

**MASTER**

## Lines in the Spectrum of

 ${}^7\text{LiH}(4728\text{-}5298\text{ \AA})^*$ K. C. Li<sup>†</sup>

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The emission spectra of the  $A^1\Sigma^+ - X^1\Sigma^+$  bands of  $^7\text{LiH}$  were photographed in the  $4728 \text{ \AA} - 5298 \text{ \AA}$  region with a 3.4 meter Ebert Spectrograph of theoretical resolution of about  $0.07 \text{ cm}^{-1}$ . High purity  $^7\text{LiH}$  crystals were obtained from Oak Ridge National Laboratory. The atomic percent of  $^7\text{Li}$  in  $^7\text{LiH}$  and  $^7\text{LiD}$  was 99.93%. The discharge source was a demountable stainless steel hollow cathode lamp. A detailed description of the discharge tube is given in [1]. The lithium hydride crystals were packed into the cathode. Pressure in the discharge tube was about 10 to 20 torr of  $\text{H}_2$ . The discharge was run at about 600 volts and 1.25-1.75 amperes. Acceptable spectra were obtained with exposure time of 6 hours. A Westinghouse iron hollow cathode was used to produce the iron spectrum for calibration. The plates were measured on the Gaertner photoplate comparator with an encoder system and on-line computer service at Argonne National Laboratory. I would like to acknowledge the help of Dr. Fred Tomkins of Argonne National Laboratory in using the comparator.

The measured lines in the spectra of  $^7\text{LiH}$  are given in this report (C00-2326-19). Similar spectra for  $^6\text{LiH}$  and  $^6\text{LiD}$  are given in companion reports (C00-2326-17) and (C00-2326-18), respectively. The relative intensities of the lines are applicable only to short regions and do not extend over the whole spectrum. The assigned lines along with those reported in Jogensen's thesis [2] are listed in Report (C00-2326-20). These spectra are now being compared with spectra obtained in this laboratory from collisions of fast

( $\sim 5$  eV) H atoms with a  $\text{Li}_2$  crossed beam.

#### References

1. K. C. Li, Ph.D. Thesis, University of Iowa (1976).
2. T. Jorgensen Jr., Ph.D. Thesis, Harvard University (1935).

Lines in the Spectra of  $^7\text{LiH}$   
(4728 - 5298 Å)

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | ASSIGNMENT<br>(v', v'', Branch J) |
|------------|------------|-----------|----------|-----------------------------------|
| 21141.019  | 4728.8182  | 84.       | 0.514    |                                   |
| 21140.312  | 4728.9762  | 43.       | 0.351    |                                   |
| 21139.472  | 4729.1642  | 16.       | 0.263    |                                   |
| 21138.747  | 4729.3263  | 12.       | 0.307    |                                   |
| 21138.169  | 4729.4556  | 12.       | 0.307    |                                   |
| 21137.620  | 4729.5785  | 12.       | 0.212    |                                   |
| 21136.856  | 4729.7495  | 13.       | 0.789    |                                   |
| 21135.449  | 4730.0644  | 13.       | 0.526    |                                   |
| 21133.673  | 4730.4619  | 14.       | 0.307    |                                   |
| 21132.216  | 4730.7879  | 49.       | 0.920    |                                   |
| 21131.222  | 4731.0104  | 14.       | 0.394    |                                   |
| 21130.707  | 4731.1259  | 12.       | 0.219    |                                   |
| 21127.726  | 4731.7935  | 12.       | 0.175    |                                   |
| 21126.662  | 4732.0317  | 30.       | 0.613    |                                   |
| 21125.662  | 4732.2556  | 16.       | 0.394    |                                   |
| 21124.596  | 4732.4944  | 12.       | 0.263    |                                   |
| 21123.570  | 4732.7243  | 13.       | 0.394    |                                   |
| 21122.830  | 4732.8902  | 14.       | 0.569    |                                   |
| 21120.613  | 4733.3870  | 14.       | 0.481    |                                   |
| 21119.551  | 4733.6249  | 13.       | 0.262    |                                   |
| 21118.589  | 4733.8407  | 47.       | 0.612    | 2,4P7                             |
| 21117.223  | 4734.1470  | 13.       | 0.700    |                                   |
| 21115.948  | 4734.4328  | 88.       | 0.700    |                                   |
| 21114.964  | 4734.6534  | 38.       | 0.481    | 3,4P13                            |
| 21114.260  | 4734.8113  | 19.       | 0.394    |                                   |
| 21112.814  | 4735.1356  | 18.       | 0.393    |                                   |
| 21111.896  | 4735.3415  | 38.       | 0.556    |                                   |
| 21111.043  | 4735.5327  | 12.       | 0.262    |                                   |
| 21109.588  | 4735.8591  | 13.       | 0.306    |                                   |
| 21108.097  | 4736.1936  | 14.       | 0.555    |                                   |
| 21106.173  | 4736.6255  | 12.       | 0.213    |                                   |
| 21105.368  | 4736.8061  | 24.       | 0.565    |                                   |
| 21102.827  | 4737.3765  | 22.       | 0.480    |                                   |
| 21100.346  | 4737.9334  | 39.       | 0.524    |                                   |
| 21099.533  | 4738.1162  | 18.       | 0.437    |                                   |
| 21097.401  | 4738.5948  | 72.       | 0.555    |                                   |
| 21094.959  | 4739.1344  | 85.       | 0.742    |                                   |
| 21093.653  | 4739.4368  | 17.       | 0.480    |                                   |
| 21092.708  | 4739.6492  | 13.       | 0.393    |                                   |
| 21090.914  | 4740.0524  | 12.       | 0.305    |                                   |
| 21089.970  | 4740.2646  | 97.       | 0.698    | 2,4R9                             |
| 21087.305  | 4740.8635  | 127.      | 0.698    |                                   |

|            |            |           |          | Assignment<br>(v', v'', Branch J) |
|------------|------------|-----------|----------|-----------------------------------|
| Wavenumber | Wavelength | Intensity | Width(K) |                                   |
| 21086.172  | 4741.1155  | 22.       | 0.523    |                                   |
| 21085.166  | 4741.3445  | 13.       | 0.392    |                                   |
| 21083.867  | 4741.6368  | 27.       | 0.610    |                                   |
| 21082.950  | 4741.8406  | 12.       | 0.305    |                                   |
| 21081.625  | 4742.1410  | 27.       | 0.654    |                                   |
| 21080.508  | 4742.3922  | 15.       | 0.654    |                                   |
| 21079.651  | 4742.5850  | 15.       | 0.305    |                                   |
| 21078.706  | 4742.7977  | 16.       | 0.610    |                                   |
| 21076.311  | 4743.3367  | 14.       | 0.392    |                                   |
| 21075.665  | 4743.4820  | 18.       | 0.305    |                                   |
| 21075.091  | 4743.6113  | 18.       | 0.566    |                                   |
| 21073.135  | 4744.0514  | 14.       | 0.827    |                                   |
| 21071.576  | 4744.4025  | 12.       | 1.089    |                                   |
| 21070.543  | 4744.6350  | 12.       | 0.435    |                                   |
| 21069.952  | 4744.7682  | 13.       | 0.305    |                                   |
| 21067.551  | 4745.3090  | 14.       | 0.392    |                                   |
| 21066.620  | 4745.5188  | 17.       | 0.435    | 3,4P12                            |
| 21065.701  | 4745.7257  | 12.       | 0.218    |                                   |
| 21065.286  | 4745.8192  | 13.       | 0.305    |                                   |
| 21062.713  | 4746.3989  | 12.       | 0.392    |                                   |
| 21061.808  | 4746.6028  | 15.       | 0.522    |                                   |
| 21060.953  | 4746.7955  | 12.       | 0.565    |                                   |
| 21058.836  | 4747.2728  | 12.       | 0.565    |                                   |
| 21057.934  | 4747.4762  | 18.       | 0.522    | 1,4R0                             |
| 21056.715  | 4747.7511  | 24.       | 0.696    |                                   |
| 21055.823  | 4747.9520  | 14.       | 0.304    | 1,4R1                             |
| 21054.896  | 4748.1611  | 94.       | 0.739    | 2,4P8                             |
| 21053.850  | 4748.3971  | 16.       | 0.304    |                                   |
| 21052.481  | 4748.7059  | 26.       | 0.522    |                                   |
| 21051.630  | 4748.8527  | 19.       | 0.343    |                                   |
| 21050.114  | 4749.2338  | 114.      | 0.739    |                                   |
| 21048.952  | 4749.5020  | 19.       | 0.473    |                                   |
| 21047.800  | 4749.7620  | 65.       | 0.782    |                                   |
| 21046.678  | 4750.0151  | 12.       | 0.174    |                                   |
| 21045.964  | 4750.1764  | 42.       | 0.478    | 1,4R2                             |
| 21045.133  | 4750.3640  | 16.       | 0.347    |                                   |
| 21044.616  | 4750.4806  | 12.       | 0.217    |                                   |
| 21041.715  | 4751.1355  | 14.       | 0.521    |                                   |
| 21040.469  | 4751.4169  | 14.       | 0.174    |                                   |
| 21039.702  | 4751.5901  | 31.       | 0.868    |                                   |
| 21038.667  | 4751.8194  | 17.       | 0.304    | 1,4P1                             |
| 21037.668  | 4752.0721  | 19.       | 0.564    |                                   |
| 21036.039  | 4752.4175  | 12.       | 0.391    |                                   |
| 21035.458  | 4752.5488  | 13.       | 0.260    |                                   |
| 21034.265  | 4752.8184  | 78.       | 0.824    |                                   |
| 21033.044  | 4753.0942  | 12.       | 0.651    |                                   |
| 21031.868  | 4753.3601  | 13.       | 0.390    |                                   |
| 21030.501  | 4753.6691  | 19.       | 0.347    |                                   |
| 21029.069  | 4753.9928  | 1546.     | 1.778    | 1,4R3                             |
| 21027.530  | 4754.3406  | 18.       | 0.347    |                                   |
| 21025.890  | 4754.7116  | 12.       | 0.347    |                                   |
| 21024.967  | 4754.9157  | 12.       | 0.650    |                                   |
| 21022.232  | 4755.5390  | 103.      | 0.693    | 2,4R10                            |
| 21019.583  | 4756.1353  | 78.       | 0.866    | 3,4R14                            |
| 21018.156  | 4756.4612  | 22.       | 0.520    |                                   |
| 21017.226  | 4756.6716  | 29.       | 0.433    | 1,4P2                             |
| 21016.370  | 4756.8654  | 27.       | 0.520    |                                   |
| 21015.468  | 4757.0696  | 16.       | 0.346    |                                   |
| 21013.838  | 4757.4386  | 18.       | 0.823    |                                   |
| 21012.508  | 4757.7397  | 15.       | 0.346    |                                   |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 21011.515  | 4757.9644  | 13.       | 0.519    |                     |
| 21010.126  | 4758.2790  | 23.       | 0.433    |                     |
| 21009.211  | 4758.4262  | 152.      | 0.779    |                     |
| 21008.375  | 4758.6756  | 21.       | 0.303    |                     |
| 21007.263  | 4758.9275  | 14.       | 0.433    |                     |
| 21005.591  | 4759.3064  | 90.       | 0.735    | 1,4R4               |
| 21004.725  | 4759.5025  | 23.       | 0.303    |                     |
| 21004.233  | 4759.6142  | 19.       | 0.260    |                     |
| 21003.658  | 4759.7443  | 15.       | 0.260    |                     |
| 21002.278  | 4760.0570  | 16.       | 0.735    |                     |
| 21000.571  | 4760.4441  | 92.       | 0.592    |                     |
| 20999.678  | 4760.6465  | 16.       | 0.303    |                     |
| 20998.661  | 4760.8772  | 21.       | 0.476    |                     |
| 20997.805  | 4761.0711  | 16.       | 0.432    |                     |
| 20997.054  | 4761.2415  | 19.       | 0.519    |                     |
| 20995.880  | 4761.5077  | 149.      | 0.591    |                     |
| 20994.963  | 4761.7156  | 15.       | 0.389    |                     |
| 20993.655  | 4762.0123  | 22.       | 0.475    |                     |
| 20992.146  | 4762.3546  | 645.      | 0.394    |                     |
| 20991.094  | 4762.5932  | 20.       | 0.518    |                     |
| 20990.213  | 4762.7933  | 14.       | 0.432    |                     |
| 20989.375  | 4762.9834  | 38.       | 0.548    | 1,4P3               |
| 20988.167  | 4763.2576  | 14.       | 0.432    |                     |
| 20987.263  | 4763.4626  | 15.       | 0.389    |                     |
| 20985.777  | 4763.8000  | 23.       | 0.475    |                     |
| 20985.018  | 4763.9723  | 26.       | 0.432    |                     |
| 20984.002  | 4764.2030  | 71.       | 0.648    | 2,4P9               |
| 20983.146  | 4764.3973  | 21.       | 0.302    |                     |
| 20979.625  | 4765.1970  | 30.       | 0.777    |                     |
| 20977.877  | 4765.5940  | 112.      | 0.777    |                     |
| 20976.771  | 4765.8453  | 276.      | 0.733    |                     |
| 20975.850  | 4766.0546  | 14.       | 0.173    |                     |
| 20974.306  | 4766.4054  | 455.      | 0.892    | 1,4R5               |
| 20973.398  | 4766.6117  | 16.       | 0.216    |                     |
| 20972.833  | 4766.7403  | 14.       | 0.302    |                     |
| 20972.223  | 4766.8788  | 14.       | 0.388    |                     |
| 20971.638  | 4767.0119  | 13.       | 0.258    |                     |
| 20970.511  | 4767.2679  | 17.       | 0.504    |                     |
| 20968.344  | 4767.7606  | 50.       | 0.306    | 3,4P13              |
| 20967.516  | 4767.9490  | 19.       | 0.302    |                     |
| 20966.877  | 4768.0943  | 14.       | 0.216    |                     |
| 20966.103  | 4768.2702  | 14.       | 0.302    |                     |
| 20964.885  | 4768.5474  | 22.       | 0.388    |                     |
| 20964.279  | 4768.6851  | 20.       | 0.560    |                     |
| 20963.224  | 4768.9252  | 12.       | 0.172    |                     |
| 20962.339  | 4769.1264  | 14.       | 0.517    |                     |
| 20961.370  | 4769.3468  | 14.       | 0.258    |                     |
| 20960.568  | 4769.5295  | 20.       | 0.431    |                     |
| 20959.733  | 4769.7082  | 13.       | 0.215    |                     |
| 20959.383  | 4769.7991  | 12.       | 0.172    |                     |
| 20958.405  | 4770.0217  | 25.       | 0.560    |                     |
| 20956.250  | 4770.5123  | 13.       | 0.215    |                     |
| 20955.812  | 4770.6119  | 13.       | 0.215    |                     |
| 20955.011  | 4770.7944  | 15.       | 0.172    |                     |
| 20954.248  | 4770.9681  | 54.       | 0.546    | 1,4P4               |
| 20953.515  | 4771.1349  | 14.       | 0.172    |                     |
| 20951.717  | 4771.5443  | 14.       | 0.430    |                     |
| 20950.800  | 4771.7532  | 13.       | 0.774    |                     |
| 20949.258  | 4772.1044  | 12.       | 0.301    |                     |
| 20948.141  | 4772.3588  | 37.       | 0.645    |                     |

