

Tripoli Rocketry Association, Inc., et al. v. ATF
Civil Action No. 00-273

ATTACHMENT #20

Rocket Propulsion

An Introduction to

Fourth Edition

Elements

the Engineering of Rockets

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Table 11-1. Characteristics of Some Operational Propellants

Propellant Type	I _t Range (sec)	Flame Temperature (°F)	Density (lb/in. ³)	Metal Content (wt %)	Burning Rate (in./sec)	Pressure Exponent "n"	Hazard Classification DOT/MIL	Stress/Strain (%)		Processing Method
								-60°F	+150°F	
DB	220-230	4100	0.058	0	0.45	0.30	B/7	4600/2	490/60	Extruded
DB/AP/Al	260-265	6500	0.065	20-21	0.78	0.40	B/2	2750/5	120/50	Extruded
DB/AP-HMX/Al	265-270	6700	0.065	20	0.55	0.49	B/7	2375/3	50/33	Solvent cast
PVC/AP	230-240	4600	0.061	0	0.45	0.38	B/2	369/150	38/220	Solvent cast
PVC/AP/Al	260-265	5600	0.064	21	0.45	0.35	B/2	369/150	38/220	Cast or extruded
PS/AP	230-240	4700	0.062	0	0.35	0.43	B/2	620/35	120/70	Cast or extruded
PS/AP/Al	240-250	5000	0.062	3	0.31	0.33	B/2	320/11	99/42	Cast
PU/AP/Al	260-265	5400-6000	0.064	16-20	0.27	0.15	B/2	1170/6	75/33	Cast
PBAN/AP/Al	260-263	5800	0.064	16	0.55	0.33	B/2	520/16	71/28	Cast
CTPB/AP/Al	260-265	5600-5800	0.064	15-17	0.45	0.40	B/2	325/26	88/75	Cast
HTPB/AP/Al	260-265	5600-5800	0.067	4-17	0.40	0.40	B/2	910/50	90/33	Cast
PBAA/AP/Al	260-265	5400-6000	0.064	14	0.32	0.35	B/2	500/13	41/31	Cast

Acronyms and symbols:

Al, aluminum
 AP, ammonium perchlorate
 CTPB, carboxy-terminated polybutadiene
 DB, double base
 HMX, cyclotetramethylene tetranitramine
 HTPB, hydroxy-terminated polybutadiene

PBAA, polybutadiene-acrylic acid polymer
 PBAN, polybutadiene-acrylic acid-acrylonitrile terpolymer
 PS, polysulfide
 PU, polyurethane
 PVC, polyvinyl chloride