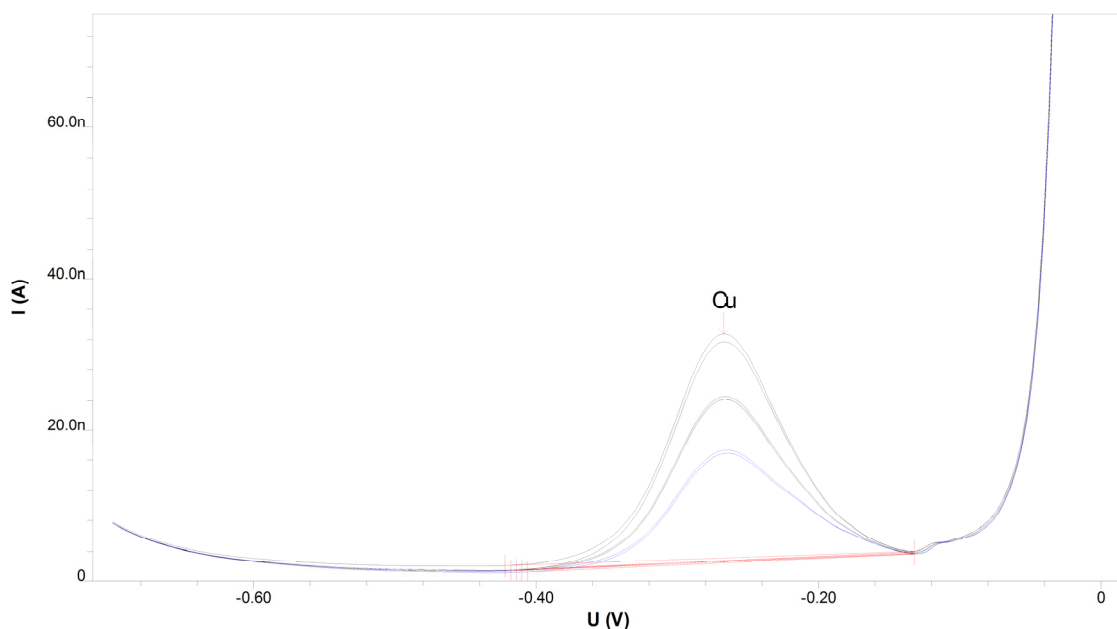


# Copper in ethanol and fuel ethanol (E85) for car engines



The presence of copper in fuel ethanol blends has gained considerable attention since  $\text{Cu}^{2+}$  catalyzes oxidative reactions in gasoline leading to olefin decomposition and gum formation.  $\text{Cu}^{2+}$  can easily be determined using anodic stripping voltammetry (ASV) in ethanol/gasoline blends directly without any sample pretreatment.

## Results

Cu in ethanol	Cu in fuel ethanol E85
5.6 $\mu\text{g/L}$	19.9 $\mu\text{g/L}$

# Method description

## Sample

- Pure ethanol
- Fuel ethanol (commercial ethanol-gasoline blend with 85% ethanol and 15% gasoline)

## Instrument

797 VA Computrace



## Electrodes

Working electrode (WE)	electrode	6.1246.020 MME (Multi-Mode Electrode) with 6.1226.030 glass capillary
Reference electrode (RE)	electrode	6.0728.010 reference electrode (Ag/AgCl/ c(LiCl) = sat. in ethanol) with 6.1245.010 electrolyte vessel filled with intermediate electrolyte c(LiCl) = sat. in ethanol
Auxiliary electrode (AE)	electrode	6.0343.000 platinum electrode

## Reagents

HCl	Hydrochloric acid, suprapur, w(HCl) = 30 %
HNO <sub>3</sub>	Nitric acid, suprapur, w(HNO <sub>3</sub> ) = 65%
LiCl	Lithium chloride monohydrate, suprapur
Ethanol	Ethanol, analytical grade, without additive
Cu standard stock solution	$\beta(\text{Cu}^{2+}) = 1 \text{ g/L}$

## Solutions

LiCl solution	Lithium chloride (suprapur) in ethanol, c(LiCl) = 2 mol/L
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Cu standard addition solution	$\beta(\text{Cu}^{2+}) = 1 \text{ mg/L}$ in ethanol, acidified with 1 mL/L HNO <sub>3</sub>
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## Analysis

Measuring solution	10 mL ethanol + 50 $\mu\text{L}$ HCl + 2.5 mL LiCl solution
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## Parameters

Working electrode	HMDE
Drop size	4
Stirrer speed	2000 rpm
Mode	DP
Initial purge time	300 s
Addition purge time	10 s
Deposition potential	-0.7 V
Deposition time	60 s
Equilibration time	5 s
Pulse amplitude	0.05 V
Start potential	-0.7 V
End potential	0 V
Voltage step	0.004 V
Voltage step time	0.2 s
Sweep rate	0.02 V/s
Peak potential Cu	-0.26 V