Flammability

The FLUTEC® liquids are not flammable in air, they have neither flash point nor spontaneous ignition temperature. Mixtures of fluorocarbon vapour with oxygen are flammable; it is probable, although experimental evidence is incomplete, that the FLUTEC™ liquids have a range of flammability (i.e. upper and lower explosive limits) only in atmospheres containing more than about 35% oxygen ($O_2 + N_2 = 100$).

Indeed, perfluorocarbons have extinguishing properties, due to their heat capacity.[1] An atmosphere of 8% octafluoropropane will put out burning cardboard, kerosene or ethanol.

FLUTEC® PP9 has been tested in oxygen gas under the conditions given below (Table 1) by an independent organisation; spontaneous ignition occurred only under the most severe conditions. Perfluorocarbon vapours will burn when ignited in an atmosphere of nitrous oxide.

Table 1 *Flammability tests*

Flutec	Test Conditions	Result
PP50	Flashpoint in oxygen	-6°C
	Flashpoint in nitrous oxide	-32°C
	Flashpoint in air	none
PP2	Lower flammability limit in pure O_2 (50°C)	7.40%
PP3	Lower flammability limit in pure O_2 (50°C)	5.20%
PP9	Spontaneous ignition test in O_2 at 127 bar	No ignition at 500°C
	Spontaneous ignition in adiabatic shock wave in O_2*	
	0.98 bar to 186 bar	No ignition
	0.98 bar to 196 bar	Ignited

*Sample initially at 100ºC in oxygen at atmospheric pressure (0.98 bar).

Note: The behaviour of PP1 and PP6 is expected to be similar to that of PP50 and PP9 respectively.

References

'Life Support Without Combustion Hazards.' E.T. McHale, *Fire Technol.*, **1974**, 10(1), 15-24.

'Habitable Atmospheres Which Do Not Support Combustion.' C. Huggett, *Combustion and Flame*, **1973**, 20, 140-142.

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