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## ABSTRACT

Optical emission spectra from high-purity Np-237 were generated with a glovebox-enclosed inductively coupled plasma (ICP) source. Spectra covering the 230 - 700 nm wavelength range are presented along with general commentary on the methodology used in collecting the data.

## INTRODUCTION

The Ames Laboratory Nuclear Safeguards and Security Program has been charged with the task of developing optical spectroscopic methods to analyze the composition of spent nuclear fuels. Such materials are highly radioactive even after prolonged "cooling" and are chemically complex. Neptunium (Np) is a highly toxic by-product of nuclear power generation and is found, in low abundance, in spent nuclear fuels. This atlas of the optical emission spectrum of Np, as produced by an inductively coupled plasma (ICP) spectroscopic source, is part of a general survey of the ICP emission spectra of the actinide elements.

The ICP emission spectrum of the actinides originates almost exclusively from the electronic relaxation of excited, singly ionized species. Spectral data on the Np ion emission spectrum (i.e., the Np II spectrum) have been reported by Tomkins and Fred [1] and Haaland [2]. Tomkins and Fred excited the Np II spectrum with a Cu spark discharge and identified 114 Np lines in the 265.5 - 436.3 nm spectral range. Haaland, who corrected some spectral line misidentifications in the work of Tomkins and Fred, utilized an enclosed Au spark discharge to excite the Np II spectrum and reported 203 Np lines within the 265.4 - 461.0 nm wavelength range.

Fred, Tomkins, Blaise, Camus, and Verges [3] published a comprehensive listing of the atomic spectrum of Np (i.e., the Np I spectrum) in the 257.5 - 2630 nm wavelength range excited by an electrodeless discharge, and Bovey and Steers [4], who also used an electrodeless discharge tube to excite the Np I spectrum, recorded the Np spectrum over the 890 - 2240 nm range.

To our knowledge, a comprehensive listing of the Np spectral emission lines produced by an ICP excitation source has not been reported in the literature. Work has been done at various laboratories to determine the most sensitive Np emission lines from an ICP source. During an early stage of this work, one of the authors obtained information [5] about the detection limits of several intense Np lines emitted by an ICP source operated at Rockwell Hanford Operations, Richland, WA.

## APPARATUS and PROCEDURES

Apparatus: The data presented herein were collected with an ICP apparatus specially adapted for glovebox operation [6,7]. The ICP operating conditions are listed in Table 1.

TABLE 1. ICP OPERATING CONDITIONS

| | |
|---|---|
| Forward R.F. Power | 900W |
| Reflected Power | <5W |
| Argon Flow Rates | |
| Outer Gas | 17 l/min |
| Intermediate Gas | For ignition only |
| Nebulizer Gas | 0.95 l/min |
| Sample Uptake Rate | 0.25 ml/min |
| Observation Height | 15 mm above load coil |
| Integration Time | see text below |

Some of the operating conditions were dictated by the limitations of glovebox operation rather than by spectroscopic considerations. For example, the power applied at the ICP torch was restricted to 900W forward power to minimize the heat input to a nearby air filtration device, and the torch-to-slit distance was set at ~1.7 m to permit the further isolation of the enclosed ICP in a separately ventilated room. A concentric nebulizer with a nominal solution uptake rate of ~0.3 to 0.5 ml/minute was chosen for this work. A peristaltic pump was used to further limit the solution uptake rate to 0.25 ml/min and thereby to reduce the amount of liquid waste generated during ICP operation.

The instrumentation used is described in Table 2. A schematic diagram of the experimental lay-out is included here as Fig. 1. The imaging optics resulted in an image demagnification at the entrance slit of ~3X.

TABLE 2. INSTRUMENTATION

| | | |
|---|---|---|
| A. POWER and NEBULIZER SYSTEM | | |
| Generator | Type HFS 3000D | (Plasma-Therm) |
| Nebulizer | TR-50-CO.5 | (Meinhard) |
| Torch | T 1.5 | (Plasma-Therm) |
| Spray Chamber | – | (Plasma-Therm) |
| Peristaltic Pump | Minipuls 2 | (Gilson Med. Elec) |
| Mass Flow Controllers | (3-channel) | (MKS) |
| B. SPECTROMETER | 1.50 m, f/14 THR1500 | (Jobin-Yvon) |
| Grating | 2400 groove/mm | (Jobin-Yvon) |
| | (Master holographic grating) | |
| Entrance Slit | 0.015 mm | |
| Filter | Schott #GG 400 for 500-700nm | |
| C. SIGNAL DETECTION ELECTRONICS | | |
| OMA | Model 1450 | (EG&G/PAR) |
| PDA Detector | Model 1453 | (EG&G/PAR) |
| D. COMPUTER SYSTEM | | |
| CPU | 11/73 | (Digital Equipment) |
| Graphics Terminal | Model 550 | (Visual Technology) |
| Operating System | RT-11 V.5.2 | (Digital Equipment) |
| Software | Ames Laboratory | |
| Plotter | Model 9872S | (Hewlett Packard) |

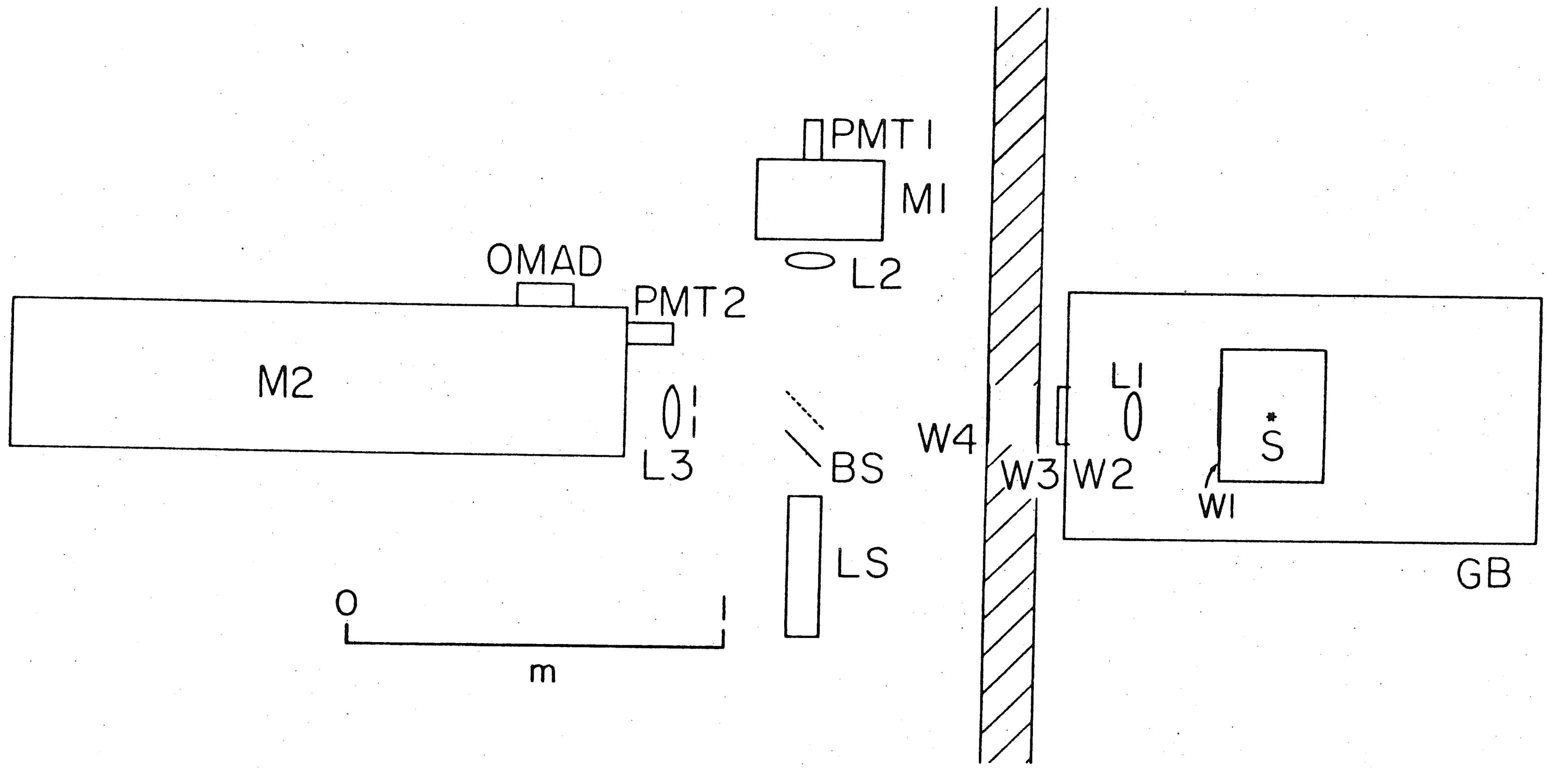


Fig. 1. Experimental lay-out. GB = stainless steel glovebox, S = ICP source, W1-W4 = fused silica windows, L1-L3 = 25 mm diameter fused silica lenses, LS = He-Ne alignment laser, M1-M2 = monochromators, BS = fused silica beamsplitter (R = ~8%), PMT1-2 = photomultipliers, OMAD = optical multichannel analyzer detector. A more complete equipment specification is provided in Table 2.

Reagents: High purity $^{237}NpO_2$, obtained from Oak Ridge National Laboratory, was dissolved in $HNO_3$ to prepare a 0.4 mg/ml $^{237}Np$ solution. This solution was introduced into the ICP torch to generate the emission spectra contained in this report.

Analysis of the starting material by spark source mass spectroscopy at Oak Ridge National Laboratory indicated that the Np sample contained less than 65 ppm total impurities (see Table 3).

TABLE 3. Np-237 IMPURITY ANALYSIS

| | |
|---|---|
| Boron | 0.1 ppm |
| Calcium | 2 ppm |
| Chlorine | 10 ppm |
| Chromium | 0.3 ppm |
| Iron | 3 ppm |
| Potassium | 0.3 ppm |
| Sodium | 2 ppm |
| Phosphorus | 0.4 ppm |
| Plutonium | <3 ppm |
| Sulfur | 3 ppm |
| Silicon | 3 ppm |
| Thorium | <3 ppm |
| Uranium | 5 ppm |
| Zinc | 0.3 ppm |
| Zirconium | 0.2 ppm |

Even though the radioactive decay of the Np-237 atom is primarily through alpha-particle emission and Np-237 has a relatively long half life of $2 \times 10^6$ years and hence has a low specific activity, it was found that our sample emitted gamma radiation. This was from Pa-233, a short-lived daughter product of Np-237, that was in secular equilibrium with the parent nucleus. To reduce operator exposure to the penetrating gamma-radiation, the bottle containing the Np stock solution was placed into a Pb covering. Laboratory personnel were also issued dosimeter badges to monitor exposure to gamma radiation. The gamma radiation dose rate in the immediate vicinity of the glovebox was measured by Health Physics personnel and was not deemed to be a health hazard (see Table 4).

TABLE 4. ALPHA FACILITY RADIATION SURVEY

| ISOTOPE; Np-237/Pa-233 | INSTRUMENT; PUG |
|---|---|
| ROOM BACKGROUND; | .02 MR/H |
| BOX WINDOW- CENTER AT 4" FROM BOT; | .30 MR/H |
| LEFT GLOVE PORT AT SURFACE; | .20 MR/H |
| BOX BET L AND M PORT AT SURFACE; | .18 MR/H |
| CENTER GLOVE PORT AT SURFACE | .43 MR/H |
| CENTER GLOVE PORT AT 3" IN; | .80 MR/H |
| BOX BET M AND R PORT AT SURFACE; | .30 MR/H |
| RIGHT GLOVE PORT AT SURFACE; | .27 MR/H |
| BOX TOP AT SURFACE; | .04 MR/H |
| EXHAUST FILTER AT SURFACE; | .14 MR/H |
| 2ND EXHAUST FILTER AT SURFACE; | .02 MR/H |
| LOWER REAR OF BOX AT SURFACE; | .15 MR/H |

Procedures: A photodiode array, optical multichannel analyzer (PDA-OMA) was used to record the optical emission of Np from 230 to 700 nm. This device was mounted on the photographic exit port of the THR1500 monochromator and, because this port was located perpendicular to the usual optical path, a mirror was used to divert the dispersed radiation to the PDA. The monochromator was used in the "single-pass" mode. In this mode, with a 2400 grooves/mm grating, the resolution of the system was ~6 pm (at 300 nm) and the spectral coverage was ~ 6 nm. The maximum useful integration time per measurement was determined to be 1 second; the photodiode detector saturated for integration times greater than 1 s. The final OMA spectra were prepared by summing a number of individual 1 second PDA exposures for each wavelength range recorded. The exposure conditions used for the various wavelength ranges are collected in Table 5. Two lens positions were used to focus the image of the plasma source onto the spectrometer entrance slit, one for the visible spectrum and the other for the ultraviolet spectrum. Spectral line intensities were relatively insensitive to changes in the lens position.

TABLE 5. OMA EXPOSURE CONDITIONS

| Wavelength range (nm) | Number of One-Second Integrations | Slit Width ($\mu$) | Lens Focus | Optical Filter |
|---|---|---|---|---|
| 230–300 | 320 | 50 | UV | none |
| 300–400 | 160 | 25 | UV | none |
| 400–500 | 160 | 25 | visible | none |
| 500–700 | 160 | 25 | visible | GG400 |

To remove second order spectral lines, a sharp cut optical filter was used for the higher wavelength exposures. The filter had a transmission of less than 1% for wavelengths below 370 nm and more than 95% for wavelength greater than 500 nm.

Software was written to link the OMA to a laboratory computer and the OMA spectra were transferred to computer memory after acquisition. The OMA output to the computer was in tabular form listing pixel number (from 0 to 1023) versus intensity as 'counts'. The counts were linearly related to the diode photocurrent. These spectra were then permanently stored on flexible 5-1/4" diskettes.

