Facts About Fuel

The following is by Don Nix, founder and former owner of POWERMASTER FUEL.

What's the Oil Content?

The following is the first in a series of articles exploring all facets of model engine fuel.

Fact (A)-It's quite likely that no other single facet of modeling generates as many myths, misconceptions, misunderstandings, errors (and more than a few lies), or as much outlandish goofiness as model fuel...one of our absolutely necessary, non-optional items for powered flight.

Fact (B)-Of all the above, the one fact that rouses the most questions – and without doubt the most wrong answers - is the ongoing nonsense about the amount of oil required in model fuel. Myth: Model Glow Fuel must contain XX%oil to operate properly, perform well and protect the engine. Fact: There is no such fixed number…at least not a valid one.

Why not? Think about it: In order for this to be true, all oils used in model fuel – all of them – would have to be identical in every characteristic. Does anyone honestly believe they are? I doubt it.

While lubricants compounded for full-size engines -automotive, recreational vehicle or aircraft -are rarely, if ever, suitable for use in model engines (for many reasons), nevertheless, there are a number of base lubricants that are available for our highly specialized use. However, most of these must be modified slightly or extensively by the use of a variety of additives and modifiers.

While Klotz model oils are perhaps the most well-known to the average user, and are quite good, they are by no means the only lubricants available to model fuel blenders, and there are currently a number in use. Each has its own "personality"-its own set of technical specifications and characteristics.

At this point, we should point out that we're speaking of the so-called "synthetic oils" popularly used in modern model fuels. Castor oils…the oil of choice, and, indeed, the only suitable model engine oil for many years are more of a common and known factor. Assuming a good grade, if a fuel uses only castor as its lubricant, then we could give you a fixed percentage, at least for the various engine groups and types.

However, few model fuels intended for R/C use today contain only castor oil as the lubricant. For the purposes of this discussion, we will only deal with fuels containing either straight synthetics, or a blend of castor and synthetics.

So…what does all that mean?

Let's draw a little picture here: Suppose at some point in your life, you become concerned about living a long and healthy life, so you decide to consult a doctor for advice as to how to accomplish this. When you come to the subject of food, you say, “Well, tell me, Doctor…if I want still be healthy and virile at 90, how do I eat?” The good doctor replies, “M’ boy, if you will eat two pounds of food a day, you’ll be fine!” My guess is your response would be something like, “Well, what kind of food, Doc"? After all, no two are exactly alike ….is that two pounds of lettuce or two pounds of pork chops?” If he replied, “It doesn’t matter. Just as long as you eat that two pounds every day, you’ll probably outlive your kids.” My bet is that you’d run, not walk, out of that quack’s office!

Why, then do we blindly follow someone’s Word from on High when they say (in words engraved on stone tablets), Thou shalt use no fuel that does not contain XX% oil.” It makes absolutely no sense to me, nor do I think it will to you, if you just stop to think about it. All foods are different; so are oils.

If that’s true, why do the instructions with my engine specify a fixed percentage of oil? Simple - to protect himself or herself. All engine manufacturers have been burned (figuratively and literally) in recent years by “bargain priced” fuels containing either inferior oils, or insufficient amounts of oils. Every one that I’ve talked to will admit off the record that they know that fuels containing good oils won’t need as much as their instructions say. But they also say they know they have no control over that, so they are going to print a high number, in hopes that amount of even a cheap oil will be sufficient. Frequently, it isn’t.

So why not just put a lot of oil –at least 20% or more - in fuel and not worry about it? A lot of reasons…all good ones. For example:

1.Too much oil -any more than is necessary -makes the engine run really crappy. Think about it: methanol burns; oil doesn’t -or at least it shouldn’t. (Some do, but that will be dealt with in another installment.) Common sense would tell us that the less oil (no burnable) we can safely use (to an irreducible minimum point, of course), the more methanol (burnable) we will have in our combustion chamber. More burnable ingredients = more power. One well-known magazine writer, with more than 50 years engine experience, tells me that in his experience, for every 1% oil removed from model fuel, the effect is about the same as adding 1% nitromethane. And it costs a lot less!

2. By the same logic, the less oil we use (to the predetermined minimum, of course), the less the oil is going to be dousing the glow plug element, and we should be able to achieve a lower, smoother idle.

3. Next to nitromethane, oil is the most expensive ingredient in model fuel. By not using an unnecessary amount of oil, especially if it ’s just to satisfy some Great Guru ’s edict...the manufacturer can keep the cost of the fuel down, which puts a smile on all modelers’ faces. Remember that even an additional 25 cents in manufacturing cost translates to an additional dollar…or more…at the retail level.

