Olson Marketing
Monthly
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in partnership with Insane Oil of Omaha
Your AMSOIL Information News Source

Product Highlight:
Oil Analyzers Test Kit

Oil analysis is a crucial practice utilized in various industries to monitor the condition of lubricating oils and the machinery they serve. By regularly sampling and analyzing oil, technicians can detect early signs of equipment wear, contamination, and degradation. This proactive approach allows for timely maintenance interventions, preventing costly breakdowns and extending the lifespan of critical assets. Through the analysis of parameters such as viscosity, acidity, particulate contamination, and metal wear debris, oil analysts gain valuable insights into the health and performance of machinery, enabling informed decision-making and optimized maintenance strategies.

Furthermore, oil analysis serves as a predictive maintenance tool, enabling organizations to move from reactive to proactive maintenance paradigms. By establishing baseline oil conditions and tracking changes over time, operators can anticipate potential issues before they escalate, minimizing unplanned downtime and optimizing asset reliability. This predictive capability not only enhances operational efficiency but also reduces maintenance costs and improves overall productivity. Consequently, oil analysis emerges as an indispensable tool for modern asset management, providing a proactive means to ensure equipment reliability, mitigate risks, and maximize operational performance.

AMSOIL provides a variety of oil analysis kits as well as kits for coolant testing and diesel fuel contamination testing.

All available kits can be found:

HERE

What's Inside This Issue?

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2012 Ford F150 - 3.5L EcoBoost Oil Analysis Report

Oil Analyzers INC.

Lubricant Analysis Report

North America: +1-877-458-3315

0	1	2	3	4
NORMAL		ABNORMAL		CRITICAL

Overall report severity based on comments.

Account Information		Component Information		Sample Information	
Account Number:	[redacted]	Component ID:	002 E	Tracking Number:	[redacted]
Company Name:	INSANE OIL	Secondary ID:	2012 FORD F150	Lab Number:	[redacted]
Contact:	JON OLSON	Component Type:	GAS ENGINE	Lab Location:	Indianapolis
Address:	[redacted]	Manufacturer:	FORD	Data Analyst:	ARF
	[redacted]	Model:	3.5L ECOBOOST	Sampled:	21-Oct-2023
Phone Number:	[redacted]	Application:	UNKNOWN	Received:	26-Oct-2023
		Sump Capacity:	6 qt	Completed:	30-Oct-2023

Filter Information		Miscellaneous Information		Product Information	
Filter Type:	FULL-FLOW AND KIDNEY LOOP	Miscellaneous:	FILTER: EA017 AMSOIL	Product Manufacturer:	AMSOIL
Micron Rating:	20			Product Name:	ASL SIG. SERIES SYN. MOTOR OIL
				Viscosity Grade:	SAE 5W30

Comments

Check for source of FUEL LEAK. Fuel is at a SEVERE LEVEL. Fuel dilution may be caused by component faults related to injectors, ignition/timing, or excessive blow-by. Additional causes include heavy throttle application, engine lugging, frequent short trips and excessive idling. FUEL DILUTION has caused viscosity to decrease moderately; FUEL DILUTION reduces the viscosity of the lubricant which decreases FILM STRENGTH and LUBRICITY and may lead to increased wear. Base Number is MODERATELY LOW. As Base Number depletes, the ability to neutralize acids is diminished. Boron is slightly low for this lubricant. Boron levels may naturally decline with use so this is not a cause for concern. Please provide the APPLICATION (transportation, off-highway, gas/oil field, industrial, marine, mining, automotive, etc.) for a more thorough analysis. Lubricant and filter change acknowledged. Resample at half interval. Sample information has been added or tests have been rerun or additional testing was added and the report has been regenerated.

