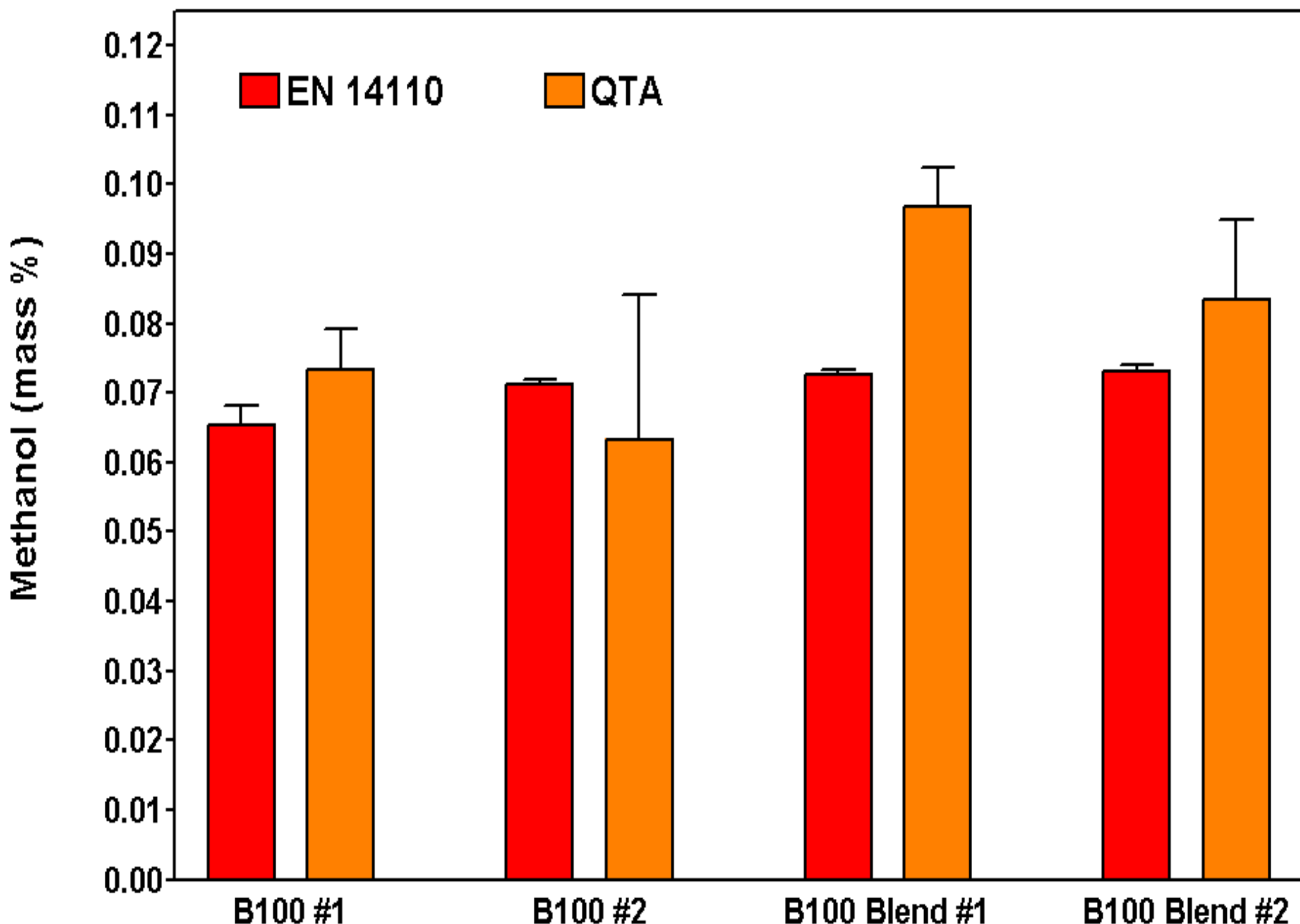


ASTM or EN Test	Description	Instrument(s)
EN 14110	Methanol Content	QTA
D 5453	Sulfur Content	Sulfur Express
D 6584	Free Glycerin	QTA
D 6584	Total Glycerin	QTA
D 86	Distillation Temperature	MiniDis
EN 14112	Oxidation Stability	PetroOxy
D 7371	Biodiesel Content	QTA QTA Mini InfraSpec InfraCal Irox Diesel Zeltex