# ASSIGNMENT

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20947.133  | 4772.5772  | 108.      | 0.543    | 2,4R11              |
| 20946.276  | 4772.7838  | 12.       | 0.301    |                     |
| 20944.967  | 4773.0222  | 59.       | 0.731    |                     |
| 20942.309  | 4773.6880  | 64.       | 0.545    | 1,4R6               |
| 20940.689  | 4774.0572  | 15.       | 0.516    |                     |
| 20939.487  | 4774.3313  | 17.       | 0.430    |                     |
| 20938.113  | 4774.6446  | 34.       | 0.545    |                     |
| 20936.397  | 4775.0360  | 28.       | 0.430    |                     |
| 20935.441  | 4775.2539  | 95.       | 0.501    |                     |
| 20934.457  | 4775.4783  | 17.       | 0.501    |                     |
| 20933.474  | 4775.7027  | 13.       | 0.387    |                     |
| 20932.799  | 4775.8568  | 14.       | 0.387    |                     |
| 20931.926  | 4776.0560  | 14.       | 0.387    |                     |
| 20930.771  | 4776.3194  | 16.       | 0.429    |                     |
| 20929.003  | 4776.7230  | 13.       | 0.472    |                     |
| 20927.906  | 4776.9733  | 16.       | 0.687    | 3,4R16              |
| 20926.131  | 4777.3786  | 34.       | 0.773    |                     |
| 20924.135  | 4777.8341  | 119.      | 0.815    |                     |
| 20923.067  | 4778.0781  | 18.       | 0.429    |                     |
| 20922.350  | 4778.2418  | 14.       | 0.172    |                     |
| 20921.861  | 4778.3535  | 14.       | 0.257    |                     |
| 20921.181  | 4778.5088  | 14.       | 0.343    |                     |
| 20920.542  | 4778.6547  | 13.       | 0.429    |                     |
| 20919.220  | 4778.9568  | 16.       | 0.729    |                     |
| 20918.010  | 4779.2333  | 17.       | 0.472    |                     |
| 20916.972  | 4779.4703  | 59.       | 0.543    |                     |
| 20916.143  | 4779.6599  | 12.       | 0.172    |                     |
| 20915.553  | 4779.7947  | 12.       | 0.257    | 1,4P5               |
| 20914.471  | 4780.0420  | 44.       | 0.557    |                     |
| 20913.698  | 4780.2187  | 14.       | 0.214    |                     |
| 20912.939  | 4780.3922  | 24.       | 0.472    | 2,4P10              |
| 20911.767  | 4780.6601  | 74.       | 0.586    |                     |
| 20910.512  | 4780.9470  | 47.       | 0.857    |                     |
| 20908.900  | 4781.3157  | 24.       | 0.857    | 1,4R7               |
| 20907.449  | 4781.6475  | 19.       | 0.386    |                     |
| 20906.005  | 4781.9778  | 106.      | 0.771    |                     |
| 20904.752  | 4782.2644  | 15.       | 0.171    | 1,4R7               |
| 20903.957  | 4782.4463  | 29.       | 0.357    |                     |
| 20902.321  | 4782.8205  | 17.       | 0.514    |                     |
| 20901.615  | 4782.9821  | 16.       | 0.214    | 1,4R7               |
| 20900.025  | 4783.3458  | 2577.     | 1.841    |                     |
| 20897.739  | 4783.8693  | 106.      | 0.685    |                     |
| 20896.768  | 4784.0915  | 14.       | 0.300    | 1,4R7               |
| 20895.937  | 4784.2818  | 13.       | 0.727    |                     |
| 20894.862  | 4784.5278  | 29.       | 0.513    |                     |
| 20893.771  | 4784.7778  | 17.       | 0.556    | 1,4R7               |
| 20892.877  | 4784.9825  | 12.       | 0.342    |                     |
| 20892.363  | 4785.1003  | 13.       | 0.257    |                     |
| 20891.691  | 4785.2540  | 13.       | 0.556    | 1,4R7               |
| 20890.406  | 4785.5484  | 17.       | 0.385    |                     |
| 20889.122  | 4785.8427  | 119.      | 0.727    |                     |
| 20887.651  | 4786.1798  | 105.      | 0.895    | 1,4R7               |
| 20886.351  | 4786.4777  | 24.       | 0.513    |                     |
| 20885.009  | 4786.7851  | 13.       | 0.342    |                     |
| 20884.188  | 4786.9734  | 13.       | 0.641    | 1,4R7               |
| 20883.360  | 4787.1631  | 13.       | 0.342    |                     |
| 20881.774  | 4787.5267  | 12.       | 0.556    |                     |
| 20880.937  | 4787.7186  | 12.       | 0.214    | 1,4R7               |
| 20879.254  | 4788.1046  | 30.       | 0.726    |                     |
| 20878.048  | 4788.3813  | 13.       | 0.214    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20877.288  | 4788.5554  | 14.       | 0.812    |                     |
| 20875.268  | 4789.3129  | 14.       | 0.940    |                     |
| 20874.341  | 4789.3034  | 134.      | 0.641    |                     |
| 20873.196  | 4789.4943  | 22.       | 0.255    |                     |
| 20872.704  | 4789.6072  | 18.       | 0.256    |                     |
| 20871.886  | 4789.7950  | 28.       | 0.640    |                     |
| 20870.957  | 4790.0050  | 28.       | 0.427    |                     |
| 20870.379  | 4790.1407  | 14.       | 0.171    |                     |
| 20869.436  | 4790.3572  | 24.       | 0.765    |                     |
| 20868.668  | 4790.5334  | 13.       | 0.213    |                     |
| 20867.596  | 4790.7795  | 61.       | 0.683    |                     |
| 20865.920  | 4791.1643  | 15.       | 0.256    |                     |
| 20864.928  | 4791.3923  | 158.      | 0.811    | 2,4R12              |
| 20863.702  | 4791.6738  | 62.       | 0.853    | 3,4P14              |
| 20862.743  | 4791.8939  | 16.       | 0.171    |                     |
| 20862.028  | 4792.0581  | 83.       | 0.682    | 1,4P6               |
| 20860.060  | 4792.5104  | 48.       | 0.768    |                     |
| 20858.846  | 4792.7892  | 14.       | 0.384    |                     |
| 20857.587  | 4793.0785  | 13.       | 0.256    |                     |
| 20856.885  | 4793.2399  | 43.       | 0.554    |                     |
| 20855.821  | 4793.4844  | 13.       | 0.384    |                     |
| 20855.200  | 4793.6273  | 16.       | 0.341    |                     |
| 20854.223  | 4793.8518  | 22.       | 0.724    |                     |
| 20852.979  | 4794.1377  | 27.       | 0.511    |                     |
| 20852.150  | 4794.3284  | 20.       | 0.341    |                     |
| 20851.130  | 4794.5628  | 16.       | 0.682    |                     |
| 20850.572  | 4794.6911  | 13.       | 0.170    |                     |
| 20849.584  | 4794.9184  | 19.       | 0.426    |                     |
| 20848.584  | 4795.1485  | 34.       | 0.767    |                     |
| 20847.818  | 4795.3245  | 17.       | 0.213    |                     |
| 20847.078  | 4795.4949  | 15.       | 0.511    |                     |
| 20845.989  | 4795.7452  | 16.       | 0.554    |                     |
| 20844.512  | 4796.0852  | 74.       | 0.595    |                     |
| 20843.112  | 4796.4073  | 14.       | 0.341    |                     |
| 20842.521  | 4796.5434  | 18.       | 0.298    |                     |
| 20841.415  | 4796.7979  | 27.       | 0.468    |                     |
| 20840.183  | 4797.0813  | 40.       | 0.723    |                     |
| 20839.512  | 4797.2360  | 18.       | 0.170    |                     |
| 20838.909  | 4797.3748  | 16.       | 0.383    |                     |
| 20838.192  | 4797.5398  | 21.       | 0.340    |                     |
| 20837.389  | 4797.7247  | 33.       | 0.596    |                     |
| 20836.556  | 4797.9145  | 14.       | 0.213    |                     |
| 20835.293  | 4798.2072  | 143.      | 0.681    | 1,4R8               |
| 20834.508  | 4798.3880  | 24.       | 0.298    |                     |
| 20833.834  | 4798.5453  | 14.       | 0.340    |                     |
| 20832.879  | 4798.7633  | 16.       | 0.383    |                     |
| 20832.139  | 4798.9338  | 12.       | 0.255    |                     |
| 20831.393  | 4799.1056  | 16.       | 0.723    |                     |
| 20830.375  | 4799.3403  | 27.       | 0.553    |                     |
| 20829.799  | 4799.4729  | 17.       | 0.213    |                     |
| 20829.166  | 4799.6188  | 13.       | 0.340    |                     |
| 20828.074  | 4799.8704  | 12.       | 0.298    |                     |
| 20827.451  | 4800.0139  | 15.       | 0.340    |                     |
| 20826.380  | 4800.2607  | 40.       | 0.765    |                     |
| 20825.260  | 4800.5143  | 14.       | 0.595    |                     |
| 20824.311  | 4800.7378  | 14.       | 0.297    |                     |
| 20823.079  | 4801.0219  | 25.       | 0.637    |                     |
| 20821.954  | 4801.2812  | 17.       | 0.255    |                     |
| 20821.111  | 4801.4756  | 205.      | 0.765    | 2,4P11              |
| 20819.726  | 4801.7739  | 43.       | 0.552    |                     |

ASSIGNMENT  
(v', v'', Branch J)

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) |
|------------|------------|-----------|----------|
| 20818.973  | 4801.9657  | 17.       | 0.510    |
| 20817.970  | 4802.2001  | 13.       | 0.467    |
| 20816.086  | 4802.6346  | 22.       | 0.425    |
| 20815.559  | 4802.7562  | 14.       | 0.170    |
| 20814.875  | 4802.9141  | 14.       | 0.424    |
| 20814.000  | 4803.1159  | 15.       | 0.467    |
| 20813.407  | 4803.2528  | 16.       | 0.297    |
| 20812.535  | 4803.4425  | 17.       | 0.340    |
| 20811.891  | 4803.6026  | 13.       | 0.212    |
| 20811.594  | 4803.6712  | 13.       | 0.212    |
| 20810.318  | 4803.9657  | 34.       | 0.552    |
| 20809.404  | 4804.1768  | 18.       | 0.339    |
| 20808.553  | 4804.3734  | 81.       | 0.551    |
| 20807.535  | 4804.6084  | 71.       | 0.594    |
| 20806.466  | 4804.8551  | 14.       | 0.594    |
| 20805.053  | 4805.1816  | 97.       | 0.679    |
| 20804.062  | 4805.4105  | 14.       | 0.339    |
| 20803.300  | 4805.5864  | 12.       | 0.254    |
| 20802.575  | 4805.7538  | 16.       | 0.466    |
| 20801.600  | 4805.9792  | 23.       | 0.551    |
| 20800.836  | 4806.1556  | 16.       | 0.297    |
| 20799.712  | 4806.4154  | 23.       | 0.381    |
| 20799.195  | 4806.5350  | 18.       | 0.254    |
| 20797.344  | 4806.9628  | 81.       | 0.720    |
| 20796.018  | 4807.2693  | 118.      | 1.059    |
| 20794.648  | 4807.5859  | 13.       | 0.254    |
| 20794.038  | 4807.7270  | 14.       | 0.466    |
| 20792.374  | 4808.1118  | 14.       | 0.593    |
| 20791.550  | 4808.3023  | 13.       | 0.424    |
| 20790.720  | 4808.4942  | 31.       | 0.551    |
| 20789.600  | 4808.7532  | 28.       | 0.593    |
| 20788.115  | 4809.0967  | 15.       | 0.381    |
| 20787.458  | 4809.2488  | 17.       | 0.506    |
| 20786.687  | 4809.4272  | 17.       | 0.296    |
| 20785.734  | 4809.6477  | 49.       | 0.593    |
| 20784.748  | 4809.8759  | 13.       | 0.592    |
| 20782.017  | 4810.5080  | 39.       | 0.465    |
| 20781.104  | 4810.7193  | 28.       | 0.677    |
| 20780.316  | 4810.9016  | 17.       | 0.296    |
| 20779.301  | 4811.1367  | 16.       | 0.254    |
| 20778.554  | 4811.3098  | 38.       | 0.550    |
| 20777.406  | 4811.5755  | 37.       | 0.888    |
| 20775.441  | 4812.0308  | 143.      | 0.719    |
| 20774.609  | 4812.2233  | 33.       | 0.211    |
| 20773.902  | 4812.3871  | 143.      | 0.634    |
| 20772.396  | 4812.7362  | 23.       | 0.372    |
| 20771.112  | 4813.0335  | 12.       | 0.254    |
| 20769.514  | 4813.4038  | 28.       | 0.507    |
| 20768.640  | 4813.6063  | 15.       | 0.254    |
| 20767.904  | 4813.7771  | 51.       | 0.591    |
| 20765.842  | 4814.2551  | 14.       | 0.422    |
| 20764.632  | 4814.5355  | 22.       | 0.549    |
| 20763.697  | 4814.7523  | 26.       | 0.380    |
| 20762.894  | 4814.9387  | 63.       | 0.549    |
| 20761.522  | 4815.2568  | 41.       | 0.507    |
| 20760.050  | 4815.5983  | 13.       | 0.253    |
| 20759.108  | 4815.8167  | 30.       | 0.507    |
| 20758.249  | 4816.0160  | 16.       | 0.380    |
| 20757.563  | 4816.1752  | 13.       | 0.253    |
| 20756.788  | 4816.3550  | 28.       | 0.422    |

