INFRARED DIODE LASER SPECTROSCOPY OF JET-COOLED $Ni(CO)_3(^{13}CO)$ AND NiCO

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The two major isotopic species (^{58}Ni and ^{60}Ni) of $Ni(CO)_3(^{13}CO)$ and NiCO have been investigated with a recently constructed infrared spectrometer. These molecules were observed by implementing a slit jet pulsed nozzle coupled to a modulated electrical discharge and a lock-in detection system. Typical nozzle pulses were approximately 2ms in duration, during which time the electrical discharge was modulated at a frequency of 15 kHz. Modulation of the electrical discharge allowed the use of a lock-in detector to improve the signal to noise ratio. A lead salt diode laser beam was multipassed across the output of the slit jet for 15 passes using a Perry cell, and the transmitted IR intensity was monitored. Analysis of the resulting spectra for the ^{13}CO and CO stretching modes in $Ni(CO)_3(^{13}CO)$ and NiCO respectively, lead to the following constants (1σ errors limits in parentheses):

	$^{58}Ni(CO)_3(^{13}CO)$	$^{60}Ni(CO)_3(^{13}CO)$	^{58}NiCO	^{60}NiCO
ν_0 (cm^{-1})	2022.075753(95)	2021.936884(181)	2010.692843(605)	2010.645425(529)
B$''$ (cm^{-1})	0.034736(2)	0.033763(4)	0.151094(8)	0.149598(7)
B$'$ (cm^{-1})	0.034688(2)	0.033709(3)	0.150244(9)	0.148741(5)