Smoke Chemistry and Chemical Composition

Chemical Composition of Smoke

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Smoke is something that we will deal with all throughout our lives, in everyday situations as well as in emergencies. But not all smoke is the same -- in fact, the smoke will vary depending upon what is being burned. So then what, exactly, is smoke made of?

complex.

Chemicals in Smoke

In addition to the chemicals listed in the table, wood smoke also contains a large amount of unreacted air, carbon dioxide, and water. It contains a variable amount of mold spores. VOCs are volatile organic compounds. Aldehydes found in wood smoke include formaldehyde, acrolein, propionaldehyde, butyraldehyde, acetaldehyde, and furfural. Alkyl benzenes found in wood smoke include toluene. Oxygenated monoaromatics include guaiacol, phenol, syringol and catechol. Numerous PAHs or polycyclic aromatic hydrocarbons are found in smoke. Many trace elements are released.

Chemical Composition of Wood Smoke

Chemical	g/kg Wood
carbon monoxide	80-370
methane	14-25
VOCs* (C2-C7)	7-27
aldehydes	0.6-5.4
substituted furans	0.15-1.7
benzene	0.6-4.0
alkyl benzenes	1-6

sulfur dioxide	0.16-0.24
methyl chloride	0.01-0.04
napthalene	0.24-1.6
substituted napthalenes	0.3-2.1
oxygenated monoaromatics	1-7
total particle mass	7-30
particulate organic carbon	2-20

oxygenated PAHs	0.15-1
Individual PAHs	10^{-5}-10^{-2}
chlorinated dioxins	$1x10^{-5}$-$4x10^{-5}$
normal alkanes (C24-C30)	$1x10^{-3}$-$6x10^{-3}$
sodium	$3x10^{-3}$-$2.8x10^{-2}$
magnesium	$2x10^{-4}$-$3x10^{-3}$
aluminum	$1x10^{-4}$-$2.4x10^{-2}$
silicon	$3x10^{-4}$-$3.1x10^{-2}$

-3	$9x10^{-2}$
-4	$1x10^{-2}$
-3	$.6x10^{-2}$
-4	$8x10^{-2}$
-5	$x10^{-3}$

	10^{-3}
	$x10^{-4}$
	$x10^{-3}$
	$x10^{-4}$
lead	$1x10^{-4}$-$3x10^{-3}$

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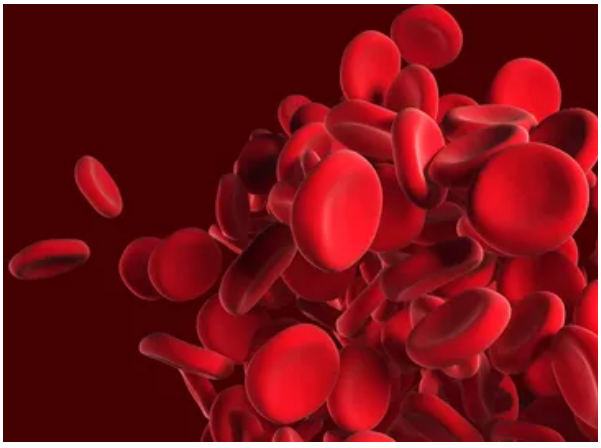

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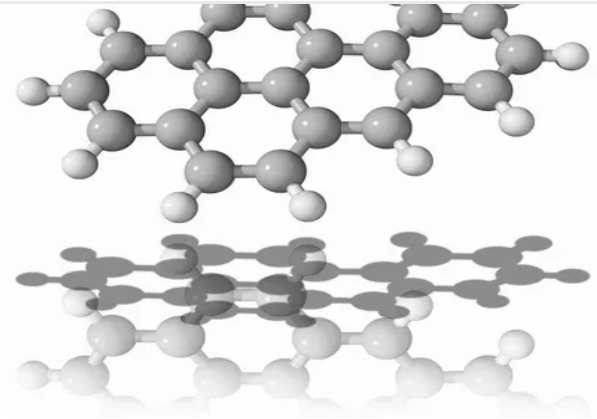

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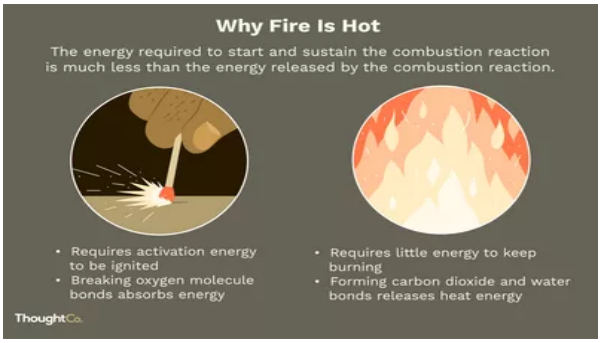

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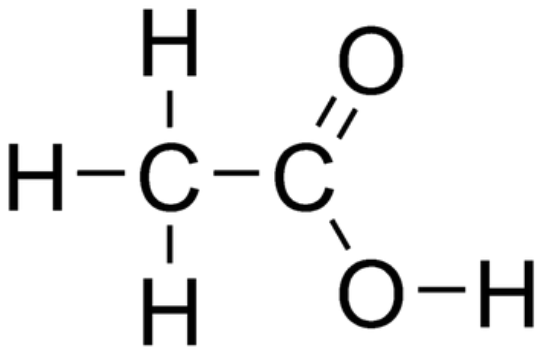

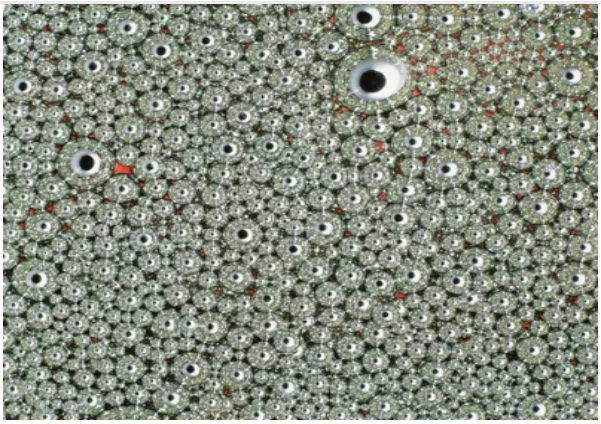

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