	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)						Additive Metals (ppm)				
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
1	16	1	0	2	16	0	0	0	0	0	9	8	2	0	177	2	3	0	41	830	1128	1	653	696

	Sample Information							Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time mi	Unit Time mi	Lube Change	Lube Added gal	Filter Change	Fuel Dilution %	Soot %	Water %	Viscosity 40°C cSt	Viscosity 100 °C cSt	Acid Number mg KOH / g	Base No. D4739 mg KOH / g	Oxidation abs / cm	Nitration abs / 0.1mm
1	21-Oct-2023	26-Oct-2023	7909	149895	Yes	0	Yes	>10 - GC	<.1	<.1 - FTIR		8.2		2.04	45	14

	Particle Count (particles/mL)										Additional Testing
Sample #	ISO Code Based On 4/6/14	> 4 particles / mL	> 6 particles / mL	> 10 particles / mL	> 14 particles / mL	> 21 particles / mL	> 38 particles / mL	> 70 particles / mL	> 100 particles / mL	Test Method	
1	/ /										

Comments are advisory only and are based on the assumption that the sample and data submitted are valid. Results relate only to the items tested. Missing fluid or component information limits the evaluation. No warranty is expressed or implied. Measurement uncertainty available upon request.

Oil Analysis Report Summary

In October 2022, I purchased a 2012 Ford F150 with a 3.5L, EcoBoost engine. I choose this specific model of vehicle as it was the number one vehicle sold in 2012. I also specifically choose the 3.5L, EcoBoost engine as this seems to be the trend that industry is headed; the Gas Direct Injection technology. I made these two choices for the purpose of having the largest audience for my YouTube channel as I do repairs on this vehicle and share those repairs on YouTube.

The same week I acquired this vehicle, I changed the oil from whatever the dealer uses to AMSOIL. I ran AMSOIL 100% Synthetic 5w-30 Motor Oil for an entire year, as I have done with all of my vehicles. After one year time, I pulled an oil sample and sent it into the lab at the same time I did my yearly oil change. The results were very concerning.

The main purpose of doing Oil Analytics is two-fold:

1. It helps determine the health of the engine.

2. It helps determine the health of the oil.

Based upon the results, the oil held up for an entire year without issue. Additionally, as you look at the results (previous page), there are no indications that the engine has any level of significant wear. Actually, the results indicate a normal level of wear across the board. The concern was with fuel dilution.

The results indicated the oil had a greater than 10% fuel dilution. According to www.fluidlife.com, "excessive" fuel dilution is greater than 4%. According to palisadeforum.com, 2.5% is considered critical. AMSOIL indicates that 2.4% is an acceptable limit. And machinerylubrication.com indicates that 1.5% is cautionary where as 5% is critical. The results from my vehicle indicate more than 10%, which is probably nearing a catastrophic level.

At the time of the reporting, I did do an oil and filter change.

As I had no prior need to research the 3.5 EcoBoost engine (prior to actually owning one), I was unaware of several issues with this specific engine as well as the fuel dilution issues. After doing quite a bit of research, I discovered that engines with Gas Direct Injection technology have several key issues that continually arise. One of these issues is high fuel dilution levels.

Upon further research, it appears as though the only viable solution that has been suggested is to decrease the oil change interval time. Essentially, what the general population and mechanics alike have indicated is to dump your oil and put new in more frequently.

Now, according to the analyst's comments on my results, the suggestion is to resample at half interval. Thus, as my last sample took place in October 2023, I have planned for April 2024 to do another test. This test will be done at the 6 month mark and in theory will show a 5% fuel dilution. If the test does come back with an elevated level, I will do an oil change at that time and adjust my routine for oil changes to be done more frequently.

One option with AMSOIL is to use AMSOIL OE 100% Synthetic Motor Oil. This product is a little less expensive, yet you still get premium protection of the engine. AMSOIL OE is rated for the OEM specifications...which ironically, the OEM specification is 10,000 miles or one year, or as indicated by the message center on the dash.

Contaminants		
Fuel Dilution	Soot	Water
%	%	%
>10 - GC	<.1	<.1 - FTIR

What is the Problem with Fuel Dilution?