So, what is the right amount?

It all depends…on what kind of oils, in what combinations, with what additives, etc. And for what use? Sport airplanes…Racing…Helicopters…Boats…Cars…Ducted Fan? What size engines? (As engine size increases, they need progressively less oil. Why? Simple mathematics. Surface area of the combustion chamber increases at about half the rate as the displacement increases.) Most people know that the big T.O.C. and Unlimited racing engines use oil in the 4% to 5% range.

Ducted fan and helicopter engines typically need more oil, 4-strokers less. It might be surprising to most airplane flyers to know that top competition model car engines use fuel with oil contents in the single digits, even though they are turning in the 40,000 -50,000 rpm range, and have no fan in front to cool them! As matter of fact, they will hardly run on regular airplane fuel.

Next installment: Synthetic or Castor oil…Which is best?

The following is the second in a series of articles exploring all facets of model engine fuel.

Which Oil is Better - Synthetic or Castor?

Before we get started on the subject heading, I'd like to offer a couple more thoughts on last month's subject, "What's the Oil Content?" -- thoughts that have been remembered since writing the original column:

Many modelers who have been involved in the hobby for a long time, including those who've been away for years and recently returned, are very stubbornly remembering when model fuel just about had to contain something in the order of 25%oil -usually all-castor. They have a hard time dealing with the idea that virtually no one runs that much oil any more in modern engines.

The operative word here, of course, is "modern." The metallurgy in today's engines barely resembles that of a generation ago. The end result, as far as model engines are concerned, is that the engines today simply don't require as much lubricant -not nearly as much. I will be quick to add that those running antique engines in Old Timer events should certainly continue to use the old time formulas -no doubt about it.

In addition to vastly improved metallurgy, we must remember than manufacturing techniques barely resemble those from years ago, in many ways. Modern CNC machinery has made it possible to routinely and cheaply make 1 or 1 million parts all exactly alike.

Those of you who have come along in later years may be shocked to know that up until the advent of this new technology, every piston was hand fitted to every liner. There was no such thing as simply machining 1,000 pistons and 1,000 sleeves, picking one from each batch and having them fit.

The belief in those days that some engines of the same size and make were markedly hotter than others was no doubt true. We’ve read that in those days, a .29 for example, might vary from as low as an actual .26 to a .32 –some 23% more displacement! More closely controlled tolerances have resulted in the ability to use much different fuel than a generation ago.

The second thought on the subject of total oil content came from reading the operating instructions included with a new imported 4-stroke engine –the DAMO FS 218 twin. It recommends a fuel containing 94% methanol, 5% nitro and 1% castor oil! Clearly, this reinforces my point that “there ain’t no such thing as a fixed percentage of oil content.” Now --on to this month’s subject.

Before we depart the subject of oil in model fuel, let’s talk about a point that’s argued vehemently all over the land - Which kind of oil is better –synthetic or castor? Each side has its very strong proponents, and each side is right...to a point. “Old-timers” tend to still favor an all-castor fuel, or at least one containing a liberal amount of castor oil. Modelers who have come to the hobby in the last 15 or 20 years have a strong affection for synthetic oils, or at least want their fuel to have mostly synthetics. Let’s take a look at both types statistically:

I’d like to insert here that there is a “Chicken Little…The Sky Is Falling” rumor making the rounds of the Internet these days that the manufacturers of castor oil have recently changed their methods of making the product, and the castor oil we are getting now is either wholly or partially incompatible with methanol.

I have talked at some length with the “Head Techie” of one of the largest castor oil importers in the U.S., and I want to go on record as saying that, according to the best information I can find, this is total B.S. The Head Techie actually laughed out loud when I told him what was going around. He said, “You know, there isn’t much we do to the stuff. We press the oil out, filter it, grade it and package it. As far as I know, nothing has changed.” It apparently started with one of the fuel manufacturers. For what reason, I have no idea, unless it’s to help them promote their proprietary synthetics. Incidentally, I have read a response on the net from SIG, agreeing with the fact that it’s nonsense.

So…there you have it. “You pays your money and takes your choice.” Actually, it ’s a little better than that, and the obvious answer is -use a combination of the two, in proportions that will come nearest to enjoying the benefits of each, while minimizing the adverse characteristics.

