

Changing the Oil in a 2004 Nissan Maxima



Prepared for Nissan
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Prepared on December 14, 2012

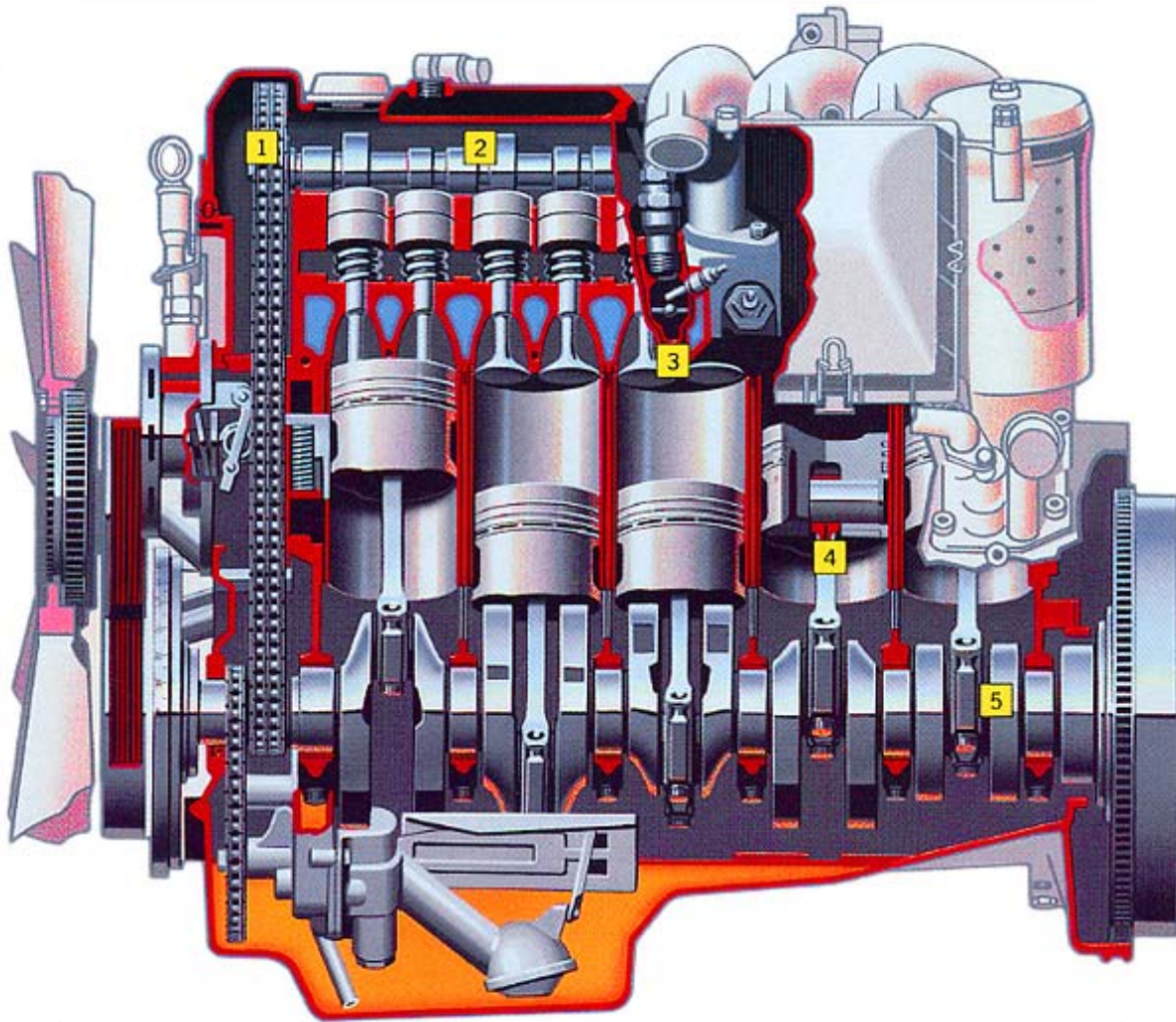
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Introduction to Changing the Oil in a 2004 Nissan Maxima

This manual will teach you how to change the oil in a 2004 Nissan Maxima. Changing the oil in a vehicle is a preventative maintenance that will save you both time and money. With a few tools and the correct supplies, you'll be able to service your own vehicle and avoid expensive repair costs down the road. New car owners may find this process interesting and educational, while veteran car enthusiasts may find this process fun and fulfilling. Either way, changing the oil in your vehicle is essential to ensuring its mechanical longevity.

