

Fuels for gas turbine engines

Update & review of their types, properties & combustion. In past, present and possible future use, 1st edition

Erratum 21st December 2018

Page 23: Table 4: Comparative Hydrogen Properties

Replace Table 4 with:

Property	Conventional					CHO	CHON	CHN	HN	CN	
	Hydrogen	Methane	Mogas	Gas Oil	Avtur	MeOH	DME	NM	UDMH	Hydrazine	Cyanogen
Formula	H ₂	CH ₄	C ₈ H ₁₈	C ₁₅ H _{27.5}	C _{12.5} H _{24.4}	CH ₃ OH	C ₂ H ₆ O	CH ₃ NO ₂	C ₂ H ₆ N ₂ H ₂	N ₂ H ₄	C ₂ N ₂
Combustion											
Spontaneous ignition temperature, °C	574	540	400	247	210	470	350	419	250	24 to 270	
Research octane number	106	105	98	-	-	114					
Cetane number	-	-	-	50	-	-					
Specific energy, net, MJ/kg	120.24	50.0	43.0	42.9	43.4	19.9	28.7	10.94	30.07	16.68	21.0
Specific energy of stoic. mix with air, net, MJ/kg	3.4		2.9	2.8	2.9						
Energy density of liquid, net MJ/L	8.42	21.2	32.3	36.0	34.7	15.8	21.1	12.5	23.8	17.0	
Energy density of vapour, net, MJ/m ³ @ 15°C	10.22		-	-	-						
Enthalpy of formation, kJ/mol	0			-308.7	-333.6	-291.3	-184.1	-81.0	-88.16	-95.2	329.07
Stoichiometric air:fuel ratio, mass	34.19	17.2	14.5	14.5	14.7	6.45	8.99	1.69	9.19	34.19	
Flammability limits, % volume fuel with air	4-74	10-34 ?	1-6	1-5.5	1-5.5	6-36	3.4-17	7.3-?	2.5-20	4.7-100	6.6-32
Laminar flame speed, m/s in air	3.5		0.5		0.6						
Carbon content, % mass	0	75	84.2	86.7	86.0	37.5	57.0	19.7	40	0	46.2
Specific heat capacity, kJ/kg	8.7*	2.3			1.94	2.5		1.8			
Handling											
Density of liquid, kg/L @ 15°C	0.07*	0.424*	0.75	0.84	0.80	0.796	0.735(-25°C)	1.14	0.79	1.02	
Density of vapour, kg/m ³ @ 0°C	0.090	0.72	-	-	-		2.11			0.95(-21°C)	
Boiling point, °C	-252.9	-161.5	33-190	180-360	150-260	64.7	-24	101.1	63.1	113.5	-21.1
Enthalpy of vaporization, kJ/kg @ 37.8°C	450	512			207	1080		564		2	
Kinematic viscosity mm ² /s @ 40°C	0.18 (bp)			6	1.1	0.55		0.47	1.5	1.4	
Freezing point, °C	-259.1	-182	-65	-7 (-20 Pour)	-47	-97.8	-141	-28.5	-57.2	0.7	-28
Cold filter plugging point, °C				-22							
Surface tension, mN/m @ 25°C			-	28	25	-	-	36	28	52	
Flash point, °C		-185	-	68	38	12	-41	35	-10		