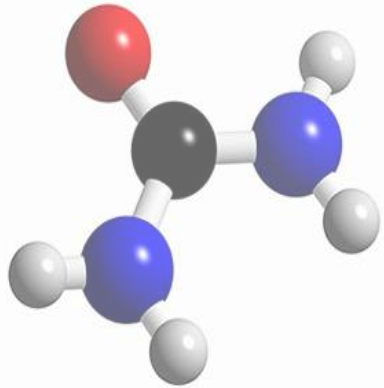


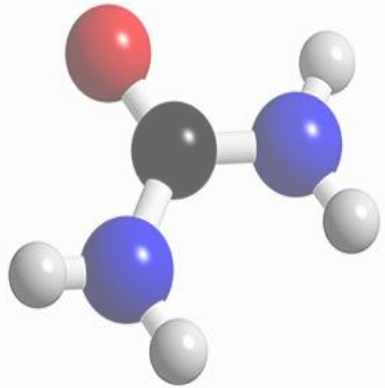
***amalgatech***

Diesel Exhaust Fluid Services



# Testing Documentation

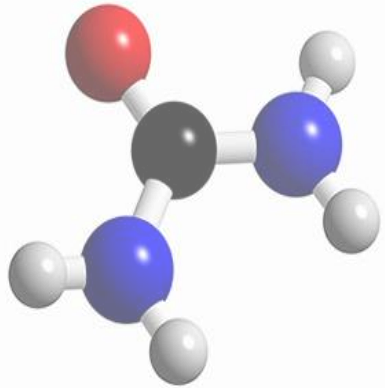
- Amalgatech is a leader in the laboratory testing of diesel exhaust fluid (DEF)
  - Full ISO 22241 test protocol
  - API DEF Licensing Program QQualification
  - Supplier Q/C Programs



# ISO 22241

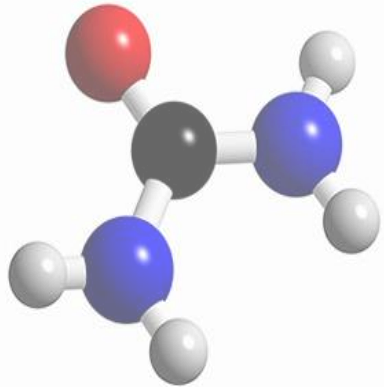
## Global DEF Standard

- Per the standard, all tests required for every batch.
- Other independent labs currently charge over \$1,000 per sample
- Other labs typical turn-around reports in 5-14 days



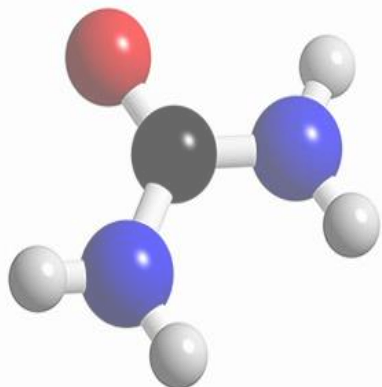
# API DEF License Testing Requirement

- Protocol includes
  - ISO 22241
  - “or manufacturing standard”



# ISO 22241 Protocol- Standard

- Urea
- Density
- Refractive Index
- Alkalinity
- Biuret
- Aldehydes
- Insolubles
- Phosphate
- Calcium
- Iron
- Copper
- Zinc
- Chromium
- Nickel
- Aluminum
- Magnesium
- Sodium
- Potassium
- FT-IR Identity



Amalgated Laboratories, Inc.  
 2965 West Osborn  
 Phoenix, AZ 85017  
 Phone: 602-252-0280 Fax: 602-252-0282 E-mail [info@amalgatech.com](mailto:info@amalgatech.com)

Rev 2 01/11 ERE  
 Pg 1 of 2

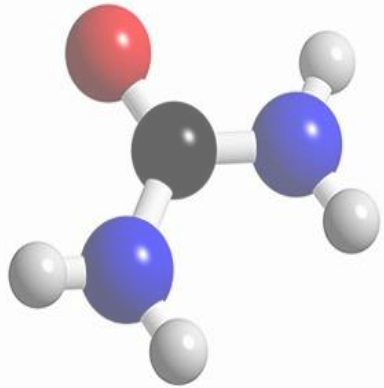
Contact:	«Contact»	Sample ID	«Coolant_ID»
Company:	«Company»	Batch #	«Units»
Address:	«Address»	Date sampled	«Date_Sampled»
	«Address2»	Date Received	«Date»
City, ST, Zip	«City», «Zip» «Zip»	Date Promised	«Date_Promised»
E-Mail	«email»	Amalgatech ID	«Amalgatech ID»
Phone / Fax	«phone» / «fax»	Report Date	«Date_Reported»