Three aspects of the OMA spectral data presented here should be noted. First, the PDA sensitivity varied with wavelength and was at a maximum near 600 nm [8]. No attempt was made to compensate for this sensitivity variation. Second, the 1024 channel photodiode array consists of alternating p- and n-silicon regions, both of which are light sensitive. A signal resulting from light falling on an n-region is divided between the adjacent p-regions. Therefore, even for situations where the spectral bandpass approximated the diode spacing of the detector, as was the case for this work, the Gaussian-like spectral line profile covered portions of several diodes. Thus the measured intensity of a line depended on the position of the line profile relative the p- and n-regions. No attempt was made to compensate for this spectral line-to-diode registry effect, which has been shown to result in intensity errors of as much as 30% [9]. Finally, the first ~175 photodiodes (on the low wavelength side of the PDA) were noted to be less light sensitive than were the remainder of the diodes. This loss of sensitivity was due to a small degree of vignetting in the spectrometer. Usually there was sufficient spectral overlap between successive Np spectral segments so that intensity information could be collected from lines isolated on the unvignetted portion of the diode array.

Spectral calibration: Haaland's Np line list [2], which includes all of the verified lines from the list of Tomkins and Fred, proved to be useful for calibrating the Np ICP spectrum. For spectral ranges that included lines reported in Haaland's study, those lines were taken as wavelength standards. If available, three lines were used to calibrate each diode array spectral segment. A quadratic fitting function was used in the calibration calculation. When three identified Np lines were not available, a single line was used in conjunction with spectrometer dispersion values obtained during the preparation of U and Pu atlases [10,11]. For spectral segments that did not include any of Haaland's identified lines, the spectral overlap of adjacent segments was used to provide wavelength markers that could be used for the calibration. Inaccuracies in wavelength assignments were thus passed on to the adjacent segment to compound the margin of error for that segment.

Many of the $^{237}$Np lines show a substantial amount of hyperfine splitting, in some cases more than 0.05 nm (see Fig. 2). It is not clear whether the wavelengths of such lines listed by Haaland represent the strongest line component, or the centroid of the plate blackening. For this atlas, we have assigned Haaland's wavelength to the strongest component, or to the OMA pixel with the highest intensity when hyperfine splitting was not resolved. This uncertainty could introduce a bias in our wavelength assignments of up to 0.05 nm.

Calibration of Np wavelengths greater than 440 nm, beyond the range of the published reference spectra, was accomplished by measuring the spectrum of a mixture of 300 $\mu$g $^{237}$Np/ml and 160 $\mu$g $^{242}$Pu/ml. These spectra were calibrated using the previously identified Pu lines and lines of H, O, and Ar [11]. The stronger Np lines were thus assigned wavelength values, which were subsequently used to calibrate the Np spectral segments. Again, any

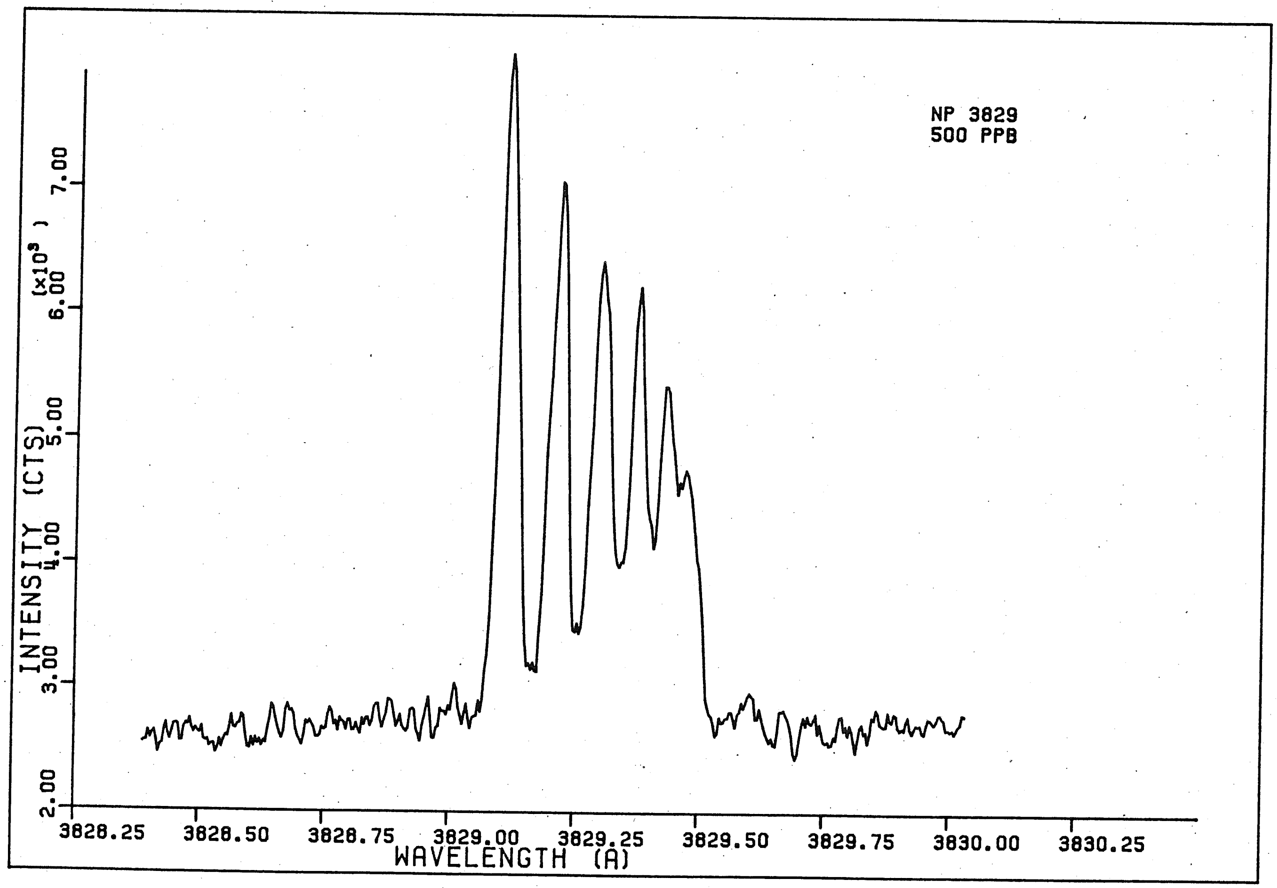


Fig. 2. Np-237 line at approximately 3829.1A showing hyperfine splitting of nearly 0.5A. This figure was obtained by scanning the spectrometer, in double pass mode, while monitoring the exit slit with a photomultiplier.

inaccuracies in the Pu wavelengths would be transferred to the Np lines. However, the Pu wavelengths are believed to be accurate to within 5 pm, although instances of greater inaccuracy are possible.

Np wavelengths below 265 nm were not previously reported, so calibration of the regions from 230 to 265 nm was carried out by using the monochromator dispersion (known from previous atlas work [11]), and the central wavelength as indicated by the wavelength counter. For this 35 nm region, the wavelength calibrations are probably accurate to within 0.2 nm.

## RESULTS AND DISCUSSION

Appendix I consists of 115 wavelength-vs-intensity plots of the $^{237}Np$ OMA data, corrected for detector dark current. These plots cover the spectral region extending from 228 to 700 nm.

Tabular data on the pages facing the wavelength-vs-intensity plots list the stronger lines, which are marked on the plots with either a dot or an element symbol (for lines not due to Np emission). The first column of the tables gives the line wavelength in Ångstrom units (i.e., 1 Angstrom unit = 0.1 nm). The line positions are generally accurate to within 0.05 nm for the Np lines. The second column lists the spectral line intensities, in counts. These values have been corrected for detector dark current, but have not been corrected to account for the variation of instrument sensitivity to spectral wavelength. An attempt was made to estimate this variation by recording the spectrum of a quartz-halogen lamp over the 250-700 nm range and dividing the resulting spectrum by the expected "black-body" emission intensity from this source. The results are shown in Fig. 3, which must be understood to represent only an approximation of the actual instrument response function.

Few Np lines were found in the spectral region from 198 to 248 nm, possibly because of the poor response of the spectroscopic apparatus at those wavelengths. To compensate for the poor sensitivity, the entrance slit of the monochromator was opened to 0.050 mm, and the number of one-second integrations was doubled to 320.

The spectral regions above 637 nm were smoothed with a running three point averaging procedure to increase their signal-to-noise ratio. This also reduced the apparent maximum intensity of the spectral lines, especially for the sharp lines. The intensity values in the accompanying tables were measured prior to the smoothing procedure, and consequently, the tabular intensities for the regions from 637 to 700 nm may not agree with the spectral intensities shown in the smoothed plots.

The detection limits of the most prominent Np lines found in this atlas have been measured with a photomultiplier detector and with the spectrometer in the double pass mode. This was done previously to determine the detection limits of several prominent Pu lines [12]. Table 6 lists the $3\sigma$ detection limits for the strongest ICP emission lines of Np.

Table 6. Np-237 ICP DETECTION LIMITS

| Wavelength (nm) | Detection Limit ($\mu$g/l) |
|---|---|
| 382.91 | 25 |
| 430.77 | 37 |
| 429.08 | 48 |
| 456.04 | 52 |
| 416.44 | 60 |
| 386.52 | 75 |
| 410.84 | 77 |
| 302.66 | 120 |
| 405.10 | 120 |

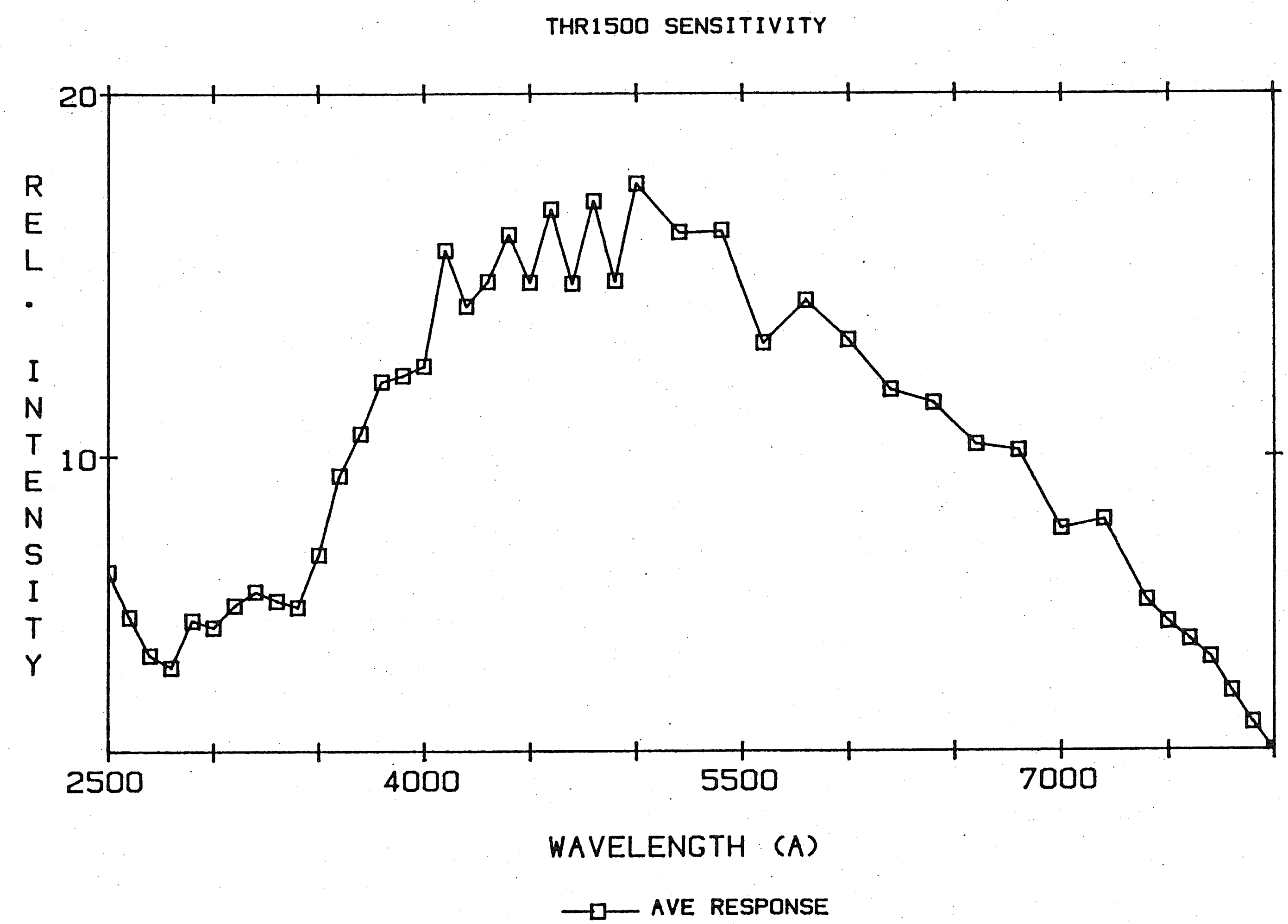


Fig. 3. Approximate variation of monochromator-OMA sensitivity with wavelength. Measured using a 1000W quartz-halogen source (Model FEL, [Q1000/4CL], General Electric) operated at 8A, with a specified color temperature of 3200K. Curve shown is the average of measurements with two different lamps.