Fuel dilution refers to the contamination of engine oil by unburned or partially burned fuel. This issue commonly arises in vehicles with certain engine designs, particularly those equipped with direct fuel injection or turbocharging systems. Fuel dilution poses several significant problems for vehicles:

Lubrication Degradation

Engine oil is designed to provide lubrication and protection to internal engine components. However, when fuel dilution occurs, the viscosity of the oil decreases, and its lubricating properties diminish. As a result, critical engine parts may experience increased friction and wear, leading to premature component failure and reduced engine lifespan.

Reduced Oil Effectiveness

Fuel dilution can compromise the oil's ability to perform its essential functions effectively. Diluted oil may struggle to maintain proper film strength and thermal stability, which are crucial for protecting engine components under various operating conditions. This reduction in oil effectiveness can result in decreased engine performance, increased fuel consumption, and elevated emissions.

Engine damage

Excessive fuel dilution can lead to more severe consequences, including damage to engine components such as piston rings, cylinder walls, and bearings. Fuel washes away the protective oil film from these parts, exposing them to increased friction and wear. Over time, this can lead to permanent damage, necessitating costly repairs or even engine replacement.

Overall, fuel dilution represents a significant concern for vehicle owners and manufacturers alike, as it can undermine engine performance, reliability, and longevity. Effective monitoring of oil quality and regular maintenance can help mitigate the risks associated with fuel dilution, ensuring the continued health and durability of the engine.

How It Is Tested

The most widely accepted analytical technique for the determination of fuel dilution is gas chromatography (GC). Oil is injected into a GC system that vaporizes the sample. The sample, which is now in the gas phase, is then separated by the analytical column by boiling point and quantitated using a flame ionization detector. The amount of fuel present is reported as a mass % of the fuel detected in the oil.

Why Does Fuel Dilution Occur?

Fuel dilution occurs in an engine primarily due to incomplete combustion of fuel during the combustion process. Several factors contribute to this phenomenon:

Cold Starts

During cold starts, the engine operates at lower temperatures, which can result in incomplete combustion of fuel. The fuel may not vaporize completely, leading to some of it seeping past the piston rings and into the crankcase, where it mixes with the engine oil.

Engine Wear

Over time, wear and tear on engine components such as piston rings, cylinder walls, and valves can create small gaps or imperfections. These gaps can allow fuel to bypass the piston rings and enter the crankcase, contaminating the oil.