3,4R16

1,4P7

0,4R0

2,4R13

0,4R1

1,4R9

0,4R2

0,4R1

## ASSIGNMENT

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20756.050  | 4816.5263  | 13.       | 0.295    |                     |
| 20754.284  | 4816.7969  | 89.       | 0.675    |                     |
| 20753.296  | 4817.1654  | 18.       | 0.380    |                     |
| 20752.223  | 4817.4146  | 31.       | 0.464    | 3,4P15              |
| 20751.392  | 4817.6073  | 12.       | 0.211    |                     |
| 20749.976  | 4817.9362  | 23.       | 0.590    |                     |
| 20748.929  | 4818.1794  | 13.       | 0.253    |                     |
| 20747.774  | 4818.4476  | 46.       | 0.590    | 0,4R3               |
| 20746.871  | 4818.6574  | 16.       | 0.422    |                     |
| 20745.634  | 4818.9446  | 13.       | 0.632    |                     |
| 20744.566  | 4819.1927  | 12.       | 0.211    |                     |
| 20743.611  | 4819.4145  | 17.       | 0.421    |                     |
| 20742.664  | 4819.6346  | 16.       | 0.506    |                     |
| 20740.817  | 4820.0638  | 106.      | 0.632    | 1,4P8               |
| 20740.089  | 4820.2330  | 17.       | 0.211    |                     |
| 20738.737  | 4820.5472  | 85.       | 0.590    |                     |
| 20736.883  | 4820.9782  | 13.       | 0.168    |                     |
| 20736.251  | 4821.1252  | 35.       | 0.505    | 0,4P2               |
| 20734.320  | 4821.5741  | 32.       | 0.758    |                     |
| 20733.102  | 4821.8574  | 18.       | 0.463    |                     |
| 20731.907  | 4822.1353  | 13.       | 0.421    |                     |
| 20730.386  | 4822.4891  | 12.       | 0.210    |                     |
| 20729.242  | 4822.7553  | 112.      | 0.673    | 2,4P12              |
| 20728.454  | 4822.9387  | 22.       | 0.295    |                     |
| 20726.336  | 4823.4314  | 2145.     | 1.809    |                     |
| 20725.015  | 4823.7390  | 23.       | 0.168    |                     |
| 20724.428  | 4823.8757  | 17.       | 0.252    |                     |
| 20723.484  | 4824.0954  | 34.       | 0.925    | 0,4R4               |
| 20722.449  | 4824.3363  | 14.       | 0.168    |                     |
| 20721.621  | 4824.5338  | 39.       | 0.757    |                     |
| 20720.545  | 4824.7797  | 12.       | 0.168    |                     |
| 20719.650  | 4824.9879  | 18.       | 0.252    |                     |
| 20718.864  | 4825.1711  | 70.       | 0.757    |                     |
| 20716.979  | 4825.6100  | 37.       | 0.546    |                     |
| 20715.516  | 4825.9508  | 13.       | 0.462    |                     |
| 20714.656  | 4826.1514  | 14.       | 0.294    |                     |
| 20713.204  | 4826.4895  | 14.       | 0.252    |                     |
| 20712.706  | 4826.6057  | 14.       | 0.420    |                     |
| 20711.939  | 4826.7843  | 18.       | 0.336    |                     |
| 20711.365  | 4826.9180  | 25.       | 0.378    |                     |
| 20710.464  | 4827.1250  | 14.       | 0.294    |                     |
| 20710.001  | 4827.2360  | 13.       | 0.210    |                     |
| 20709.462  | 4827.3616  | 13.       | 0.168    |                     |
| 20709.105  | 4827.4449  | 15.       | 0.294    |                     |
| 20708.241  | 4827.6463  | 22.       | 0.504    | 0,4P3               |
| 20707.185  | 4827.8924  | 31.       | 0.504    |                     |
| 20706.344  | 4828.0886  | 16.       | 0.294    |                     |
| 20705.086  | 4828.3820  | 113.      | 0.672    | 1,4R10              |
| 20704.020  | 4828.6306  | 12.       | 0.210    |                     |
| 20703.616  | 4828.7248  | 12.       | 0.252    |                     |
| 20702.549  | 4828.9736  | 24.       | 0.504    |                     |
| 20701.044  | 4829.3248  | 88.       | 0.671    |                     |
| 20700.153  | 4829.5327  | 13.       | 0.336    |                     |
| 20699.415  | 4829.7047  | 12.       | 0.336    |                     |
| 20698.796  | 4829.8492  | 12.       | 0.336    |                     |
| 20697.524  | 4830.1460  | 13.       | 0.252    |                     |
| 20696.943  | 4830.2817  | 16.       | 0.461    |                     |
| 20695.405  | 4830.6407  | 15.       | 0.419    |                     |
| 20693.138  | 4831.1581  | 13.       | 0.336    |                     |
| 20692.364  | 4831.3505  | 15.       | 0.210    |                     |

ASSIGNMENT  
(v', v'', Branch J)

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) |
|------------|------------|-----------|----------|
| 20691.394  | 4831.5770  | 112.      | 1.048    |
| 20688.932  | 4832.1521  | 13.       | 0.503    |
| 20688.154  | 4832.3337  | 13.       | 0.377    |
| 20687.193  | 4832.5541  | 48.       | 0.461    |
| 20686.250  | 4832.7755  | 151.      | 0.838    |
| 20684.820  | 4833.1127  | 54.       | 0.587    |
| 20683.767  | 4833.3586  | 36.       | 0.754    |
| 20682.827  | 4833.5783  | 12.       | 0.377    |
| 20682.222  | 4833.7198  | 12.       | 0.251    |
| 20681.217  | 4833.9546  | 16.       | 0.419    |
| 20680.656  | 4834.0857  | 14.       | 0.251    |
| 20678.736  | 4834.5347  | 134.      | 0.754    |
| 20677.748  | 4834.7656  | 13.       | 0.209    |
| 20676.930  | 4834.9569  | 12.       | 0.419    |
| 20675.600  | 4835.2678  | 20.       | 0.544    |
| 20674.918  | 4835.4275  | 15.       | 0.167    |
| 20674.423  | 4835.5432  | 20.       | 0.335    |
| 20673.753  | 4835.6998  | 16.       | 0.293    |
| 20672.794  | 4835.9243  | 24.       | 0.460    |
| 20671.165  | 4836.3054  | 12.       | 0.251    |
| 20669.248  | 4836.7538  | 159.      | 0.578    |
| 20668.339  | 4836.9667  | 21.       | 0.251    |
| 20666.758  | 4837.3367  | 13.       | 0.293    |
| 20664.101  | 4837.9586  | 13.       | 0.167    |
| 20662.933  | 4838.2321  | 78.       | 0.962    |
| 20661.675  | 4838.5267  | 14.       | 0.209    |
| 20660.788  | 4838.7345  | 26.       | 0.418    |
| 20659.969  | 4838.9263  | 27.       | 0.543    |
| 20658.676  | 4839.2292  | 26.       | 0.418    |
| 20655.488  | 4839.9761  | 16.       | 0.375    |
| 20651.243  | 4840.9709  | 29.       | 0.501    |
| 20650.350  | 4841.1804  | 13.       | 0.375    |
| 20649.240  | 4841.4404  | 14.       | 0.501    |
| 20648.291  | 4841.6630  | 14.       | 0.626    |
| 20645.446  | 4842.3302  | 22.       | 0.543    |
| 20643.875  | 4842.6987  | 13.       | 0.167    |
| 20643.344  | 4842.8234  | 18.       | 0.542    |
| 20641.931  | 4843.1547  | 21.       | 0.626    |
| 20640.897  | 4843.3975  | 15.       | 0.250    |
| 20639.573  | 4843.7082  | 25.       | 0.626    |
| 20637.200  | 4844.2650  | 14.       | 0.375    |
| 20636.557  | 4844.4160  | 18.       | 0.334    |
| 20635.871  | 4844.5771  | 50.       | 0.459    |
| 20634.286  | 4844.9493  | 32.       | 0.459    |
| 20633.109  | 4845.2257  | 73.       | 0.375    |
| 20632.047  | 4845.4751  | 12.       | 0.333    |
| 20631.452  | 4845.6147  | 13.       | 0.250    |
| 20630.323  | 4845.8798  | 187.      | 1.042    |
| 20628.818  | 4846.2336  | 99.       | 0.567    |
| 20627.765  | 4846.4810  | 19.       | 0.455    |
| 20625.994  | 4846.8971  | 23.       | 0.416    |
| 20625.185  | 4847.0872  | 50.       | 0.541    |
| 20624.361  | 4847.2809  | 13.       | 0.333    |
| 20623.062  | 4847.5862  | 23.       | 0.708    |
| 20621.910  | 4847.8568  | 12.       | 0.167    |
| 20621.103  | 4848.0467  | 23.       | 0.749    |
| 20619.972  | 4848.3125  | 35.       | 0.499    |
| 20617.234  | 4848.9565  | 27.       | 0.566    |
| 20616.036  | 4849.2382  | 25.       | 0.541    |
| 20615.025  | 4849.4761  | 45.       | 0.749    |

2,4R14

0,4P4

1,4P9

0,4R6

3,4P16

2,4P13

1,4R11

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20613.679  | 4849.7927  | 16.       | 0.458    |                     |
| 20612.719  | 4850.0185  | 40.       | 0.541    |                     |
| 20611.659  | 4850.2679  | 12.       | 0.208    |                     |
| 20606.421  | 4851.5010  | 26.       | 0.457    |                     |
| 20605.412  | 4851.7385  | 13.       | 0.291    |                     |
| 20604.706  | 4851.9047  | 15.       | 0.208    |                     |
| 20604.175  | 4852.0297  | 23.       | 0.338    |                     |
| 20603.574  | 4852.1712  | 32.       | 0.418    | 0,4R7               |
| 20602.844  | 4852.3423  | 14.       | 0.248    |                     |
| 20602.123  | 4852.5130  | 13.       | 0.457    |                     |
| 20600.524  | 4852.8898  | 20.       | 0.498    |                     |
| 20598.859  | 4853.2818  | 12.       | 0.418    |                     |
| 20598.319  | 4853.4092  | 12.       | 0.168    |                     |
| 20597.529  | 4853.5952  | 23.       | 0.418    |                     |
| 20595.885  | 4853.9827  | 12.       | 0.208    |                     |
| 20594.944  | 4854.2045  | 51.       | 0.747    |                     |
| 20594.071  | 4854.4102  | 12.       | 0.166    |                     |
| 20592.457  | 4854.7909  | 13.       | 0.374    |                     |
| 20590.588  | 4855.2316  | 106.      | 0.564    | 1,4P10              |
| 20589.814  | 4855.4141  | 17.       | 0.298    |                     |
| 20588.726  | 4855.6705  | 13.       | 0.298    |                     |
| 20588.103  | 4855.8175  | 12.       | 0.298    |                     |
| 20587.629  | 4855.9293  | 13.       | 0.248    |                     |
| 20587.068  | 4856.0617  | 14.       | 0.538    |                     |
| 20586.359  | 4856.2290  | 12.       | 0.338    |                     |
| 20585.148  | 4856.5147  | 93.       | 0.954    |                     |
| 20584.171  | 4856.7452  | 13.       | 0.168    |                     |
| 20583.667  | 4856.8640  | 13.       | 0.418    |                     |
| 20582.013  | 4857.2544  | 28.       | 0.418    |                     |
| 20581.289  | 4857.4251  | 14.       | 0.207    |                     |
| 20580.597  | 4857.5865  | 15.       | 0.418    |                     |
| 20579.612  | 4857.8210  | 139.      | 0.663    | 0,4P6               |
| 20577.953  | 4858.2127  | 55.       | 0.538    |                     |
| 20576.826  | 4858.4788  | 12.       | 0.168    |                     |
| 20575.873  | 4858.7038  | 13.       | 0.331    |                     |
| 20574.900  | 4858.9335  | 132.      | 0.704    | 2,4R15              |
| 20573.429  | 4859.2810  | 71.       | 0.456    |                     |
| 20572.690  | 4859.4556  | 52.       | 0.373    |                     |
| 20571.566  | 4859.7211  | 45.       | 0.456    |                     |
| 20570.828  | 4859.8985  | 14.       | 0.207    |                     |
| 20570.037  | 4860.0704  | 22.       | 0.331    |                     |
| 20569.684  | 4860.1658  | 18.       | 0.166    |                     |
| 20568.459  | 4860.4552  | 94.       | 0.538    | 3,4R18              |
| 20566.648  | 4860.8832  | 9580.     | 2.153    |                     |
| 20564.589  | 4861.3699  | 9580.     | 1.573    |                     |
| 20562.875  | 4861.7750  | 4290.     | 1.407    |                     |
| 20561.634  | 4862.0685  | 37.       | 0.331    |                     |
| 20561.039  | 4862.2091  | 25.       | 0.414    |                     |
| 20560.067  | 4862.4392  | 15.       | 0.455    |                     |
| 20559.027  | 4862.6852  | 22.       | 0.414    |                     |
| 20558.074  | 4862.9104  | 13.       | 0.165    |                     |
| 20557.529  | 4863.0393  | 14.       | 0.579    |                     |
| 20556.717  | 4863.2315  | 14.       | 0.289    |                     |
| 20556.292  | 4863.3321  | 13.       | 0.165    |                     |
| 20555.929  | 4863.4179  | 12.       | 0.207    |                     |
| 20555.120  | 4863.6094  | 17.       | 0.496    |                     |
| 20553.976  | 4863.8800  | 12.       | 0.207    |                     |
| 20553.479  | 4863.9976  | 13.       | 0.331    |                     |
| 20552.424  | 4864.2475  | 13.       | 0.455    |                     |
| 20551.359  | 4864.4994  | 12.       | 0.248    |                     |

