

Dealing with Diesel Fuel in Cold Weather

By Scott Goff
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Your equipment will not run on candlepower!

Ultra-Low Sulfur Diesel (ULSD)

- ULSD differs from “yesterday’s” diesel fuels
 - Hygroscopic – holds more water than other types of diesel fuels.
 - Size and shape of paraffin wax seed crystals have changed dramatically in ULSD compared to previous diesel fuels.
 - Microscopic wax crystals are larger and tend to “stick together” more readily, causing gelling and wax drop out (WDO) issues in cold weather.

Cloud Point / Gel Point

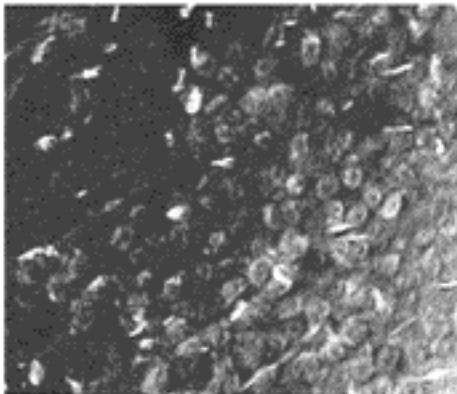
Microscope pictures of a typical diesel fuel



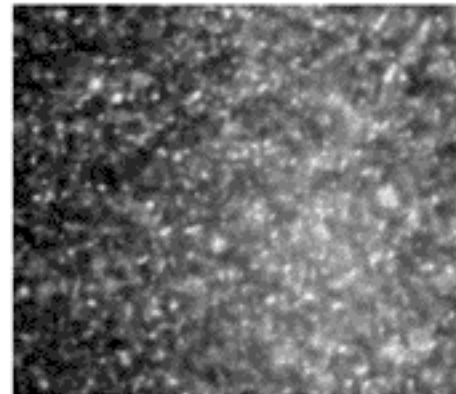
Diesel fuel 1°C above cloud point
No crystals



Diesel fuel at cloud point
A few wax crystals appear
instantaneously



Diesel fuel at cloud point
one hour later
More crystals formed



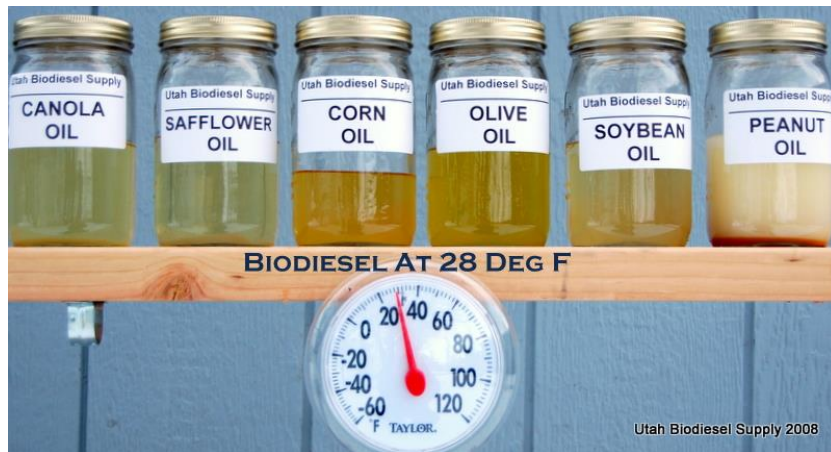
Diesel fuel at 3°C below cloud point
Immediate and extensive crystal
formation

What is “Gelling”?

Diesel fuel contains paraffin wax in 2 forms, liquid wax in suspension and wax seed crystals which float throughout the fuel.

- As fuel temperature drops, microscopic wax particles will bind (stick) to the liquid wax in the fuel, creating larger particles that can eventually be seen with the naked eye – (Cloud Point)
- As temperature continues to drop, the wax particles continue to get larger and have difficulty passing thru the fuel filters – (Gel Point or Cold Filter Plug Point (CFPP))
- If temp continues to drop, the fuel will become a semi-solid when it reaches the Pour Point. (PP)

- The blending of different biodiesel products can compound these problems.



Biodiesel at 28 degrees F



Biodiesel at 18 degrees F

How to Treat Your Fuel

- Cutting diesel with kerosene is not as effective as it once was, due to different refining methods for ULSD.
- Experts are now recommending additives rather than cutting with kerosene.
- Modern additives contain anti-gel (co-polymers) which coat the wax particles and keep them from growing and sticking together.

Preventatives versus Curatives



- Preventatives prevent trouble before it occurs.
Remember - they are ineffective on gelled fuel!



- Curatives are only used after the fuel has gelled.
Remember – they will not prevent gelling!

Diesel Fuel Additives

(Added each time you refill the tank)

Your fuel treatment should contain:

- Anti-gel (Cold flow) improver
- Seed crystal modifier
- Water dispersant
- Cetane improver
- Lubricity improver
- Injector cleaner



It should not contain any alcohol or methanol

EMERGENCY FUEL TREATMENTS

(A curative added only when fuel has gelled)

- Effective only after the fuel has gelled –
- Reliquefies gelled fuel by dissolving wax
- De-ices frozen fuel filters

Remember - They will not prevent gelling!



Not all additives are created equal



1 Quart treats 250 gallons

- Contains anti-gel
- Contains water dispersant
- Contains cetane improver
- Contains lubricity additive
- Contains injector cleaner
- Contains pour point depressant



1 Quart treats 100 gallons

- Contains anti-gel
- Contains filter de-icer
- Contains cetane improver
- Contains lubricity additive

References

- Well Worth Tech Articles
- Filter Manufacturers Council, Technical Service Bulletin 91-1
- FPPF Tech Specs
- Wikipedia