A few years back, the modeling community was in” synthetic oil frenzy and the swing were toward all-synthetic fuels. Happily -at least in this writer’s opinion, we’ve seen a very noticeable swing back toward the center, with the majority seeming to prefer a synthetic/castor blend. We think this makes sense, and many years experience proves it.

The most frequent comment I hear from lovers of all-synthetic fuels is, “Brand XX leaves a lot less oil on my model.” My response to that is, “Doesn’t that bother you? If you don’t see much oil on your model after flying, that tells you one of two things -or both: Either there wasn’t enough oil in there in the first place, or the oil is burning off with the methanol. Neither is good. There’s no way oil can burn off and properly lubricate at the same time.” This is usually met with a puzzled look, then one of the light dawning, having just realized something they never thought of before. Oil residue in model engines is a natural as barking is to a dog. We have to learn to live with it.

As an aside, not long back a friend sent me a copy of an article published in a European model magazine. In one part, the writer stated, “The Americans are the only ones rich enough and dumb enough to use synthetic oils.” Perhaps overstated just a bit, but it has some validity.

There a couple of types of engines that do require an all-castor fuel or at least one with a considerably higher castor content than most others. One would be the Fox ringed iron piston type, and the other would be the small Cox engines, because of their rather unique ball-and-socket connecting rod-to-piston design.

Pattern flyers traditionally prefer an all-synthetic fuel, for a couple of reasons, I think. One is the fact that pattern flyers practice a lot -hour after hour after hour. That much use, plus the tuned pipe setup that is almost universal with them probably, tends to cause a greater problem with varnish and carbon buildup than in sport types. (At the risk of bombarded, I also think it’s largely a state of mind. “Joe Champion uses all-synthetic, so that’s what I ’m going to use.”)

The other area where we have seen all-synthetic fuels gain in popularity in recent years has been with model helicopters, probably for the same reasons. Also, the trend toward 30% nitro fuel for serious competition has led to using a lower viscosity lubricant, and, as shown in the comparison charts above, this necessarily dictates using synthetics.

Next installment: Nitromethane –the “mystery” ingredient.

The following is the third in a series of articles exploring all facets of model engine fuel.

Nitromethane, the Mystery Ingredient?

Nitromethane -everybody knows it’s there, but few, it seems, really know much about it. Although most seem to know -at least vaguely -that’s its primary purpose is to add power, we still get an occasional call or letter asking, “Why do you use it in model fuel?” At best, there is much misinformation regarding this somewhat exotic ingredient. Let’s see what we can do to clear some of it up.

Nitromethane is just one of a family of chemicals called “nitroparaffins.” Others are nitroethane and 1-nitropropane and 2-nitropropane. Nitroethane can be used successfully in small quantities. (Top fuel drag racers, which generally run on straight nitromethane, sometimes add a little in hot, humid weather to prevent detonation.) At one time, nitroethane was only about half as expensive as nitromethane, but its cost now is so nearly the same, using it to lower cost is hardly worth the trouble. Neither of the nitropropanes will work in model engine fuel. Incidentally, nitromethane is made from propane, in case you didn't know (and I'll bet you didn't).

Yes, NITRO = POWER! But there are conditions and contingencies. First of all, it doesn't add power because it's such a "hot" chemical. Not at all. This may come as a surprise to most readers, but the methanol (methyl alcohol) in the fuel is by far the most flammable ingredient…Nearly twice as flammable as nitromethane. As a matter of fact, if nitro were only 4 degrees less flammable, it wouldn't even have to carry the red diamond "flammable" label!!

In actuality, nitromethane must be heated to 96 degrees F. before it will begin to emit enough vapors that some sort of spark or flame can ignite them! (I demonstrated this not long ago to a friend by repeatedly putting a flaming match out in a lid full of nitro. I might add that he insisted on standing about 20 feet away during the demonstration.)

So...how does it add power? We all know (I think) that although we think of the liquid part substance we put in fuel tanks (in our automobiles or model airplanes) as the fuel, in truth, there is another "fuel," without which the liquid part would be useless. Remember what it is? Right…just plain old air (in reality, the oxygen in the air).

Every internal combustion engine mixes air and another fuel of some sort…in our case, a liquid…glow fuel. The purpose of the carburetor is to meter those two ingredients in just the right proportions, and every individual engine has a requirement for a specific proportion of liquid fuel and air. Try to push in too much liquid without enough air, and the engine won't run at all. That's the purpose of the turbocharger on full-size engines…to cram in a lot more air than a simple carburetor or fuel injection system can handle.