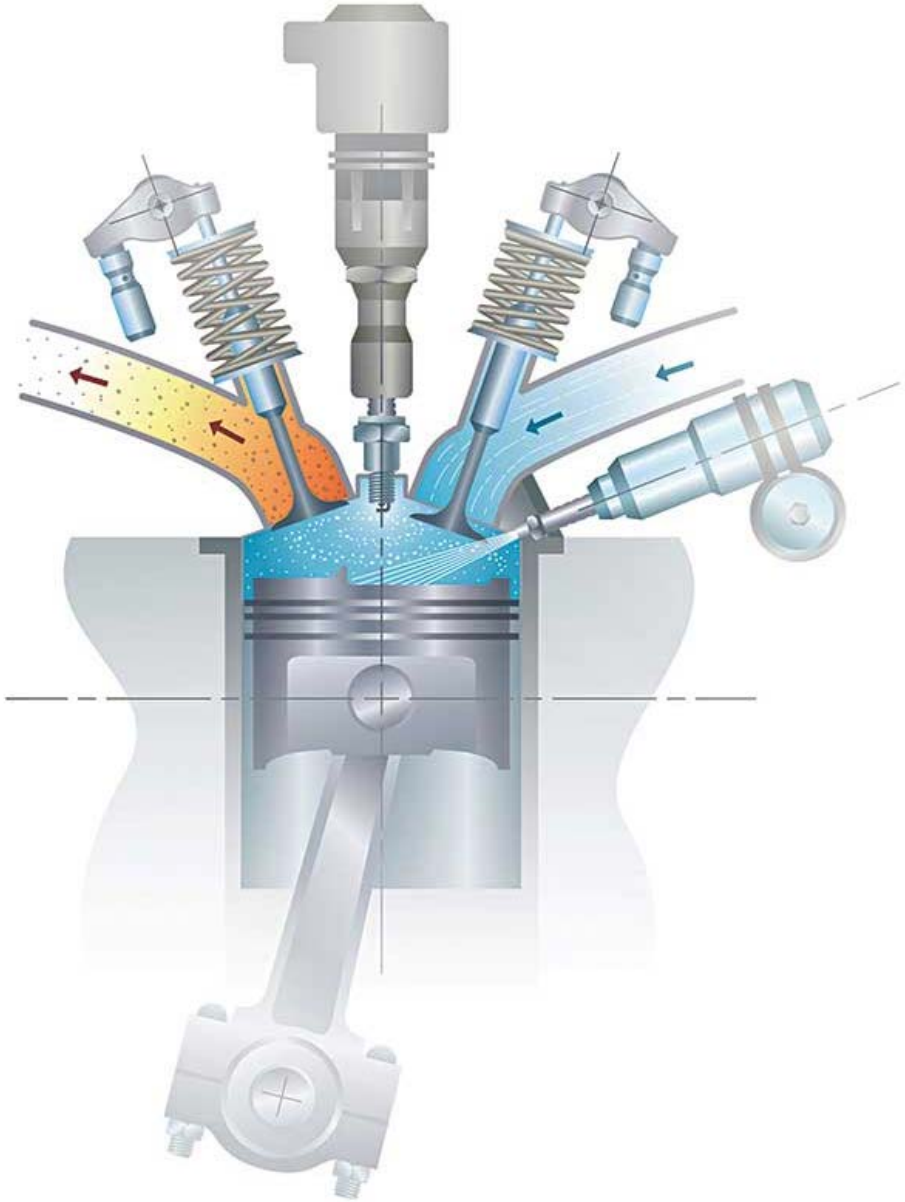
Engine Design

Certain engine designs, such as those with direct fuel injection or turbocharging systems, are more prone to fuel dilution. Direct injection systems, for example, can spray fuel directly into the combustion chamber at high pressures, increasing the likelihood of fuel bypassing the piston rings.

Operating Conditions

Operating conditions such as frequent short trips, stop-and-go driving, or idling can exacerbate fuel dilution. In these conditions, the engine may not reach optimal operating temperatures, leading to inefficient combustion and increased fuel dilution.

The 3.5L EcoBoost engine, renowned for its performance and efficiency, has gained popularity in various Ford vehicles. However, like many modern direct-injection turbocharged engines, the 3.5L EcoBoost is susceptible to fuel dilution issues. Due to its direct injection system and turbocharging technology, there's a potential for fuel to bypass the piston rings and contaminate the engine oil, leading to fuel dilution. This concern underscores the importance of regular maintenance, including monitoring oil quality and adhering to recommended oil change intervals, to mitigate the risks associated with fuel dilution and ensure the long-term reliability and performance of vehicles equipped with the 3.5L EcoBoost engine.



How Can I Reduce Fuel Dilution?

Reducing fuel dilution in gas direct injection (GDI) engines is crucial for maintaining engine performance, longevity, and reliability. Several strategies can be employed to mitigate the risks associated with fuel dilution:

Optimizing Engine Operating Conditions

GDI engines operate most efficiently when they reach their optimal operating temperatures. Short trips, frequent idling, and stop-and-go driving can hinder the engine from reaching these temperatures, increasing the likelihood of fuel dilution. Encouraging smoother driving habits and minimizing idling time can help reduce fuel dilution by allowing the engine to warm up more quickly and operate more efficiently.

Regular Maintenance and Oil Changes

Regular maintenance, including timely oil changes, is essential for preventing fuel dilution in GDI engines. Fresh, high-quality engine oil helps maintain proper lubrication and viscosity, reducing the risk of fuel contamination. Additionally, using oil formulations specifically designed for GDI engines can provide enhanced protection against fuel dilution and its associated consequences.