Chapter 1: What Motor Oil Does for an Engine



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Without motor oil, engines simply would not work. Oil has many functions for the engine, and there are many types of oils. This chapter will discuss those functions and types in depth.

The Function of Motor Oil

The primary function of motor oil is to provide lubrication for many different types of internal combustion engines. A secondary function of motor oil is its ability to gather loose metal shavings and byproducts of combustion from the engine. It also helps prevent corrosion of both the engine block and its components, and extends the longevity of vital rubber seals and gaskets. Lastly, motor oil contributes to the cooling of the engine by carrying heat away from the moving parts.



Figure 1: Motor Oil

Types of Motor Oil

There are two fundamentally different types of motor oil. Conventional oils are made from naturally occurring oil while synthetic oils are manmade. All conventional motor oils start off as

a thick base stock of petroleum hydrocarbon

derived from crude oils. Synthetic motor oils are created in the lab and possess better mechanical properties. Manufacturers manipulate the viscosity of the oil and introduce it to additives. Different viscosities produce different grades of oil. The SAE (Society of Automotive Engineers) have broken motor oil into eleven different grades



Figure 2: Conventional and Synthetic Motor Oils

(weights or viscosities), which are measured at two different temperature ranges. The six cold (winter-grade) oils have viscosity ratings of 0W, 5W, 10W, 15W, 20W, and 25W. The non-winter grade oils have viscosity ratings of 20, 30, 40, 50, and 60. Because most engines will operate in a variety of weather conditions, manufacturers create multi-grade oils by combining a winter-grade with a non-winter grade, so that the oil performs optimally under any circumstances. Below is a chart to help figure out optimal operating temperatures of different motor oils.