Now, suppose we were to find a way to run more liquid through our model engines without increasing the air supply? That would add power, wouldn't it? Well, guess what, we can! An internal combustion engine can burn more than 2 1/2 times as much nitromethane to a given volume of air than it can methanol. Voila! More Power! That's how it works, and it isn't all that complicated. Nor do we have to spend a lot of time thinking about it in the course of a normal day's sport flying.

However, there are some factors we do need to consider. As a practical matter, virtually all of our everyday sport flying can be done on model fuel containing from 5% to 15% nitromethane. If you're flying something like a trainer or a Cub or similar model, there's probably no reason why 5% won't work perfectly well. Need a little more power? Move up to 10% or 15%. In most of our sport engines today, I really wouldn't recommend going any higher than that. It probably won't hurt anything, but it won't do you much good, either.

We sell more 15% fuel than any other single blend, and for good reason. Most of the popular engines on the market today are built to run on something very near that blend. Typically, European engines will successfully run on lower nitro blends, because they are built to do so. Why? In Europe, nitro can cost between $150 to $200 a gallon! Reason enough?

Nitro does more than just add power. It also helps achieve a lower, more reliable idle. One good rule of thumb for checking to see if a particular engine needs a higher nitro blend is to start the engine, let it warm up for a few seconds, set throttle to full idle and remove the glow driver. If it drops rpm, move up to a 5% higher nitro blend. If there is no discernible drop, you should be fine right where you are.

One of the most popular misconceptions is that by adding substantial nitro, the user will immediately achieve a huge power jump. Just ain't so. Most will be surprised to learn that in the 5% - 25% nitro range, you will probably only see an rpm increase of about 100 rpm static (sitting on the ground or on a test stand) for each 5% nitro increase. In the air, it will unload and achieve a greater increase, and it will probably idle better, too.

My pet rule is this: If you have a model that's doing well, but just isn't quite "there" power wise, go up 5% in nitro. If that doesn't do it, you need a bigger engine, not more nitro!

Most of our popular sport engines in use today aren't set up to run on much more than 15% or 20% nitro. Increasing the nitro has the effect of increasing the compression ratio, and each specific engine has an optimum compression level. Exceed it and performance will probably suffer, not gain, and the engine will become much less "user friendly."

High performance racing engines, for example, are tuned entirely differently in compression ratio, intake and exhaust timing etc., and are usually intended to run on much higher nitro blends. One exception, of course, is racing engines used in certain international and world competition (FAI). By the rules, these engines are not allowed to use any nitro at all, and they go just as fast as those that run on 60 or 65%! The first question that comes to mind, then, is, "Why aren't all engines designed to run on no nitro, so we can all save a lot of money?" Ask any of the world-class competitors. Those engines are a serious bitch to tune and run, and are definitely not user-friendly! In fact, they are well beyond the skill levels of most average flyers. There's a price to everything.

Another statement we read or hear frequently is that nitromethane is acidic and causes corrosion in engines. It isn't acidic, and the manufacturers say it doesn't happen, it can't happen. However, at least one noted engine expert and magazine writer insists that it does. Flip a coin. (I once asked Dave Shadel, 3-time World Pylon Champion, and a fellow who works on more high performance engines than anyone I know, how frequently he encounters rust in engines that have been using high nitro blends. His answer? "Never.")

Why does nitro cost so much? While I have no clue as to the cost of manufacturing, other than it takes a multimillion-dollar investment in a large refinery to produce it, there is one pretty good reason. There is only one manufacturer of nitromethane in the Western Hemisphere. Figure it out for yourself.

Also (and this will come as a big surprise), our hobby industry only consumes about 5% of all the nitromethane produced: and full-size auto racing about another 5%or so. This means we have no “clout” whatever, and simply must pay the asking price. Where does the rest of it go? Industry. It’s used for a variety of things -a solvent for certain plastics, insecticides, explosives (yes, it was an ingredient in the Oklahoma City bombing) and I’m told it’s an ingredient in Tagamet, a well-known prescription ulcer medication (no wonder that stuff is so expensive!). Please note that while nitromethane is an ingredient in making some explosives, under normal use, it in itself, is not explosive. Remember, the guy used fertilizer, too.

Hardly a month passes that someone doesn’t call to ask, “I hear more nitro will make my engine run cooler. Is that true?” Nope. The higher the nitro content, the higher the operating temperature. Fortunately, in most of our sport engines, the difference in operating temps between 5% and 10% is negligible, and there are lot of other factors (proper lubrication, etc.), that are much more important.

