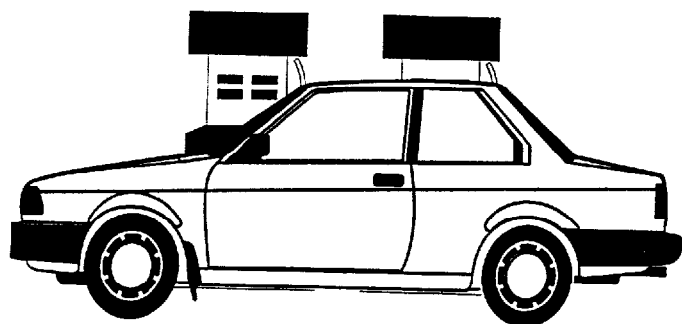


Gasoline

Questions & Answers

For Your Car

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Fuel Saving Tips

- *Have your car tuned regularly*—A simple engine tune-up can improve car fuel economy by an average of 1 mile per gallon.
- *Keep your tires properly inflated*—Underinflated tires can decrease fuel economy by up to 1 mile per gallon.
- *Slow down*—The faster you drive, the more gasoline your car uses. Driving at 65 miles per hour rather than 55 miles per hour reduces fuel economy by about 2 miles per gallon.
- *Avoid jackrabbit starts*—Abrupt starts require about twice as much gasoline as gradual starts.
- *Pace your driving*—Unnecessary speedups, slowdowns, and stops can decrease fuel economy by up to 2 miles per gallon. Stay alert and drive steadily, not erratically. Keep a reasonable, safe distance from the car ahead of you and anticipate traffic conditions.
- *Use your air conditioner sparingly*—The use of air conditioning can reduce fuel economy by as much as 2 miles per gallon under certain speeds and operating conditions.
- *Avoid lengthy engine idling*—Turn your engine off when you are delayed for more than a couple of minutes.
- *Plan your trips carefully*—Combine short trips and avoid traveling during rush hours to reduce fuel-consuming patterns such as starting and stopping and numerous idle periods. Consider joining a car pool.
- *Drive only when you need to*—Don't drive needlessly.

Gasoline For Your Car

1

Q. What is gasoline?

- A.** Gasoline is the fuel used for the spark-ignited internal combustion engine. It is basically a blend of petroleum-derived compounds, called *hydrocarbons*, and additives. Some gasolines may contain other components known as oxygenates. Oxygenates are compounds in which oxygen is chemically combined with hydrocarbons. Examples of oxygenates are alcohols and ethers. A carburetor or fuel injection system mixes gasoline with air on the way into the combustion chamber of the engine. There the mixture is compressed, ignited, and burned. The energy released on combustion is converted to mechanical energy, which is used to propel the car or light-duty truck.

2

Q. What features of gasoline should I be concerned about?

- A.** Gasoline should have the proper volatility (tendency of liquid fuel to vaporize) to provide good starting, fast warm-up, smooth acceleration, and freedom from stalling. Gasoline volatility is also closely controlled in summer months to minimize evaporative emissions from your vehicle. It should have an adequate octane level to provide power and economy without frequent or severe engine knocking (pinging). It should be formulated with suitable additives to control deposits and corrosion to help keep the carburetor or fuel injectors, intake valves, and other engine parts clean. It should

also be free from contamination. In winter, many gasolines are blended with alcohols or ethers to reduce exhaust carbon monoxide emissions.

8

Q. Why does gasoline contain additives?

- A.** Detergent additives control deposits throughout the fuel-metering and induction system. Corrosion inhibitors can protect your fuel system and other vital engine parts from rust and corrosion. Other additives (antioxidants and metal deactivators) prevent gum and other harmful compounds from forming while gasoline is stored. Still others (deicers) help keep ice from forming in your car's fuel system during cold weather.

4

Q. What are detergent additives?

- A.** Detergent additives keep carburetors and fuel injectors clean and can prevent deposits from forming in the engine intake system. Deposits in the intake manifold, intake valve port area, or on the inlet side of the intake valve may cause reduced warm-up driveability performance, increased emissions, and in some cases, a drop in power.

Fuel injector deposits can restrict fuel flow to the engine or destroy the injector's ability to form the fine mist of fuel with a uniform spray pattern necessary for optimum engine performance. This condition is commonly called fuel injector fouling. Vehicles with fouled fuel injectors may be hard to start, idle poor-

ly, stall frequently, and lack power on acceleration. Similar problems are caused by carburetor deposits that restrict fuel and air flow to the engine. These deposits, if significant, will reduce fuel economy and increase exhaust emissions in both fuel injection and carburetor-equipped cars.

Deposits in the intake system of the engine affect cold-start and warm-up performance. Even a small amount of intake valve deposits can cause hard starting, rough idling, and stalling. The automotive and oil industries have developed tests that measure a gasoline's ability to keep intake valves clean.

All new car manufacturers now recommend using of gasoline containing additives that prevent fuel injector, carburetor, and intake valve deposits.

Deposit-control additives are required by law in all gasoline sold in all 50 states after January 1, 1995. California required deposit control additives in all gasolines sold after January 1, 1992.

5

Q. What are oxygenated fuels?

- A. Oxygenated fuels are gasolines blended with either alcohols or ethers in accordance with state or federal regulations. The most common oxygenates are ethanol, which is an alcohol that can be blended up to 10 volume percent in gasoline, and MTBE (methyl-tertiary butyl ether), which can be blended up to 15 volume percent in gasoline. Other ethers, such as ETBE (ethyl-tertiary butyl ether) and TAME (tertiary-amyl methyl ether), can also be used.