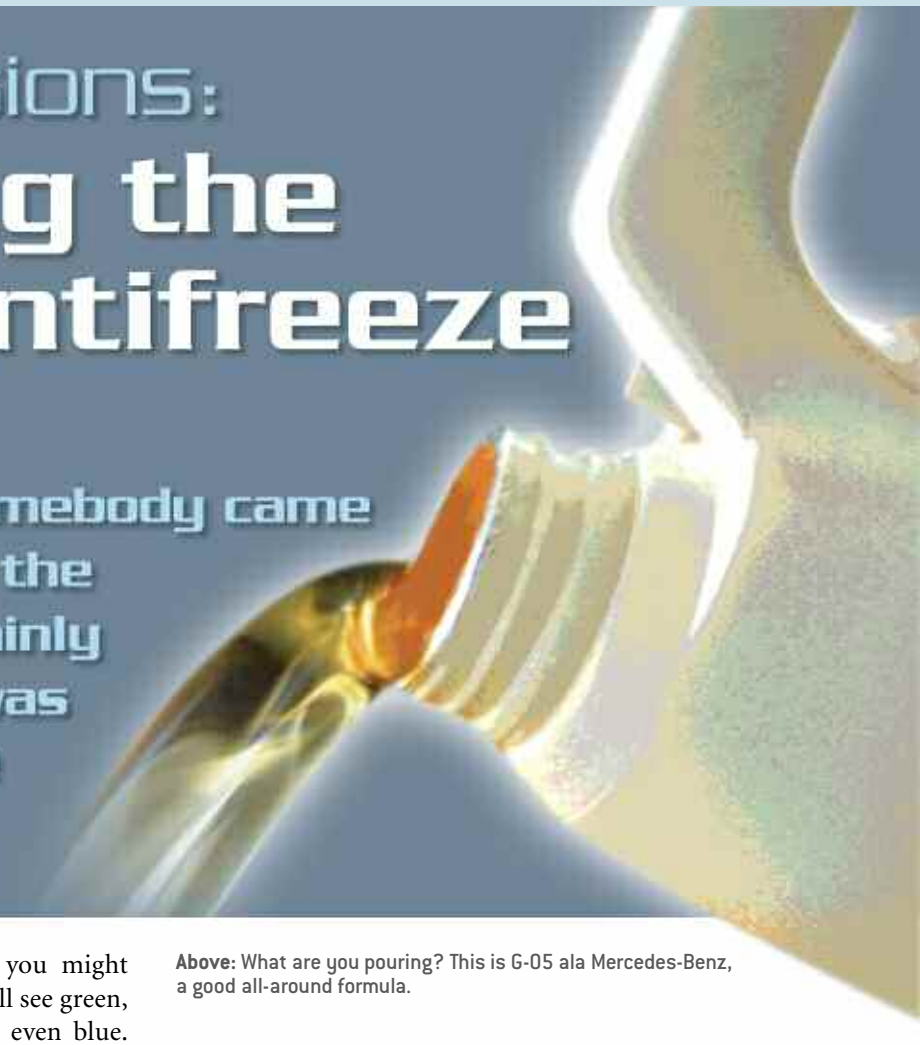
Daily Decisions: Choosing the Right Antifreeze

By Bob Freudenberger

It's about time somebody came right out and told the whole story as plainly as possible, and was willing to take the inevitable flak.



Remove a radiator cap today and you might think you're on an acid trip — you'll see green, gold, yellow, orange, pink, red, or even blue. What are those rainbow colors telling you? Not all that much, actually. There's a lot more to the antifreeze story than dye, but only two big practical questions: What's the right formula to use in your customer's car? And, is there any such thing as a universal antifreeze that'll simplify stocking?