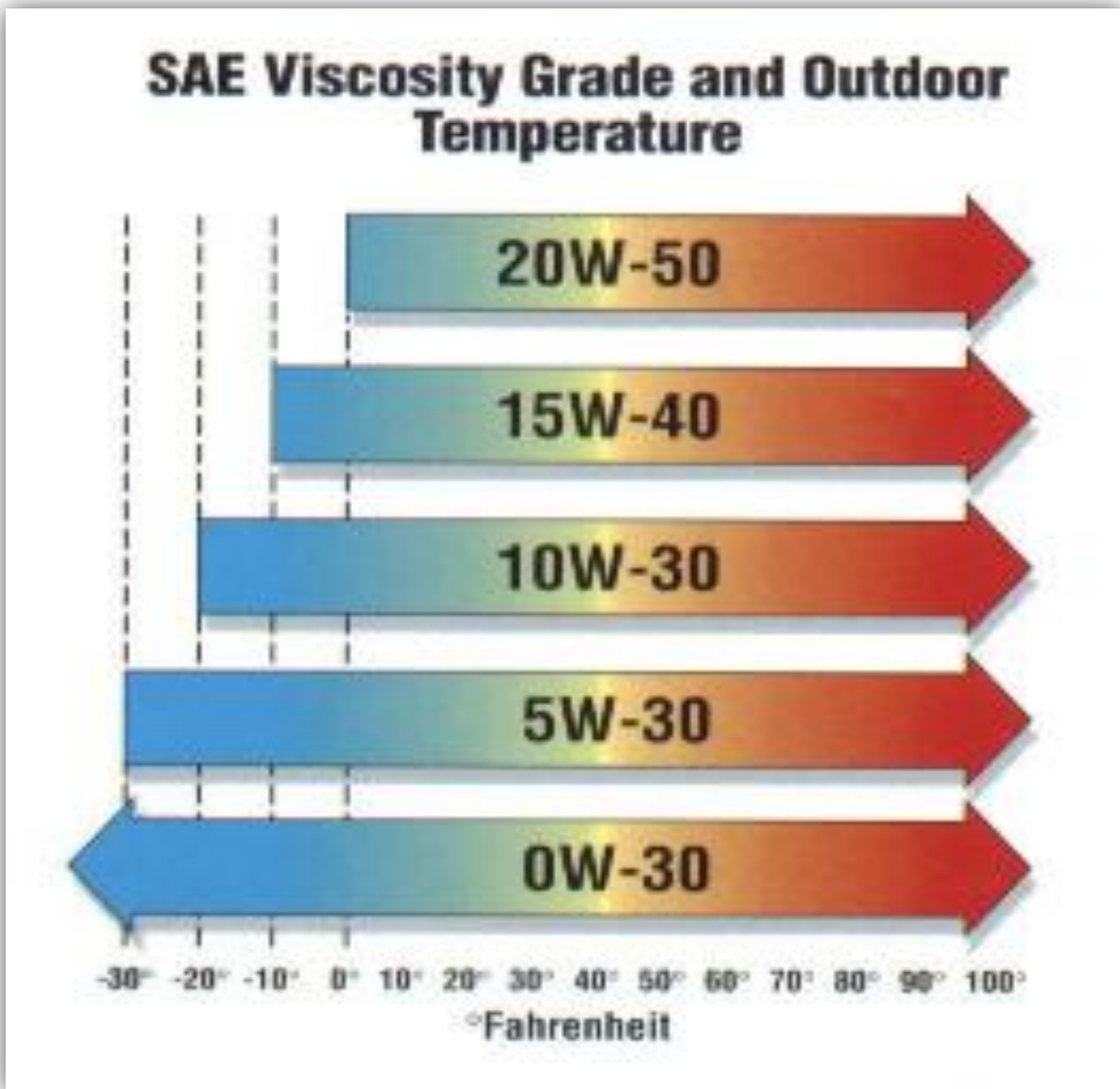


Figure 3: Viscosity Grade and Outdoor Temperature

Chapter 2: Consequences of Neglecting Engine Oil



Chapter 2: Consequences of Neglecting Engine Oil

The inside of a combustion engine is an extremely hostile environment. Consequently, motor oil begins to break down immediately following engine ignition. As oil breaks down, it loses its ability to perform the following five tasks that are vital to the longevity of an engine:

Lubrication of Engine Components

Motor oil that has broken down past a certain point is unable to properly lubricate the interior of the engine. This additional strain on the engine and wear on parts begins to increase exponentially, which greatly shortens the overall life of the engine.

Protection Against Oxidation and Corrosion

The additives that give motor oil their lubricating and protective properties become harmful once the oil begins to break down. The chemicals will react with oxygen and heat forming acids to form corrosive compounds. These compounds increase wear and cause sludge buildup, which leads to increased oil consumption, sticking valves, and seized pistons.



Figure 4: Oxidation in an Engine

Protection Against the Clogging of Oil Passageways

Carbon deposits and sludge resulting from old oil can clog the oil filter, as well as the oil passageways within the engine that circulate the oil. If these blockages become severe enough, they can completely stop the flow of oil to the engine, which will almost always cause severe damage.

Removal of Carbon Deposits in the Engine

Carbon deposits due to the breakdown of oil can cause serious blockage to essential components such as the PCV valve (Positive Crankcase Ventilation) and the EGR valve (Exhaust Gas Recirculation) in the exhaust system. This will cause the engine to run rougher and hotter, and increase exhaust emissions. All of this leads to a decrease in overall engine power.



Figure 5: Comparison Between a Blocked PCV Valve and a Clean PCV Valve

Thermal Breakdown Within the Engine

Motor oil undergoes thermal breakdown when the heat of the engine weakens the viscosity of the oil. This leads to the issues regarding lubrication of the engine, but it also causes the oil to slip past seals and gaskets into the combustion chamber. Once there, it will burn along with gasoline, leading to smoke coming from the exhaust system and increased oil consumption.

Chapter 3: Preparation for the Oil Change



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You need to gather a few components before beginning the oil change to ensure everything goes smoothly. This list is not extensive, but each item is very important.