Upgrading PCV (Positive Crankcase Ventilation) Systems

PCV systems play a crucial role in controlling crankcase pressures and preventing fuel vapors from accumulating in the crankcase. Upgrading to more robust PCV systems with improved vapor separation capabilities can help minimize the amount of unburned fuel that enters the crankcase, thereby reducing fuel dilution in GDI engines.

Improving Fuel Injection and Combustion Processes

Optimizing fuel injection timing, duration, and pressure can improve the combustion efficiency of GDI engines, reducing the likelihood of fuel bypassing the piston rings and entering the crankcase. Advanced engine management systems can dynamically adjust fuel injection parameters based on operating conditions, ensuring optimal combustion and minimizing fuel dilution. Additionally, optimizing air-fuel ratios and combustion chamber designs can further enhance combustion efficiency, reducing the amount of unburned fuel that reaches the crankcase.

Utilizing Fuel Additives

Certain fuel additives can help mitigate fuel dilution in GDI engines by improving fuel combustion and reducing carbon deposits. Additives that enhance fuel atomization and promote more complete combustion can help minimize the formation of unburned fuel residues that contribute to fuel dilution. Additionally, fuel detergents and cleaners can prevent carbon buildup on fuel injectors and intake valves, ensuring optimal engine performance and reducing the risk of fuel dilution over time.

In conclusion, reducing fuel dilution in gas direct injection engines requires a combination of proactive maintenance practices, engine optimization strategies, and the use of specialized additives. By optimizing engine operating conditions, implementing regular maintenance routines, upgrading PCV systems, improving fuel injection and combustion processes, and utilizing fuel additives, vehicle owners and manufacturers can effectively mitigate the risks associated with fuel dilution, ensuring the long-term reliability and performance of GDI engines.

Shop Talk...

with Dr. Jonathan D. Olson, EdD
(Independent Amsoil Dealer #10458)

Over the past few months we have been discussing oil change intervals, oil analytics, and other issues related to oil (such as fuel dilution in oil). In the upcoming months we are going to switch gears and provide some information on the fuel end of the spectrum.

I do want to wrap up our discussion on oil by noting that if you have a Gas-Direct Injection vehicle, a vehicle with a Turbocharger, or even if you only drive very short distances each day, I would highly recommend doing an oil analysis test the next time you are due for an oil change. Allowing your fuel dilution to get too high will lead to premature engine wear and damage and Fuel Dilution is a known issue in these types of situations.

I will mention again that AMSOIL has a variety of test kits. All of which can be found:

HERE

I use THIS ONE on my vehicles.

Congratulations to NEW Amsoil Opportunists and Enthusiasts!

Congratulations:

New Catalog Customers

Alex Dupree
Saint Stephen, SC

Jack Stender
Sherman, IL

Andre McCaney
Grand Prairie, TX

Frank Johnson
Jackson, OH

Tou Vang
Sacramento, CA

Patrick More
Georgetown, TX

Congratulations:

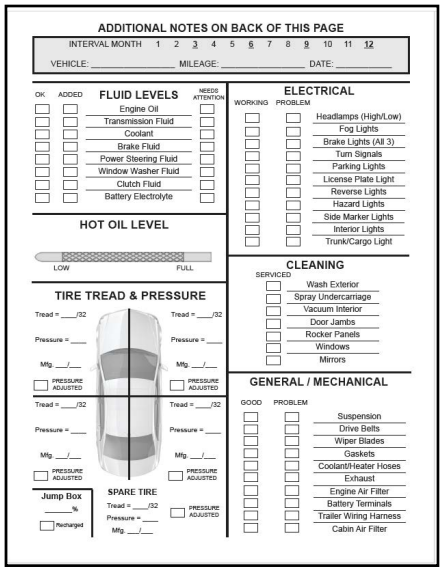
New Preferred Customers

Rylan Perez
Bellevue, NE

Bill Stukenholtz
Lincoln, NE

Matthew Simms
Wichita, KS

Monthly Auto Maintenance Inspection Report



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