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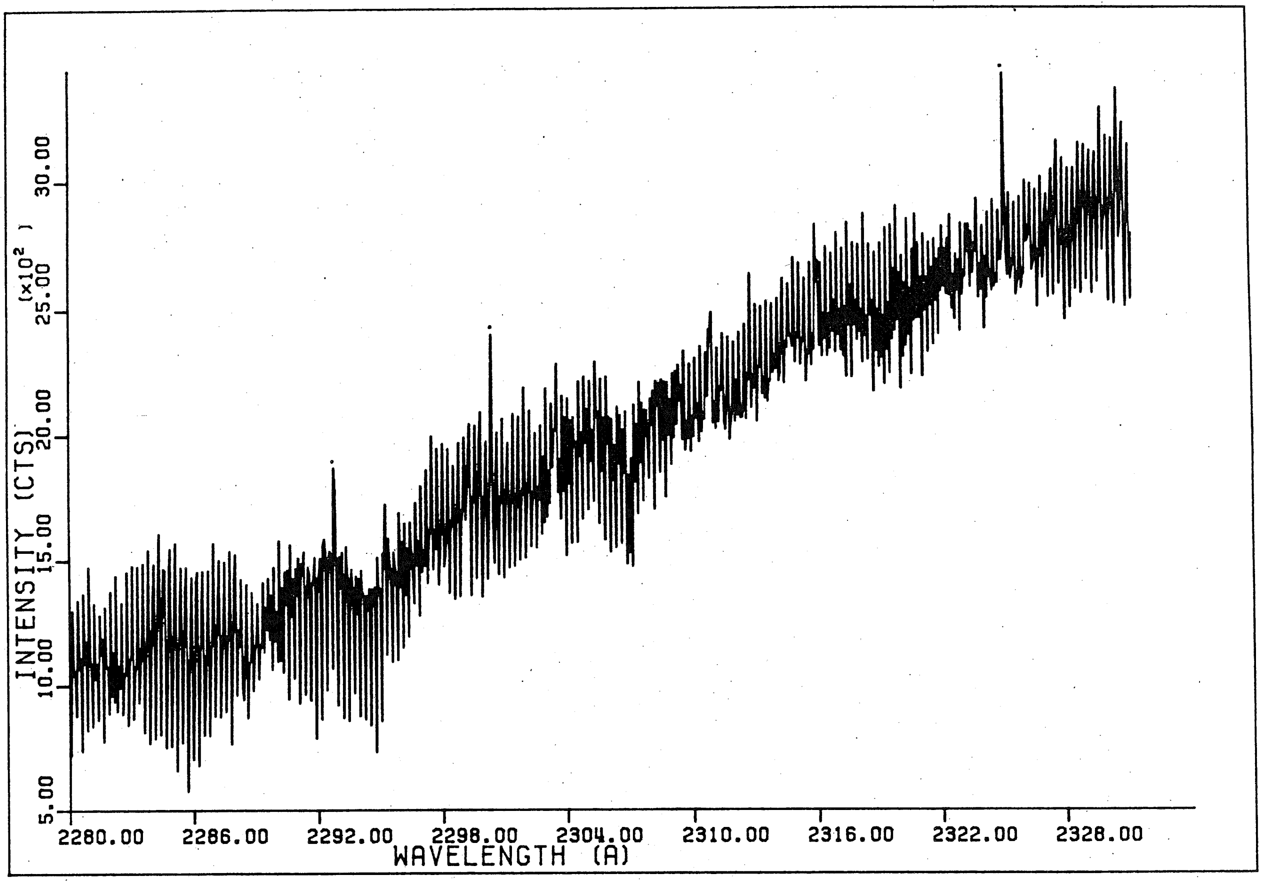
APPENDIX I

FIGURES 1-115

ICP-OMA spectra of a ~0.5 ~~≅0.4~~ mg/ml Np-237 solution. The spectra are corrected for OMA detector dark current contributions, are unsmoothed, and represent the summation of 160 one-second integrations (see text for special recording conditions for spectra in the 230 - 300 and the 637 - 700 nm regions). Please note that the wavelength axis of these figures is labelled in Angstrom units, and that 1A = 0.1 nm.