Diesel Exhaust Fluid per ISO 22241<sup>1</sup>

Characteristic	Unit	Test Methods	Limits		Acceptance Range <sup>2</sup>		Results
			min.	max.	min.	max.	
Urea content	% (m/m)	ISO 22241-2 Annex A ISO 22241-2 Annex B	31.8	33.2	30.8	34.2	«Urea_Content___mm»
Density at 20°C	kg/m <sup>3</sup>	ISO 3675 or ISO 12185	1067.0	1093.0	1066.5	1093.5	«Density_at_20°_C_kgm3»
Refractive Index at 20°C	—	ISO 22241-2 Annex C	1.3614	1.3643	1.3604	1.3653	«Refractive_index_at_20°_C»
Alkalinity as NH <sub>3</sub>	%m/m	ISO 22241-2 Annex D	—	0.2	—	0.24	«Alkalinity_as_NH3___mm»
Bluret	%m/m	ISO 22241-2 Annex E	—	0.3	—	0.34	«Bluret___mm»
Aldehydes	mg/kg	ISO 22241-2 Annex F	—	5.0	—	7.4	«Aldehydes_mgkg»
Insoluble matter	mg/kg	ISO 22241-2 Annex G	—	20	—	27.6	«Insoluble_Matter_mgkg»
Phosphate (PO <sub>4</sub> )	mg/kg	ISO 22241-2 Annex H	—	0.5	—	0.53	«Phosphate_mgkg»
Calcium	mg/kg	ISO 22241-2 Annex I	—	0.5	—	0.55	«Calcium_mgkg»
Iron	mg/kg	ISO 22241-2 Annex I	—	0.5	—	0.65	«Iron_mgkg»
Copper	mg/kg	ISO 22241-2 Annex I	—	0.2	—	0.24	«Copper_mgkg»
Zinc	mg/kg	ISO 22241-2 Annex I	—	0.2	—	0.26	«Zinc_mgkg»
Chromium	mg/kg	ISO 22241-2 Annex I	—	0.2	—	0.26	«Chromium_mgkg»
Nickel	mg/kg	ISO 22241-2 Annex I	—	0.2	—	0.26	«Nickel_mgkg»
Aluminum	mg/kg	ISO 22241-2 Annex I	—	0.5	—	0.65	«Aluminum_mgkg»
Magnesium	mg/kg	ISO 22241-2 Annex I	—	0.5	—	0.65	«Magnesium_mgkg»
Sodium	mg/kg	ISO 22241-2 Annex I	—	0.5	—	0.75	«Sodium_mgkg»
Potassium	mg/kg	ISO 22241-2 Annex I	—	0.5	—	0.75	«Potassium_mgkg»
Identity	—	ISO 22241-2 Annex J	Identical to reference		Identical to reference		«Identity»
Comments by Amalgatech: «Comments by Amalgatech»							

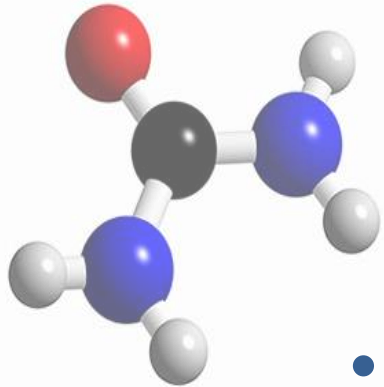
<sup>2</sup> Acceptance Range = Limit adjusted for reproducibility per Annex B

# ISO 22241 Report



## Testing Cost (per sample)

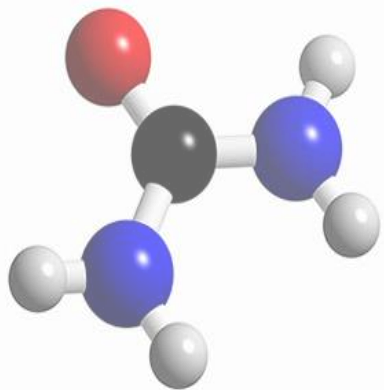
- ISO 22241 – Standard:
  - Other labs ~~\$1,120~~
  - Amalgatech \$ 599



