

conjunction with the crystal dimensions in eqn (5) to give K_1 . These two sources of K_1 are compared for a range of liquids at 30°C in table 1 and the agreement averages 0.2 % with a range of -0.2 to +0.7 %. Density and viscosity data were taken from Timmermans⁴

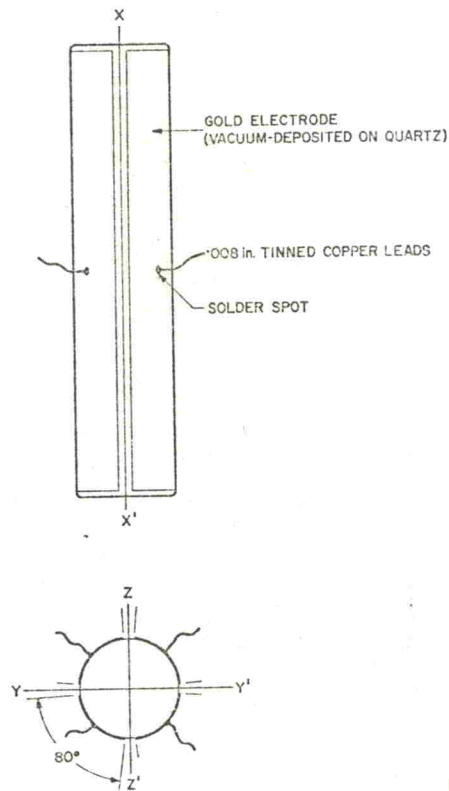


FIG. 1.—Configuration of electrodes for the torsional crystal.

except for iso- and n-pentane for which A.P.I. viscosity values⁵ have been used. Table 1 also shows that the value of the constant K_1 is slightly dependent on the kinematic viscosity of the fluid. Harrison and Lamb³ have shown that the variation of K_1 and K_2 with kinematic viscosity is due to irregularity in the crystal surface and that this effect which is larger for K_2 is readily removed by careful polishing. According to eqn (2), the attenuation of the viscous wave is inversely proportional to the exponential of the square root of the kinematic viscosity. Therefore, if the kinematic viscosity is sufficiently small, the attenuation length and irregularities in the crystal surface may become comparable, resulting in an increase in the electromechanical constants. For fluids of kinematic viscosity greater than

TABLE 1.—VALUES OF THE CONSTANT K_1 FOR A 39.5 kHz POLISHED CRYSTAL IN VARIOUS LIQUIDS AT 30°C AND ATMOSPHERIC PRESSURE

liquid	$(\eta/e)/\text{mSt}$	$K_1/\Omega \text{ cm}^2 \text{ s g}^{-1}$	
		from eqn. (3)	from eqn (5)
iso-pentane	3.34	5255	5290
n-pentane	3.48	5260	5285
carbon tetrachloride	5.35	5105	5085
benzene	6.47	5060	5080
cyclohexane	10.64	5080	5075
decalin	22.2	—	5030
di-butyl phthalate	130	5020	5010