COOLANT "SMARTS" FROM GW ……..

About coolant system problems with the new red 5-year / 150,000 mile antifreeze products

This product is often known as "Dex-Cool", although there are other brand or product names. The distinguishing features are a red or orange dyed color, and the phrasing "organic acid technology" or "OAT" in the product literature. The older green (or blue) coolants use silicates or phosphates for their additive packages. (The recommended practice with green coolant is replacement every 2 or 3 years, as the anticorrosion additive package gets used up.)

What you cannot do: mix red / orange coolant with the ordinary green or blue coolants. Both kinds are ethylene glycol-based materials with similar freeze protection performance, but the anti-corrosion additive packages are completely different in their chemical basis. If you have red coolant, top off with red coolant. If you have green coolant, top off with green coolant. The presence of green coolant destroys the anticorrosion package of the red coolant (and probably vice versa).

Yes, you can switch from one to the other, but it is difficult: this requires multiple clean-water flushings to rid the system of every last trace of coolant residuals. The flush water itself cannot all be drained, and must be taken into account when getting the new mixture correct. If you don't get the mixture correct, both freeze protection and corrosion protection can fail.

There is a pending lawsuit: it is against GM for damage supposedly caused by this new antifreeze material. As best I can tell, from accounts and information posted on the internet, these problems are severe, and have multiple causes coming together in one place. They may not all be GM's fault.

What I think these troubles really are: the red / orange Dex-Cool (and similar OAT antifreezes) appear to be sensitive to **two problems** that can occur in late-model vehicles.

First, there is something about low coolant levels that causes the formation of brown rust-looking contamination in the coolant, and massive corrosion and corrosion-related deposits throughout the cooling system. Aluminum parts appear to be damaged first and worst. Some plastic parts get "eaten up" and fail, too. The cure for this is simple: do not ever let the level get low. But that's not the only thing, because the low level is symptomatic of a leak, in turn the symptom of another deeper problem. Read on …..

Second, (and most likely much more importantly !!!!!) these new red coolants appear to have a problem whenever the natural electrolysis currents in the cooling system are too large. These currents are inherent whenever dissimilar metals (such as the iron engine block and the aluminum head) are in electrical contact mediated by a conductive fluid. The red coolants appear (from these internet accounts) to partly gel up into a goo or gunk when the electrolysis currents are too high. The cure for this one is not simple at all.

Things that seem to make the second problem worse: recent vehicle designs have switched away from copper-based radiator designs to aluminum and plastic designs. This seems to have greatly exacerbated the electrolysis current problem. This can be detected by a current probe. 0.03 amp is supposed to be still OK, but lower is better. Some new vehicles show 10 times that limit, or even more, when probed. A good radiator shop can do this electrolysis current probing for you. If you have these currents, eventually you will have both problems (contamination/corrosion and gelling-up goo/gunk).

The "cure" for electrolysis current problems seems to be two-fold. **First**, every radiator and coolant system component needs its own ground strap to the car chassis ground. **Second**, a big copper tube can be inserted into radiator hoses like a splice and clamped in place to seal. This tube splice will also need a heavy ground wire connected to car chassis ground. The combination of component grounding and the presence of grounded copper wetted in the coolant seems to reduce electrolysis currents back to safe levels, at least in some of the cases posted elsewhere on the internet. Most of the other "cures" being offered appear to be ineffective.

It appears to me that the corrosion damage induced by electrolysis currents (the second problem) is what starts the leaks that lead to low coolant levels (the first problem). Left long enough, major engine parts are destroyed by this. It seems to be very much worse with the red coolants. This is just my opinion, but it would seem that early intervention by grounding everything and introducing grounded copper may well head off both problems before they start.

I am not yet sure, but I think I see some evidence of similar electrolysis damage due to inadequate grounding in my old F-150, even with the green coolants. It just happens a lot slower, and without all the gunk, goo, and contamination. I think it showed up as a radiator leak right through the original all-aluminum core. It's hard to tell, because the new replacement aluminum and plastic tank cores have seals to their plastic tanks that are also proving to be unreliable. One already developed massive seal leaks after only 15 months service.

Gary W. Johnson 11-23-07

Miscellaneous Information about Antifreeze

Ethylene glycol and propylene glycol are the two common chemical bases for modern antifreeze solutions. They have similar properties in practice. They provide both freezing resistance and boiling resistance. However, what you get depends on mixture strength, and can make the problem worse if you get too much.

They replace earlier salt and alcohol solutions. Saltwater only has minimal freeze or boil resistance, but has enormous corrosion problems. The alcohols made fair to middling antifreezes, but reduced boiling resistance considerably.

I looked at data from a couple of websites, and made plots of freezepoint and boiling performance vs mixture. The stories told by the two websites are similar. The performance of the two materials is similar. Most of us can get by with a simple 50-50 mix. In the cold belt, don't go beyond 60-40 concentrate-water.

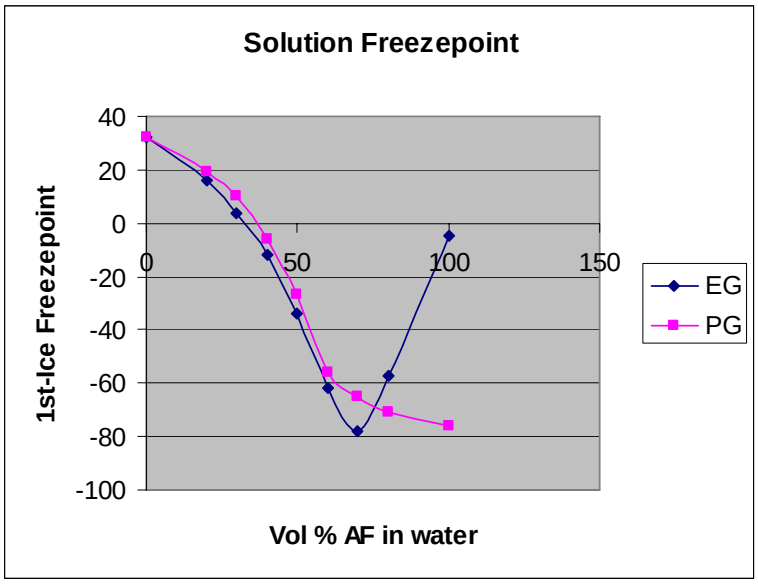
Antifreeze mixtures **Lyondell Chemical** **9/30/2006**

FP (1st ice per ASTM D-1177) deg F

vol % AF	EG	PG
0	32	32
20	16	19
30	4	10
40	-12	-6
50	-34	-27
60	-62	-56
70	-78	-65
80	-57	-71
100	-5	-76

EG = ethylene glycol

PG = propylene glycol



Redpulsar.us/~coldfusion/freeze.htm

%EG	FP, F	1 atm BP, F
0	32	212
10	26	213
20	18	216
30	9	218
40	-4	222
50	-22	227
60	-48	234
70	-93	247
100	9	388

calculated data, not test data