| $\lambda(\text{Å})$ | I |
|---|---|
| 2292.7612 | 1869. |
| 2300.3940 | 2400. |
| 2325.6621 | 3370. |
| 2340.6211 | 1668. |
| 2362.1445 | 2596. |
| 2366.2129 | 2540. |
| 2367.5254 | 3023. |
| 2369.4939 | 2484. |
| 2371.5938 | 3059. |
| 2372.2500 | 5043. |
| 2375.2686 | 2490. |
| 2378.4839 | 2872. |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(x10$^2$ )
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15.00
20.00
25.00
30.00
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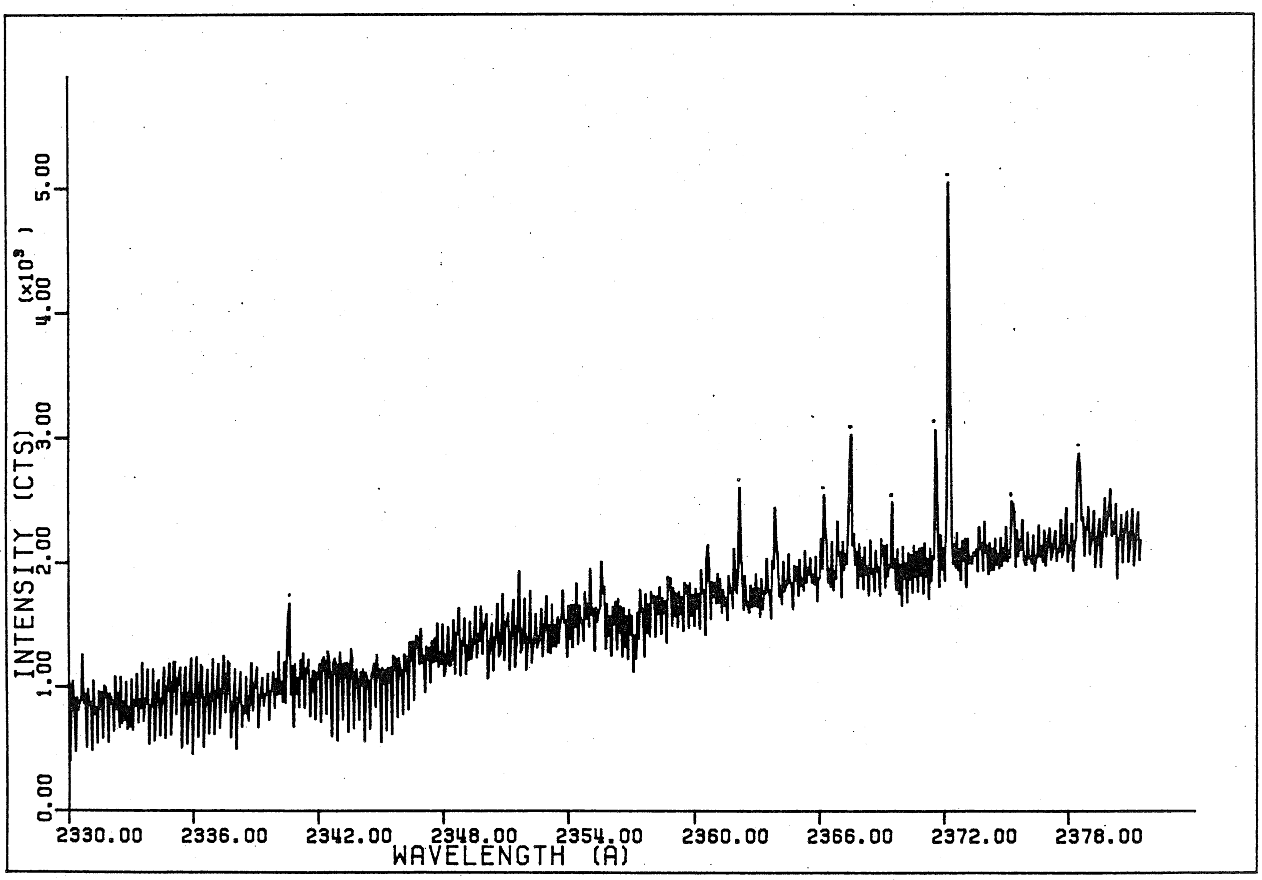
2286.00
2292.00
2298.00
2304.00
2310.00
2316.00
2322.00
2328.00
WAVELENGTH (A)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(x10$^3$ )
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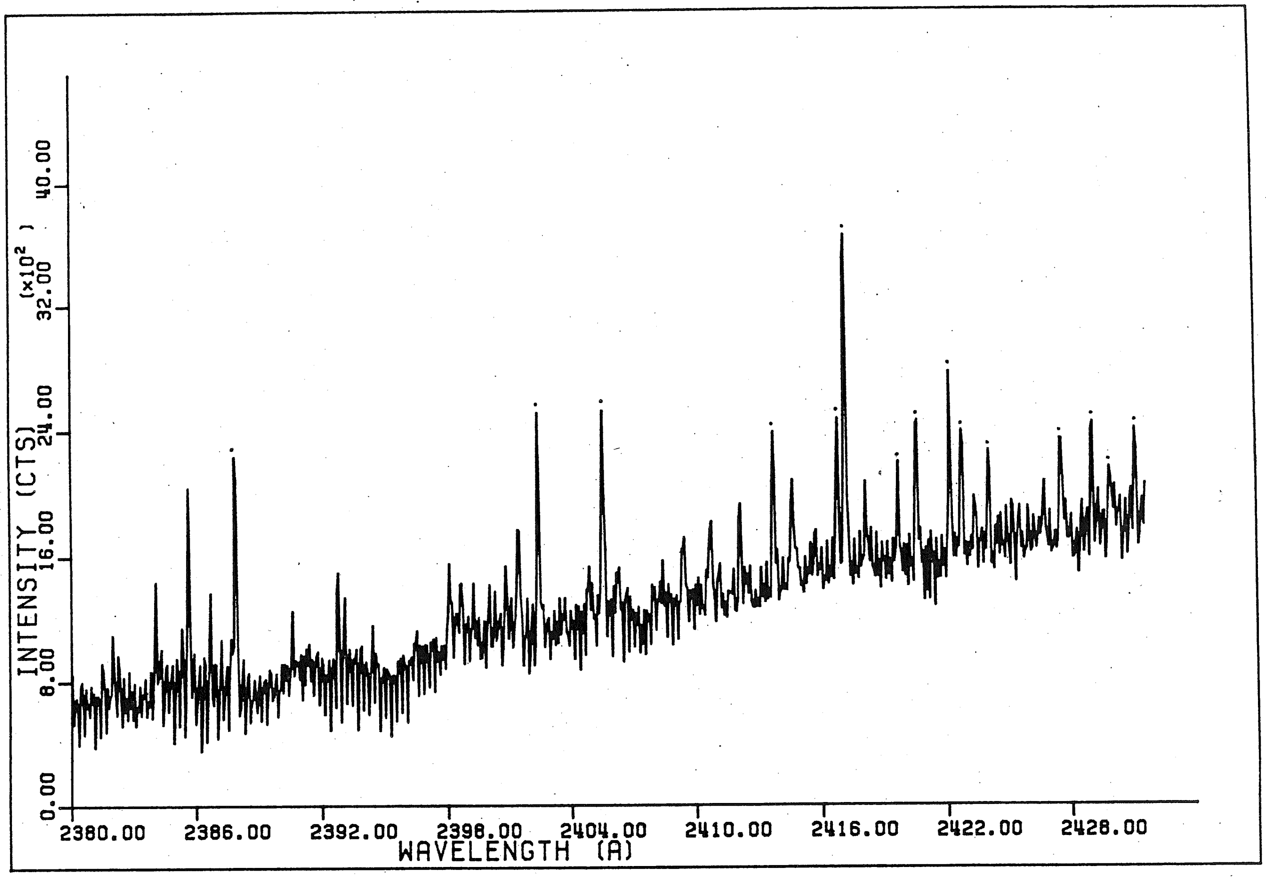
2.00
3.00
4.00
5.00
2330.00
2336.00
2342.00
2348.00
2354.00
2360.00
2366.00
2372.00
2378.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 2387.8926 | 2233. |
| 2402.4224 | 2510. |
| 2405.5640 | 2524. |
| 2413.7451 | 2383. |
| 2416.8213 | 2467. |
| 2417.2141 | 3652. |
| 2419.7012 | 2192. |
| 2420.6174 | 2453. |
| 2422.1882 | 2762. |
| 2422.7773 | 2387. |
| 2424.0864 | 2263. |
| 2427.5552 | 2336. |
| 2429.1260 | 2441. |
| 2429.9114 | 2157. |
| 2431.1550 | 2401. |
| 2437.4570 | 4049. |
| 2442.2239 | 2149. |
| 2442.8770 | 3811. |
| 2446.7949 | 2264. |
| 2447.0562 | 2825. |
| 2447.5784 | 2209. |
| 2451.9536 | 2704. |
| 2453.3901 | 3529. |
| 2460.0508 | 2414. |
| 2462.3362 | 2493. |
| 2462.9893 | 2744. |
| 2464.4912 | 3569. |
| 2464.8176 | 2076. |
| 2468.2786 | 2049. |
| 2469.3232 | 3647. |
| 2475.0044 | 2111. |
| 2475.3311 | 2597. |
| 2476.0493 | 2291. |
| 2476.7676 | 2686. |
| 2478.2695 | 2885. |
| 2479.1836 | 2901. |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16.00
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32.00
40.00
2380.00
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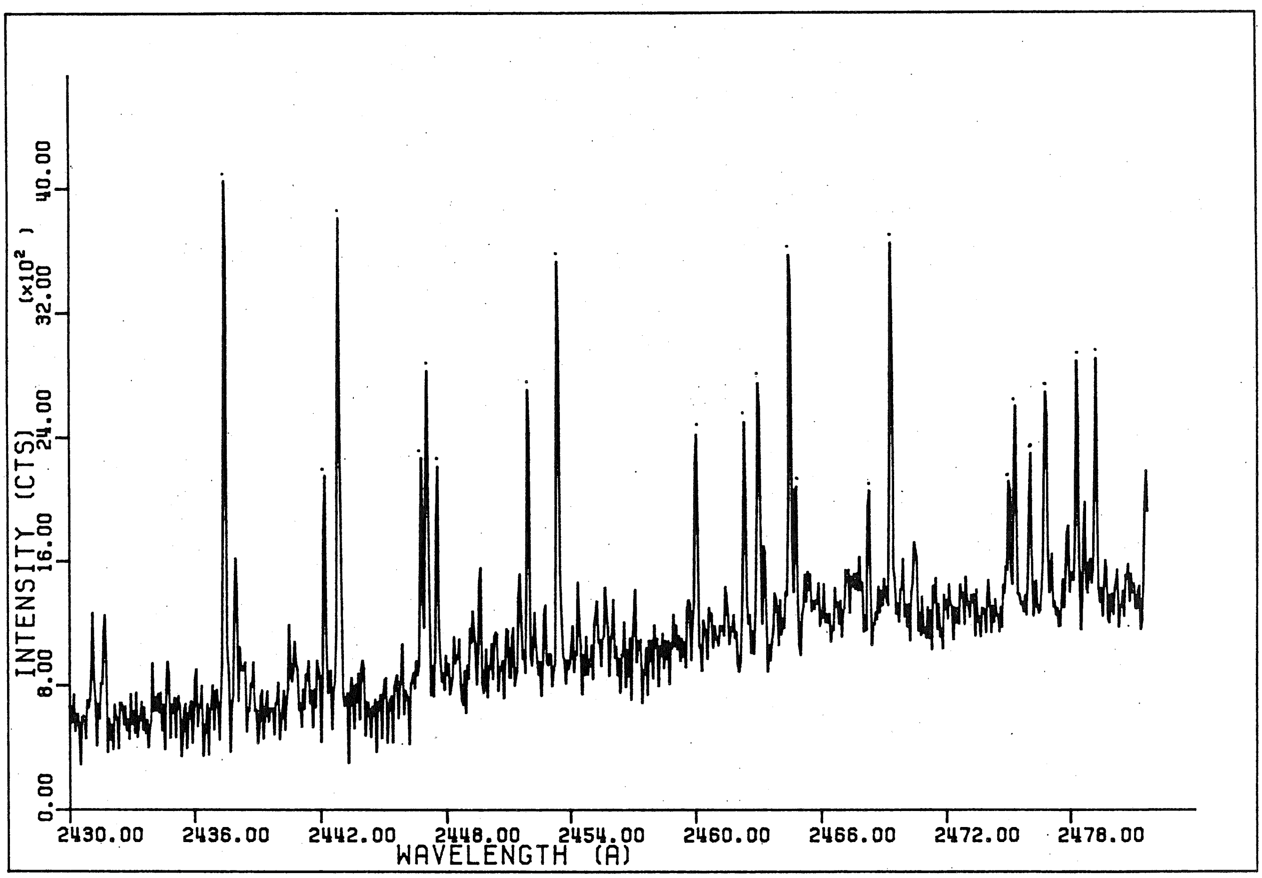
2398.00
2404.00
2410.00
2416.00
2422.00
2428.00
WAVELENGTH (A)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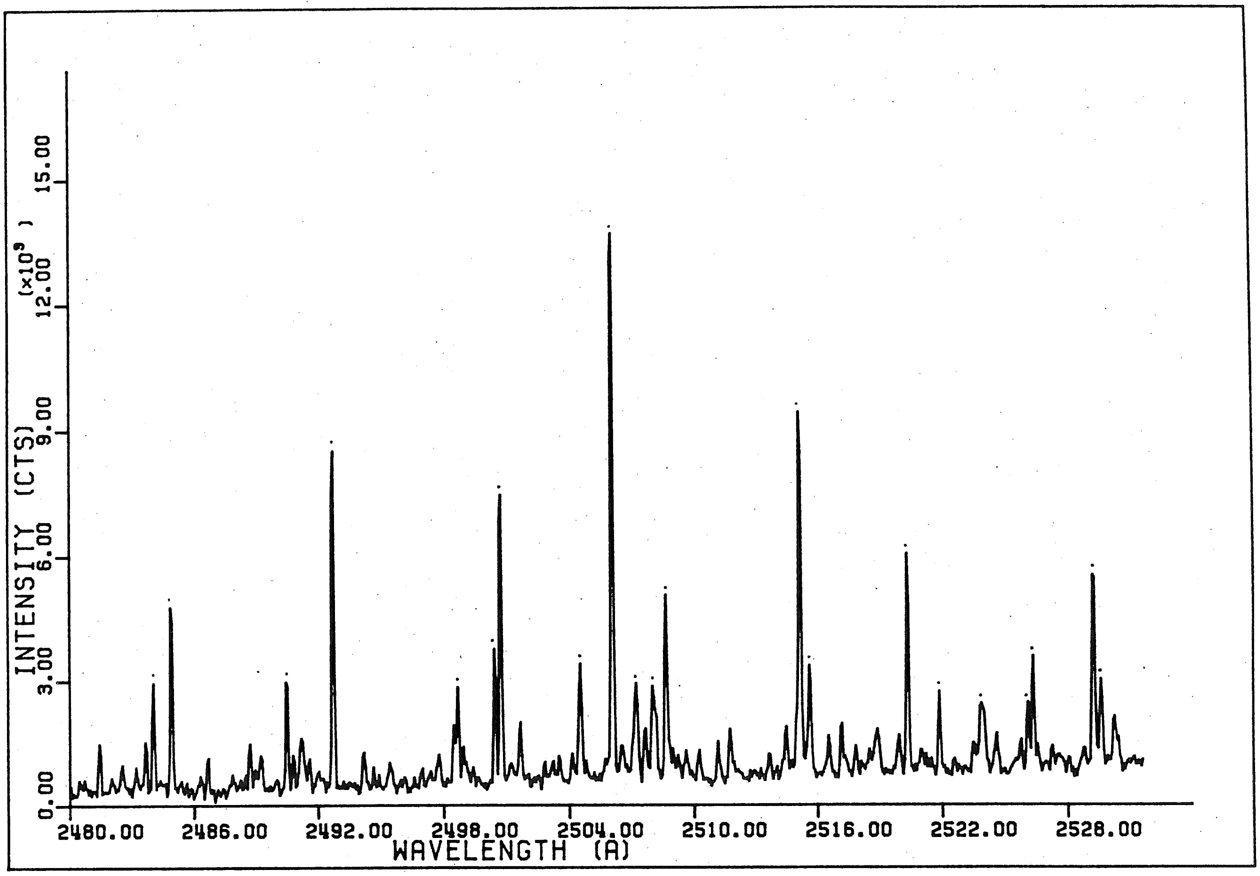
16.00
24.00
32.00
40.00
2430.00
2436.00
2442.00
2448.00
2454.00
2460.00
2466.00
2472.00
2478.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 2484.0356 | 2948. |
| 2484.8821 | 4781. |
| 2490.4807 | 2973. |
| 2492.7590 | 8510. |
| 2498.6831 | 2846. |
| 2500.4409 | 3766. |
| 2500.7664 | 7465. |
| 2504.5422 | 3411. |
| 2506.1047 | 13680. |
| 2507.2114 | 2938. |
| 2507.9924 | 2868. |
| 2508.6436 | 5066. |
| 2515.1536 | 9431. |
| 2515.6091 | 3363. |
| 2520.2964 | 6045. |
| 2521.8589 | 2738. |
| 2523.8770 | 2444. |
| 2526.0903 | 2468. |
| 2526.3508 | 3588. |
| 2529.2151 | 5532. |
| 2529.6057 | 3026. |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2480.00
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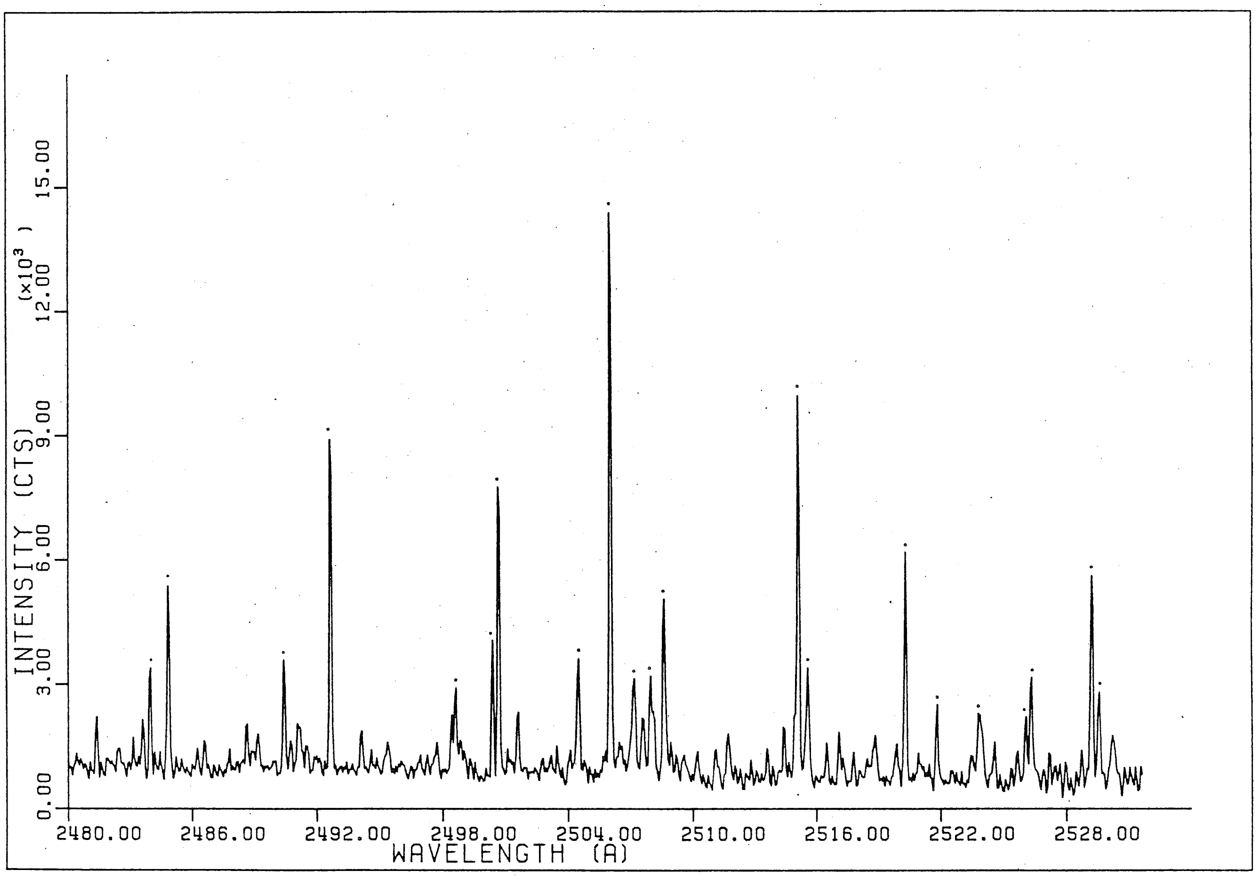
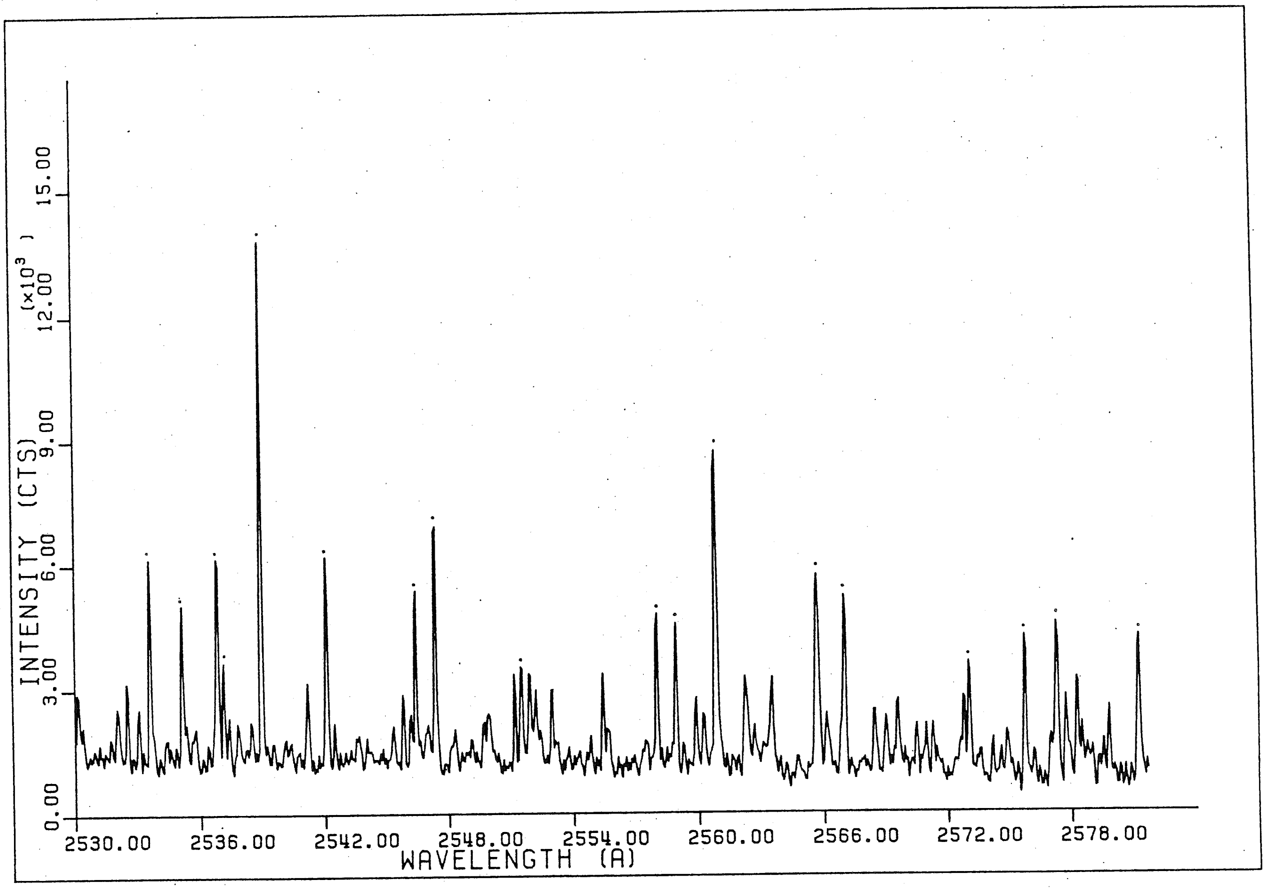
2510.00
2516.00
2522.00
2528.00
WAVELENGTH (A)


