TECHNICAL TUESDAYS

FLAME RETARDANT FINISH – PART I

REF: TT/ MARCH 2018 / WK 1

How a textile substance burns

Textile is a highly ignitable material, hence spreading the fire rapidly.

For a substance to burn, it must become a gas. When a textile fabric exposed to a heat source, it experiences a temperature rise. If the temperature of the source is high and the rate of heat transfer to the fabric is also high.

Then, pyrolytic decomposition of the fiber substrate will occur. The products of this decomposition include combustible gases, non-combustible gases and carbonaceous char. The combustible gases mix with the ambient air and its oxygen.

The mixture ignites, yielding a flame when its composition and temperature are favourable. Part of the heat generated within the flame is transferred to the fabric to sustain the burning process and part is lost to the surroundings.

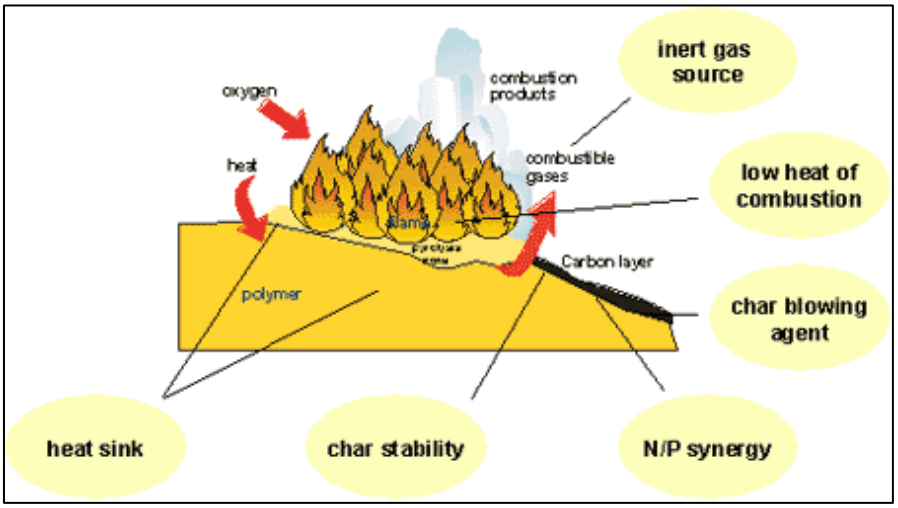

Fig 1.1 Ignition of a fabric and spreading over

Reduction of Ignitable Property of Textile

The ignitable property of a textile material can be reduced by any one of the three methods:

- By using inorganic materials such as Asbestos, Glass etc.
- By chemically treating the textile with Flame Retardant chemicals.
- By modifying the polymer.

Flame Retardant Chemicals and its Mechanism

Flame retardant chemicals are applied to fabrics to inhibit or suppress the combustion process. They interfere with combustion at various stages of the process.

- By cooling the substrate.
- By forming a protective layer: The heat transfer is impeded, fewer pyrolysis gases are evolved, and the oxygen is excluded.
- By dilution: Substances, which evolve inert gases on decomposition, dilute the fuel in the solid and gaseous phases.
- Reaction in the gas phase: The free radical mechanism of combustion processes which takes place in the gas phase could be interrupted by flame retardants.

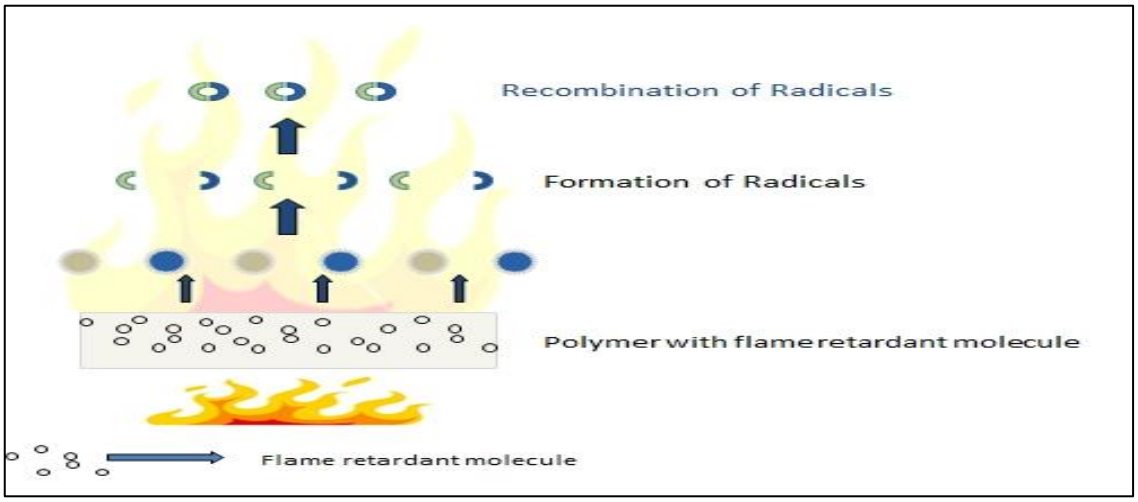

Fig 1.2 Reaction in the gas phase

- Reaction in the solid phase: One mechanism is the accelerated breakdown of polymers.

To be continued…

Wishing you a great week ahead!

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arc@resil.com | www.resil.com.