Finally, remember in the beginning of this, we said that nitro adds power because we can burn more of it than we can methanol, for a given volume of air? This also means that the higher the nitro content of the fuel, the less “mileage” (or flying time) we will get. In a typical .40 size engine using 15% nitro, we can usually get a minute to a minute and a half flying time for every ounce of fuel. The Formula 1 guys are lucky to get 2 minutes out of an 8 oz. tank!

What’s the practical side of this? If you go to a higher nitro blend, be sure to open your needle valve a few clicks and reset before you go flying. Otherwise, you’ll be too lean, and could hurt your engine. Conversely, if you drop to a lower nitro blend, you’ll have to crank‘er in a little.

Next Installment: 2-Stroke vs. 4-Stroke Fuels - Is there really a difference?

2-&4-Stroke Fuels?

The following is the fourth in a series of articles exploring all facets of model engine fuel.

Well, what do you think? Is there really a difference, or is this merely a big hype by the fuel manufacturers to sell more products? Let’s see a show of hands - ah, yes - about evenly divided. Well, let’s explore the facts.

Fact: Most 4-stroke model fuels contain less oil than comparable 2-stroke fuels. The most common response to this is, “But 4-stroke engines have more moving parts, they should need more oil, not less!” Well, that sounds reasonable, but it doesn’t stand up under close examination. The number of moving parts has nothing to do with it. What is important? Think about it.

Fact: With rare exceptions, 4-stroke engines run at substantially slower RPMs than a comparable 2-stroke engine, most in the under-10,000 rpm range vs.12,000, 13,000 or more for a typical 2-stroke of the same size. They are engineered to deliver maximum power at slower RPMs, with bigger props. What does this have to do with it? One of the main factors used in determining the proper oil content of fuel is heat. To use the well-worn term, it doesn't take a rocket scientist to figure out that the more slowly an engine turns, the less heat it generates from friction. If you don't believe that, rub your palms together slowly, then as fast as you can. So, lower RPMs = less heat = less need for oil.

Fact: 4-stroke engines only fire every other stroke, vs. every stroke by a 2-stroke engine. Firing, or combustion, burns fuel, which creates heat. Logically, it may be deduced that if there is fire in the chamber only every other stroke, the engine has time to cool off a bit between combustion cycles. Let's take that a little further. Using a hypothetical 4-stroke engine turning 10,000 rpm = 5,000 combustion cycles per minute, vs. a hypothetical 2-stroker turning 13,000 rpm, with the same number of combustion cycles per minute, the gap widens. The 2-stroker has 160% more combustion cycles than the 4-stroker. Even though this is partially offset by the fact that at least some 4-strokers have a higher exhaust gas temperature, the message is clear: 4-strokers remain cooler, and need less oil.

Fact: Oil doesn't burn (or shouldn't) - methanol does. Using a little logic, we arrive at the conclusion that a properly made 4-stroke fuel will deliver better performance than a 2-stroke fuel in the same engine. Why? Remember…the 4-stroker is only firing every other stroke. This results in the plug element wanting to cool down between strokes, resulting in a "colder" plug. Excess or unnecessary oil, constantly dousing the element, is going to make it more difficult to achieve a slow, smooth idle. Those who contend that, "Well, using too much oil can't hurt anything" are wrong. In addition to causing undue friction in the engine, keeping the metal parts from properly mating, etc., too much oil in 4-stroke fuel is constantly trying to cool a plug element that is already having problems. Sort of like pouring a bucket of cold water on a poor guy whom is already shivering. Again, since oil doesn't burn, it's doing nothing to help us develop power; it simply lubricates and goes right out the exhaust and all over everything. However, suppose we don't put unnecessary oil in the fuel, and replace it with methanol, which does burn. Well, what do you know greater top end power! Hey, I think we're on to something here! Remove unnecessary oil from 4-stroke fuel, and we get a "twofer " -- two benefits for the price of one, a slower, more reliable idle plus greater top end power!

Conclusion: For reasons that should be clear above, a properly blended 4-stroke fuel should deliver better all-around performance in a 4-stroke engine than a regular 2-stroke fuel in the same engine.

While it's not going to actually harm anything to run 2-stroke fuel in a 4-stroke engine, never, ever run 4-stroke fuel in a 2-stroke engine. It's not going to have enough oil. Now, for those of you will say that you have done it with no problems, I'll agree. If you have a real good ear and keep the needle valve "fat" (rich), it will probably work just fine. But the official word is DON'T! It reduces your margin of error unacceptably.