## ASSIGNMENT

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20530.332  | 4864.7426  | 15.       | 0.537    | 0,4R8               |
| 20549.376  | 4864.9625  | 51.       | 0.579    |                     |
| 20548.171  | 4865.2542  | 34.       | 0.496    |                     |
| 20546.212  | 4865.7150  | 41.       | 0.826    | 1,4R12              |
| 20544.927  | 4866.0224  | 122.      | 0.702    |                     |
| 20543.839  | 4866.2659  | 16.       | 0.578    |                     |
| 20542.906  | 4866.5011  | 12.       | 0.165    |                     |
| 20542.151  | 4866.6801  | 17.       | 0.413    |                     |
| 20541.271  | 4866.8855  | 21.       | 0.206    |                     |
| 20540.744  | 4867.0133  | 27.       | 0.537    |                     |
| 20539.429  | 4867.3248  | 13.       | 0.495    |                     |
| 20538.902  | 4867.4497  | 13.       | 0.205    |                     |
| 20538.444  | 4867.5585  | 12.       | 0.248    |                     |
| 20537.367  | 4867.8135  | 43.       | 0.495    |                     |
| 20536.722  | 4867.9665  | 16.       | 0.248    |                     |
| 20535.903  | 4868.1607  | 24.       | 0.454    |                     |
| 20535.247  | 4868.3161  | 14.       | 0.206    |                     |
| 20534.297  | 4868.5415  | 24.       | 0.413    |                     |
| 20533.416  | 4868.7503  | 12.       | 0.289    |                     |
| 20531.994  | 4869.0874  | 12.       | 0.536    |                     |
| 20530.606  | 4869.4167  | 40.       | 0.701    |                     |
| 20529.738  | 4869.6226  | 22.       | 0.289    |                     |
| 20528.265  | 4869.9721  | 12.       | 0.206    |                     |
| 20527.489  | 4870.1561  | 12.       | 0.390    |                     |
| 20525.788  | 4870.5596  | 13.       | 0.247    | 2,4P14              |
| 20524.782  | 4870.7283  | 122.      | 0.701    |                     |
| 20522.726  | 4871.2865  | 144.      | 0.577    |                     |
| 20521.826  | 4871.5000  | 68.       | 0.577    | 0,4P7               |
| 20520.401  | 4871.8384  | 13.       | 0.494    |                     |
| 20519.241  | 4872.1136  | 66.       | 0.536    |                     |
| 20515.572  | 4872.9851  | 96.       | 0.947    |                     |
| 20514.292  | 4873.2891  | 24.       | 0.535    |                     |
| 20513.306  | 4873.5234  | 12.       | 0.206    |                     |
| 20510.640  | 4874.1568  | 19.       | 0.412    | 3,4P17              |
| 20509.834  | 4874.3485  | 37.       | 0.453    |                     |
| 20508.196  | 4874.7377  | 40.       | 0.782    |                     |
| 20506.857  | 4875.0560  | 14.       | 0.329    | 1,4P11              |
| 20505.755  | 4875.3180  | 59.       | 0.617    |                     |
| 20504.802  | 4875.5447  | 119.      | 0.617    |                     |
| 20503.137  | 4875.9407  | 42.       | 0.781    |                     |
| 20502.047  | 4876.1997  | 13.       | 0.411    |                     |
| 20501.263  | 4876.3849  | 17.       | 0.370    |                     |
| 20500.606  | 4876.5425  | 24.       | 0.370    |                     |
| 20499.008  | 4876.9228  | 49.       | 0.493    |                     |
| 20496.571  | 4877.5025  | 14.       | 0.370    |                     |
| 20495.818  | 4877.6818  | 18.       | 0.452    |                     |
| 20493.659  | 4878.1956  | 32.       | 0.452    |                     |
| 20492.388  | 4878.4962  | 13.       | 0.493    |                     |
| 20490.735  | 4878.8919  | 21.       | 0.411    |                     |
| 20488.971  | 4879.3118  | 24.       | 0.411    |                     |
| 20486.943  | 4879.7948  | 16.       | 0.493    |                     |
| 20484.871  | 4880.2834  | 29.       | 0.493    | 0,4R9               |
| 20484.047  | 4880.4848  | 13.       | 0.411    |                     |
| 20483.251  | 4880.6745  | 12.       | 0.205    |                     |
| 20481.688  | 4881.0467  | 13.       | 0.492    |                     |
| 20480.021  | 4881.4441  | 34.       | 0.328    |                     |
| 20479.372  | 4881.5990  | 37.       | 0.451    |                     |
| 20477.464  | 4882.0536  | 16.       | 0.492    |                     |
| 20476.503  | 4882.2828  | 16.       | 0.369    |                     |
| 20474.629  | 4882.7297  | 13.       | 0.738    |                     |

## ASSIGNMENT

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20473.655  | 4882.9619  | 14.       | 0.451    |                     |
| 20471.443  | 4883.4295  | 16.       | 0.369    |                     |
| 20470.334  | 4883.7543  | 51.       | 0.861    |                     |
| 20469.413  | 4883.9739  | 15.       | 0.246    |                     |
| 20468.459  | 4884.2017  | 13.       | 0.492    |                     |
| 20467.723  | 4884.3771  | 15.       | 0.328    |                     |
| 20467.266  | 4884.4853  | 13.       | 0.323    |                     |
| 20465.486  | 4884.9112  | 13.       | 0.574    |                     |
| 20464.063  | 4885.2507  | 107.      | 0.655    | 2,4R16              |
| 20463.336  | 4885.4244  | 14.       | 0.205    |                     |
| 20461.968  | 4885.7509  | 25.       | 0.451    |                     |
| 20460.777  | 4886.0353  | 15.       | 0.450    |                     |
| 20459.397  | 4886.3649  | 14.       | 0.655    |                     |
| 20458.077  | 4886.6803  | 13.       | 0.328    |                     |
| 20456.618  | 4887.0287  | 39.       | 0.655    | 0,4P8               |
| 20455.051  | 4887.4033  | 13.       | 0.327    |                     |
| 20453.650  | 4887.7379  | 85.       | 0.655    | 1,4R13              |
| 20451.469  | 4888.2592  | 42.       | 0.532    |                     |
| 20450.459  | 4888.5006  | 15.       | 0.286    |                     |
| 20447.720  | 4889.1554  | 35.       | 0.573    |                     |
| 20445.243  | 4889.7479  | 41.       | 0.532    |                     |
| 20444.490  | 4889.9279  | 13.       | 0.245    |                     |
| 20441.089  | 4890.7414  | 103.      | 0.613    |                     |
| 20438.948  | 4891.2538  | 72.       | 0.490    | 3,4R19              |
| 20437.973  | 4891.4870  | 347.      | 0.817    |                     |
| 20436.761  | 4891.7772  | 31.       | 0.613    |                     |
| 20435.978  | 4891.9646  | 13.       | 0.245    |                     |
| 20433.395  | 4892.5830  | 25.       | 0.490    |                     |
| 20431.910  | 4892.9387  | 41.       | 0.572    |                     |
| 20430.204  | 4893.3472  | 23.       | 0.403    |                     |
| 20429.504  | 4893.5149  | 14.       | 0.245    |                     |
| 20428.213  | 4893.8241  | 15.       | 0.531    |                     |
| 20427.247  | 4894.0556  | 16.       | 0.442    |                     |
| 20426.079  | 4894.3355  | 18.       | 0.286    |                     |
| 20425.191  | 4894.5482  | 45.       | 0.898    |                     |
| 20424.219  | 4894.7813  | 15.       | 0.326    |                     |
| 20422.816  | 4895.1175  | 13.       | 0.403    |                     |
| 20421.649  | 4895.3971  | 15.       | 0.367    |                     |
| 20420.772  | 4895.6074  | 13.       | 0.285    |                     |
| 20419.532  | 4895.8927  | 13.       | 0.443    |                     |
| 20417.275  | 4896.4460  | 52.       | 0.856    |                     |
| 20416.095  | 4896.7239  | 12.       | 0.245    |                     |
| 20413.697  | 4897.3042  | 27.       | 0.403    | 0,4R10              |
| 20412.534  | 4897.5831  | 109.      | 0.530    | 2,4P15              |
| 20411.736  | 4897.7628  | 99.       | 0.489    | 1,4P12              |
| 20408.688  | 4898.5063  | 13.       | 0.244    |                     |
| 20407.461  | 4898.8006  | 32.       | 0.733    |                     |
| 20404.358  | 4899.5457  | 13.       | 0.163    |                     |
| 20403.898  | 4899.6561  | 16.       | 0.407    |                     |
| 20402.874  | 4899.9021  | 32.       | 0.692    |                     |
| 20401.522  | 4900.2267  | 51.       | 0.926    |                     |
| 20400.522  | 4900.4669  | 12.       | 0.163    |                     |
| 20399.813  | 4900.6373  | 21.       | 0.529    |                     |
| 20398.561  | 4900.9250  | 59.       | 0.570    |                     |
| 20396.648  | 4901.3978  | 47.       | 0.651    |                     |
| 20395.081  | 4901.7743  | 13.       | 0.366    |                     |
| 20394.399  | 4901.9282  | 17.       | 0.366    |                     |
| 20393.031  | 4902.2670  | 12.       | 0.325    |                     |
| 20389.650  | 4903.0801  | 16.       | 0.163    |                     |
| 20388.980  | 4903.2411  | 35.       | 0.813    |                     |