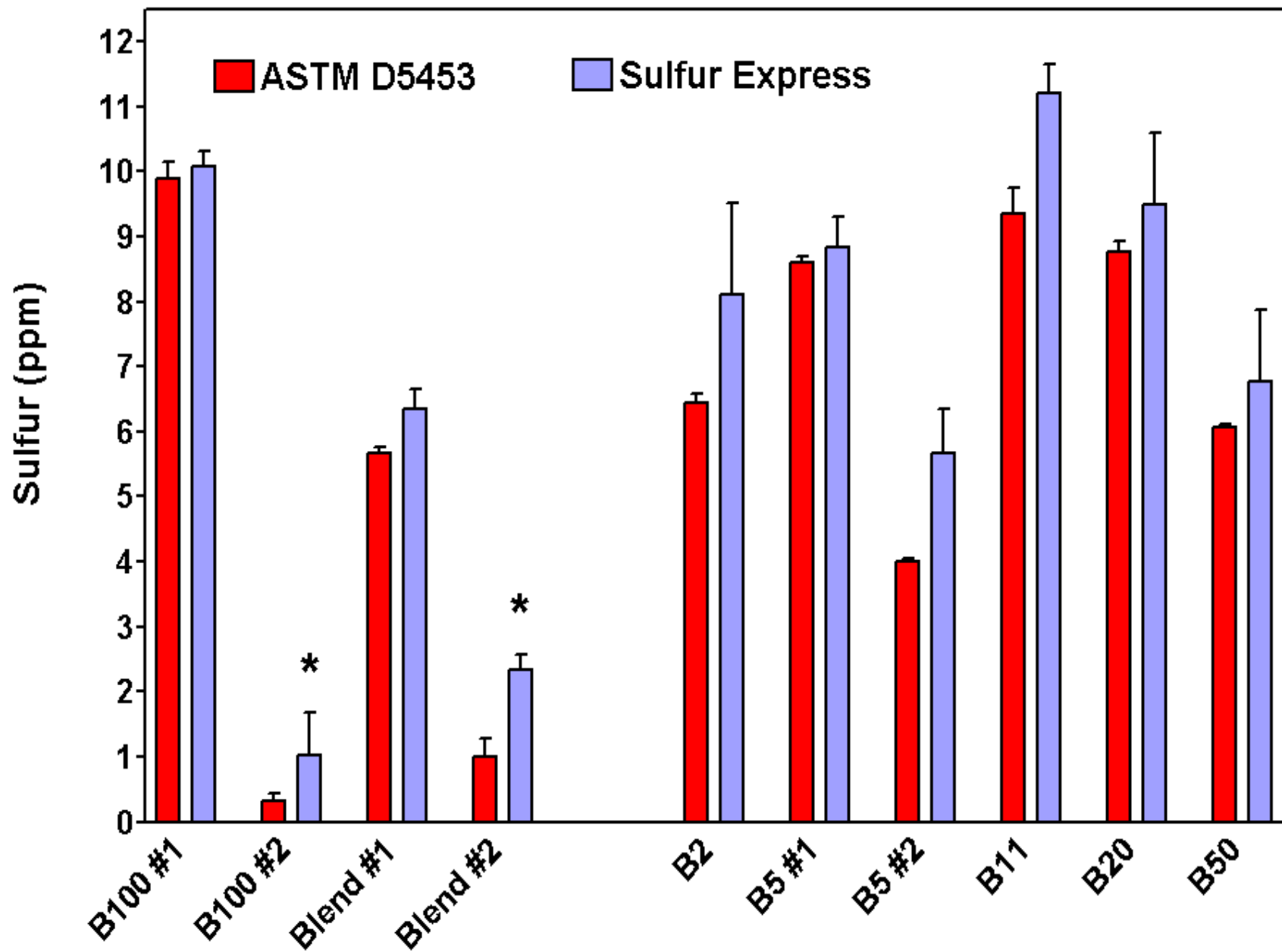
Fuel Samples Used

Fuel	Description
B100 #1	Soy B100, old sample
B100 #2	Soy B100
B100 Blend #1	Soy/Animal Blend
B100 Blend #2	Soy/Animal Blend
B2	2% Biodiesel
B5 #1	5% Biodiesel
B5 #2	5% Biodiesel
B11	#2 Diesel with 11% Soy Biodiesel
B20	#2 Diesel with 20% Soy Biodiesel
B50	#2 Diesel with 50% Soy Biodiesel

