



Octane molecule C₈H₁₈
8-carbon molecules and 18-hydrogen molecules

Carbon Staining on Concrete

One of the most popular questions that we are asked at Phase III is, “if my concrete is clean, then why is there still a stain”. First, let’s look at what caused the stain... oil and in 99% of the cases, it’s from used motor oil. So why does it stain? For this we need to understand what oil is really made from?

Motor oils are derived from petroleum-based and non-petroleum synthesized chemical compounds. Motor oils today are mainly blended by using base oils composed of hydrocarbons (mineral, polyalphaolefins (PAO), polyinternal ofefins (PIO), thus organic compounds consisting entirely of **carbon** and **hydrogen**.

The majority of hydrocarbons that are found naturally occur in crude oil, where decomposed organic matter provides an abundance of carbon and hydrogen which, when bonded, can catenate (to form a long chain structure) into seemingly limitless formulation of oil, gas, grease, gasoline, diesel fuel, etc.

The primary ingredients found in crude oil are; Carbon 83-87%, Hydrogen 10-14%, Nitrogen 0.1-2%, Oxygen 0.1-1.5%, Sulfur 0.5-6% and metals which typically are less than 1000ppm. Used motor oil turns darker as the lubricity additives and gas molecules break down from heat, leaving a higher concentration of carbon (that’s why it is darker than new oil).

With that said, you noticed that carbon is the main ingredient in oil; it’s what makes crude oil so black. You also noticed that there are several gases involved as well as other organic materials like metals which are the result of trace minerals that exist in soil like iron, copper, zinc, but these percentages are very low compared to carbon.

When we have an oil stain on a surface like concrete (which contains millions of very small pores for the oil to get trapped in) the oil penetrates into and under the surface until it is extracted out. Many people use absorbents like Oil Sponge which has a unique wicking capability that draws the oil to the surface, helping to reduce staining and collateral environmental impact. Many shop applications use a mop and bucket system immediately and again, this helps to reduce staining and collateral environmental impact.

Then there are the ones that choose to respond to the spill several days, weeks or months later. When this happens, that oil sits in the pores and begins to oxidize. Oxidation occurs when an addition oxygen

molecule is added to the hydrocarbon molecule. With one extra oxygen molecule, the hydrogen (gas), nitrogen (gas) and additional oxygen molecule (gas) are released into the atmosphere... essentially evaporation is occurring.

As the oil is oxidized, more and more carbon is left behind which is organic just like the concrete, but now the concentration level is closer to 90-95% and it's very dark now. When you use a cleaner like Oil Sponge UC+ or Oil Sponge HD for concrete cleaning you are breaking down the residual oil that hasn't oxidize completely. If you use the right dilution ratio (yes, you need to dilute and rinse with water for efficacy) you will effectively clean the hydrocarbons (carbon + hydrogen + nitrogen + oxygen + sulfur + oil additives + sludge + dirt) from the surface!

But you still have a stain, right? The remaining stain is more of a combination of residual oil under the surface and staining from the high levels of carbon left behind from oxidation. Carbon is an excellent dye. Did you know that tires are naturally white? Carbon is used to dye them black. Coal is composed primarily of carbon along with variable quantities of other elements, mainly sulfur, hydrogen, oxygen and nitrogen (sound familiar?). Charcoal is primarily carbon, burnt wood turns black as the only thing that remains from the cellulose and lignin is the carbon. All of these items are dry to the touch, but leave behind a black stain, the same stain that remains in concrete after you've cleaned it up.

So is the surface really free of oils? Is the surface slip free? When you touch it do you get oil on your fingers? Proper use of Oil Sponge branded cleaners should have removed as much oil as it came in contact with (remember there are millions of pours in concrete). Repeated use and a good housekeeping protocol will help to clean any remaining sub surface oils and the stain will lighten with time, but it may never truly go away.

There are other ways to remove concrete staining, but these are either very caustic or acidic solutions, which in turn damage the concrete. These quick and dirty methods will cost you more in the long run as you will have to eventually replace the concrete or resurface it. The best method is to clean the spill up when it occurs. If your stain is old and dry to the touch, you will need to be patient as it will take a long time to remove, but it can be done.