Old Reliable

The saga begins with the conventional American green (although Prestone used to dye it gold, and now that company's product of the same color is something else altogether — beware of relying on color) that's been with us for decades, and traditionally carried a two-year change interval. It consists mostly of ethylene glycol, of course, as do all antifreezes except Sierra, Prestone Lo-Tox, and perhaps a couple of others that are based on propylene glycol, none of which has achieved much market penetration. Besides the 93-95% EG, it contains up to 5% silicate and phosphate corrosion/erosion inhibitors, benzoate (an organic acid), lots of other inhibitors such as triazole (usually tolytriazole, which provides copper-brass protection), a couple of percent of water to keep things in solution, and a tiny bit of dye for leak tracing and identification (hey, what's dripping from that car?).

Above: What are you pouring? This is G-05 ala Mercedes-Benz, a good all-around formula.

There are a couple of very good things about this formula. First, the inhibitors start working almost instantly, and the kind of protection they impart to metal surfaces remains even if the coolant level should be allowed to fall and the metal is exposed to air. Also, the silicates and to a certain extent the phosphates offer the best resistance to and repair of cavitation erosion, as you might find in a water pump if the engine sees heavy loads (trailer towing in the mountains, perhaps?), which minimizes corrosion.

The only thing that's wrong with this stuff is that its inhibitor package becomes depleted over time, hence the two-year interval mentioned. But Ford, for one, believed it was good enough to keep in there for four years or 50,000 miles. We think it's just fine as long as you remind your customers to have regular fluid maintenance done.

Eastern Wiisdom

A corollary to this is Japanese green or red conventional. This contains no silicates, but typically has phosphates and benzoate, plus molybdate for cast iron protection, and nitrate, which guards aluminum. Although the major Japanese carmakers haven't recommended American conventional green, they've never prohibited it, either.

Bad News

Regardless of the metal, this is the kind of thing inhibitors are supposed to prevent. OAT is very good at guarding against corrosion, but do you want the ramifications?

We'll deal with what we consider a big negative in as straightforward a manner as possible: DexCool (boy, are we going to hear about this). It's based on OAT (Organic Acid Technology), and its additive package can keep corrosion away for a very long time indeed. The trouble is, this admirable property is defeated by one simple thing: air. If the coolant level in the system should be allowed to drop (if you don't have some customers who tend to neglect fluids, you live in a better world than we do) so that all surfaces aren't continually immersed, oxidation occurs rapidly. The dusty deposits that form accumulate into ugly glop that clogs up the works.

On top of that, one of DexCool's main organic acids, 2-EHA (sodium 2-ethyl hexanoate), is what's known as a "plasticizer" — it softens certain plastics. See the article on GM intake gasket leaks elsewhere in this issue of Master Technician for more on that, but here we'd like to add that Ford was very forthcoming about its gasket failures due to this stuff, and even has graphic warnings under the hood of many models that say, "Don't Use Orange" (that actually refers to Ford's own OAT as found in the Cougar Duratec, but the point holds nevertheless).

Oh, really? Sorry, but we beg to differ, protestations to the contrary notwithstanding.

Also, Honda and, to a lesser extent, Toyota pretty much forbid the use of DexCool, mostly because of concern over 2-EHA's deleterious effects. We've seen some misinformation (we hope not disinformation) out there that says DexCool is the right choice for most Japanese cars. This is emphatically not true — ask Honda if you want to get an earful. What's the positive aspect of 2-EHA that convinced Texaco chemists to use it? Apparently, it's a very good inhibitor, and inexpensive, too. So, if a carmaker never saw gasket deterioration, it might opt for it.

There's yet another problem with DexCool: It takes a long time — 5,000 miles or so — before it starts to protect metal from corrosion. That's a big concern if, say, you've just replaced a water pump or a cylinder head. And its organic acids are simply incapable of resisting erosion corrosion as silicates and phosphates do.

Are we down on DexCool? Let's put it this way: Years ago when it was first touted as the greatest thing ever, we retrofitted a couple of our vehicles to it. After all, its lack of mineral content was supposed to save water pump seals, which claim turned out to be bogus — the ceramic seal elements hardly ever fail; it's the rubber parts that get cooked. Then, as we learned more, we dumped it and put conventional green back in. As former ASE/NAPA Tech of the Year, California shop owner, and esteemed Master Technician contributing editor Phil Fournier once said to us when we told him we'd bought a new freshwater-cooled Mercruiser and found it was filled with DexCool, "Get that stuff out of there as soon as possible!"