INTENSITY (CTS)
(x10³ )
0.00
3.00
6.00
9.00
12.00
15.00
2480.00
2486.00
2492.00
2498.00
2504.00
2510.00
2516.00
2522.00
2528.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 2533.5701 | 6146. |
| 2535.1301 | 5015. |
| 2536.8201 | 6142. |
| 2537.1450 | 3634. |
| 2538.9651 | 13805. |
| 2542.0852 | 6183. |
| 2546.4402 | 5350. |
| 2547.4150 | 6895. |
| 2551.5100 | 3502. |
| 2558.0100 | 4769. |
| 2558.9202 | 4527. |
| 2560.8701 | 8682. |
| 2565.6802 | 5685. |
| 2566.9802 | 5177. |
| 2573.0251 | 3575. |
| 2575.6902 | 4203. |
| 2577.2500 | 4521. |
| 2581.2151 | 4207. |
| 2581.1328 | 5831. |
| 2583.1416 | 6289. |
| 2585.6689 | 4631. |
| 2589.2329 | 5177. |
| 2593.3801 | 5862. |
| 2595.3889 | 6479. |
| 2598.3049 | 9137. |
| 2598.9529 | 4998. |
| 2603.9426 | 5446. |
| 2605.3682 | 5182. |
| 2605.6272 | 19744. |
| 2606.9233 | 24544. |
| 2607.3770 | 5359. |
| 2609.0618 | 4899. |
| 2613.9216 | 15827. |
| 2615.6064 | 9877. |
| 2620.9202 | 5110. |
| 2622.1514 | 6329. |
| 2623.1882 | 5073. |
| 2623.8362 | 5842. |
| 2624.2898 | 14020. |
| 2628.5664 | 4690. |
| 2628.7610 | 5064. |
| 2629.0200 | 19610. |


INTENSITY (CTS)
(×10³ )
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3.00
6.00
9.00
12.00
15.00
2530.00
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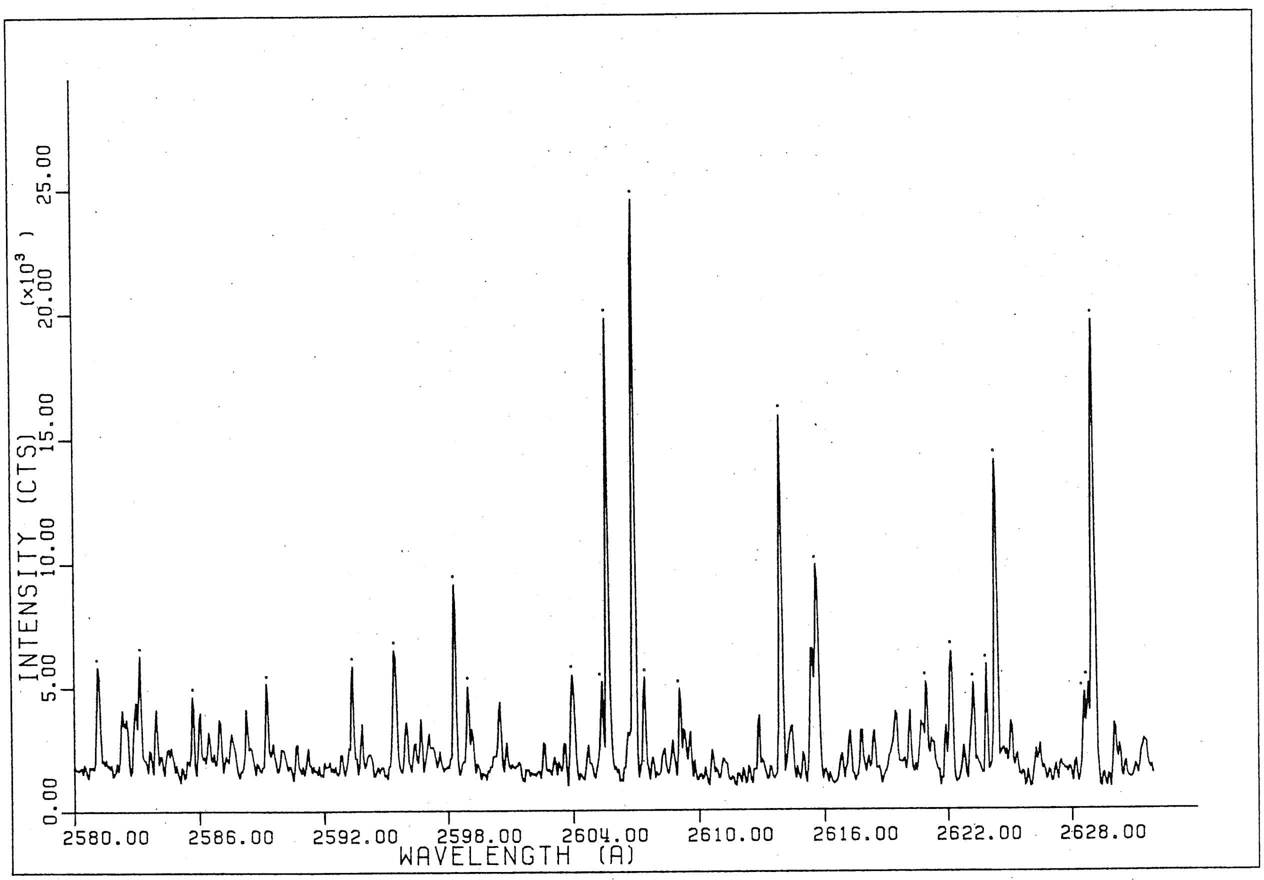
2560.00
2566.00
2572.00
2578.00
WAVELENGTH (A)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15.00
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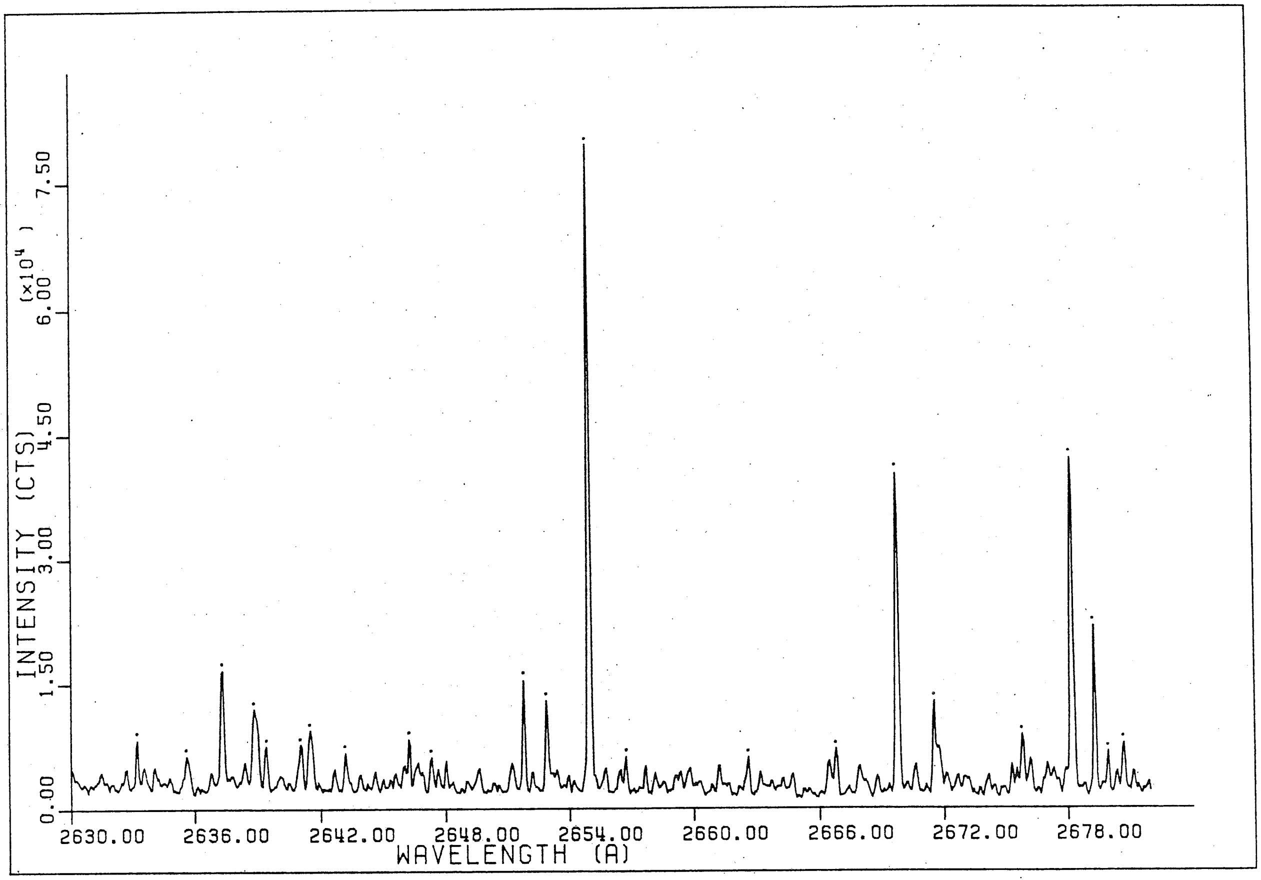
25.00
2580.00
2586.00
2592.00
2598.00
2604.00
2610.00
2616.00
2622.00
2628.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 2633.2202 | 8263. |
| 2635.6104 | 6336. |
| 2637.3545 | 16611. |
| 2638.8403 | 12019. |
| 2639.4216 | 7534. |
| 2641.0366 | 7764. |
| 2641.4890 | 9428. |
| 2643.1685 | 6732. |
| 2646.2048 | 8293. |
| 2647.3030 | 6153. |
| 2651.7603 | 15310. |
| 2652.8586 | 12908. |
| 2654.9902 | 79438. |
| 2656.7346 | 6150. |
| 2662.6130 | 6092. |
| 2666.8120 | 7149. |
| 2669.7837 | 40111. |
| 2671.5925 | 12755. |
| 2675.8562 | 8755. |
| 2678.3110 | 41947. |
| 2679.4092 | 21725. |
| 2680.0552 | 6749. |
| 2680.8303 | 7701. |
| 2680.5269 | 9828. |
| 2684.2124 | 17233. |
| 2688.9299 | 10952. |
| 2691.6709 | 10381. |
| 2693.4937 | 9842. |
| 2697.3877 | 9634. |
| 2700.9424 | 20295. |
| 2704.4192 | 14764. |
| 2709.4812 | 16543. |
| 2710.0562 | 11419. |
| 2711.3323 | 10957. |
| 2712.3518 | 19065. |
| 2714.5146 | 17647. |
| 2715.0864 | 18344. |
| 2715.4673 | 11268. |
| 2716.4187 | 12934. |
| 2717.2424 | 49496. |
| 2722.1687 | 16935. |
| 2727.1294 | 13390. |
| 2728.4434 | 10231. |
| 2728.7559 | 10040. |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6.00
7.50
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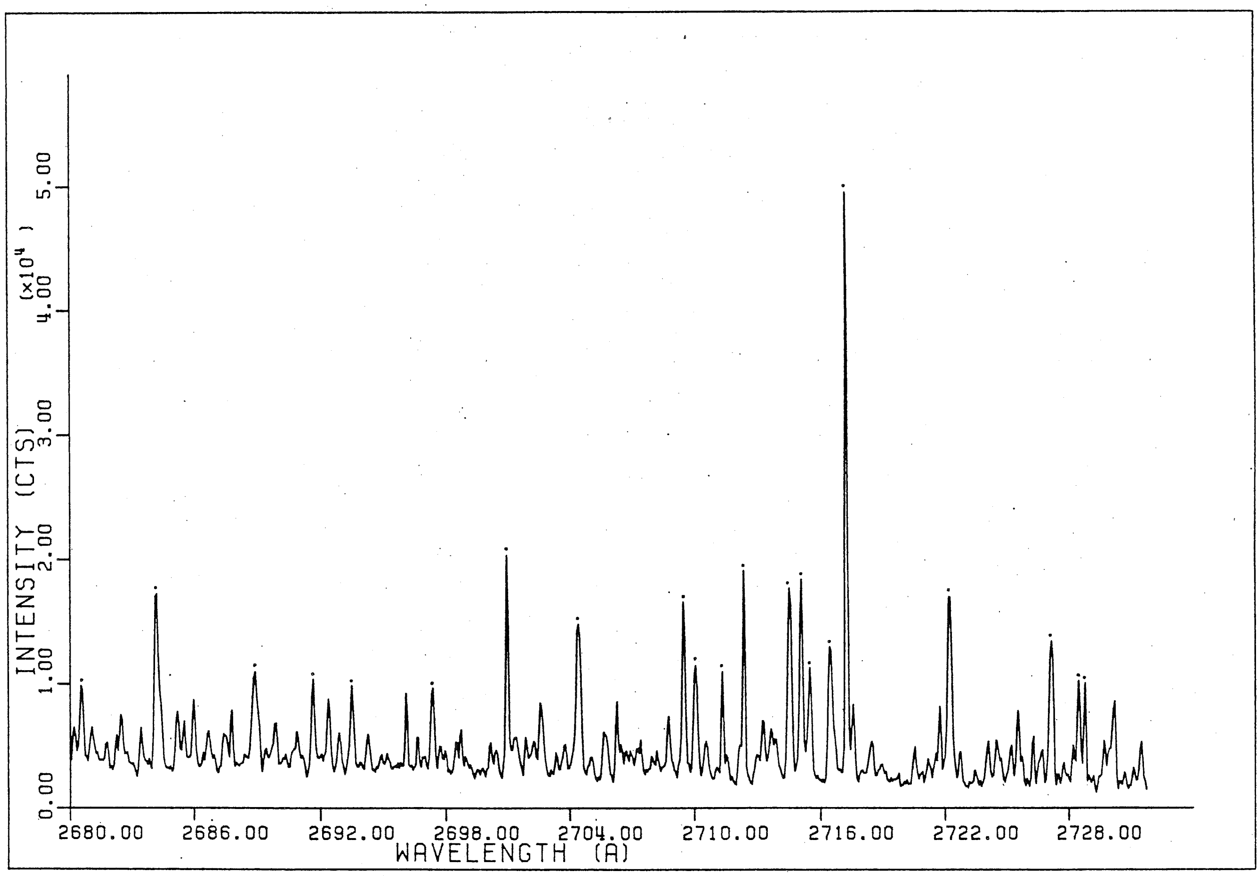
2666.00
2672.00
2678.00
WAVELENGTH (A)


