



Tech Talk



Gasoline Ratings & Octane

Source - Larry Rains - Retired Automotive Industrial Arts Teacher

Most of the things I know about fuel and octane I have read about. A few things I have experienced myself after racing for twenty years and teaching auto mechanics for thirty-three years. The first thing I will try to explain is fuel ratios. 14.7 pounds of air mixing with 1 pound of gasoline is supposed to be the perfect ratio. Air doesn't weigh much, so 14.7 pounds is a lot air. Good thing we only pay for the gasoline. 12 to 1 is an example of rich: not so much air. 17 to 1 is an example of lean: more air. No matter what it is, there is always a lot more air. Whether you have an old car with a carburetor or a newer one with fuel injection, it is the same thing. We want to control the amount of fuel mixing with the air. You directly control the amount of air with your right foot on the accelerator pedal. The fuel is indirectly controlled by vacuum, computer, etc. This could be a whole new topic.

To make an engine run well, you need a perfect fuel mixture whether running fast, slow or in between. Acceleration is a whole new thing. If it's too rich it will lose power and backfire out the exhaust. If you see race cars with fire coming out the exhaust that is unburned fuel still burning as it leaves the engine. If you have a lean fuel mixture it will backfire out the intake side. The old cars we used to have, had carburetor fires because of lean backfires. Both are not good.

The last thing I will talk about is octane. This topic I hate to bring up because I can't test it. There are a lot of experts on gasoline types and octane: but I am not one of them. What little I know I will explain. High compression engines need high octane: a low compression engine doesn't. I've had students who put Cam 2 type racing gasoline in their street cars only to have their cars run worse. Octane is a way to keep the fuel from burning from the heat of compression. That's what diesel engines do: not gas engines. We want our fuel to wait on the spark at the

spark plug. The spark is supposed to start the fuel burning. If you have low octane levels in your engine, it will start to burn because it got too hot. When that flame hits the flame caused by the spark plug, it creates a terrible noise and incomplete combustion: this is called ping or knock. Put in high octane fuel and your engine should stop pining and gain performance. In the old cars we could have the spark plug spark later or richen-up the fuel mixture and this would help also. New cars will do this through the computer with the help of knock sensors installed in the engine. If you run lower octane in you C-6 Corvette, it will probably won't knock or run too bad. You will lose performance but you probably won't know it. The computer will take away some timing, meaning the spark plug will spark later on the combustion cycle. This is like towering the compression. C5 Corvettes are not quite as forgiving, but will basically work the same way.

So, high octane simply means the fuel can get hotter before it burns. Racing fuel burns cooler and slower to provide very high octane. Octane is a difficult subject because you can't really see it burn. Maybe this will give you something to think about the next time you fill-up.