Yeah, it and other pure OATs (Prestone's new Extended-Life gold is the same formula without the DexCool name, as is Wal-Mart's Super Tech brand) have garnered a horrible reputation among techs, and we're not going to argue with that. Sure, you've got to keep using it in GMs and Volkswagens/Audis while they're under warranty, but we don't ever put it into anything else. In fact, when our personal Buick reached the landmark 36,000 miles, we flushed it very thoroughly and replaced it with good old green.

Not a bad idea in our opinion, providing the vehicle isn't still under warranty and a thorough flush is done.

Please don't think of us as Luddites or old techs who resolutely resist change. In fact, we were among the first to embrace what initially looked like a promising new antifreeze. Unfortunately, our real-world experiences haven't borne out that promise. With all due respect to GM and Texaco, sometimes companies get so entrenched in a policy that it's just about impossible for them to back down, all evidence to the contrary notwithstanding.

Hybrids

There are numerous formulas out there that attempt to combine the very long-lived corrosion protection of OAT (*without* the plastic softening ingredient, or at least with much less) and the desirable characteristics of silicates and/or phosphates. Called HOAT (Hybrid Organic Acid Technology), this is where the action is today.

G-05 is a European antifreeze standard espoused by Mercedes-Benz for many years, and approved by Daimler-Chrysler and Ford, among others. It's a hybrid with no phosphates and a small amount of silicates. A company like M-B that has always made a big point of selling worldwide naturally uses the hardest water it can find for its testing, with the result that it ends up shunning phosphates, which tend to react with calcium, magnesium and iron to cause electrolytic corrosion and form serious deposits inside a cooling system.

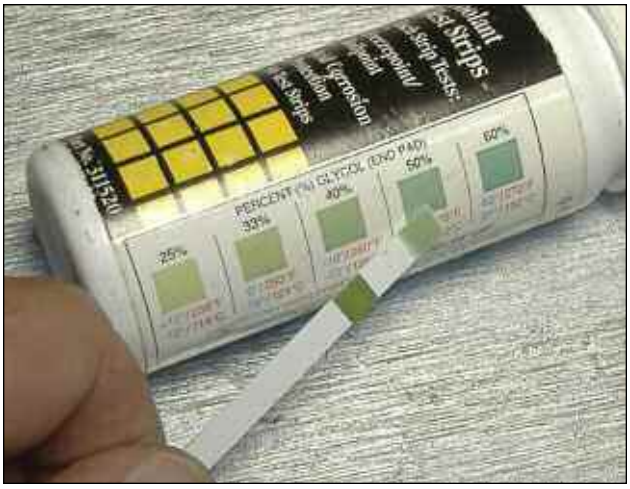
Here's a good example of what we said in the introduction: Color doesn't necessarily mean what you might think. While Ford's G-05 is yellow, as is the major aftermarket brand, Zerex, the same antifreeze in Chrysler Group products has orange dye. Go figure.

Mercedes is the only automaker that employs a neat trick to keep the silicate level up in very long-life situations — a little packet of silica gel in the coolant reservoir that refreshes that inhibitor for years and years, believe it or not.

The formulations BMW and Volvo use are quite similar. With no phosphates and low silicates, they're a lot like G-05 except that they add just a little 2-EHA.

The Japanese see HOATs differently. Apparently, hard water isn't a big problem in Asia because Eastern car manufacturers typically specify formulas containing phosphates, but no silicates. Their extended-life green and pink (Toyota) are based on OAT, mostly sebacate with other inhibitors in smaller amounts (2-EHA is taboo, as we said).

Subaru's branded antifreeze is a good example of the Japanese philosophy. It combines the benefits of OAT and phosphate (non-amine) chemistry, which establishes a semi-permanent protective coating on metal surfaces even if the coolant level is allowed to fall. It also contains sebacate, the organic acid used in most extended-life antifreezes. In addition, it contains an inhibitor chemically similar to benzoate, the organic acid used in conventional antifreezes. By the way, Fuji's engineers are apparently quite conservative because they recommend that the coolant be changed every two years or 30,000 miles. From our perspective, that can't be a bad thing.