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| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20357.705  | 4903.5477  | 56.       | 0.555    |                     |
| 20355.729  | 4904.0231  | 12.       | 0.163    |                     |
| 20355.318  | 4904.1219  | 13.       | 0.366    |                     |
| 20384.218  | 4904.3865  | 15.       | 0.163    | 0,4P9               |
| 20383.754  | 4904.4982  | 29.       | 0.485    |                     |
| 20381.966  | 4904.9284  | 15.       | 0.325    |                     |
| 20381.303  | 4905.0881  | 16.       | 0.406    | 3,4P18              |
| 20379.068  | 4905.6260  | 35.       | 0.528    |                     |
| 20377.130  | 4906.0925  | 14.       | 0.203    |                     |
| 20376.607  | 4906.2185  | 17.       | 0.509    |                     |
| 20375.680  | 4906.4416  | 15.       | 0.284    |                     |
| 20374.781  | 4906.6581  | 24.       | 0.528    |                     |
| 20370.609  | 4907.6631  | 16.       | 0.406    |                     |
| 20368.963  | 4908.0597  | 14.       | 1.175    |                     |
| 20367.845  | 4908.3291  | 15.       | 0.406    |                     |
| 20365.914  | 4908.7945  | 112.      | 1.257    |                     |
| 20363.487  | 4909.3795  | 13.       | 0.446    |                     |
| 20359.619  | 4910.3122  | 13.       | 0.486    |                     |
| 20357.217  | 4910.8916  | 13.       | 0.162    |                     |
| 20356.421  | 4911.0837  | 17.       | 0.891    | 1,4R14              |
| 20354.995  | 4911.4276  | 72.       | 0.567    |                     |
| 20354.360  | 4911.5809  | 24.       | 0.203    |                     |
| 20353.661  | 4911.7497  | 26.       | 0.405    |                     |
| 20351.769  | 4912.2063  | 39.       | 0.525    |                     |
| 20350.404  | 4912.5358  | 13.       | 0.243    |                     |
| 20349.611  | 4912.7272  | 21.       | 0.405    |                     |
| 20348.947  | 4912.8876  | 14.       | 0.243    | 2,4R17              |
| 20346.258  | 4913.5369  | 93.       | 0.683    |                     |
| 20344.483  | 4913.9655  | 18.       | 0.324    |                     |
| 20343.424  | 4914.2213  | 12.       | 0.243    |                     |
| 20339.998  | 4915.0490  | 12.       | 0.485    |                     |
| 20337.084  | 4915.7534  | 16.       | 0.404    | 0,4R11              |
| 20334.679  | 4916.3349  | 24.       | 0.404    |                     |
| 20334.219  | 4916.4458  | 17.       | 0.202    |                     |
| 20333.448  | 4916.6324  | 27.       | 0.364    |                     |
| 20332.862  | 4916.7741  | 40.       | 0.404    |                     |
| 20331.465  | 4917.1118  | 13.       | 0.202    |                     |
| 20330.883  | 4917.2526  | 17.       | 0.404    |                     |
| 20328.615  | 4917.8013  | 25.       | 0.485    |                     |
| 20326.316  | 4918.3576  | 13.       | 0.242    |                     |
| 20325.742  | 4918.4963  | 16.       | 0.404    |                     |
| 20324.427  | 4918.8146  | 22.       | 0.242    |                     |
| 20323.755  | 4918.9774  | 151.      | 0.525    |                     |
| 20323.038  | 4919.1509  | 58.       | 0.485    |                     |
| 20321.700  | 4919.4747  | 13.       | 0.202    |                     |
| 20321.276  | 4919.5773  | 14.       | 0.242    |                     |
| 20320.812  | 4919.6896  | 12.       | 0.202    |                     |
| 20319.534  | 4919.9993  | 29.       | 0.484    |                     |
| 20318.738  | 4920.1918  | 13.       | 0.202    |                     |
| 20317.483  | 4920.4958  | 347.      | 0.847    |                     |
| 20316.029  | 4920.8479  | 13.       | 0.605    |                     |
| 20314.546  | 4921.2073  | 15.       | 0.766    |                     |
| 20312.632  | 4921.6709  | 13.       | 0.282    |                     |
| 20311.808  | 4921.8705  | 76.       | 0.645    | 1,4P13              |
| 20310.206  | 4922.2557  | 33.       | 0.403    |                     |
| 20308.636  | 4922.6395  | 17.       | 0.323    |                     |
| 20308.012  | 4922.7905  | 13.       | 0.282    |                     |
| 20306.730  | 4923.1015  | 16.       | 0.403    | 0,4P10              |
| 20303.567  | 4923.5685  | 37.       | 0.363    | 3,4R20              |
| 20302.459  | 4924.0401  | 98.       | 0.645    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20301.655  | 4924.3320  | 14.       | 0.322    |                     |
| 20299.857  | 4924.7683  | 12.       | 0.282    |                     |
| 20298.541  | 4925.0876  | 27.       | 0.483    |                     |
| 20297.883  | 4925.2472  | 17.       | 0.201    |                     |
| 20296.407  | 4925.5054  | 12.       | 0.483    |                     |
| 20295.548  | 4925.8140  | 15.       | 0.403    |                     |
| 20293.327  | 4926.3530  | 103.      | 0.584    | 2,4P16              |
| 20292.193  | 4926.6284  | 17.       | 0.362    |                     |
| 20290.504  | 4927.0383  | 13.       | 0.443    |                     |
| 20289.800  | 4927.2094  | 13.       | 0.322    |                     |
| 20288.774  | 4927.4585  | 13.       | 0.282    |                     |
| 20287.976  | 4927.6524  | 33.       | 0.483    |                     |
| 20285.188  | 4928.3297  | 17.       | 0.282    |                     |
| 20283.712  | 4928.6881  | 246.      | 1.568    |                     |
| 20282.189  | 4929.0582  | 15.       | 0.643    |                     |
| 20280.457  | 4929.4792  | 15.       | 0.402    |                     |
| 20278.868  | 4929.8655  | 16.       | 0.442    |                     |
| 20277.563  | 4930.1829  | 12.       | 0.201    |                     |
| 20277.062  | 4930.3047  | 13.       | 0.362    |                     |
| 20273.940  | 4931.0639  | 12.       | 0.402    |                     |
| 20270.967  | 4931.7870  | 33.       | 0.562    |                     |
| 20269.210  | 4932.2147  | 41.       | 0.503    |                     |
| 20267.993  | 4932.5108  | 16.       | 0.442    |                     |
| 20266.886  | 4932.7802  | 15.       | 0.401    |                     |
| 20265.822  | 4933.0391  | 12.       | 0.161    |                     |
| 20265.139  | 4933.2054  | 35.       | 0.482    |                     |
| 20264.040  | 4933.4731  | 72.       | 1.003    |                     |
| 20262.616  | 4933.8197  | 23.       | 0.502    |                     |
| 20260.960  | 4934.2230  | 128.      | 0.963    |                     |
| 20260.042  | 4934.4465  | 17.       | 0.201    |                     |
| 20259.568  | 4934.5620  | 14.       | 0.241    |                     |
| 20257.038  | 4935.1753  | 12.       | 0.561    |                     |
| 20253.924  | 4935.9370  | 13.       | 0.441    |                     |
| 20252.759  | 4936.2210  | 13.       | 0.200    |                     |
| 20252.099  | 4936.3820  | 17.       | 0.501    |                     |
| 20251.173  | 4936.5076  | 25.       | 0.441    |                     |
| 20249.411  | 4937.0372  | 36.       | 0.361    | 1,4R15              |
| 20248.830  | 4937.1789  | 52.       | 0.441    |                     |
| 20248.184  | 4937.3243  | 21.       | 0.200    |                     |
| 20247.759  | 4937.4400  | 22.       | 0.320    | 0,4R12              |
| 20246.323  | 4937.7201  | 24.       | 0.501    |                     |
| 20245.686  | 4937.9455  | 12.       | 0.160    |                     |
| 20244.804  | 4938.1606  | 13.       | 0.481    |                     |
| 20243.661  | 4938.4395  | 21.       | 0.440    |                     |
| 20243.042  | 4938.5925  | 17.       | 0.400    |                     |
| 20242.098  | 4938.8208  | 48.       | 0.520    | 3,4P19              |
| 20241.403  | 4938.9903  | 18.       | 0.160    |                     |
| 20240.818  | 4939.1331  | 31.       | 0.440    |                     |
| 20240.113  | 4939.3051  | 13.       | 0.160    |                     |
| 20238.998  | 4939.5772  | 14.       | 0.240    |                     |
| 20238.417  | 4939.7192  | 14.       | 0.520    |                     |
| 20237.355  | 4939.9784  | 14.       | 0.400    |                     |
| 20236.956  | 4940.0758  | 12.       | 0.160    |                     |
| 20235.929  | 4940.3264  | 15.       | 0.400    |                     |
| 20232.475  | 4941.1699  | 24.       | 0.480    |                     |
| 20231.058  | 4941.5160  | 12.       | 0.360    |                     |
| 20229.758  | 4941.8325  | 23.       | 0.440    |                     |
| 20228.833  | 4942.0595  | 14.       | 0.580    |                     |
| 20226.974  | 4942.5136  | 39.       | 0.580    |                     |
| 20225.598  | 4942.8498  | 25.       | 0.440    |                     |

