HYDROCARBON SOLVENT SOLUTIONS

by Nancy Eilerts, Ph.D.

Hydrocarbon Safety: Understanding Flash Point

You probably fill your car's gas tank every week or two. Gasoline is in most ways very different from hydrocarbon drycleaning solvents, but it's also similar in that it is composed of hydrocarbons. Although gasoline was used as an early drycleaning solvent, today's hydrocarbons are very different from gasoline. High quality hydrocarbon solvents have high flash points, are very low in aromatics (such as benzene), and are odorless. Gasoline, on the other hand, has a very low flash point, contains appreciable quantities of aromatics, and has a distinctive odor. But to understand the concept of flash point, discussing gasoline and its behavior is very useful. Knowing why you handle gasoline in the way you do can help you to understand many things about hydrocarbon or petroleum drycleaning solvents. Remember, though, that your hydrocarbon drycleaning solvent is safer in every respect than is gasoline, and that gasoline should never be used for any type of cleaning.

Flash point is a little understood characteristic of solvents. We throw the term around because we know that local fire marshals are interested in the flash point of the solvents we use, but understanding what flash point means can make a big difference in how we look at the safety of our solvents.

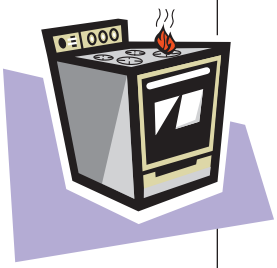
What does flash point mean?

Flash point is defined as "the lowest temperature corrected to a pressure of 101.3 kPa (760 mmHg) at which application of an ignition source causes the vapors of a specimen of the sample to ignite under specified conditions of test."[1] From a practical standpoint, this means the temperature at which a flame will ignite the solvent vapors. The temperature is corrected for pressure because at lower pressures experienced in higher elevations, solvents will vaporize more rapidly. This is why many recipes specify longer cooking times at higher altitudes (because boiling water doesn't get as hot). The important thing to remember about flash point is that the tester is actually applying flame to the vapors to ignite them.

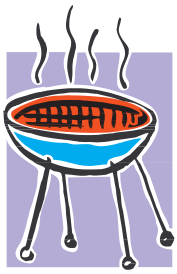
What is necessary for a fire?

To start and keep a fire burning requires four elements: fuel, oxygen, an ignition source, and a chemical chain reaction. A few examples will illustrate why each of the four elements is necessary.

You are using a butane cigarette lighter.
How do you put out the flame? You release your thumb from the lever.
Why did the fire go out? The lever feeds butane to the flame, so by releasing it, you cut off the fuel source.



You are cooking with grease on your stovetop and the grease catches fire.
How do you put out the fire? You put a lid on the pot.
Why did the fire go out? You eliminated oxygen from the fire.



You are spraying charcoal lighter fluid on your briquettes.
Why don't they catch fire? You need to apply an ignition source (throw in a match).

You put a log in your fireplace and put a match to it.
Why doesn't it catch fire? You have all the elements but the chemical chain reaction. You can start the chemical reaction by lighting small kindling, which is small enough to light and keep burning.

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The Gasoline Comparison

Isooctane, the main component of gasoline, has a flash point of 21 °F. Compare that to the flash point of a class IIIA solvent (140–200 °F). Most months of the year, you are pumping gasoline when the outside temperature is over its flash point. Why is this safe to do?

We all know the rules about turning off our engines and not smoking when filling up our cars with gas. What we are really doing is eliminating the ignition source. Using cellular phones is also not a good idea when pumping gas, as pushing the buttons can in some cases cause sparks (the same reason why you should not flick a light switch or use a telephone when you smell a natural gas leak in your home). Static electricity can also serve as an ignition source, so you should never fill a portable gas can that is not sitting on the ground, since a can on the ground can "ground" the static charge.

The nozzles at gas stations are also fitted with baffles or in many cases with rubber vapor recovery sleeves. Both of these act to reduce the concentration of fumes or vapors in the atmosphere. This both protects the environment by reducing the amount of smog-forming pollutants and reduces the chances of fire.

Am I completely safe from fire if I use a solvent that doesn't have a flash point?

Just because a solvent doesn't have a flash point does not mean that it does not burn. In fact, some solvent manufacturers claim that their solvents do not have flash points, when in fact the flash point is just higher than the class IIIA requirements. A high flash point means that the solvent vapors do not easily ignite or that the solvent requires considerable heat to generate enough vapor to catch fire. All the alternative solvents can burn because some part of the blend or of the molecules is hydrocarbon, although the conditions under which they will burn will vary.

What does this all mean to dry cleaners?

You should always follow good safety and housekeeping practices to minimize exposure to all products you use. Some good ways to reduce losses of hydrocarbon solvents include:

- Keep solvent containers tightly closed and store rags wet with solvents in approved, covered metal cans.
- Equipment that blankets the solvent in the wheel with nitrogen makes the machine much safer. The nitrogen displaces the oxygen that is necessary for combustion.
- Dry the clothes completely. Yes, the hydrocarbon solvents will weather off garments that are not completely dry, but the vapors are going into your shop and into the air you breathe.

Remember, the flash point of the solvent is just one element to consider in your safety program. Be sure to follow the machine manufacturer's solvent class recommendations closely to optimize the performance and safety of your hydrocarbon plant.

[1]ASTM D 56 – 00: Standard Test Method for Flash Point by Tag Closed Tester, American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Copies can be ordered by calling 610-832-9585.This article originally appeared in Fabricare Canada magazine.

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EcoSolv® Drycleaning Fluid

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