Tools You Will Need

You will need the following tools to perform the oil change:

- An oil rag (any rag which can get dirty will do)
- A funnel*
- A drain pan
- One 12-millimeter wrench
- One oil filter wrench*
- Safety goggles*
- Safety gloves*



Figure 6: Oil Filter Wrench

Parts You Will Need

You will need the following parts to perform the oil change:

- 5 quarts of oil**
- An oil filter***



Figure 7: Oil Filter

* Optional, but strongly recommended

** It is recommended that you use Pennzoil Synthetic 5W-30

*** It is recommended that you use the K&N SS-1008

Chapter 4: Performing the Oil Change



Chapter 4: Performing the Oil Change

Once you have the necessary tools and parts for the oil change, it is time to begin.

Part 1: Before the Hood is Opened

Before you even open the hood, follow these steps:

1. Run the vehicle for approximately five minutes to stir up any carbon deposits and other debris that settled to the bottom of the engine.
2. Look at the instrument panel (located behind the steering wheel) and check for the red oil light.
 - If the light is not illuminated, continue with the oil change.
 - If the light is illuminated, then your oil pressure is not in the correct range. Perform the oil change like normal, but if the light remains on after the oil has been changed then you have an issue with your oil pressure. Take the vehicle to a repair shop and allow an expert to determine the source of the problem.
3. Turn off the vehicle and secure the keys. Place the keys far enough away from the ignition switch to avoid an accidental ignition.
4. Pull the hood release lock. It is located on the underside of the dash next to the driver side door.



Figure 8: Oil Pressure Light

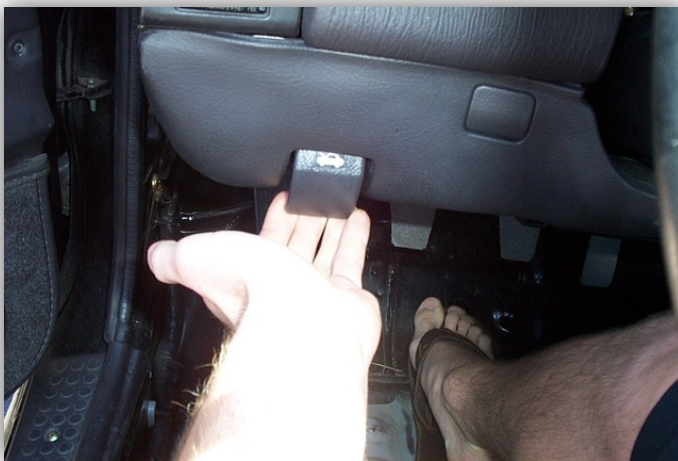


Figure 9: Approximate Location of Hood Release Lock

5. Go to the front of the vehicle and pull the hood release lever. This lever may be difficult to find; you can locate it easily by running your hand along the underside of the hood from the driver side towards the center.

6. Once you've pulled the hood release lever, gently lift the hood to the upright position. The hydraulic pistons on either side of the hood will keep the hood from closing.

Part 2: Under the Hood

Now that you're under the hood, the real mechanical work starts.

1. Locate the oil cap. It is located on top of the engine, directly to the left of the Nissan logo. Remove the oil cap by turning it counter clockwise. Place this somewhere you will

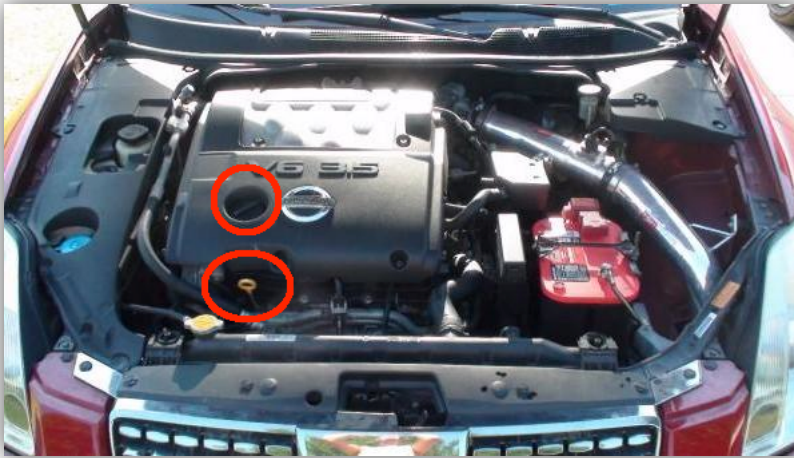


Figure 10: Location of Oil Cap and Dipstick

remember.