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| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20224.063  | 4943.2252  | 34.       | 0.799    | 2,4R18              |
| 20222.860  | 4943.5144  | 13.       | 0.519    |                     |
| 20221.595  | 4943.8276  | 155.      | 0.633    |                     |
| 20220.964  | 4943.9779  | 29.       | 0.280    |                     |
| 20219.901  | 4944.2426  | 14.       | 0.360    |                     |
| 20217.908  | 4944.7300  | 14.       | 0.479    | 0,4P11              |
| 20217.437  | 4944.8453  | 12.       | 0.160    |                     |
| 20216.903  | 4944.9758  | 13.       | 0.519    |                     |
| 20215.744  | 4945.2593  | 26.       | 0.479    |                     |
| 20214.950  | 4945.4537  | 12.       | 0.519    |                     |
| 20214.173  | 4945.6437  | 12.       | 0.240    | 1,4P14              |
| 20212.694  | 4946.0056  | 13.       | 0.319    |                     |
| 20211.917  | 4946.1956  | 42.       | 0.519    |                     |
| 20211.125  | 4946.3896  | 13.       | 0.239    |                     |
| 20209.438  | 4946.8024  | 13.       | 0.439    |                     |
| 20207.034  | 4947.3909  | 12.       | 0.279    | 1,4P14              |
| 20204.715  | 4947.9588  | 73.       | 0.598    |                     |
| 20203.861  | 4948.1679  | 17.       | 0.319    |                     |
| 20203.302  | 4948.3049  | 13.       | 0.239    |                     |
| 20202.429  | 4948.5188  | 12.       | 0.478    |                     |
| 20201.481  | 4948.7509  | 13.       | 0.478    | 1,4P14              |
| 20200.721  | 4948.9372  | 13.       | 0.159    |                     |
| 20200.424  | 4949.0098  | 13.       | 0.239    |                     |
| 20196.384  | 4949.9999  | 12.       | 0.199    |                     |
| 20195.984  | 4950.0979  | 12.       | 0.279    |                     |
| 20193.138  | 4950.7833  | 13.       | 0.279    | 1,4P14              |
| 20192.359  | 4950.9866  | 33.       | 0.438    |                     |
| 20191.468  | 4951.2050  | 14.       | 0.319    |                     |
| 20191.159  | 4951.2807  | 13.       | 0.159    |                     |
| 20190.385  | 4951.4706  | 12.       | 0.398    |                     |
| 20189.481  | 4951.6923  | 15.       | 0.358    | 1,4P14              |
| 20185.909  | 4952.5687  | 13.       | 0.199    |                     |
| 20185.541  | 4952.6589  | 13.       | 0.239    |                     |
| 20184.399  | 4952.9391  | 13.       | 0.279    |                     |
| 20183.325  | 4953.2027  | 22.       | 0.637    |                     |
| 20182.417  | 4953.4256  | 22.       | 0.398    | 1,4P14              |
| 20179.809  | 4954.0657  | 15.       | 0.438    |                     |
| 20177.740  | 4954.5736  | 12.       | 0.398    |                     |
| 20176.890  | 4954.7823  | 17.       | 0.318    |                     |
| 20176.099  | 4954.9767  | 22.       | 0.716    |                     |
| 20174.010  | 4955.4297  | 13.       | 0.199    | 2,4P17              |
| 20173.232  | 4955.6817  | 33.       | 0.477    |                     |
| 20172.178  | 4955.9397  | 32.       | 0.358    |                     |
| 20171.503  | 4956.1057  | 14.       | 0.199    |                     |
| 20171.191  | 4956.1823  | 14.       | 0.199    |                     |
| 20168.768  | 4956.7776  | 42.       | 0.715    | 2,4P17              |
| 20167.682  | 4957.0446  | 77.       | 0.556    |                     |
| 20166.685  | 4957.2837  | 100.      | 0.477    |                     |
| 20165.394  | 4957.6071  | 480.      | 0.794    |                     |
| 20164.562  | 4957.8117  | 14.       | 0.159    |                     |
| 20164.130  | 4957.9179  | 13.       | 0.318    | 3,4R21              |
| 20162.984  | 4958.1956  | 12.       | 0.238    |                     |
| 20161.657  | 4958.5259  | 21.       | 0.516    |                     |
| 20160.526  | 4958.8042  | 59.       | 0.635    |                     |
| 20159.734  | 4958.9990  | 13.       | 0.233    |                     |
| 20157.248  | 4959.6105  | 15.       | 0.516    | 2,5R3               |
| 20154.819  | 4960.2084  | 14.       | 0.436    |                     |
| 20153.793  | 4960.4608  | 12.       | 0.198    |                     |
| 20153.180  | 4960.6118  | 25.       | 0.436    |                     |
| 20152.682  | 4960.7344  | 26.       | 0.278    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20152.154  | 4960.2644  | 12.       | 0.275    |                     |
| 20149.734  | 4961.4454  | 16.       | 0.515    |                     |
| 20149.320  | 4961.5620  | 14.       | 0.153    |                     |
| 20146.938  | 4961.6561  | 12.       | 0.153    |                     |
| 20144.722  | 4962.6945  | 12.       | 0.357    |                     |
| 20142.998  | 4963.1152  | 13.       | 0.476    |                     |
| 20140.868  | 4963.6443  | 13.       | 0.436    |                     |
| 20137.636  | 4964.4260  | 15.       | 0.356    | 2,5R4               |
| 20137.088  | 4964.5760  | 12.       | 0.158    |                     |
| 20135.533  | 4964.9592  | 63.       | 0.634    | 1,4R16              |
| 20134.548  | 4965.2023  | 13.       | 0.158    |                     |
| 20133.582  | 4965.4403  | 22.       | 0.475    |                     |
| 20132.736  | 4965.6491  | 14.       | 0.475    |                     |
| 20131.886  | 4965.8589  | 18.       | 0.277    |                     |
| 20130.931  | 4966.0943  | 17.       | 0.435    |                     |
| 20130.373  | 4966.2320  | 15.       | 0.198    |                     |
| 20130.019  | 4966.3193  | 14.       | 0.198    |                     |
| 20129.424  | 4966.4660  | 13.       | 0.198    |                     |
| 20128.817  | 4966.6158  | 16.       | 0.317    |                     |
| 20127.606  | 4966.9147  | 32.       | 0.752    |                     |
| 20126.667  | 4967.1463  | 17.       | 0.633    |                     |
| 20126.070  | 4967.2938  | 15.       | 0.158    |                     |
| 20125.595  | 4967.4110  | 15.       | 0.356    |                     |
| 20124.795  | 4967.6034  | 17.       | 0.435    |                     |
| 20124.263  | 4967.7398  | 18.       | 0.158    |                     |
| 20123.622  | 4967.8981  | 22.       | 0.237    |                     |
| 20123.147  | 4968.0154  | 19.       | 0.237    |                     |
| 20121.954  | 4968.3100  | 23.       | 0.395    |                     |
| 20120.461  | 4968.6786  | 28.       | 0.395    | 0,4P12              |
| 20119.248  | 4968.9781  | 22.       | 0.356    |                     |
| 20118.276  | 4969.2183  | 24.       | 0.514    |                     |
| 20116.745  | 4969.5964  | 17.       | 0.593    |                     |
| 20115.783  | 4969.8341  | 14.       | 0.751    |                     |
| 20114.735  | 4970.0929  | 13.       | 0.395    |                     |
| 20113.948  | 4970.2874  | 13.       | 0.198    |                     |
| 20113.203  | 4970.4715  | 23.       | 0.474    |                     |
| 20112.251  | 4970.7068  | 18.       | 0.671    |                     |
| 20110.992  | 4971.0180  | 33.       | 0.513    |                     |
| 20107.927  | 4971.7756  | 10590.    | 3.830    |                     |
| 20104.446  | 4972.6366  | 49.       | 0.513    |                     |
| 20103.344  | 4972.9092  | 19.       | 0.434    |                     |
| 20102.555  | 4973.1043  | 18.       | 0.276    |                     |
| 20101.767  | 4973.2994  | 39.       | 0.671    |                     |
| 20100.503  | 4973.6120  | 14.       | 0.197    |                     |
| 20099.396  | 4973.7375  | 16.       | 0.355    |                     |
| 20098.944  | 4973.9979  | 39.       | 0.473    | 3,4P20              |
| 20098.077  | 4974.2124  | 12.       | 0.316    |                     |
| 20097.263  | 4974.4139  | 14.       | 0.394    |                     |
| 20096.344  | 4974.6414  | 14.       | 0.394    |                     |
| 20095.549  | 4974.8382  | 13.       | 0.158    |                     |
| 20094.465  | 4975.1066  | 15.       | 0.434    |                     |
| 20093.746  | 4975.2846  | 16.       | 0.158    |                     |
| 20093.360  | 4975.3803  | 17.       | 0.276    |                     |
| 20092.768  | 4975.5267  | 16.       | 0.315    |                     |
| 20091.906  | 4975.7402  | 21.       | 0.355    |                     |
| 20091.301  | 4975.8901  | 29.       | 0.236    |                     |
| 20090.644  | 4976.0529  | 30.       | 0.433    | 1,4P15              |
| 20089.970  | 4976.2198  | 90.       | 0.473    | 2,4R19              |
| 20088.089  | 4976.6858  | 30.       | 0.512    |                     |
| 20087.111  | 4976.9281  | 14.       | 0.473    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20086.459  | 4977.0894  | 13.       | 0.394    | 2,5P4               |
| 20085.734  | 4977.2569  | 14.       | 0.473    |                     |
| 20085.029  | 4977.4440  | 21.       | 0.394    |                     |
| 20083.827  | 4977.7419  | 13.       | 0.394    | 2,5R6               |
| 20083.091  | 4977.9242  | 17.       | 0.394    |                     |
| 20082.522  | 4978.0653  | 13.       | 0.157    |                     |
| 20081.829  | 4978.2371  | 14.       | 0.591    | 2,5R6               |
| 20080.552  | 4978.5536  | 122.      | 0.709    |                     |
| 20079.025  | 4978.9322  | 14.       | 0.197    |                     |
| 20078.343  | 4979.1014  | 18.       | 0.512    | 2,5R6               |
| 20077.291  | 4979.3622  | 12.       | 0.236    |                     |
| 20075.871  | 4979.7146  | 12.       | 0.472    |                     |
| 20074.405  | 4980.0781  | 13.       | 0.315    | 2,5R6               |
| 20073.970  | 4980.1862  | 14.       | 0.235    |                     |
| 20072.986  | 4980.4303  | 35.       | 0.590    |                     |
| 20072.391  | 4980.5778  | 21.       | 0.197    | 2,5R6               |
| 20071.680  | 4980.7542  | 25.       | 0.511    |                     |
| 20070.524  | 4981.0411  | 13.       | 0.472    |                     |
| 20068.961  | 4981.4291  | 12.       | 0.197    | 2,5R6               |
| 20066.487  | 4982.0434  | 12.       | 0.197    |                     |
| 20064.622  | 4982.5064  | 19.       | 0.314    |                     |
| 20063.390  | 4982.8124  | 260.      | 0.786    | 2,5R6               |
| 20062.676  | 4982.9896  | 29.       | 0.275    |                     |
| 20062.065  | 4983.1414  | 14.       | 0.157    |                     |
| 20061.618  | 4983.2525  | 16.       | 0.432    | 2,5R6               |
| 20060.526  | 4983.5237  | 17.       | 0.364    |                     |
| 20059.142  | 4983.8676  | 16.       | 0.275    |                     |
| 20058.112  | 4984.1234  | 13.       | 0.393    | 2,5R6               |
| 20057.217  | 4984.3460  | 16.       | 0.353    |                     |
| 20055.931  | 4984.6656  | 20.       | 0.550    |                     |
| 20054.268  | 4985.0789  | 13.       | 0.432    | 2,5R6               |
| 20053.564  | 4985.2538  | 17.       | 0.353    |                     |
| 20052.468  | 4985.5264  | 33.       | 0.510    |                     |
| 20051.716  | 4985.7134  | 14.       | 0.314    | 0,4R14              |
| 20050.801  | 4985.9410  | 19.       | 0.549    |                     |
| 20049.890  | 4986.1674  | 13.       | 0.392    |                     |
| 20049.181  | 4986.3437  | 17.       | 0.275    | 0,4R14              |
| 20048.514  | 4986.5097  | 32.       | 0.471    |                     |
| 20046.687  | 4986.9640  | 13.       | 0.431    |                     |
| 20040.360  | 4988.5386  | 23.       | 0.431    | 0,4R14              |
| 20039.390  | 4988.7799  | 12.       | 0.314    |                     |
| 20037.659  | 4989.2110  | 13.       | 0.353    |                     |
| 20037.283  | 4989.3046  | 13.       | 0.196    | 2,4P18              |
| 20035.568  | 4989.7317  | 65.       | 0.549    |                     |
| 20034.862  | 4989.9076  | 20.       | 0.313    |                     |
| 20032.651  | 4990.4584  | 12.       | 0.548    | 2,5R7               |
| 20030.883  | 4990.6987  | 16.       | 0.587    |                     |
| 20029.366  | 4991.2767  | 16.       | 0.392    |                     |
| 20028.071  | 4991.5994  | 25.       | 0.509    | 2,5R7               |
| 20023.528  | 4992.7319  | 12.       | 0.313    |                     |
| 20019.910  | 4993.6344  | 30.       | 0.509    |                     |
| 20017.794  | 4994.1621  | 19.       | 0.469    | 0,4P13<br>1,4R17    |
| 20014.951  | 4994.8716  | 34.       | 0.508    |                     |
| 20013.774  | 4995.1652  | 12.       | 0.195    |                     |
| 20013.396  | 4995.2596  | 12.       | 0.274    | 3,4R22              |
| 20012.004  | 4995.6070  | 59.       | 0.625    |                     |
| 20009.729  | 4996.1752  | 12.       | 0.274    |                     |
| 20008.393  | 4996.5088  | 15.       | 0.352    | 3,4R22              |
| 20006.959  | 4996.8668  | 13.       | 0.742    |                     |
| 20002.722  | 4997.9254  | 44.       | 0.781    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 20011.239  | 4994.2235  | 12.       | 0.505    | 2,5P6               |
| 19998.317  | 4999.0262  | 12.       | 0.312    |                     |
| 19995.436  | 4999.7240  | 14.       | 0.390    |                     |
| 19993.690  | 5000.1831  | 12.       | 0.429    |                     |
| 19992.021  | 5000.5856  | 26.       | 0.468    |                     |
| 19989.454  | 5001.2427  | 14.       | 0.390    |                     |
| 19987.595  | 5001.6329  | 17.       | 0.390    |                     |
| 19986.930  | 5001.8618  | 38.       | 0.429    |                     |
| 19986.049  | 5002.0948  | 12.       | 0.429    |                     |
| 19981.526  | 5003.2270  | 27.       | 0.429    | 2,5R8               |
| 19980.913  | 5003.3805  | 18.       | 0.351    |                     |
| 19979.425  | 5003.7523  | 17.       | 0.306    |                     |
| 19974.815  | 5004.9080  | 14.       | 0.389    |                     |
| 19972.934  | 5005.3795  | 15.       | 0.350    |                     |
| 19972.443  | 5005.5026  | 13.       | 0.350    |                     |
| 19971.602  | 5005.7133  | 25.       | 0.389    | 1,4P16              |
| 19970.042  | 5006.1043  | 36.       | 0.311    |                     |
| 19969.511  | 5006.2375  | 49.       | 0.428    |                     |
| 19968.561  | 5006.4755  | 13.       | 0.389    |                     |
| 19967.757  | 5006.6771  | 19.       | 0.428    |                     |
| 19966.595  | 5006.9685  | 12.       | 0.272    |                     |
| 19965.350  | 5007.2808  | 12.       | 0.506    |                     |
| 19962.524  | 5007.9896  | 14.       | 0.505    |                     |
| 19959.821  | 5008.6677  | 18.       | 0.933    |                     |
| 19956.922  | 5009.3955  | 17.       | 0.894    | 2,4R20              |
| 19953.294  | 5010.3063  | 22.       | 0.466    |                     |
| 19951.897  | 5010.6572  | 43.       | 0.777    |                     |
| 19949.855  | 5011.1699  | 36.       | 0.582    | 3,4P21              |
| 19947.358  | 5011.7972  | 12.       | 0.621    |                     |
| 19946.412  | 5012.0350  | 15.       | 0.560    |                     |
| 19944.841  | 5012.4297  | 12.       | 0.233    | 2,5P7               |
| 19944.360  | 5012.5535  | 12.       | 0.194    |                     |
| 19942.434  | 5013.0196  | 26.       | 0.560    |                     |
| 19941.335  | 5013.3110  | 17.       | 0.343    |                     |
| 19940.539  | 5013.5113  | 14.       | 0.504    |                     |
| 19934.524  | 5015.0241  | 49.       | 1.008    |                     |
| 19928.722  | 5016.4840  | 18.       | 0.542    |                     |
| 19926.749  | 5016.9808  | 13.       | 0.232    |                     |
| 19926.341  | 5017.0835  | 14.       | 0.194    |                     |
| 19925.809  | 5017.2174  | 18.       | 0.426    |                     |
| 19924.353  | 5017.5840  | 13.       | 0.310    |                     |
| 19923.896  | 5017.6991  | 12.       | 0.232    |                     |
| 19922.393  | 5018.0776  | 21.       | 0.387    | 2,5R9               |
| 19917.383  | 5019.3399  | 13.       | 0.310    |                     |
| 19916.746  | 5019.5006  | 13.       | 0.387    |                     |
| 19912.641  | 5020.5352  | 12.       | 0.155    |                     |
| 19912.033  | 5020.6885  | 17.       | 0.619    |                     |
| 19910.128  | 5021.1690  | 13.       | 0.309    |                     |
| 19909.645  | 5021.2909  | 12.       | 0.271    | 0,4P14              |
| 19907.672  | 5021.7884  | 18.       | 0.425    |                     |
| 19905.929  | 5022.2281  | 16.       | 0.303    |                     |
| 19900.595  | 5023.5742  | 13.       | 0.309    | 2,4P19              |
| 19898.259  | 5024.1640  | 19.       | 0.425    |                     |
| 19897.009  | 5024.4797  | 44.       | 0.541    |                     |
| 19895.114  | 5024.9583  | 16.       | 0.386    |                     |
| 19892.063  | 5025.7290  | 12.       | 0.733    |                     |
| 19890.642  | 5026.0880  | 14.       | 0.463    |                     |
| 19887.299  | 5026.9329  | 25.       | 0.463    | 1,4R18              |
| 19886.518  | 5027.1305  | 14.       | 0.386    |                     |
| 19884.673  | 5027.5967  | 25.       | 0.386    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 19828.403  | 5041.8645  | 14.       | 0.153    |                     |
| 19827.245  | 5041.9811  | 15.       | 0.307    |                     |
| 19827.360  | 5042.1297  | 14.       | 0.422    |                     |
| 19826.690  | 5042.3001  | 13.       | 0.345    |                     |
| 19825.839  | 5042.5039  | 13.       | 0.192    |                     |
| 19825.332  | 5042.6455  | 13.       | 0.153    |                     |
| 19824.654  | 5042.8180  | 15.       | 0.153    |                     |
| 19824.162  | 5042.9433  | 29.       | 0.345    |                     |
| 19823.564  | 5043.0953  | 53.       | 0.345    | 1,5R4               |
| 19822.804  | 5043.2886  | 29.       | 0.460    |                     |
| 19822.068  | 5043.4760  | 13.       | 0.263    |                     |
| 19821.369  | 5043.6537  | 13.       | 0.460    |                     |
| 19820.414  | 5043.8967  | 14.       | 0.460    |                     |
| 19819.581  | 5044.1087  | 13.       | 0.345    |                     |
| 19819.134  | 5044.2225  | 13.       | 0.191    |                     |
| 19818.758  | 5044.3183  | 13.       | 0.230    |                     |
| 19818.052  | 5044.4979  | 12.       | 0.727    |                     |
| 19817.233  | 5044.7065  | 13.       | 0.536    |                     |
| 19816.295  | 5044.9452  | 14.       | 0.421    | 2,5P9               |
| 19815.547  | 5045.1357  | 12.       | 0.383    |                     |
| 19814.969  | 5045.2827  | 13.       | 0.383    |                     |
| 19814.516  | 5045.3983  | 12.       | 0.230    |                     |
| 19814.044  | 5045.5183  | 12.       | 0.191    |                     |
| 19813.689  | 5045.6089  | 12.       | 0.191    |                     |
| 19813.326  | 5045.7012  | 12.       | 0.191    |                     |
| 19807.435  | 5047.2019  | 32.       | 0.497    | 2,4R21              |
| 19806.730  | 5047.3817  | 16.       | 0.229    |                     |
| 19806.243  | 5047.5058  | 17.       | 0.382    | 1,5P3               |
| 19805.324  | 5047.7400  | 13.       | 0.583    |                     |
| 19802.590  | 5048.4367  | 13.       | 0.382    |                     |
| 19801.265  | 5048.7491  | 12.       | 0.191    |                     |
| 19801.000  | 5048.8421  | 13.       | 0.229    |                     |
| 19800.138  | 5049.0519  | 13.       | 0.420    |                     |
| 19799.022  | 5049.3465  | 18.       | 0.459    |                     |
| 19797.293  | 5049.7875  | 14.       | 0.611    |                     |
| 19794.823  | 5050.4177  | 41.       | 0.587    | 1,5R5, 3,4P22       |
| 19793.374  | 5050.7874  | 15.       | 0.382    |                     |
| 19790.112  | 5051.6199  | 17.       | 0.496    | 0,4P15              |
| 19787.761  | 5052.2201  | 19.       | 0.382    | 2,5R11              |
| 19787.077  | 5052.3948  | 19.       | 0.382    |                     |
| 19785.068  | 5052.9079  | 12.       | 0.153    |                     |
| 19784.780  | 5052.9814  | 13.       | 0.191    |                     |
| 19784.327  | 5053.0971  | 14.       | 0.343    |                     |
| 19777.805  | 5054.7633  | 12.       | 0.305    |                     |
| 19776.646  | 5055.2596  | 13.       | 0.539    |                     |
| 19772.691  | 5056.0708  | 18.       | 0.419    | 1,5P4               |
| 19771.828  | 5056.2915  | 13.       | 0.572    |                     |
| 19770.845  | 5056.5429  | 15.       | 0.343    |                     |
| 19769.772  | 5056.8174  | 12.       | 0.586    |                     |
| 19769.121  | 5056.9839  | 12.       | 0.229    |                     |
| 19768.032  | 5057.2624  | 13.       | 0.305    |                     |
| 19767.185  | 5057.4792  | 12.       | 0.609    |                     |
| 19762.478  | 5058.6838  | 13.       | 0.305    |                     |
| 19761.066  | 5059.0401  | 12.       | 1.028    |                     |
| 19758.218  | 5059.7745  | 25.       | 0.457    | 1,5R6               |
| 19752.734  | 5061.1791  | 22.       | 0.266    | 1,4R19              |
| 19752.172  | 5061.3232  | 32.       | 0.380    | 2,4P20              |
| 19750.712  | 5061.6974  | 12.       | 0.646    |                     |
| 19744.337  | 5063.3188  | 12.       | 0.570    |                     |
| 19742.794  | 5063.7274  | 15.       | 0.190    |                     |