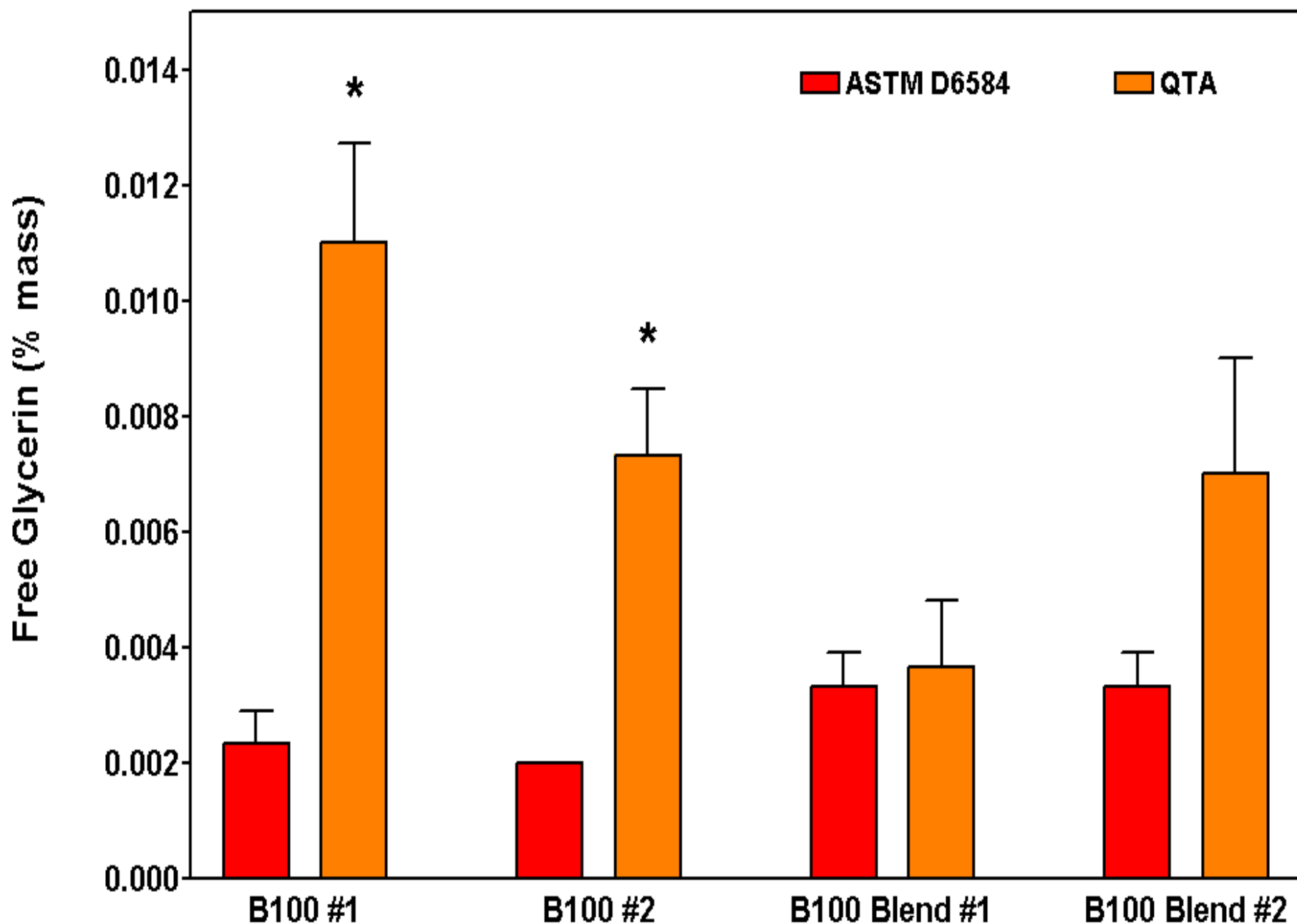
Methanol by EN 14110



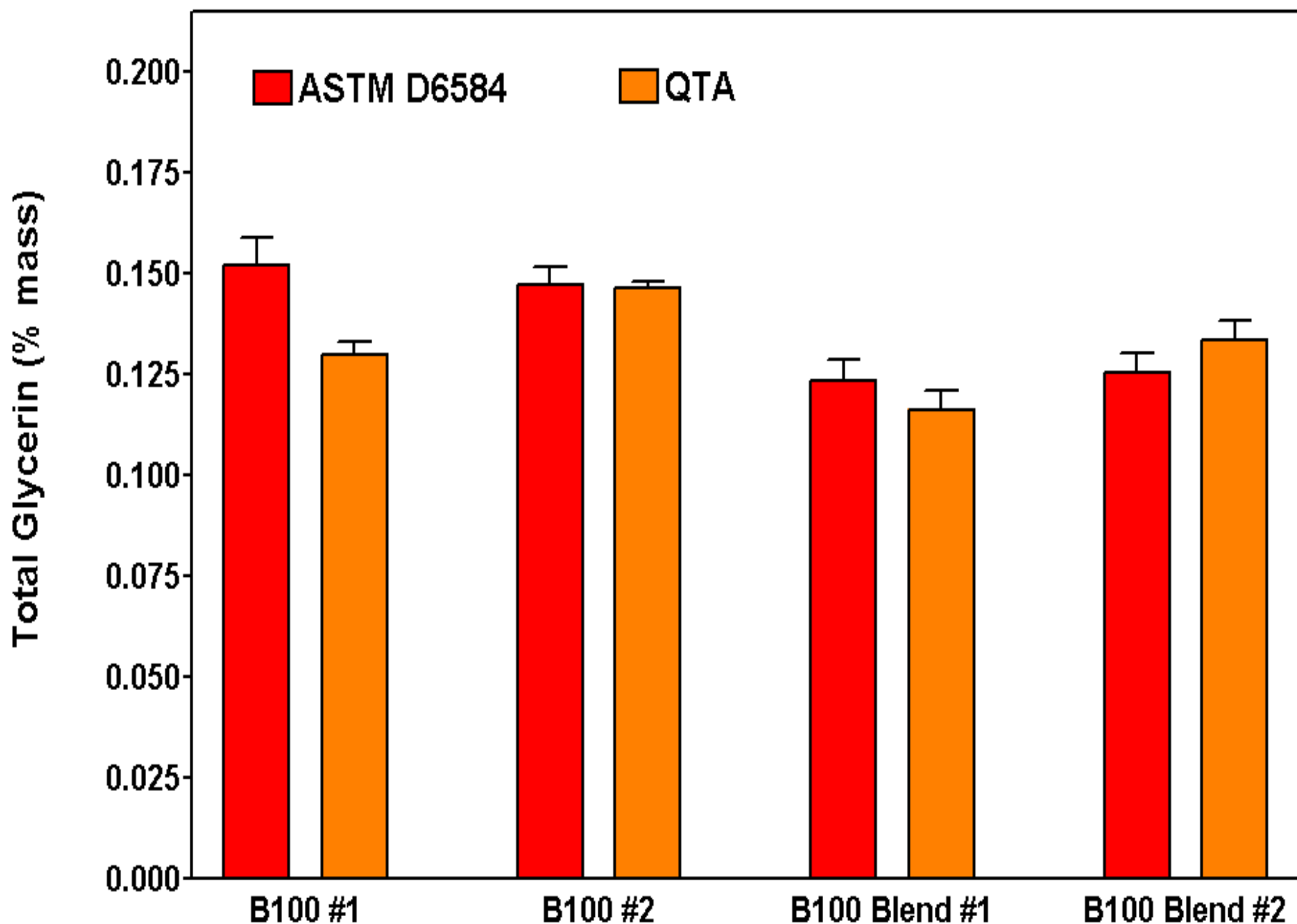
