NEW LINE LISTS INCLUDING INTENSITIES FOR THE $C_2$ SWAN SYSTEM ($d^3\Pi_g$-$a^3\Pi_u$), $C_2$ SINGLET SYSTEMS AND ROVIBRATIONAL TRANSITIONS WITHIN THE NH $X^3\Sigma^-$ GROUND STATE.

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Line lists including both positions and absolute intensities are required by those who wish to calculate abundances from spectroscopic observations. New line lists for the diatomic molecules $C_2$ and NH are presented.

Line strengths for the $C_2$ Swan system ($d^3\Pi_g$-$a^3\Pi_u$) have been calculated for vibrational bands with $v'$=0-10 and $v''$=0-9, and $J$ values up to $J$=34-96, based on previous observations in 36 vibrational bands. Line positions from several sources were combined with the results from recent deperturbation studies of the $v'$=4 and $v'$=6 levels, to provide updated molecular constants. The line strengths are based on a recent ab initio calculation of the transition dipole moment function. Einstein $A$ coefficients and $f$-values were also calculated for the vibrational bands of the Swan system. A line list has been made available, including observed and calculated line positions, Einstein $A$ coefficients and oscillator strengths ($f$-values). This list will be useful for astronomers, combustion scientists and materials scientists who utilize $C_2$ Swan spectra. Similar work is being carried out for a number of singlet systems of $C_2$, in which a single global fit of positions will be performed and intensities calculated.

For NH, a line list is being created for the infrared transitions within the $X^3\Sigma^-$ ground state, including previous observations of rotational lines within $v$=0-2, and rovibrational lines of the $\Delta v$=1 sequence up to $v'$=6. The intensity calculations use a recently calculated dipole moment function which has been used to calculate the lifetime of the $v$=1 level, but was unpublished. A line list like that for the $C_2$ Swan system will be made available, which will be useful for astronomers investigating NH and nitrogen abundance in cool objects.