# ASSIGNMENT

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 19824.137  | 5027.7324  | 17.       | 0.303    | 2,5P8               |
| 19823.397  | 5027.8688  | 13.       | 0.231    |                     |
| 19822.134  | 5028.2329  | 17.       | 0.386    |                     |
| 19820.559  | 5028.6373  | 13.       | 0.231    |                     |
| 19875.825  | 5029.8198  | 14.       | 0.501    | 1,5R1               |
| 19873.893  | 5030.3239  | 22.       | 0.616    |                     |
| 19873.318  | 5030.4695  | 14.       | 0.154    |                     |
| 19871.916  | 5030.8245  | 12.       | 0.578    |                     |
| 19871.030  | 5031.0487  | 13.       | 0.424    |                     |
| 19869.887  | 5031.3382  | 16.       | 0.347    |                     |
| 19866.810  | 5032.1173  | 13.       | 0.269    |                     |
| 19866.047  | 5032.3106  | 12.       | 0.577    |                     |
| 19865.494  | 5032.4507  | 12.       | 0.154    |                     |
| 19864.773  | 5032.6335  | 12.       | 0.423    |                     |
| 19863.950  | 5032.8419  | 14.       | 0.462    | 1,5R2               |
| 19863.151  | 5033.0444  | 12.       | 0.192    |                     |
| 19862.311  | 5033.2571  | 13.       | 0.192    |                     |
| 19861.636  | 5033.4282  | 18.       | 0.423    |                     |
| 19860.556  | 5033.7020  | 13.       | 0.731    | 2,5R10<br>3,4R23    |
| 19859.652  | 5033.9312  | 14.       | 0.462    |                     |
| 19858.526  | 5034.2165  | 19.       | 0.385    |                     |
| 19857.407  | 5034.5003  | 38.       | 0.500    |                     |
| 19856.418  | 5034.7511  | 19.       | 0.461    | 1,5P1               |
| 19855.676  | 5034.9391  | 13.       | 0.231    |                     |
| 19854.905  | 5035.1346  | 13.       | 0.345    |                     |
| 19854.506  | 5035.2358  | 13.       | 0.154    |                     |
| 19854.035  | 5035.3554  | 16.       | 0.307    |                     |
| 19852.798  | 5035.6691  | 26.       | 0.500    |                     |
| 19851.130  | 5035.9921  | 21.       | 0.384    |                     |
| 19850.239  | 5036.3183  | 13.       | 0.231    |                     |
| 19849.718  | 5036.4505  | 13.       | 0.346    | 1,5R3               |
| 19849.165  | 5036.5907  | 15.       | 0.230    |                     |
| 19848.841  | 5036.6729  | 15.       | 0.192    |                     |
| 19848.396  | 5036.7858  | 15.       | 0.461    |                     |
| 19847.895  | 5036.9131  | 13.       | 0.154    |                     |
| 19847.550  | 5037.0005  | 13.       | 0.154    |                     |
| 19846.409  | 5037.2903  | 25.       | 0.384    |                     |
| 19845.506  | 5037.5193  | 14.       | 0.384    |                     |
| 19844.955  | 5037.6592  | 16.       | 0.230    | 1,4P17              |
| 19844.408  | 5037.7981  | 24.       | 0.307    |                     |
| 19843.020  | 5038.1506  | 23.       | 0.346    |                     |
| 19841.871  | 5038.4422  | 148.      | 0.653    |                     |
| 19840.485  | 5038.7943  | 14.       | 0.192    | 1,5P2               |
| 19839.786  | 5038.9717  | 14.       | 0.806    |                     |
| 19839.007  | 5039.1695  | 13.       | 0.230    |                     |
| 19838.534  | 5039.2772  | 14.       | 0.230    |                     |
| 19838.241  | 5039.3643  | 14.       | 0.153    |                     |
| 19837.820  | 5039.4713  | 14.       | 0.230    |                     |
| 19837.205  | 5039.6275  | 17.       | 0.537    |                     |
| 19836.509  | 5039.8041  | 18.       | 0.460    |                     |
| 19835.467  | 5040.0690  | 14.       | 0.806    |                     |
| 19834.781  | 5040.2433  | 13.       | 0.192    |                     |
| 19834.347  | 5040.3537  | 13.       | 0.192    | 1,5P2               |
| 19833.607  | 5040.5417  | 17.       | 0.384    |                     |
| 19832.932  | 5040.7132  | 17.       | 0.307    |                     |
| 19832.263  | 5040.8831  | 15.       | 0.230    |                     |
| 19831.652  | 5041.0386  | 15.       | 0.230    |                     |
| 19830.576  | 5041.3121  | 96.       | 0.613    |                     |
| 19829.436  | 5041.6019  | 15.       | 0.460    |                     |
| 19828.863  | 5041.7476  | 15.       | 0.268    |                     |

## ASSIGNMENT

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 19742.258  | 5063.8624  | 20.       | 0.370    | 2,5P10              |
| 19740.844  | 5064.2276  | 14.       | 0.380    |                     |
| 19739.086  | 5064.6788  | 14.       | 0.494    |                     |
| 19735.875  | 5065.5027  | 14.       | 0.418    |                     |
| 19734.290  | 5065.9095  | 13.       | 0.455    |                     |
| 19733.037  | 5066.2313  | 15.       | 0.493    |                     |
| 19732.227  | 5066.4392  | 20.       | 0.417    | 1,5P5               |
| 19730.953  | 5066.7663  | 12.       | 0.303    |                     |
| 19728.280  | 5067.4529  | 17.       | 0.455    |                     |
| 19727.344  | 5067.6934  | 13.       | 0.265    |                     |
| 19726.349  | 5067.9488  | 12.       | 0.152    |                     |
| 19725.771  | 5068.0974  | 14.       | 0.607    |                     |
| 19723.243  | 5068.7471  | 14.       | 0.379    |                     |
| 19722.051  | 5069.0533  | 12.       | 0.303    |                     |
| 19720.698  | 5069.4011  | 12.       | 0.417    |                     |
| 19718.694  | 5069.9163  | 17.       | 0.341    |                     |
| 19717.296  | 5070.2757  | 14.       | 0.417    |                     |
| 19716.864  | 5070.3869  | 13.       | 0.189    |                     |
| 19714.680  | 5070.9486  | 27.       | 0.454    | 1,5R7               |
| 19711.003  | 5071.8945  | 12.       | 0.492    |                     |
| 19710.156  | 5072.1127  | 19.       | 0.379    | 2,5R12              |
| 19709.358  | 5072.3179  | 12.       | 0.227    |                     |
| 19708.575  | 5072.5194  | 13.       | 0.378    |                     |
| 19708.129  | 5072.6343  | 12.       | 0.189    |                     |
| 19707.111  | 5072.8963  | 28.       | 0.492    | 1,4P18              |
| 19699.842  | 5074.7682  | 16.       | 0.416    |                     |
| 19698.673  | 5075.0694  | 13.       | 0.605    |                     |
| 19697.876  | 5075.2747  | 12.       | 0.340    |                     |
| 19696.875  | 5075.5326  | 22.       | 0.454    | 3,4R24              |
| 19694.754  | 5076.0793  | 12.       | 0.453    |                     |
| 19688.652  | 5077.6525  | 12.       | 0.264    |                     |
| 19686.517  | 5078.2030  | 12.       | 0.340    |                     |
| 19684.860  | 5078.6305  | 22.       | 0.452    | 1,5P6               |
| 19683.638  | 5078.9457  | 14.       | 0.491    |                     |
| 19680.664  | 5079.7134  | 12.       | 0.302    |                     |
| 19678.495  | 5080.2734  | 13.       | 0.226    |                     |
| 19677.755  | 5080.4643  | 16.       | 0.679    |                     |
| 19675.314  | 5081.0945  | 12.       | 0.264    |                     |
| 19673.952  | 5081.4463  | 12.       | 0.490    |                     |
| 19673.139  | 5081.6565  | 12.       | 0.226    |                     |
| 19672.174  | 5081.9057  | 14.       | 0.528    |                     |
| 19671.301  | 5082.1311  | 15.       | 0.377    |                     |
| 19670.593  | 5082.3141  | 12.       | 0.302    |                     |
| 19669.050  | 5082.7128  | 12.       | 0.528    |                     |
| 19666.411  | 5083.3948  | 12.       | 0.226    |                     |
| 19665.457  | 5083.6415  | 13.       | 0.339    |                     |
| 19664.017  | 5084.0138  | 26.       | 0.527    | 1,5R8               |
| 19661.529  | 5084.6415  | 14.       | 0.339    | 2,5P11              |
| 19660.719  | 5084.8666  | 14.       | 0.565    |                     |
| 19660.097  | 5085.0273  | 12.       | 0.226    |                     |
| 19659.474  | 5085.1837  | 13.       | 0.264    |                     |
| 19658.589  | 5085.4174  | 16.       | 0.678    |                     |
| 19656.528  | 5085.9509  | 36.       | 0.527    | 2,4R22              |
| 19655.249  | 5086.2818  | 13.       | 0.263    |                     |
| 19654.281  | 5086.5323  | 14.       | 0.452    |                     |
| 19653.395  | 5086.7615  | 12.       | 0.263    |                     |
| 19652.382  | 5087.0237  | 12.       | 0.226    |                     |
| 19651.604  | 5087.2252  | 12.       | 0.263    |                     |
| 19651.184  | 5087.3337  | 12.       | 0.226    |                     |
| 19643.635  | 5089.2889  | 13.       | 0.451    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 19634.384  | 5091.6867  | 22.       | 0.563    | 3,4P23              |
| 19633.122  | 5092.0141  | 15.       | 0.483    |                     |
| 19631.308  | 5092.4847  | 13.       | 0.225    |                     |
| 19630.611  | 5092.6656  | 22.       | 0.413    | 1,5P7               |
| 19629.369  | 5092.9878  | 12.       | 0.263    |                     |
| 19627.060  | 5093.3870  | 12.       | 0.263    |                     |
| 19625.762  | 5093.9237  | 21.       | 0.563    | 2,5R13              |
| 19622.790  | 5094.6954  | 12.       | 0.337    |                     |
| 19620.755  | 5095.2236  | 16.       | 0.450    |                     |
| 19616.029  | 5096.4512  | 13.       | 0.412    | 1,4R20              |
| 19611.286  | 5097.6839  | 17.       | 0.337    |                     |
| 19609.465  | 5098.1573  | 12.       | 0.225    |                     |
| 19607.726  | 5098.6094  | 12.       | 0.786    | 1,5R9               |
| 19606.251  | 5098.9931  | 26.       | 0.449    |                     |
| 19602.196  | 5100.0479  | 12.       | 0.337    |                     |
| 19601.227  | 5100.3000  | 25.       | 0.449    | 2,4P21              |
| 19597.437  | 5101.2863  | 13.       | 0.449    |                     |
| 19596.325  | 5101.5758  | 12.       | 0.449    |                     |
| 19589.922  | 5103.2432  | 15.       | 0.598    | 0,5R1               |
| 19589.154  | 5103.4432  | 13.       | 0.187    |                     |
| 19588.748  | 5103.5490  | 13.       | 0.224    |                     |
| 19585.893  | 5104.2931  | 14.       | 0.374    | 0,5R2               |
| 19582.824  | 5105.0929  | 12.       | 0.411    |                     |
| 19581.848  | 5105.3475  | 17.       | 0.336    |                     |
| 19581.216  | 5105.5121  | 18.       | 0.336    | 0,5R2               |
| 19580.251  | 5105.7638  | 13.       | 0.261    |                     |
| 19579.078  | 5106.0697  | 15.       | 0.373    |                     |
| 19577.741  | 5106.4186  | 14.       | 0.299    | 2,5P12              |
| 19576.744  | 5106.6786  | 12.       | 0.261    |                     |
| 19576.398  | 5106.7688  | 12.       | 0.187    |                     |
| 19574.491  | 5107.2662  | 14.       | 0.373    | 0,5P1               |
| 19571.605  | 5108.0195  | 12.       | 0.224    |                     |
| 19569.659  | 5108.5535  | 19.       | 0.447    |                     |
| 19565.889  | 5109.5116  | 19.       | 0.410    | 1,4P19              |
| 19564.648  | 5109.8357  | 14.       | 0.373    |                     |
| 19563.283  | 5110.1925  | 13.       | 0.224    |                     |
| 19562.397  | 5110.4239  | 16.       | 0.335    | 0,5P2               |
| 19553.063  | 5112.8634  | 14.       | 0.372    |                     |
| 19552.093  | 5113.1171  | 15.       | 0.409    |                     |
| 19551.555  | 5113.2579  | 13.       | 0.298    | 0,5R4               |
| 19549.842  | 5113.7059  | 12.       | 0.484    |                     |
| 19544.149  | 5115.1954  | 12.       | 0.706    |                     |
| 19543.423  | 5115.3853  | 12.       | 0.372    | 1,5R10              |
| 19541.794  | 5115.8119  | 16.       | 0.186    |                     |
| 19541.239  | 5115.9310  | 25.       | 0.446    |                     |
| 19539.514  | 5116.4089  | 14.       | 0.260    | 2,5R14              |
| 19539.094  | 5116.5186  | 15.       | 0.260    |                     |
| 19537.696  | 5116.8842  | 12.       | 0.557    |                     |
| 19534.420  | 5117.7429  | 18.       | 0.409    | 3,4R25              |
| 19533.715  | 5117.9277  | 13.       | 0.371    |                     |
| 19532.261  | 5118.3088  | 14.       | 0.334    |                     |
| 19530.647  | 5118.7316  | 17.       | 0.371    | 0,5P3               |
| 19525.180  | 5120.1649  | 13.       | 0.334    |                     |
| 19524.251  | 5120.4066  | 13.       | 0.334    |                     |
| 19521.112  | 5121.2321  | 12.       | 0.631    | 0,5R5               |
| 19517.113  | 5122.2812  | 12.       | 0.334    |                     |
| 19514.801  | 5122.8881  | 12.       | 0.592    |                     |
| 19513.706  | 5123.1756  | 13.       | 0.445    | 0,5R5               |
| 19511.609  | 5123.7261  | 17.       | 0.519    |                     |
| 19506.519  | 5125.0632  | 12.       | 0.370    |                     |

