

- 1 - AMINCO AIR-DRIVEN DIAPHRAGM GAS COMPRESSOR
- 2 - ELECTRICALLY-DRIVEN DIAPHRAGM GAS COMPRESSOR
- 3 - PRESSURE GAUGE
- 4 - RUPTURE DISK
- 5 - MITY-MITE PRESSURE REGULATOR
- 6 - NITROGEN SUPPLY CYLINDER
- 7 - MICRON FILTER
- 8 - STAGNANT AIR BATH
- 9 - CALORIMETER
- 10 - CONSTANT TEMPERATURE GLYCOL BATH

- 11 - PREHEATER
- 12 - MANOMETER
- 13 - ROTAMETER
- 14 - THREE-WAY SOLENOID VALVE
- 15 - SURGE TANK
- 16 - COLLECTION BOMBS IMMERSED IN LIQUID NITROGEN
- 17 - 12-GALLON STORAGE CYLINDER
- 18 - THERMOMETER
- 19 - GLASS COLLECTION BOMBS
- 20 - McLEOD GAUGE
- 21 - ABSOLUTE MANOMETER

Fig. 1. Schematic flow diagram of isothermal throttling calorimeter.

The time required to perform a single run was on the order of 8 to 12 hr. This length of time was required to reach steady state operation. The high total heat capacity of the calorimeter relative to that of the fluid led to a sluggish response of changes in power input.

### EXPERIMENTAL RESULTS

Compositions of the two mixtures studied are given in Table 1. Experimental results are given in Table 2 for methane and the two mixtures. The uncorrected  $\Delta h$  values are the raw data, that is, the enthalpy differences between the outlet and inlet conditions of the calorimeter. These  $\Delta h$  values were corrected from the calorimeter outlet pressure (15 to 50 lb./sq. in. abs.) to zero outlet pressure and for small differences between the inlet and outlet temperatures of the calorimeter ( $\sim 0.2^\circ\text{F}$ ). The pressure

TABLE 1. COMPOSITIONS OF METHANE-PROPANE MIXTURES

Component	Mole Percent Compositions	
	94%CH <sub>4</sub>	86%CH <sub>4</sub>
methane	93.90	86.23*
ethane	0.27	0.28
propane	5.09	12.57*
carbon dioxide	0.20	0.41
oxygen	0.01	0.01
nitrogen	0.53	0.49
isobutane	Trace	Trace
	100.00	100.00

\* Adjusted from original values of  $86.47 \pm 0.5$  and  $12.61 \pm 0.4$  to give a total of 100.00.

corrections were made using a truncated virial equation of state and experimental second virial coefficients for the gases (5, 8). Ideal gas state heat capacities (1) and a generalized correlation for the effect of pressure on heat capacity (9) were used in making temperature correc-

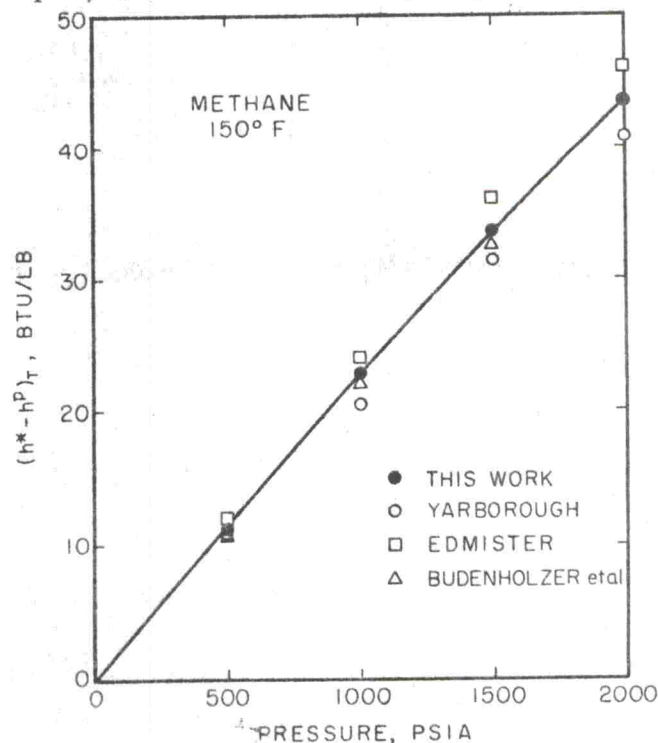


Fig. 2. Enthalpy of methane at 150°F.