2. Locate the dipstick. It is located directly in front of the oil cap. Gently tug at the dipstick until it is out of the engine and fully exposed. Wipe the dipstick clean with your oil rag, and then reinsert it all the way into the engine. Pull the dipstick out once again in order to get a precise reading of your

oil level before changing it. To read the dipstick, look at where on the dipstick the oil stops. There is a crisscross pattern on the dipstick; anywhere on it between “high” and “low” is the acceptable range.

There are three different readings you could obtain:

- If the oil is too low, then your engine may be burning or leaking oil. It is recommended that you take your vehicle to a repair shop and allow an expert to determine the source of the problem.
- If the oil is within the crisscross pattern, then your oil level is in the proper range and you have nothing to worry about.
- If the oil is too high, then whoever last performed the oil changed used too much oil.

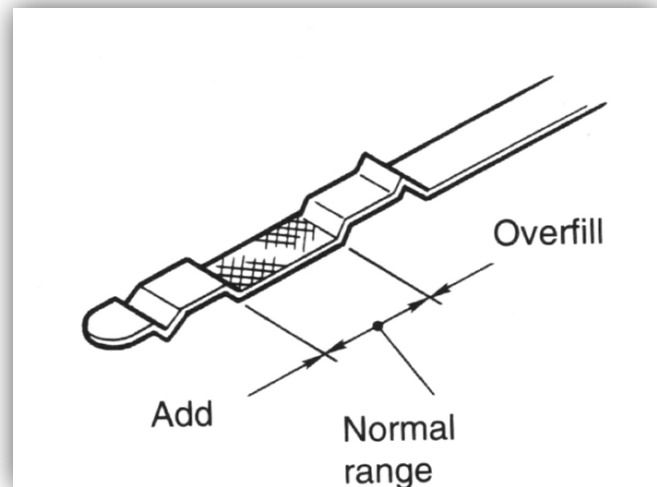


Figure 11: Oil Dipstick

3. Once you have read the dipstick, completely reinsert it into the engine and make sure that it is secured.

Part 3: Under the Engine

It is now time to drain the oil.

1. Slide underneath the vehicle and locate the oil filter and drainage nut. The filter should stand out; it will be a colorful cylinder protruding from the oil pan. The drainage nut may be more difficult to find; it will be helpful to find the lowest point on the oil pan—the nut will be there. Refer to the picture for exact locations.