Sulfur by ASTM D5453



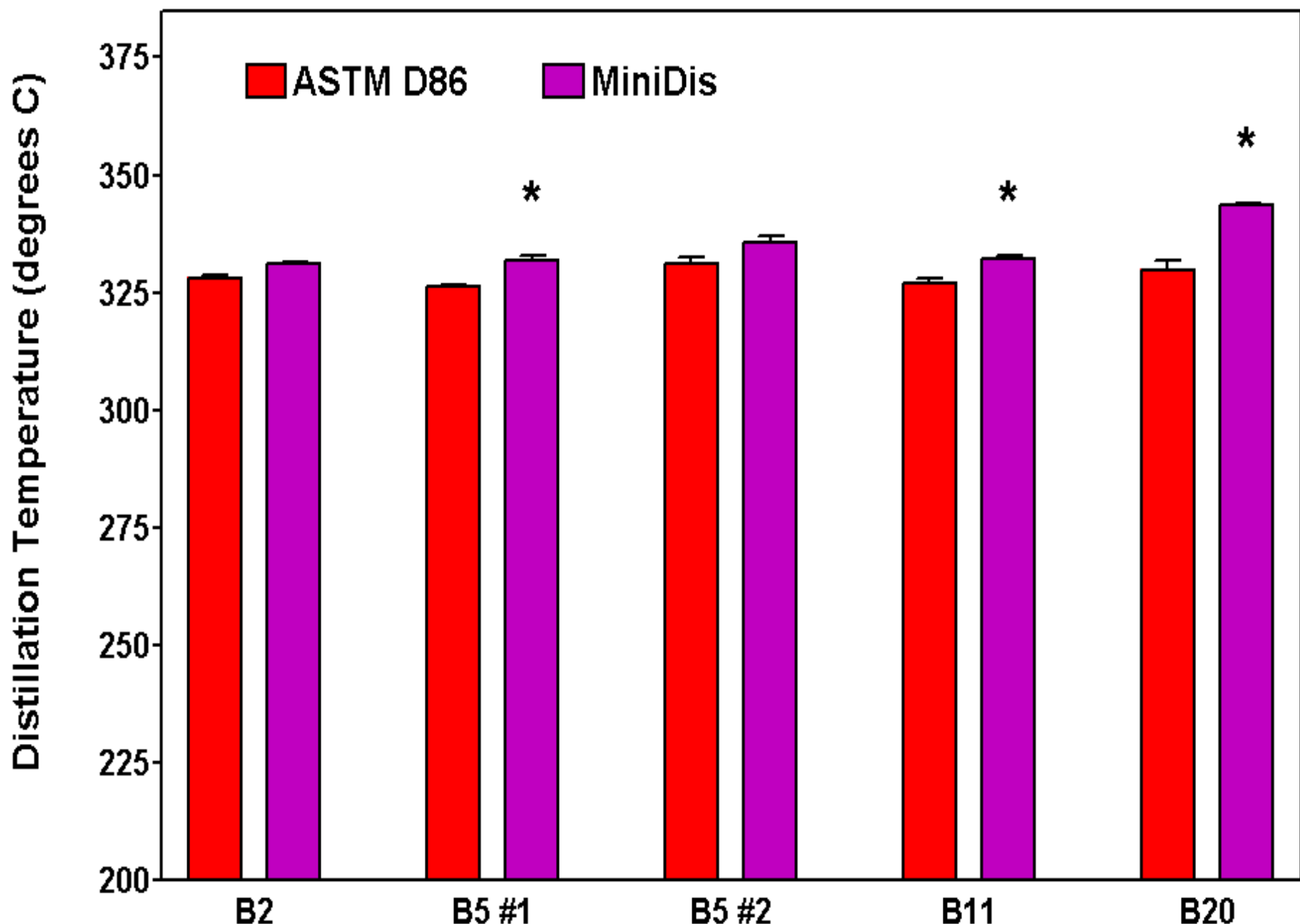
Free Glycerin by ASTM D6584