INTENSITY (CTS) (x10⁴ )
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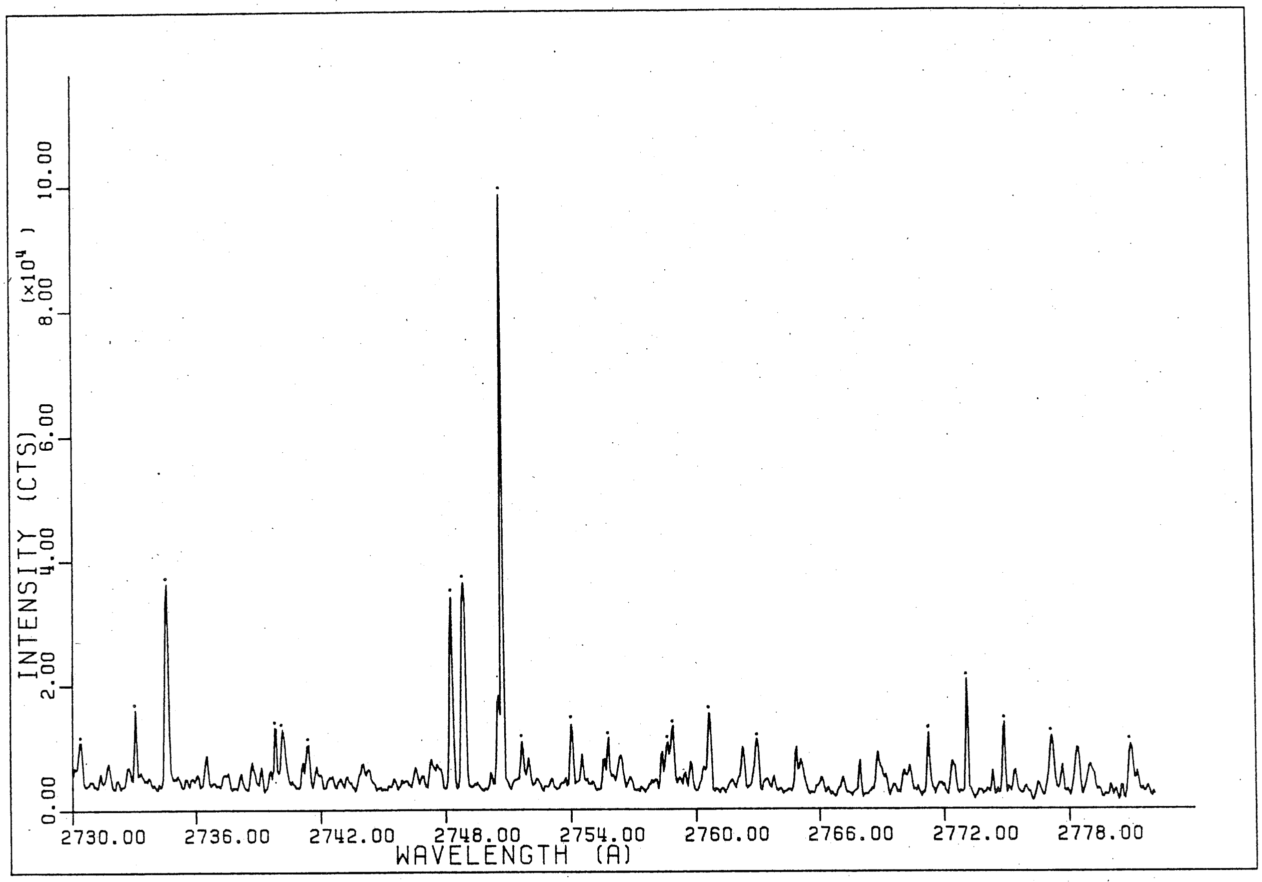
1.00
2.00
3.00
4.00
5.00
2680.00
2686.00
2692.00
2698.00
2704.00
2710.00
2716.00
2722.00
2728.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 2730.3635 | 10819. |
| 2733.0620 | 16054. |
| 2734.6040 | 36235. |
| 2739.8081 | 13163. |
| 2740.1936 | 12836. |
| 2741.4146 | 10409. |
| 2748.2893 | 33956. |
| 2748.8674 | 36302. |
| 2750.7307 | 98406. |
| 2751.6301 | 10830. |
| 2754.0076 | 13561. |
| 2755.8064 | 11417. |
| 2758.6335 | 10650. |
| 2758.8904 | 13255. |
| 2760.6252 | 15261. |
| 2762.9382 | 11175. |
| 2771.2266 | 12056. |
| 2773.0898 | 20631. |
| 2774.8887 | 13739. |
| 2777.1375 | 11608. |
| 2780.9282 | 10241. |
| 2780.7803 | 12486. |
| 2783.2783 | 12509. |
| 2785.3279 | 42416. |
| 2787.1853 | 41812. |
| 2789.1709 | 11340. |
| 2790.0037 | 18363. |
| 2790.6440 | 15181. |
| 2792.5015 | 17131. |
| 2796.0242 | 11641. |
| 2796.6648 | 13753. |
| 2798.1379 | 13430. |
| 2798.7783 | 34784. |
| 2800.7000 | 47623. |
| 2803.5823 | 13995. |
| 2804.2866 | 11158. |
| 2816.9045 | 20152. |
| 2820.3633 | 10589. |
| 2822.3489 | 12072. |
| 2824.0142 | 13496. |
| 2825.2312 | 28126. |



INTENSITY (CTS) (x10^4)
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4.00
6.00
8.00
10.00
2730.00
2736.00
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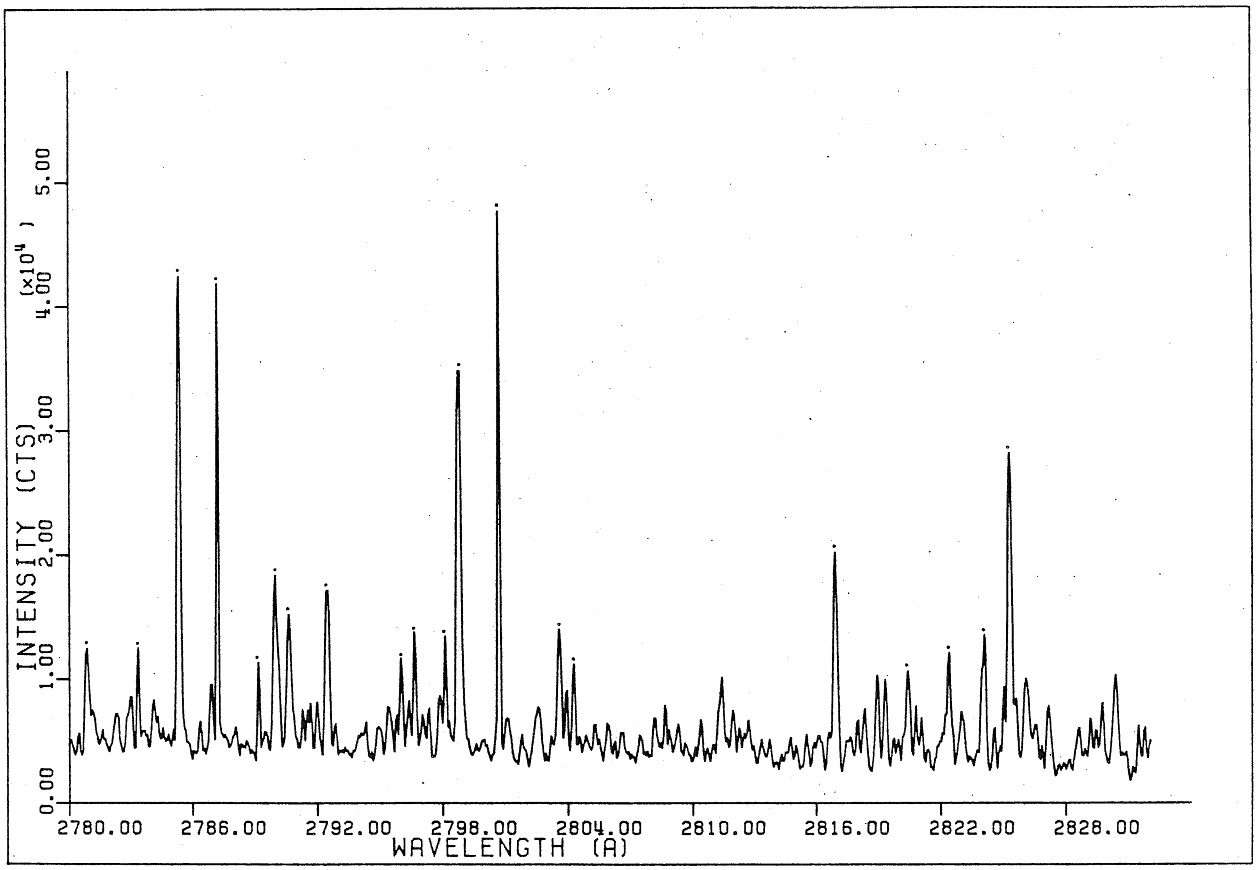
2748.00
2754.00
2760.00
2766.00
2772.00
2778.00
WAVELENGTH (A)

INTENSITY (CTS) (x10^4)
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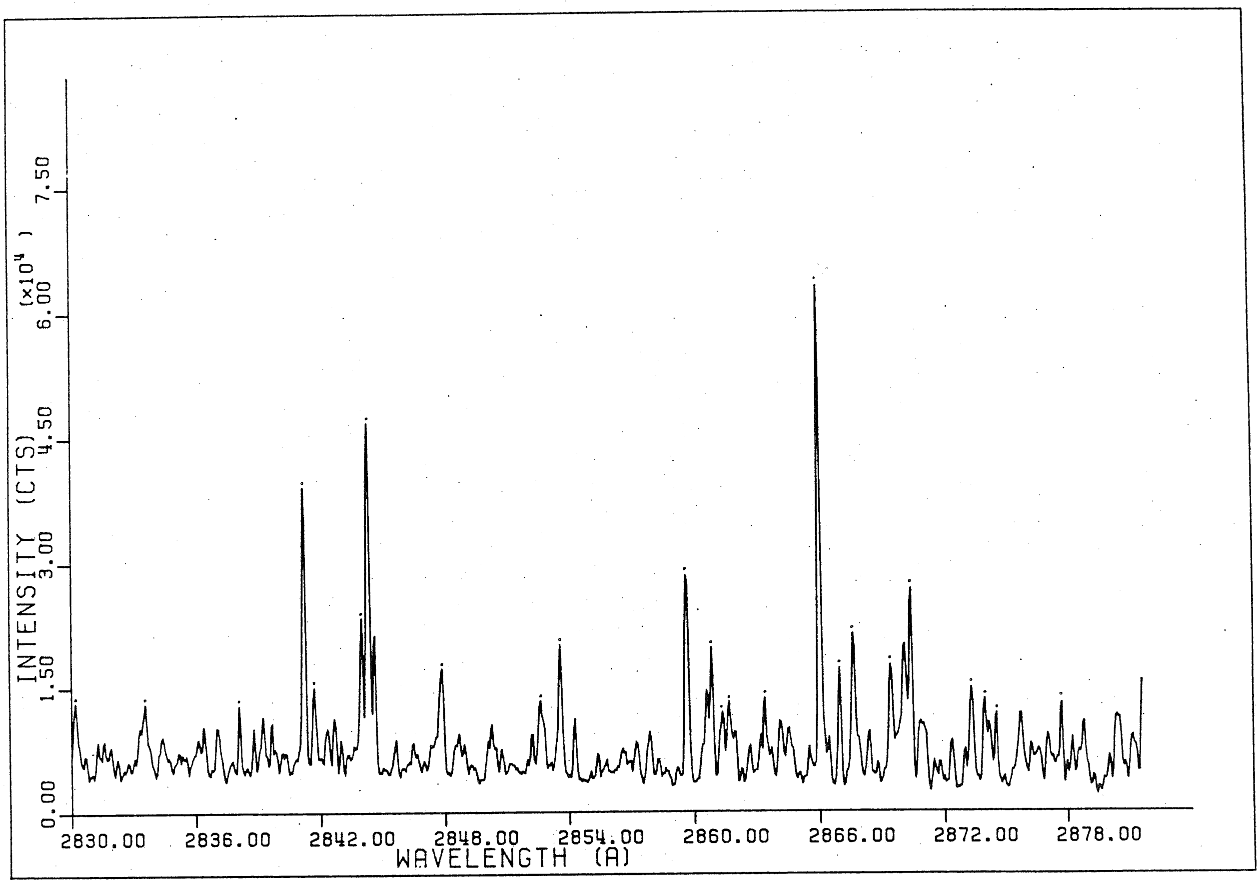
1.00
2.00
3.00
4.00
5.00
2780.00
2786.00
2792.00
2798.00
2804.00
2810.00
2816.00
2822.00
2828.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 2830.1172 | 13211. |
| 2833.5012 | 13081. |
| 2838.0347 | 12833. |
| 2841.1633 | 39150. |
| 2841.6741 | 15000. |
| 2843.9727 | 23359. |
| 2844.2920 | 46787. |
| 2847.8677 | 17236. |
| 2852.6562 | 13344. |
| 2853.6140 | 20042. |
| 2859.6799 | 28317. |
| 2860.6377 | 14486. |
| 2861.4038 | 11893. |
| 2861.7231 | 13151. |
| 2863.4470 | 13545. |
| 2866.0649 | 62989. |
| 2867.0227 | 17147. |
| 2867.6611 | 21257. |
| 2869.4490 | 17516. |
| 2870.4705 | 26685. |
| 2873.4075 | 14783. |
| 2874.0461 | 13429. |
| 2874.6208 | 11734. |
| 2877.8132 | 12922. |
| 2881.5085 | 20875. |
| 2884.1838 | 23619. |
| 2887.8149 | 52929. |
| 2889.2163 | 22105. |
| 2891.0635 | 20875. |
| 2893.7390 | 49523. |
| 2898.9624 | 34186. |
| 2899.9177 | 29129. |
| 2900.6187 | 30081. |
| 2901.0007 | 53328. |
| 2902.7844 | 35815. |
| 2904.2495 | 76003. |
| 2904.5679 | 28112. |
| 2905.5872 | 22699. |
| 2913.4224 | 68277. |
| 2916.6709 | 23617. |
| 2918.6458 | 25304. |
| 2920.4292 | 23511. |
| 2923.0410 | 20668. |
| 2925.2068 | 58442. |
| 2926.7993 | 36120. |
| 2927.5000 | 31597. |
| 2928.9651 | 35887. |
| 2929.4109 | 73561. |
| 2930.1753 | 20714. |
| 2931.3857 | 80247. |



