



Technical Bulletin

Heat of Combustion of EcoSafe® hydraulic fluids

The **Heat of Combustion** (ΔH_c^0) is the energy released as heat when a compound undergoes complete combustion with oxygen under standard conditions. The chemical reaction is typically a hydrocarbon reacting with oxygen to form carbon dioxide, water and heat. It may be expressed with the quantities:

energy/mole of fuel (kJ/mol)

energy/mass of fuel

energy/volume of fuel

The heat of combustion is traditionally measured with a bomb calorimeter. It may also be calculated as the difference between the heat of formation (ΔH_f^0) of the products and reactants.

The **Flash Point** of a volatile liquid is the lowest temperature at which it can vaporize to form an ignitable mixture in air. Measuring a liquid's flash point requires an ignition source.

The **Autoignition Temperature** or kindling point of a substance is the lowest temperature at which it will spontaneously ignite in a normal atmosphere without an external source of ignition, such as a flame or spark. This temperature is required to supply the activation energy needed for combustion.

The Heat of Combustion, Flash Point, and Autoignition Temperature are provided for common classes of hydraulic fluids with gasoline listed as a common reference point.

Lubricant	MJ/kg	BTU/lb	Flash point	Autoignition Temperature
	ASTM D-4809		ASTM D-92	ASTM E-659
Gasoline	47.30	20,400	-43 C (-45 F)	246 C (495 F)
Mineral Oil Based Hydraulic Fluids	46.00	19,900	95 C (200 F)	220 C (410 F)
Ester Based Hydraulic Fluids	37.27	16,100	275 C (527 F)	450 C (842 F)
EcoSafe® Hydraulic Fluids	34.50	14,880	310 C (590 F)	382 C (720 F)
EcoSafe® V Hydraulic Fluids	29.82	12,860	325 C (615 F)	400 C (750 F)