Coolant test strips let you know how that critical fluid is holding up, and also make a great customer communications tool. We staple them to the R.O.s.

No Universal

Okay, can you stock just one type of antifreeze and use it in every vehicle that rolls into your bays? Not if you want to adhere to O.E. technical preferences and maintain warranty requirements. But you don't need to keep numerous types in inventory, either. In our opinion, four will do.

1. In order to top up GM and VW/Audi vehicles, or if they're still under warranty, you need to have DexCool available even though you may not like the stuff.

2. Conventional American green will work fine on older domestics and Asians, and is actually a pretty good choice for retrofit on anything as long as the customer is willing to have some minimal fluid maintenance done.

3. For Europeans, Daimler-Chryslers and Fords, a G-05 formula is perfect for top up, and it's not bad as a retrofit on anything.

4. To top up late-model Japanese vehicles with HOATs such as Toyota pink, you might be tempted to use DexCool, but we suggest you resist. It wouldn't be that hard to keep a few jugs of one of the Japanese long-life formulas around.

The important thing is not to mix OAT or HOAT with conventional. Not only will it look ugly, but both types of protection will be diluted.

To the Last Drop?

Not many pieces of shop equipment can improve efficiency as much as a coolant exchange machine. Use it for regular changes, or to switch from one type of antifreeze to another.

Finally, it takes lots of patience to get all the old coolant out of an engine. Numerous fill, run and drain cycles will eventually do pretty well, but, of course, a coolant exchange or flushing machine will vastly improve efficiency (one maker claims a 92-98% exchange in less than three minutes). No matter how you do it, though, you'll never get that last drop. It doesn't really matter. The fresh load's additives will take over.

One more thing: Half the coolant is water. Doesn't it seem silly to agonize over your choice of antifreeze, then mix it with whatever comes out of the tap? Distilled water will cost you less than a dollar a car — load up on your next trip to the grocery store. ■

Cadillac Tire Pressure Sensor Reprogramming

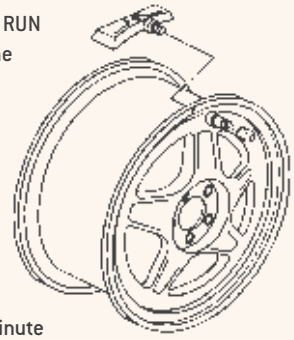
by Rich Diegle

Use the following procedure to reprogram the TPMS whenever the tires are rotated, replaced, repaired, or a wheel sensor is changed. You will need a horseshoe magnet (Kent-Moore tool J-41760 or equivalent):

Service Procedure:

(Review safety procedures contained in the ALLDATA® system before beginning)

NOTE: The recommended air pressure placard is located on the driver's side rear door.



1. Turn the ignition to the RUN position. Do not start the vehicle.
2. Press and hold the key fob LOCK and UNLOCK buttons simultaneously until a horn chirp is heard. This should happen within ten seconds.

NOTE: You will have only one minute per step to complete the next four instructions. If any step is not completed within the one-minute time limit, the system will leave the programming mode and you will have to begin again from Step 2.

3. Go to the LEFT FRONT tire and hold the horseshoe magnet directly over the valve stem until a horn chirp is heard. This should happen within five seconds.
4. Go to the RIGHT FRONT tire and hold the magnet over the valve stem until a horn chirp is heard.
5. Go to the RIGHT REAR tire and hold the magnet over the valve stem until a horn chip is heard.
6. Go to the LEFT REAR tire and hold the magnet over the valve stem until a horn chirp is heard.
7. A double chirp after the final tire indicates that the system has been successfully programmed. If you do not hear the double horn chirp, the system did not program properly and you will have to begin at Step 2 again.
8. Scroll through the Driver Information Center (DIC) with the mode button to verify that the tire pressures are displayed for all four wheel locations. If any data is missing, repeat from Step 2.

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