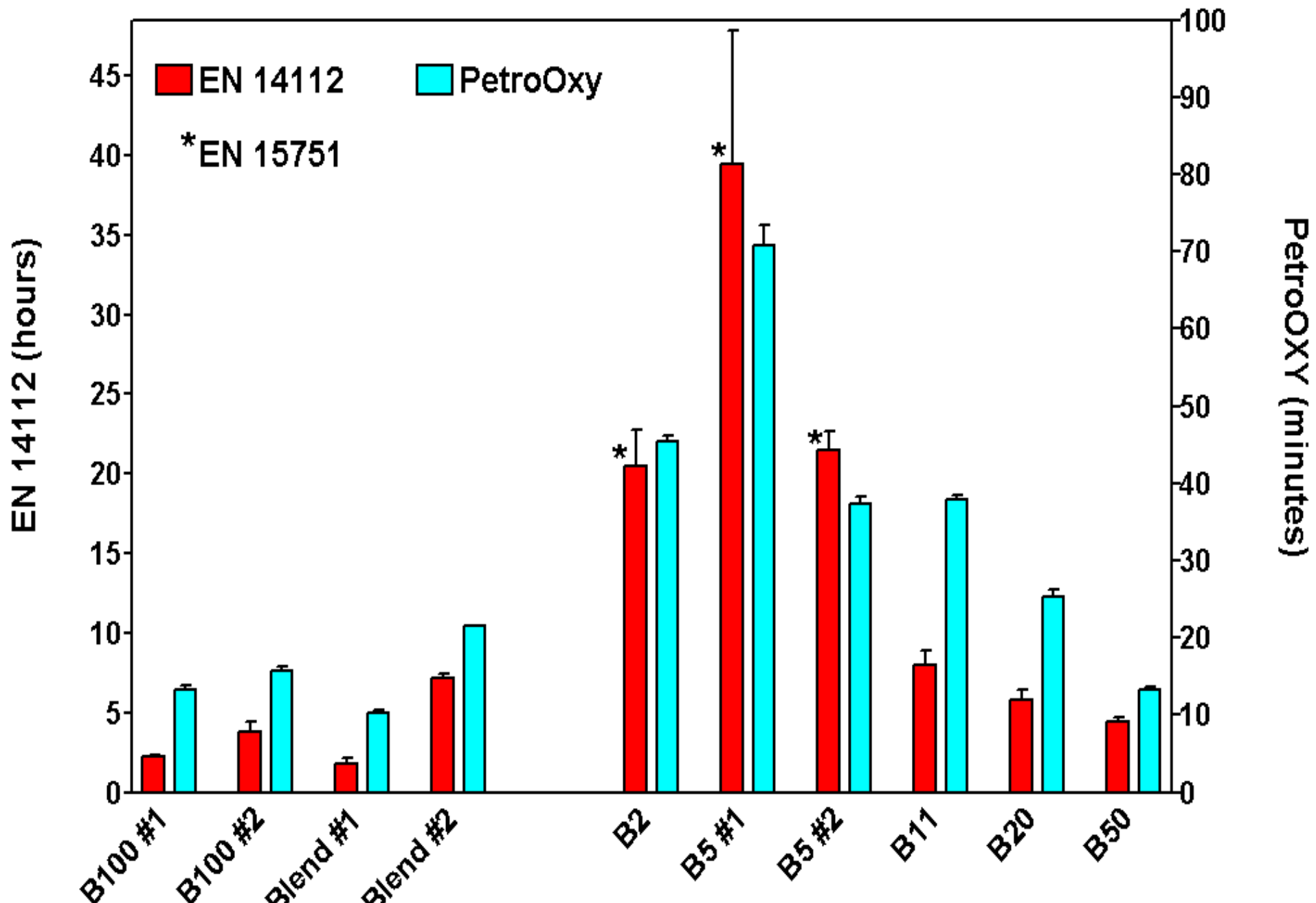
Total Glycerin by ASTM D6584



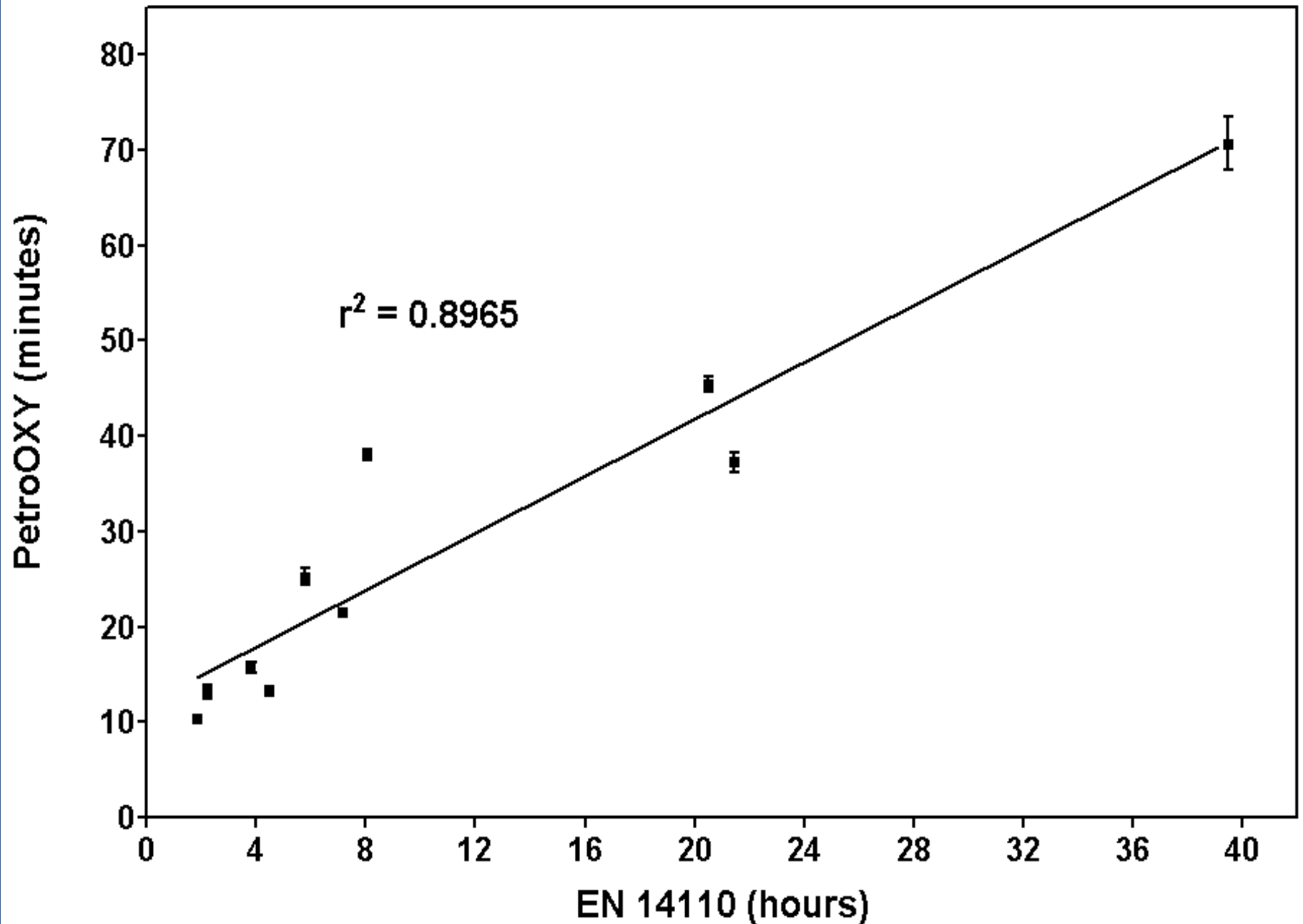
