ACCURATE ANALYTICAL POTENTIAL AND MOLECULAR CONSTANTS FOR THE GROUND $X^1\Sigma^+$ ELECTRONIC STATE OF CARBON MONOXIDE

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All available infrared and microwave spectroscopic line measurements for seven isotopomers of carbon monoxide in the ground electronic state have been employed in a weighted least squares fit giving directly the Born-Oppenheimer potential in compact analytic form, as well as additional radial functions that describe Born-Oppenheimer breakdown. The 18,858 line positions, which include vibrational levels covering approximately 70% of the well depth, are represented by 29 adjustable parameters with a reduced standard deviation of 0.43. Effective vibrational-rotational Hamiltonian operators constructed for each isotopomer have been employed to calculate accurate and quantum-mechanically meaningful rotational and centrifugal distortion constants that, along with the rotationless vibrational eigenvalues, represent the experimental data with the same degree of success as the eigenvalues of the radial operators.