INTENSITY (CTS)
(x10⁴ )
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6.00
7.50
2830.00
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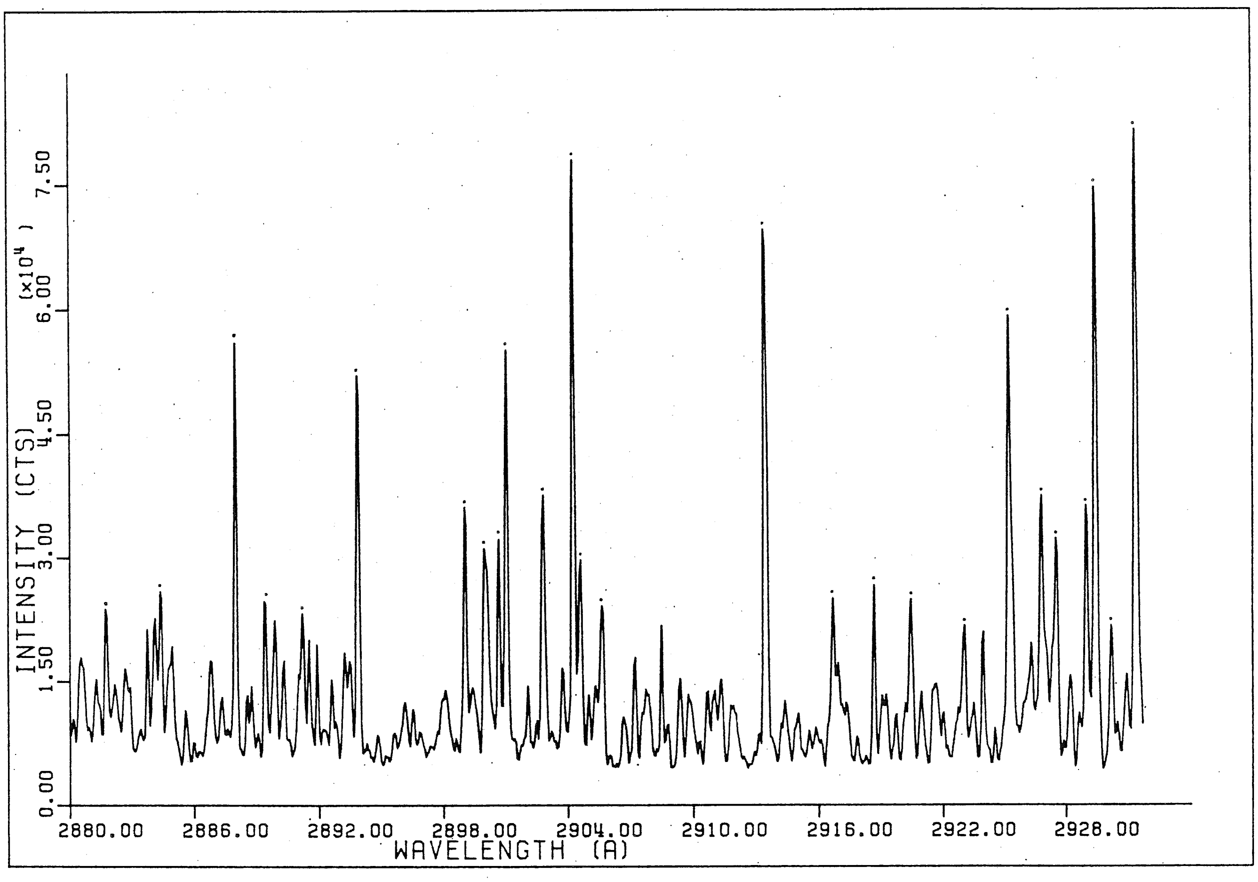
2842.00
2848.00
2854.00
2860.00
2866.00
2872.00
2878.00
WAVELENGTH (A)

INTENSITY (CTS)
(x10⁴ )
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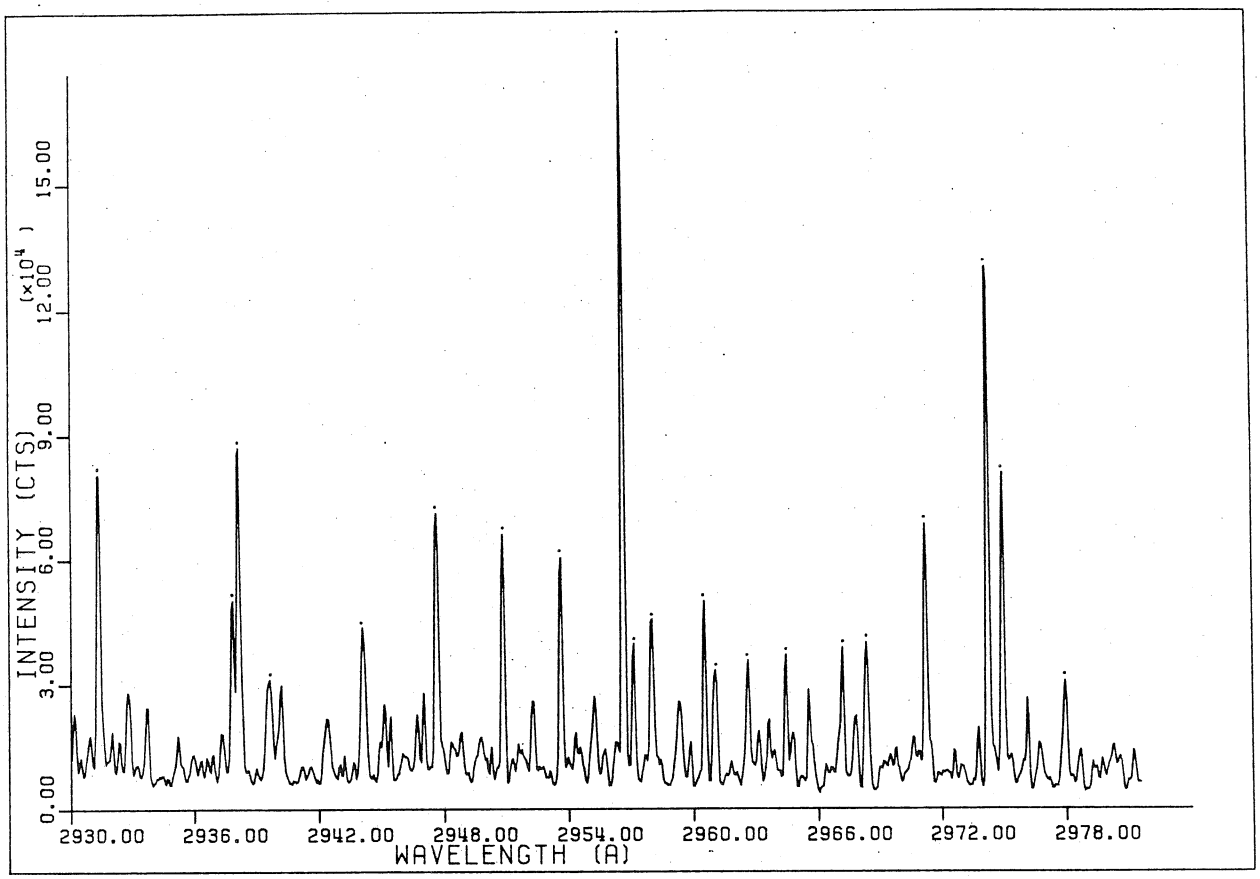
3.00
4.50
6.00
7.50
2880.00
2886.00
2892.00
2898.00
2904.00
2910.00
2916.00
2922.00
2928.00
WAVELENGTH (A)

| λ(Å) | I |
| --- | --- |
| 2931.2676 | 78037. |
| 2937.8081 | 47444. |
| 2938.1255 | 84514. |
| 2939.5862 | 28609. |
| 2944.0310 | 41146. |
| 2947.5872 | 68587. |
| 2950.8257 | 64248. |
| 2953.6196 | 58617. |
| 2956.6040 | 183513. |
| 2957.1121 | 37738. |
| 2958.0012 | 43353. |
| 2960.5410 | 48054. |
| 2961.0491 | 31360. |
| 2962.6367 | 33867. |
| 2964.4780 | 35797. |
| 2967.2085 | 37336. |
| 2968.3516 | 38980. |
| 2971.2727 | 67298. |
| 2974.3206 | 128859. |
| 2975.0825 | 79615. |
| 2978.0671 | 29214. |
| 2983.6125 | 44976. |
| 2986.9673 | 29939. |
| 2988.1067 | 35359. |
| 2992.4744 | 67399. |
| 2993.5505 | 35214. |
| 2993.8669 | 40192. |
| 2995.4495 | 35397. |
| 2997.6650 | 37448. |
| 2998.2981 | 146252. |
| 2999.7539 | 29734. |
| 3001.3364 | 53539. |
| 3002.7290 | 49704. |
| 3012.6038 | 43418. |
| 3015.0725 | 58484. |
| 3017.2249 | 46422. |
| 3025.2639 | 32862. |
| 3025.6436 | 35473. |
| 3026.0234 | 27266. |
| 3026.6565 | 156358. |
| 3027.5427 | 28366. |
| 3029.2517 | 49216. |


INTENSITY (CTS)
(×10⁴ )
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6.00
9.00
12.00
15.00
2930.00
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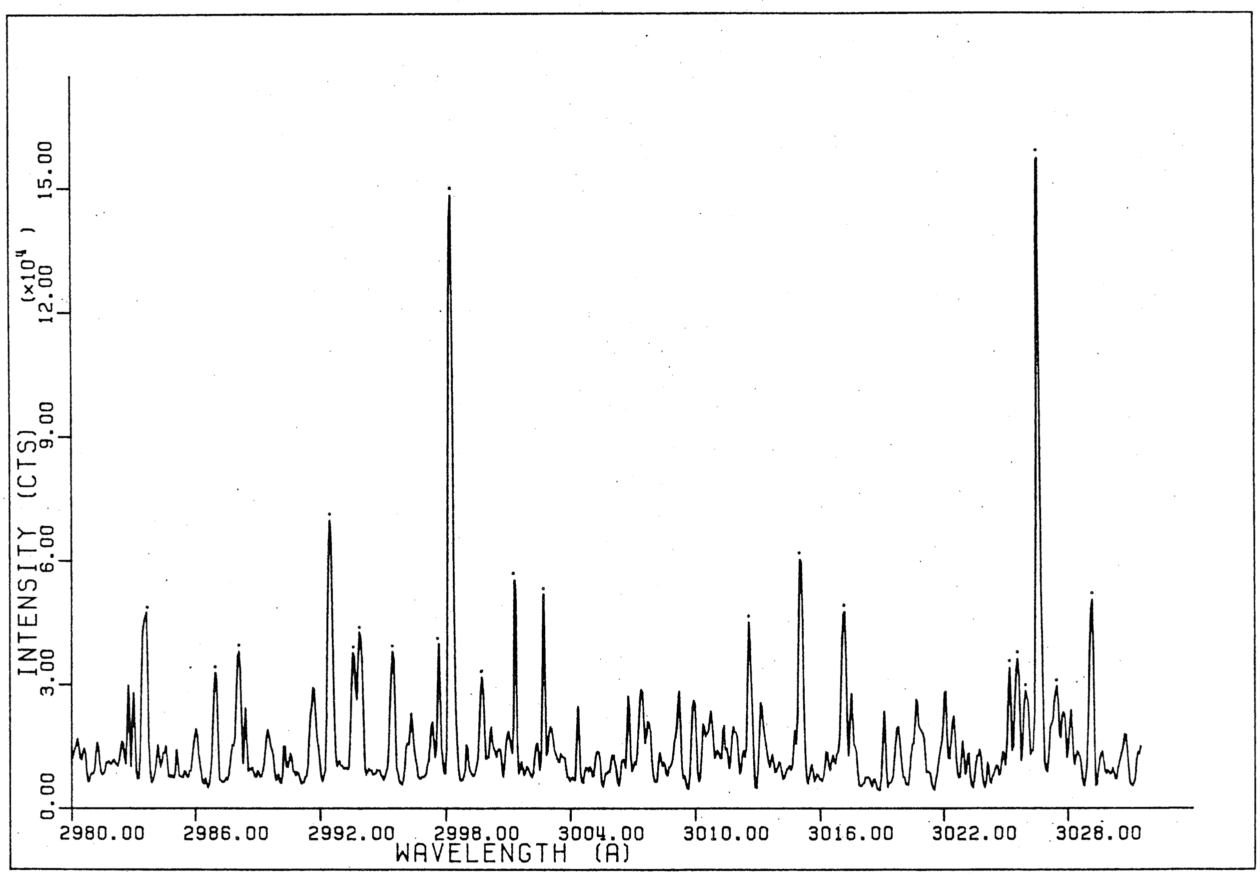
2942.00
2948.00
2954.00
2960.00
2966.00
2972.00
2978.00
WAVELENGTH (A)