Distillation by ASTM D86



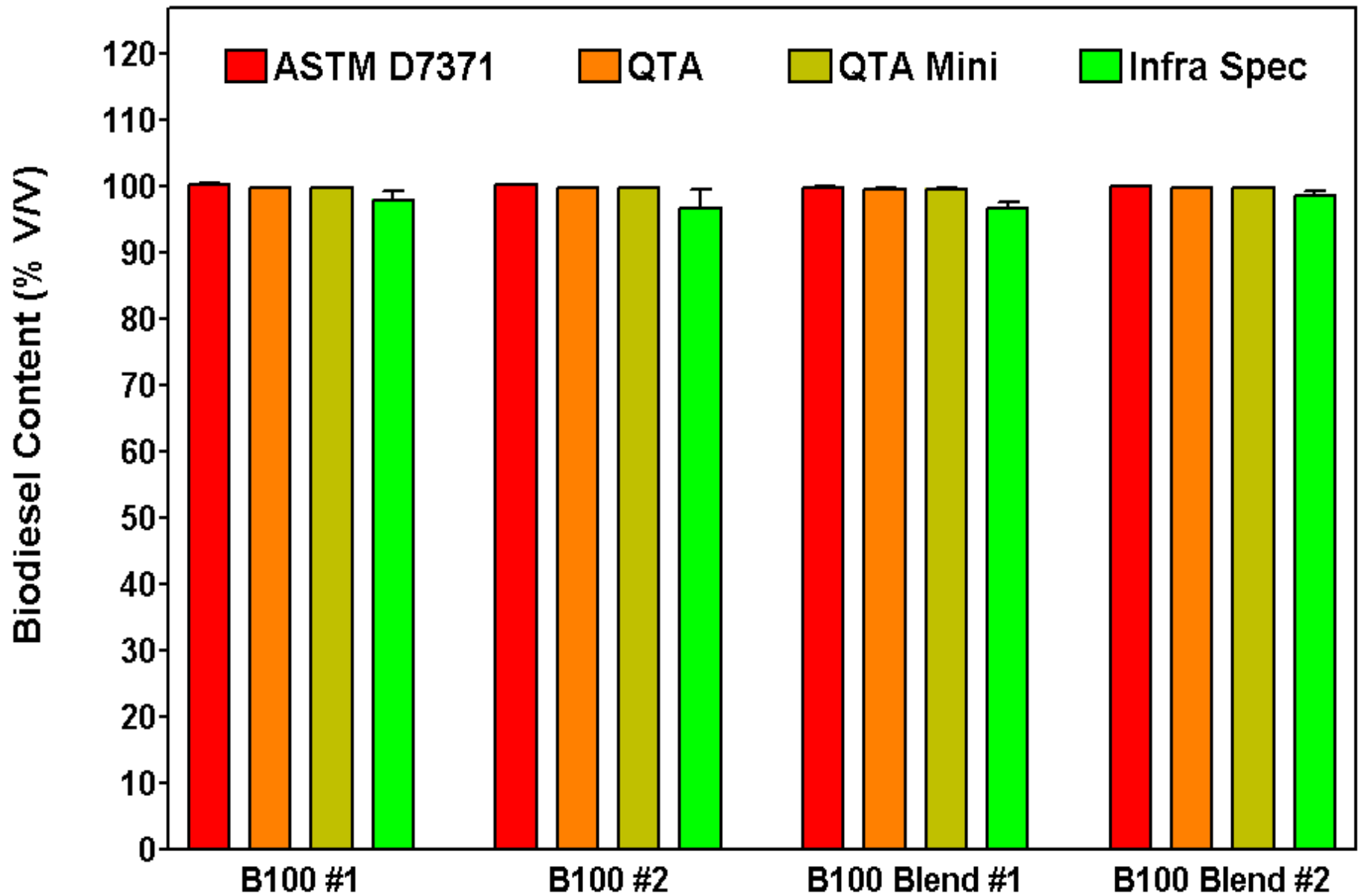
Oxidation Stability by EN 14112