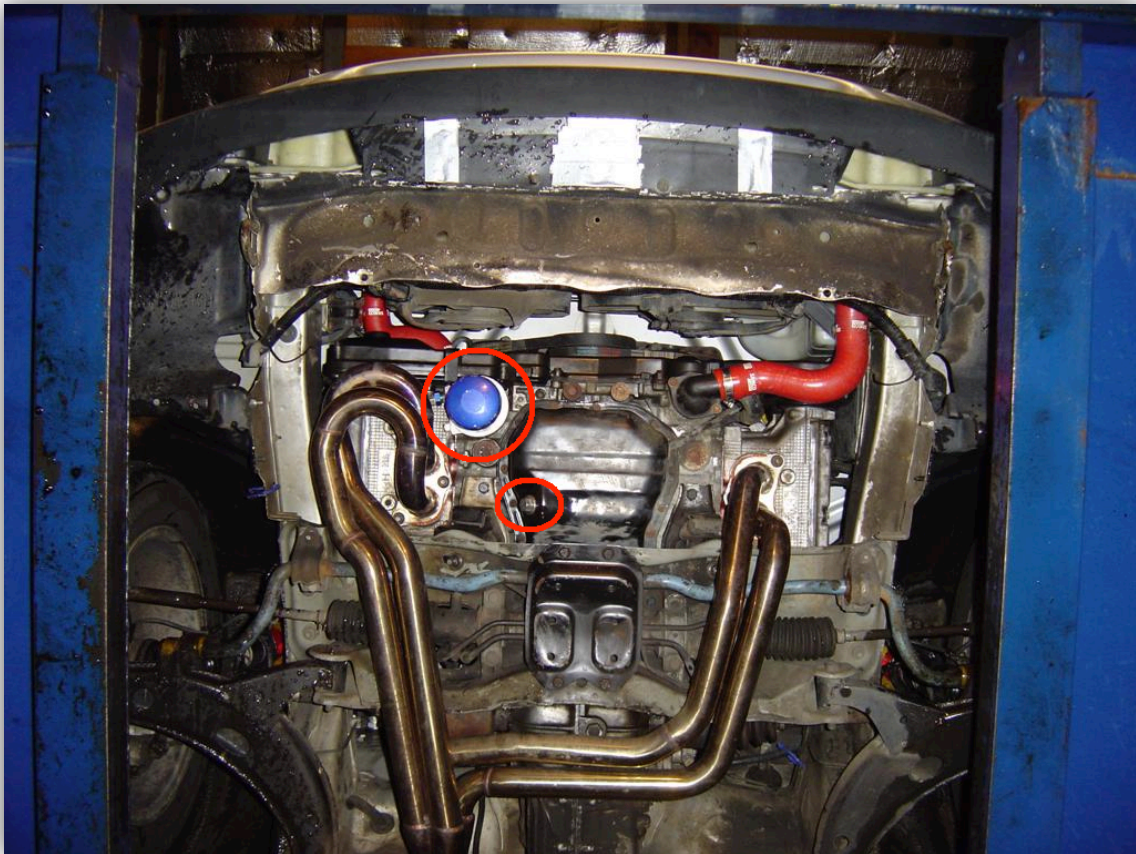


Figure 12: Location of Oil Filter and Drainage Nut

2. Now that you've located the oil filter and drainage nut, position your drain pan directly underneath both of the components.

Important Safety Information

- Watch out for hot spots on the engine; touching one could cause severe burns.
- Wear safety goggles while draining the oil to ensure your eyes are protected.

- Using the 12-millimeter wrench, turn the drainage nut counterclockwise until it is almost unthreaded. Finish unthreading the nut by hand so that the nut doesn't drop into the drain pan. Once the oil starts flowing out, place the nut aside and turn your attention to the oil filter.
- Unthread the filter off the spindle by turning it counterclockwise by hand. If necessary, use the oil filter wrench to gain leverage (though you shouldn't need it if the filter was previously installed correctly) to unthread the filter. Some oil will drain out of the filter mounting plate.
- Wait until the oil stops flowing out of the oil pan and the filter mounting plate. Do not proceed until the oil has either completely stopped or is dripping very slowly.
- Install the new oil filter by mounting it on the filter mounting plate and threading it clockwise onto the spindle. Turn the filter until it is flush with the filter mounting plate, and then give it another half turn. Do not tighten the filter as much as you can, and do not use the filter wrench to tighten it either. Both of these things can damage the spindle.
- Reinstall the drainage nut by starting to thread it clockwise by hand, and then tightening it down with the 12-millimeter wrench. Tighten the nut until it is very snug in the oil pan.
- Wipe off any excess oil from the underside of the engine with the oil rag, and then return to the topside of the vehicle.



Figure 13: Oil Draining from the Pan

Part 4: Refilling the Oil

The final step is to refill the engine with oil.

- Install the funnel where the oil cap was and secure it to stay upright.
- Pour 5 quarts of oil into the engine through the funnel.
- Remove the funnel, and reinstall the oil cap by turning it clockwise.
- Wipe off any excess oil from the top of the engine.
- Start the engine and check for the oil pressure light again. If the light does not engage, then you are good to go.
- Check the dipstick once more to ensure that you are within the proper oil level. Place the dipstick back in the engine, double check the oil cap to be secure, and then close the hood.



Figure 14: Using a Funnel to Pour the Oil

Part 5: Cleanup and Disposal

The oil change is now complete and you need to dispose of the byproducts in a safe manner. You can dispose of both used oil and filters at your local repair shop. There may be a fee; it varies by location. This is a necessary and important step, as used motor oil is very harmful to the environment.