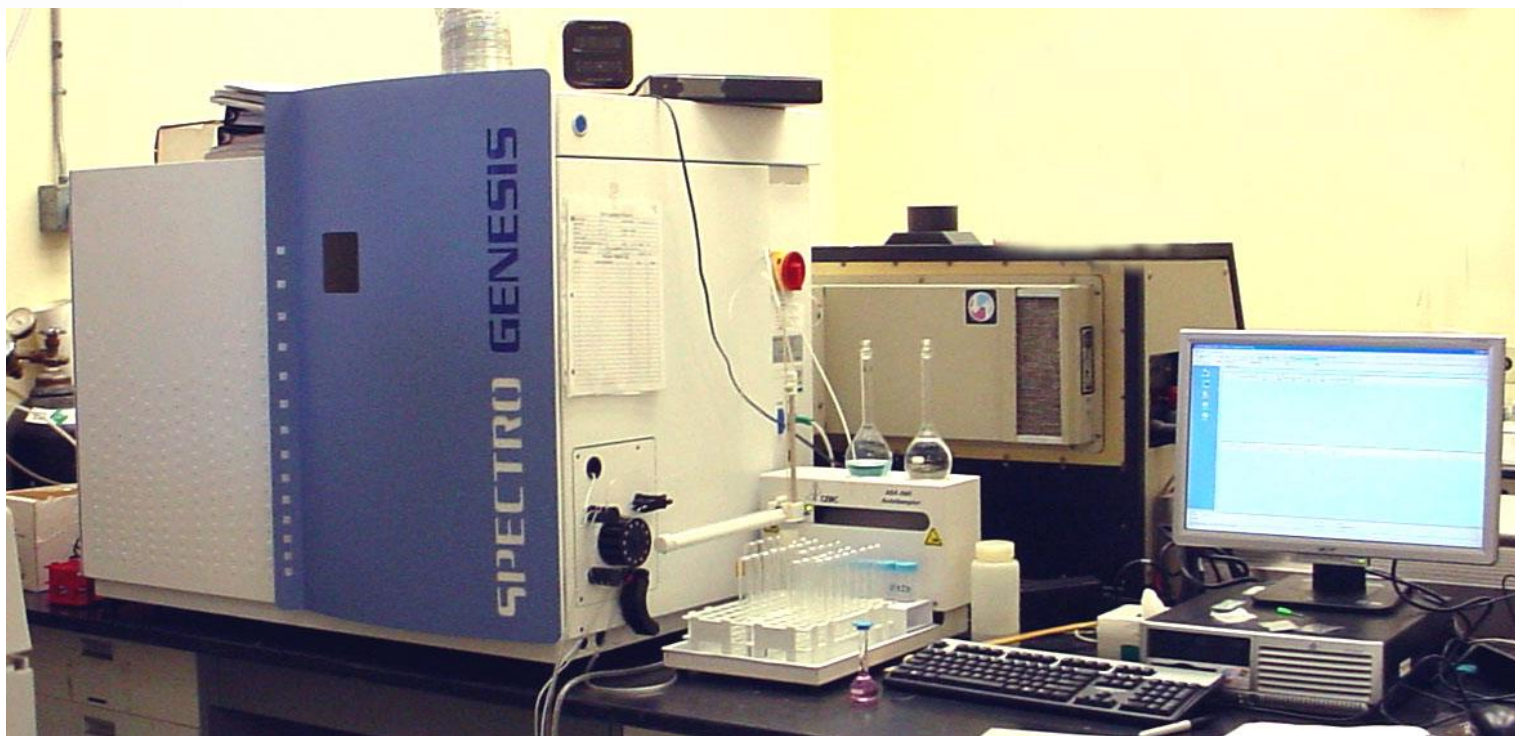
# Why Use Amalgatech?