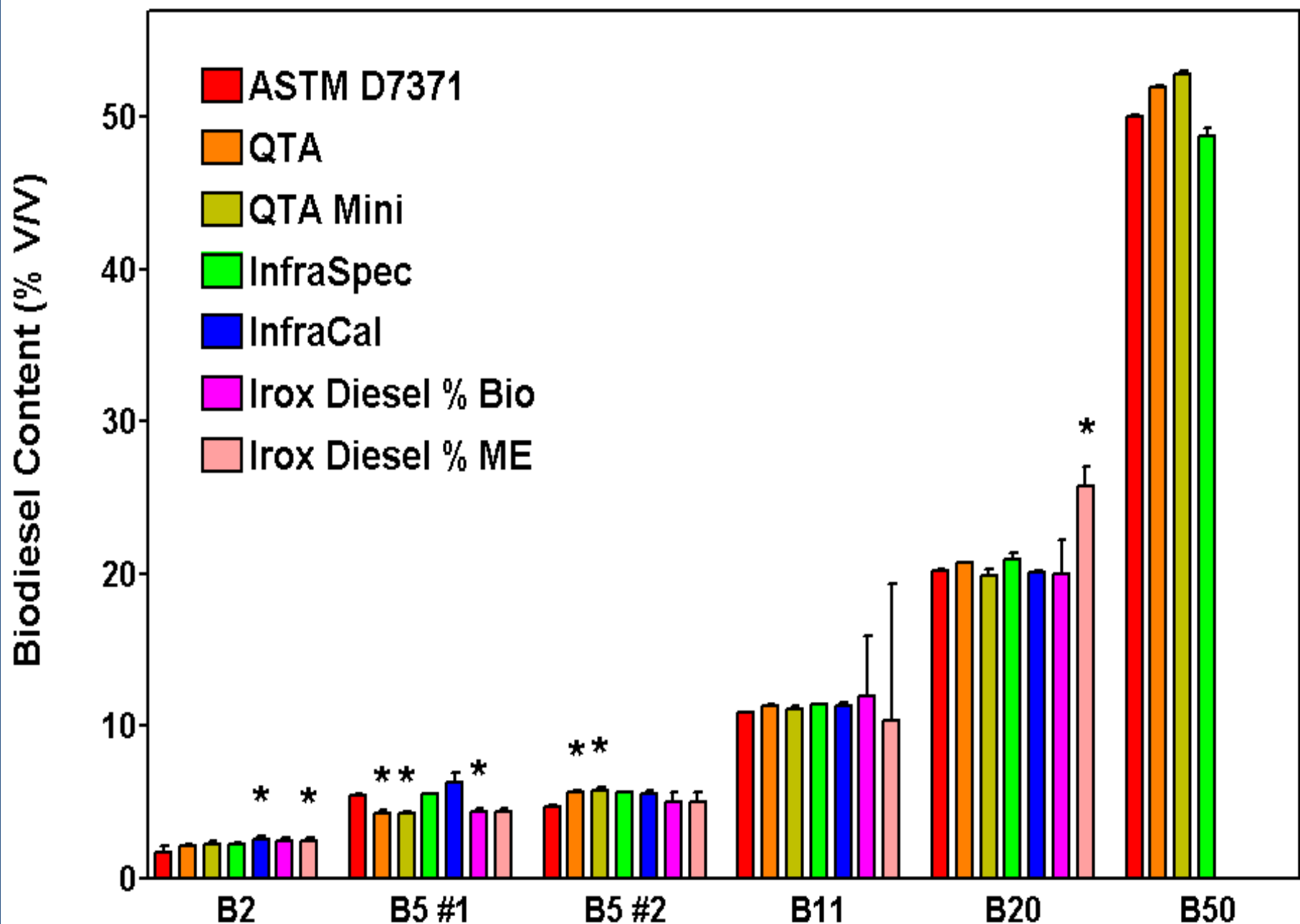
EN 14110 vs PetroOXY Oxidation Stability Correlation Plot