Finally: Because engine manufacturers have been burned in recent years by some fuel makers' attempt to lower the cost of their products by using too little oil or a cheap grade, most manufacturers today are recommending that you run a 2-stroke fuel only in their 4-stroke engines. Or they will specify what would seem to be abnormally high oil content (and it probably is). Who could blame them? Since they know they have no control over the oil used in someone else's fuel, they're just trying to cover their fannies. So would I.

Note: I believe it's commonly known that the manufacturers of YS engines, among the most powerful 4-stroke engines available, mandate that only fuels containing oil contents in the normal 2-stroke range be used. Their engines are unique, and the manufacturer's recommendations should be followed, although, as with anything, there are exceptions.

Next Installment: Storing fuel for maximum shelf life.

Storing Fuel for Maximum Shelf Life

The following is the fifth, and last, in a series of articles exploring all facets of model engine fuel.

Readers are invited to contact Don directly via e-mail – FLYERDON@aol.com

During the Q&A part of countless "Dog & Pony Shows" at hobby clubs all over the U.S., one of the frequently asked questions is, "What's the shelf life of fuel?" The answer is both simple and easy. Properly stored, model engine fuel will last almost indefinitely. So, what constitutes "properly stored"? Let's take a look.

Contrary to many things you might have read or heard, just about the only thing that adversely affects model fuel is the absorption of moisture from the air. Keep the air away from it, and your fuel will likely be potent longer than you are! Methanol -the major ingredient in model fuel- is hygroscopic. This means it's virtually 100% soluble in water, and absorbs moisture from the air like a vacuum cleaner sucking up dirt.

Most modelers have no idea how rapidly this can and does happen, and tend to be rather skeptical about the idea. Let me paint a picture for you. Almost everyone has spilled a little fuel on the top of their fuel can in their flight box. If so, you've no doubt noticed that the shallow film of raw fuel takes on a cloudy, milky look. What you are seeing is the methanol sucking moisture right out of the air. Since the quantity of fuel is thin with a lot of surface area, the absorption is rapid. The water won't mix with the oil and the fuel turns cloudy. Just remember how quickly this happens, almost immediately, and it might give you an idea of just how quickly your fuel can be ruined if you leave the cap off, allow a vent tube to remain open, etc.

The wide surface area relative to the quantity of the fuel exposed is disproportionate, of course, to leaving the cap off the fuel jug, but I think you get the idea. In humid conditions such as exist in parts of the U.S.; it doesn't take very long at all to adversely affect your fuel. And it doesn't take a large opening, a cross-threaded cap, a small vent line, etc. is all that's needed to do the damage.

The solution is simple, of course, just keep it tightly sealed. And yet, sometimes that's not enough. Most of us have seen small droplets condensed inside our fuel jugs after it's become partially empty. This is the result of condensation of moisture as the air trapped inside the jug cools. Until about a year ago, there was little we could do about this, but there is now a method to take care of this problem. Since it's not the purpose of this column to commercially promote our own products, those interested are invited to contact the writer at the e-mail address above, and we'll be happy to tell you about the product that will solve the problem.

For the reasons above, it's our opinion that it is rarely a good idea to buy model fuel in 55-gallon drums. Unless all the fuel is poured up the first time the drum is opened, a substantial volume of air is trapped inside the drum each time it's opened. Steel containers of any kind warm and cool much more readily and rapidly than plastic containers and condensation is much more evident in this type of container. The result is that the last portion of the drum of fuel is quite likely to be contaminated with moisture, sometimes to the point of being unusable.

There is another downside to buying fuel in drums, especially if more than one person is using it. With no control over the type container the fuel is dispensed into, perhaps not bearing sufficient or proper warnings, etc., the liability is incredibly high if an accident of any sort should occur. Model clubs considering this type of fuel purchase for their members should be particularly aware of the potential liability, which is huge!

While it's true that the UV in sunlight (or in fluorescent lights, for that matter) will cause pure nitromethane to deteriorate over time, it's our experience that once the nitro is in solution and substantially diluted, the deteriorative effect is relatively minor.

To test this, some years ago we put a gallon of 10% fuel out in direct sunlight (in sunny Southern California) for a month. At the end of that time, we tested that fuel in an engine vs. fresh product and could see no difference. While it certainly won't hurt anything to store fuel away from direct sunlight, etc., it's our personal opinion that the adverse effect of sunlight on fuel under normal operating conditions is too little to worry about.