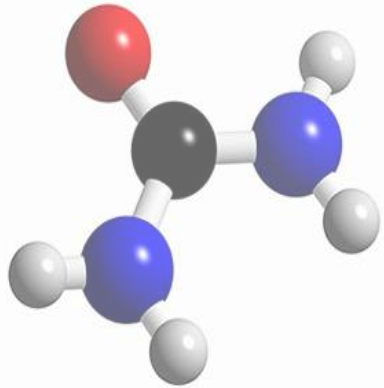
- Dedicated, new equipment
- Highly trained personnel
- DEF is a principle service, not a sideline, at Amalgatech.
- Cost-effective pricing programs
- Quick turn-around performance
- ½ liter sample requirements.





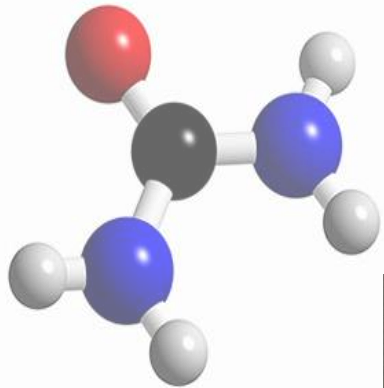
# Lab Equipment - ICP



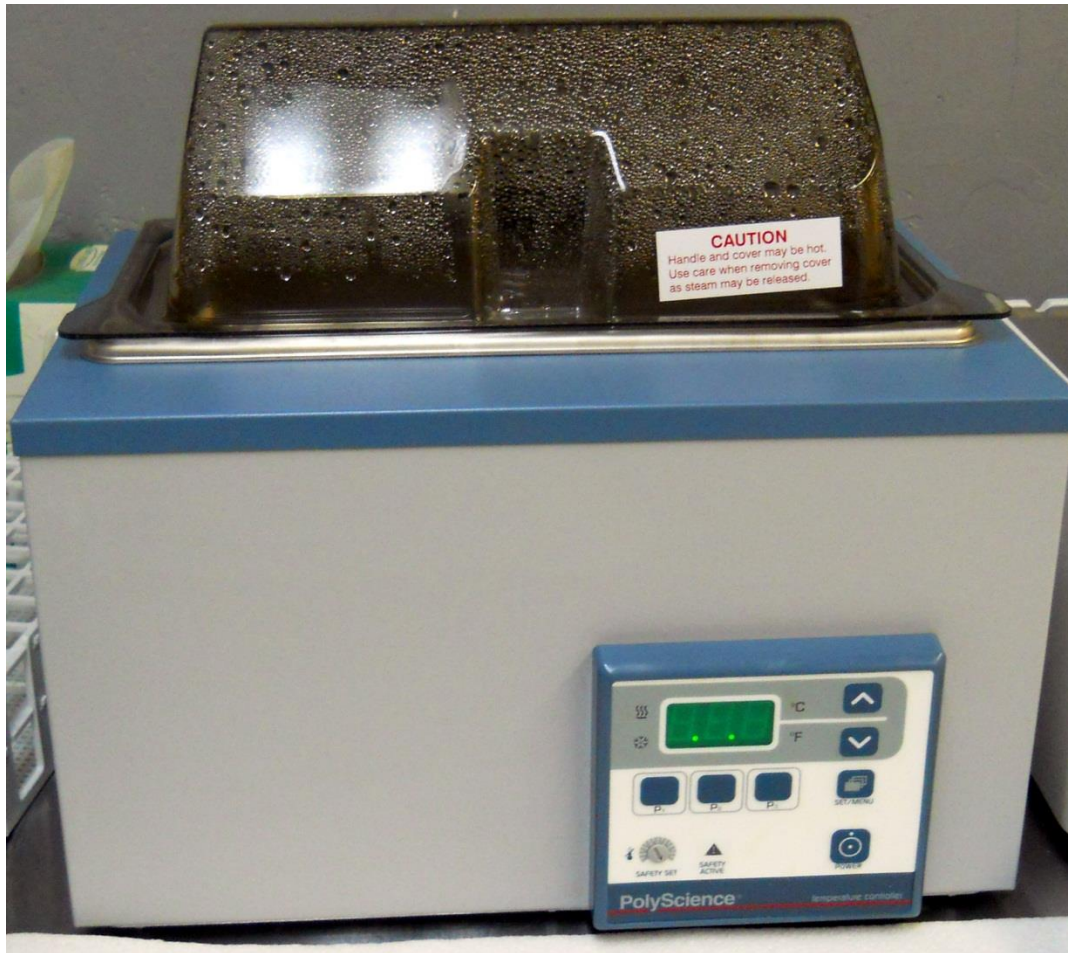


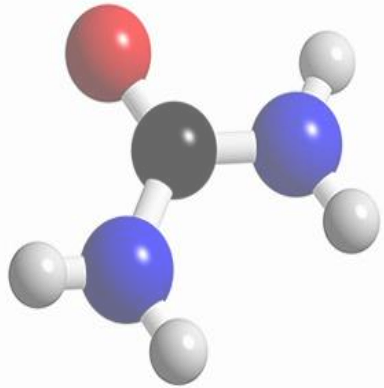