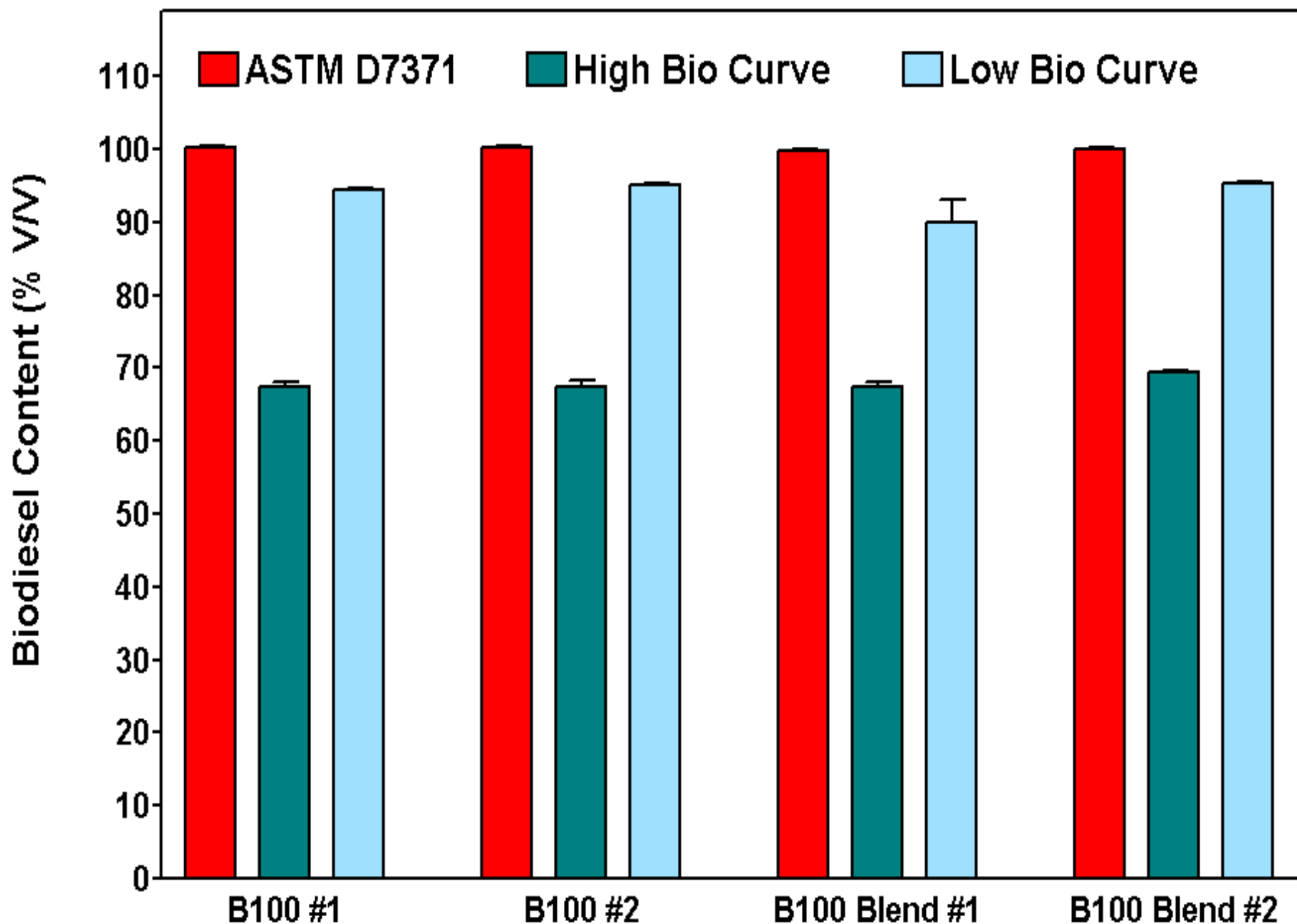
Biodiesel Content by ASTM D7371



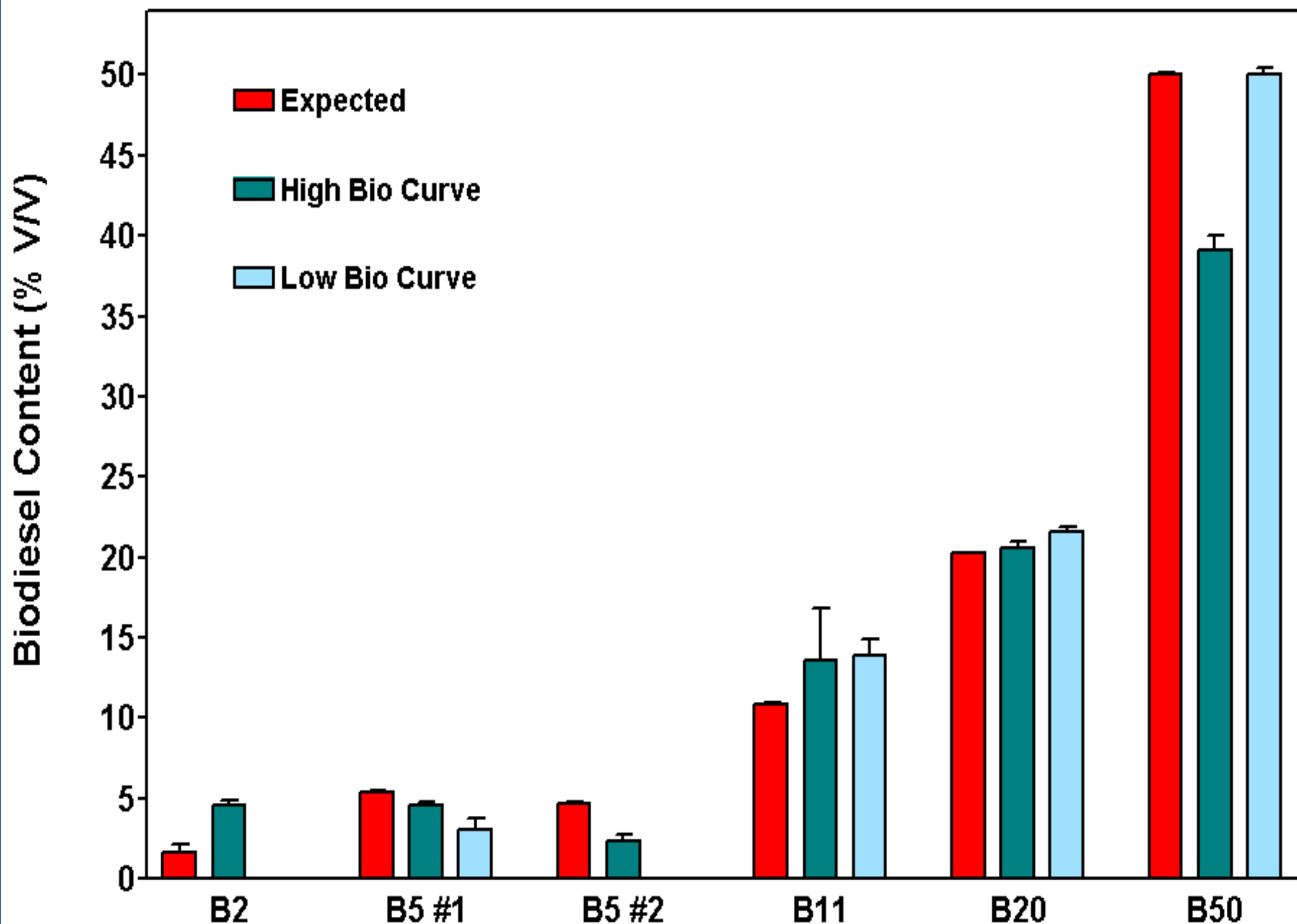
Biodiesel Content by ASTM D7371



Zeltex B100 Biodiesel Content



Zeltex Biodiesel Blends Content



Anecdotal Thoughts....

- InfraCal and InfraSpec
 - Easy to run, easy to clean; InfraSpec needed computer
 - Minimal consumables, chemicals etc.
- Irox Diesel
 - Relatively easy to operate, no consumables, no cleaning
 - Some warm-up time needed, hexane needed as reference
- MiniDis
 - Small sample volume, faster than D86, minimal cleaning (disposable sample cups)
 - Crimped lines- easy fix; heating error- self corrected

- PetroOxy
 - Definitely faster, easy to use/maintain, minimal consumables
 - Correlates with EN 15751
 - Does require oxygen line
- QTA & QTA Mini
 - fast, multiple analyses, minimal consumables, easy to clean/maintain
 - On-line access 24/7
- Sulfur Express
 - Compact, easy to set up, stand-alone (no gasses)
 - Not recommended for B100 (plugged needles); not recommended for high throughput
 - Some consumables, 45 min warm-up, incessant beeping!
- ZX-101C
 - Very simple and easy to use
 - Relatively large sample volume
 - Calibration curves possibly switched

Acknowledgements

- DOE
- Josh Hayes
- Kelly Kuester