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| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 15511.652  | 5126.3423  | 25.       | 0.444    | 1,5P9               |
| 15500.448  | 5126.6589  | 12.       | 0.407    |                     |
| 15499.341  | 5126.9499  | 19.       | 0.444    | 2,4R23              |
| 15492.073  | 5128.8616  | 13.       | 0.370    |                     |
| 15491.252  | 5129.0777  | 14.       | 0.333    | 0,5P4               |
| 15487.091  | 5130.1729  | 13.       | 0.296    |                     |
| 15486.496  | 5130.3294  | 15.       | 0.406    |                     |
| 15485.293  | 5130.6462  | 13.       | 0.259    |                     |
| 15480.732  | 5131.8475  | 14.       | 0.406    | 2,5P13              |
| 15473.975  | 5133.6282  | 16.       | 0.554    | 0,5R6               |
| 15472.323  | 5134.0637  | 12.       | 0.406    |                     |
| 15469.329  | 5134.8531  | 22.       | 0.406    | 1,5R11              |
| 15468.038  | 5135.1938  | 16.       | 0.406    | 3,4P24              |
| 15464.543  | 5136.1158  | 12.       | 0.184    |                     |
| 15463.949  | 5136.2724  | 12.       | 0.221    |                     |
| 15463.133  | 5136.4878  | 13.       | 0.295    | 1,4R21              |
| 15456.509  | 5138.2366  | 13.       | 0.553    |                     |
| 15452.824  | 5139.2099  | 13.       | 0.295    |                     |
| 15451.988  | 5139.4309  | 18.       | 0.331    |                     |
| 15450.389  | 5139.8533  | 14.       | 0.405    | 0,5P5               |
| 15444.164  | 5141.4989  | 18.       | 0.331    | 2,4P22              |
| 15443.117  | 5141.7756  | 13.       | 0.294    |                     |
| 15437.111  | 5143.3646  | 14.       | 0.441    |                     |
| 15436.416  | 5143.5486  | 16.       | 0.441    | 2,5R15              |
| 15434.050  | 5144.1746  | 13.       | 0.257    |                     |
| 15431.116  | 5144.9516  | 12.       | 0.220    |                     |
| 15429.277  | 5145.4383  | 15.       | 0.441    | 0,5R7               |
| 15426.999  | 5146.0418  | 24.       | 0.477    | 1,5P10              |
| 15422.807  | 5147.1526  | 12.       | 0.294    |                     |
| 15421.092  | 5147.6071  | 13.       | 0.220    |                     |
| 15419.097  | 5148.1358  | 13.       | 0.183    |                     |
| 15418.748  | 5148.2282  | 14.       | 0.220    |                     |
| 15418.076  | 5148.4065  | 16.       | 0.367    | 1,4P20              |
| 15416.575  | 5148.8045  | 13.       | 0.330    |                     |
| 15413.835  | 5149.5313  | 13.       | 0.367    |                     |
| 15410.035  | 5150.5392  | 17.       | 0.183    |                     |
| 15405.065  | 5151.8586  | 13.       | 0.256    |                     |
| 15402.519  | 5152.5346  | 14.       | 0.586    | 0,5P6               |
| 15400.012  | 5153.2003  | 18.       | 0.293    |                     |
| 15399.364  | 5153.3727  | 17.       | 0.256    |                     |
| 15390.216  | 5155.8040  | 20.       | 0.366    | 1,5R12              |
| 15380.547  | 5158.3761  | 14.       | 0.438    | 2,5P14              |
| 15379.456  | 5158.6665  | 14.       | 0.402    |                     |
| 15376.989  | 5159.3233  | 15.       | 0.256    | 0,5R8               |
| 15372.628  | 5160.4847  | 13.       | 0.329    |                     |
| 15371.142  | 5160.8807  | 12.       | 0.292    |                     |
| 15369.531  | 5161.3099  | 12.       | 0.365    |                     |
| 15368.343  | 5161.6266  | 12.       | 0.212    |                     |
| 15367.938  | 5161.7344  | 12.       | 0.255    |                     |
| 15367.301  | 5161.9042  | 12.       | 0.182    |                     |
| 15366.020  | 5162.2456  | 14.       | 0.328    |                     |
| 15364.045  | 5162.7721  | 13.       | 0.511    |                     |
| 15362.569  | 5163.1657  | 12.       | 0.219    |                     |
| 15361.870  | 5163.3521  | 12.       | 0.146    |                     |
| 15361.446  | 5163.4651  | 14.       | 0.365    |                     |
| 15360.821  | 5163.6318  | 13.       | 0.401    |                     |
| 15360.096  | 5163.8253  | 12.       | 0.474    |                     |
| 15359.520  | 5163.9789  | 12.       | 0.292    |                     |
| 15358.786  | 5164.1747  | 16.       | 0.364    | 3,4R26              |
| 15358.189  | 5164.3341  | 12.       | 0.182    |                     |

| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 19357.667  | 5164.4733  | 12.       | 0.182    |                     |
| 19356.904  | 5164.6769  | 12.       | 0.364    |                     |
| 19356.467  | 5164.7935  | 12.       | 0.146    |                     |
| 19355.597  | 5165.0256  | 12.       | 0.182    |                     |
| 19355.234  | 5165.1090  | 12.       | 0.182    |                     |
| 19354.839  | 5165.2279  | 13.       | 0.219    |                     |
| 19354.332  | 5165.3631  | 14.       | 0.364    |                     |
| 19353.878  | 5165.4843  | 13.       | 0.146    |                     |
| 19352.995  | 5165.7201  | 29.       | 0.765    |                     |
| 19352.046  | 5165.9733  | 14.       | 0.401    |                     |
| 19351.377  | 5166.1520  | 12.       | 0.437    |                     |
| 19350.858  | 5166.2905  | 12.       | 0.255    |                     |
| 19350.297  | 5166.4402  | 12.       | 0.328    |                     |
| 19349.030  | 5166.7786  | 12.       | 0.255    |                     |
| 19347.477  | 5167.1933  | 15.       | 0.473    | 0,5P7               |
| 19346.395  | 5167.4824  | 32.       | 0.510    |                     |
| 19345.436  | 5167.7384  | 19.       | 0.328    | 1,5P11              |
| 19343.772  | 5168.1830  | 12.       | 0.473    |                     |
| 19342.688  | 5168.4726  | 12.       | 0.400    |                     |
| 19341.656  | 5168.7485  | 13.       | 0.291    |                     |
| 19340.814  | 5168.9734  | 12.       | 0.546    |                     |
| 19339.439  | 5169.3409  | 12.       | 0.473    |                     |
| 19338.916  | 5169.4807  | 12.       | 0.182    |                     |
| 19338.573  | 5169.5725  | 13.       | 0.218    |                     |
| 19336.190  | 5170.2094  | 15.       | 0.364    | 2,4R24              |
| 19333.781  | 5170.8538  | 14.       | 0.435    |                     |
| 19331.772  | 5171.3911  | 14.       | 0.327    | 2,5R16              |
| 19330.991  | 5171.6001  | 14.       | 0.254    |                     |
| 19327.069  | 5172.6495  | 12.       | 0.400    |                     |
| 19319.572  | 5174.6569  | 12.       | 0.218    |                     |
| 19317.272  | 5175.2731  | 13.       | 0.508    | 0,5R9               |
| 19309.548  | 5177.3432  | 13.       | 0.435    |                     |
| 19308.406  | 5177.6423  | 13.       | 0.254    | 1,4R22              |
| 19306.629  | 5178.1259  | 12.       | 0.399    |                     |
| 19305.402  | 5178.4549  | 12.       | 0.254    |                     |
| 19303.983  | 5178.8356  | 18.       | 0.435    | 1,5R13              |
| 19297.573  | 5180.5561  | 13.       | 0.326    |                     |
| 19296.284  | 5180.9020  | 13.       | 0.471    | 3,4P25              |
| 19289.415  | 5182.7470  | 13.       | 0.470    |                     |
| 19285.290  | 5183.8555  | 13.       | 0.289    | 0,5P8               |
| 19282.795  | 5184.5263  | 13.       | 0.325    |                     |
| 19281.110  | 5184.9793  | 16.       | 0.434    | 2,4P23              |
| 19273.886  | 5186.9228  | 13.       | 0.289    | 2,5P15              |
| 19263.748  | 5189.6525  | 13.       | 0.397    | 1,4P21              |
| 19262.842  | 5189.8966  | 27.       | 0.180    |                     |
| 19257.122  | 5191.4331  | 19.       | 0.361    | 1,5P12              |
| 19253.804  | 5192.3329  | 15.       | 0.288    |                     |
| 19249.965  | 5193.3683  | 13.       | 0.216    | 0,5R10              |
| 19241.886  | 5195.5488  | 48.       | 0.180    |                     |
| 19233.718  | 5197.7552  | 12.       | 0.216    |                     |
| 19233.120  | 5197.9168  | 12.       | 0.216    |                     |
| 19220.388  | 5201.3603  | 14.       | 0.323    | 2,5R17              |
| 19216.039  | 5202.5373  | 13.       | 0.215    | 0,5P9               |
| 19211.147  | 5203.8621  | 13.       | 0.179    |                     |
| 19210.583  | 5204.0150  | 14.       | 0.251    | 1,5R14              |
| 19208.795  | 5204.4994  | 263.      | 0.753    |                     |
| 19203.160  | 5206.0266  | 370.      | 0.860    |                     |
| 19202.128  | 5206.3065  | 12.       | 0.215    |                     |
| 19198.705  | 5207.2346  | 13.       | 0.358    |                     |
| 19194.360  | 5208.4135  | 417.      | 0.967    |                     |

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| WAVENUMBER | WAVELENGTH | INTENSITY | WIDTH(K) | (v', v'', Branch J) |
|------------|------------|-----------|----------|---------------------|
| 19181.509  | 5211.9031  | 13.       | 0.535    |                     |
| 19179.391  | 5212.4785  | 47.       | 0.179    |                     |
| 19166.975  | 5215.8551  | 13.       | 0.464    |                     |
| 19162.048  | 5217.1952  | 14.       | 0.393    | 1,5P13              |
| 19161.131  | 5217.4458  | 13.       | 0.749    | 2,5P16              |
| 19158.251  | 5218.2302  | 15.       | 0.321    |                     |
| 19133.632  | 5224.9445  | 13.       | 0.249    |                     |
| 19133.134  | 5225.0806  | 13.       | 0.391    |                     |
| 19126.549  | 5226.8796  | 13.       | 0.391    |                     |
| 19125.193  | 5227.2502  | 14.       | 0.391    |                     |
| 19124.639  | 5227.4015  | 17.       | 0.178    |                     |
| 19112.238  | 5230.7934  | 13.       | 0.390    | 2,4R24              |
| 19110.167  | 5231.3602  | 14.       | 0.355    | 1,5R15              |
| 19104.259  | 5232.9781  | 19.       | 0.319    |                     |
| 19102.348  | 5233.5015  | 13.       | 0.319    | 2,5R18              |
| 19095.052  | 5235.5012  | 13.       | 0.213    |                     |
| 19092.923  | 5236.0850  | 13.       | 0.213    | 0,5R12              |
| 19085.593  | 5238.0960  | 27.       | 0.177    |                     |
| 19078.171  | 5240.1339  | 17.       | 0.177    |                     |
| 19074.574  | 5241.1220  | 47.       | 0.177    |                     |
| 19067.230  | 5243.1408  | 27.       | 0.177    |                     |
| 19060.139  | 5245.0915  | 13.       | 0.388    | 1,5P14              |
| 19050.842  | 5247.6511  | 15.       | 0.317    |                     |
| 19047.760  | 5248.5001  | 17.       | 0.176    |                     |
| 19042.878  | 5249.8458  | 17.       | 0.176    |                     |
| 19039.261  | 5250.8432  | 17.       | 0.176    |                     |
| 19034.276  | 5252.2183  | 17.       | 0.176    |                     |
| 19017.856  | 5256.7532  | 13.       | 0.246    |                     |
| 19016.919  | 5257.0122  | 17.       | 0.176    |                     |
| 19014.243  | 5257.7519  | 28.       | 0.176    |                     |
| 19002.838  | 5260.9077  | 13.       | 0.526    | 1,5R16              |
| 18990.651  | 5264.2837  | 15.       | 0.315    |                     |
| 18978.991  | 5267.5181  | 17.       | 0.175    |                     |
| 18978.462  | 5267.6647  | 47.       | 0.175    |                     |
| 18976.893  | 5268.1005  | 47.       | 0.175    |                     |
| 18975.534  | 5268.4777  | 17.       | 0.175    |                     |
| 18974.349  | 5268.8067  | 17.       | 0.175    |                     |
| 18973.029  | 5269.1733  | 48.       | 0.140    |                     |
| 18972.758  | 5269.2486  | 17.       | 0.140    |                     |
| 18971.139  | 5269.6983  | 18.       | 0.385    |                     |
| 18968.013  | 5270.5665  | 13.       | 0.210    |                     |
| 18948.763  | 5275.9210  | 13.       | 0.488    |                     |
| 18947.561  | 5276.2558  | 13.       | 0.314    |                     |
| 18940.766  | 5278.1486  | 119.      | 0.174    |                     |
| 18894.149  | 5291.1715  | 17.       | 0.173    |                     |
| 18880.618  | 5294.9634  | 27.       | 0.173    |                     |
| 18880.343  | 5295.0407  | 17.       | 0.173    |                     |
| 18874.099  | 5296.7924  | 17.       | 0.173    |                     |
| 18870.983  | 5297.6670  | 15.       | 0.311    |                     |
| 18868.687  | 5298.3117  | 13.       | 0.346    |                     |
| 18867.853  | 5298.5458  | 14.       | 0.380    |                     |