# Lab Equipment - Refractometer





# Lab Equipment – Water Bath

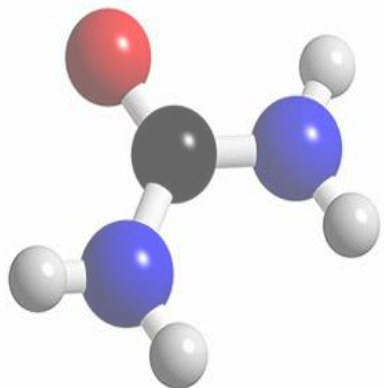




# Lab Equipment

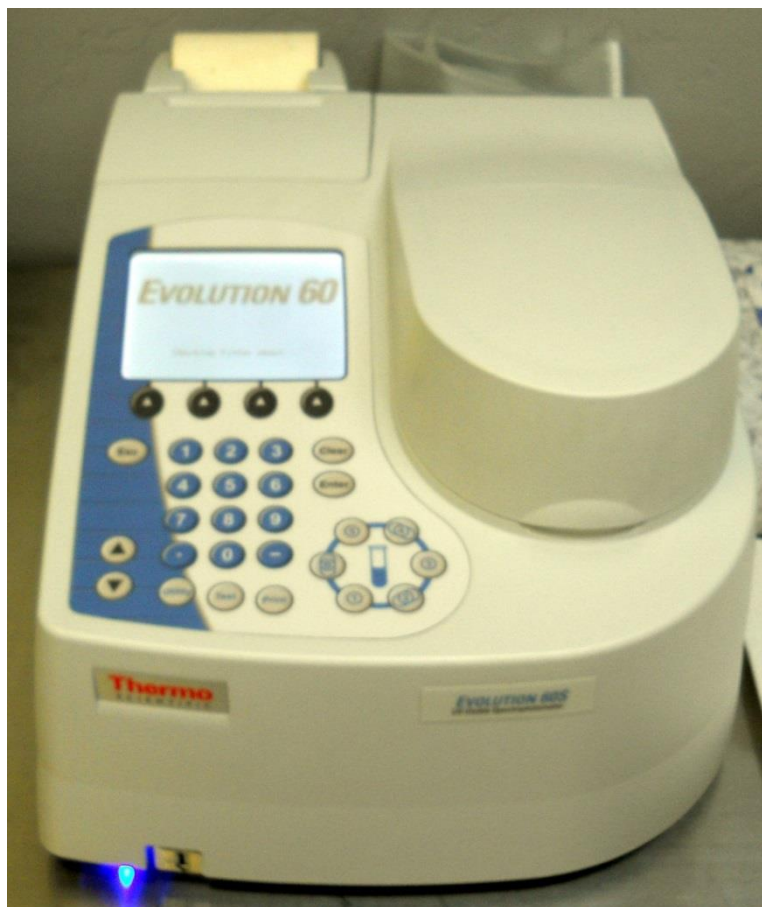
## Fourier Transfer Infrared Spectrometer

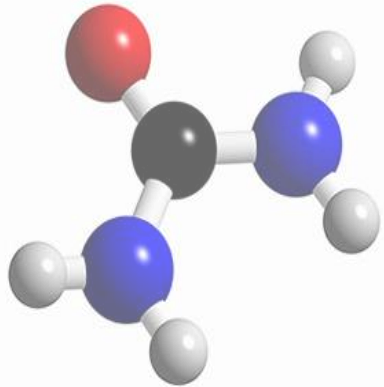




# Lab Equipment

## UV Vis Spectrometer





## Contact Us!

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- Phone: 602-252-0280
- [www.DEFTesting.com](http://www.DEFTesting.com)