INTENSITY (CTS)
(×10⁴ )
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6.00
9.00
12.00
15.00
2980.00
2986.00
2992.00
2998.00
3004.00
3010.00
3016.00
3022.00
3028.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 2982.7263 | 8555. |
| 2983.6125 | 11872. |
| 2986.9673 | 7102. |
| 2988.1067 | 8270. |
| 2991.7148 | 6847. |
| 2992.4744 | 15652. |
| 2993.5505 | 8345. |
| 2993.8669 | 9341. |
| 2995.4495 | 8998. |
| 2997.6650 | 10586. |
| 2998.2981 | 33399. |
| 2999.7539 | 6795. |
| 3001.3364 | 14606. |
| 3002.7290 | 13763. |
| 3006.7803 | 7108. |
| 3012.6038 | 11265. |
| 3015.1357 | 14019. |
| 3017.2249 | 11135. |
| 3017.5413 | 6723. |
| 3025.2639 | 7741. |
| 3025.6436 | 8350. |
| 3026.5933 | 40139. |
| 3029.2517 | 11607. |
| 3033.6140 | 10955. |
| 3034.1824 | 6990. |
| 3037.8450 | 7000. |
| 3044.6021 | 5748. |
| 3046.6860 | 6836. |
| 3048.4543 | 5681. |
| 3052.1169 | 19063. |
| 3052.6853 | 7747. |
| 3053.4431 | 8218. |
| 3054.8323 | 6550. |
| 3055.9690 | 6101. |
| 3056.4111 | 7654. |
| 3057.6741 | 27402. |
| 3059.4424 | 5779. |
| 3063.7366 | 6010. |
| 3064.1785 | 6837. |
| 3066.5151 | 15913. |
| 3067.3362 | 5617. |
| 3068.1570 | 9200. |
| 3070.3672 | 10788. |
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| 3073.9668 | 5687. |
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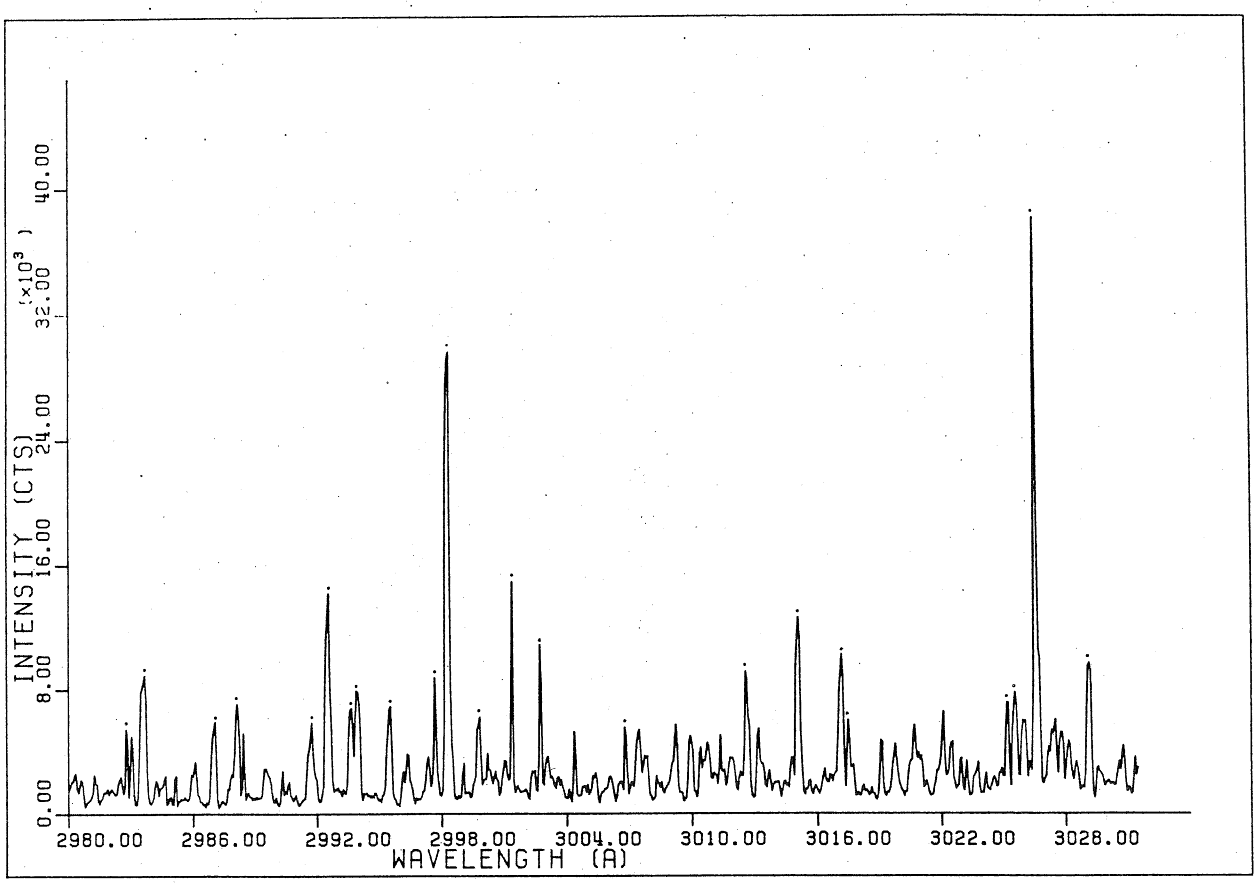
| 3079.7766 | 8443. |


INTENSITY (CTS)
(×10³)
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24.00
32.00
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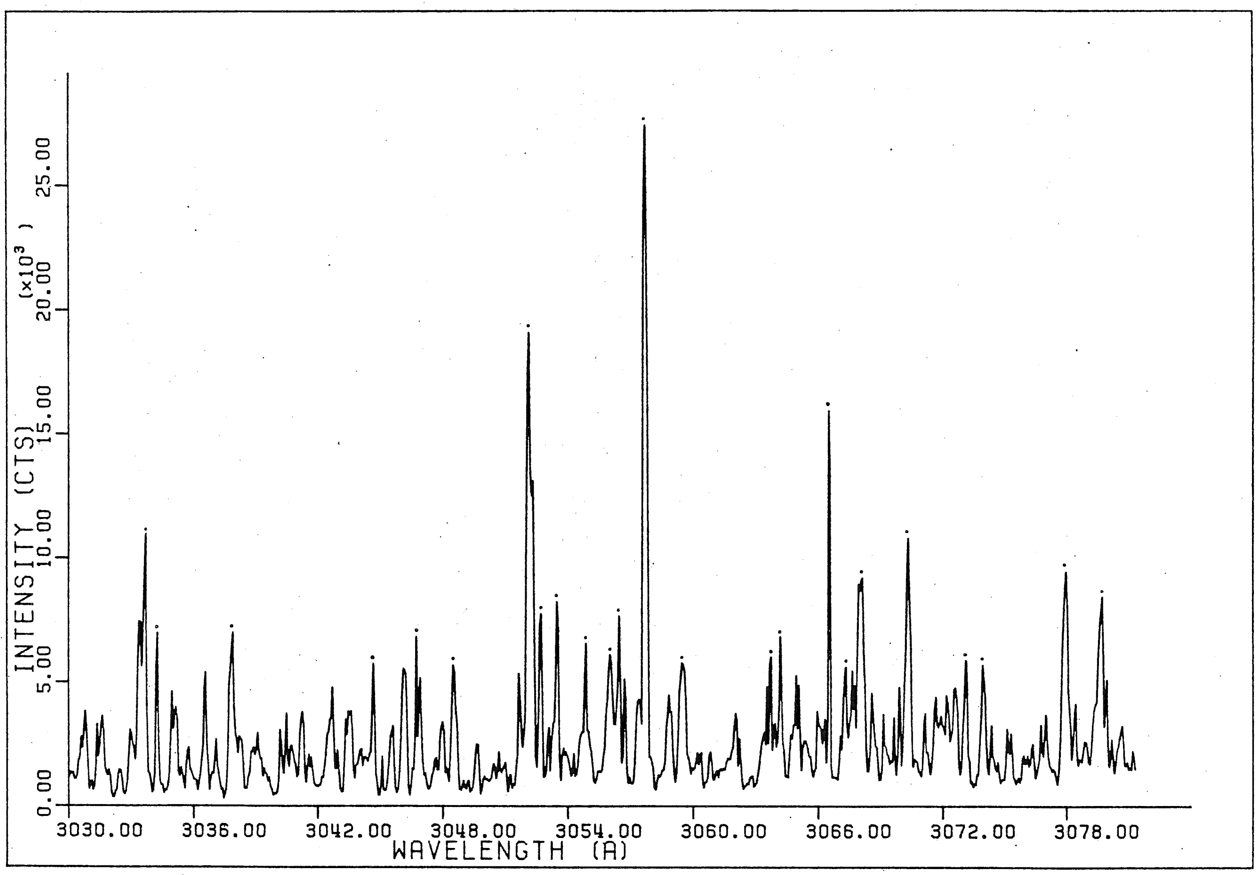
WAVELENGTH (A)


INTENSITY (CTS)
(×10³)
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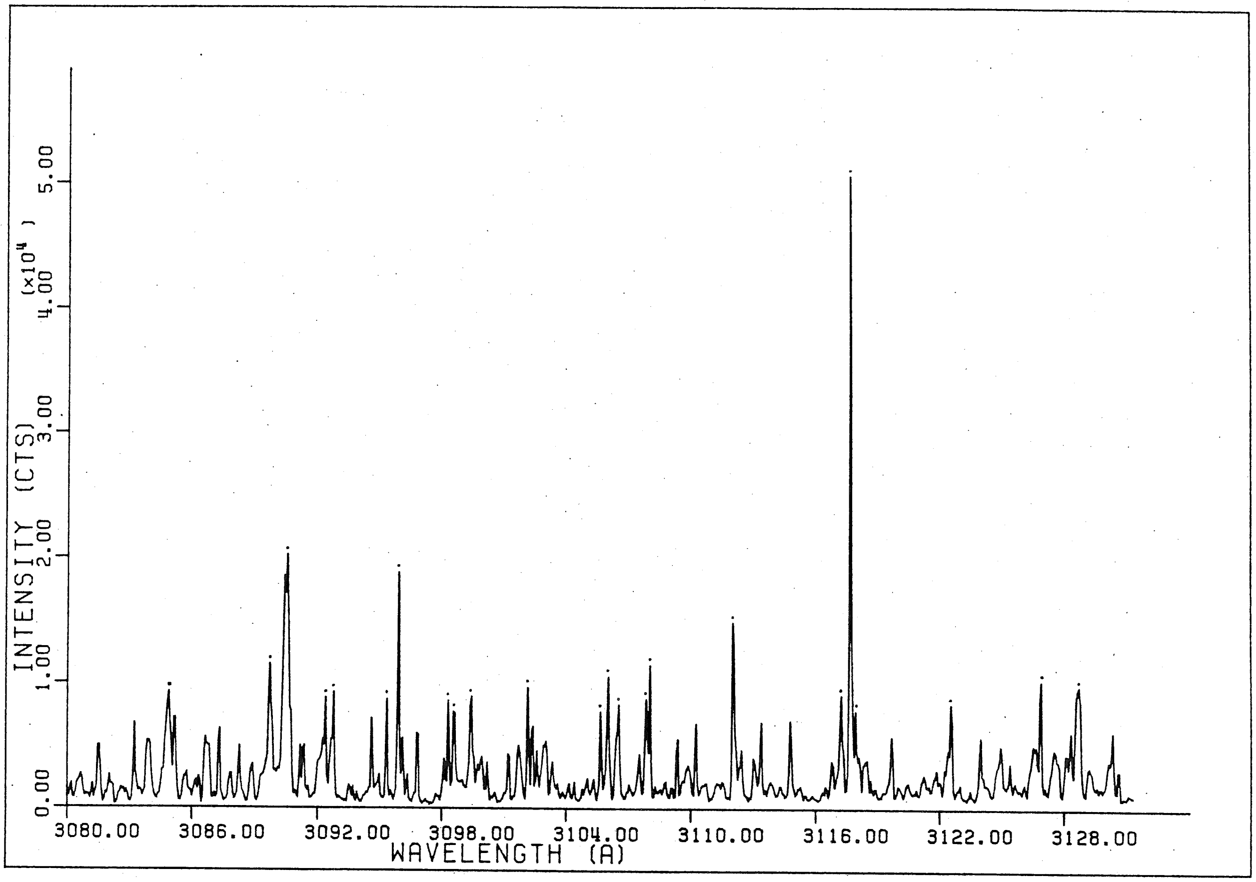
15.00
20.00
25.00
3030.00
3036.00
3042.00
3048.00
3054.00
3060.00
3066.00
3072.00
3078.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3084.8865 | 9284. |
| 3089.7336 | 11530. |
| 3090.5520 | 20231. |
| 3092.3777 | 8844. |
| 3092.7554 | 9275. |
| 3095.3362 | 8722. |
| 3095.9028 | 18788. |
| 3098.2949 | 8616. |
| 3098.5466 | 7734. |
| 3099.4280 | 8944. |
| 3102.1348 | 9648. |
| 3105.6599 | 7747. |
| 3106.0376 | 10502. |
| 3106.5413 | 8310. |
| 3107.8633 | 8745. |
| 3108.0520 | 11446. |
| 3112.0181 | 14882. |
| 3117.2429 | 9088. |
| 3117.6833 | 50646. |
| 3117.9353 | 7814. |
| 3122.5935 | 8372. |
| 3126.9370 | 10242. |
| 3128.7627 | 9841. |
| 3131.4338 | 6079. |
| 3133.1907 | 6147. |
| 3134.3203 | 8005. |
| 3135.3870 | 6486. |
| 3138.1479 | 20644. |
| 3142.4150 | 4754. |
| 3143.7954 | 4903. |
| 3144.9250 | 7455. |
| 3149.8196 | 5658. |
| 3151.6392 | 15304. |
| 3152.7688 | 13267. |
| 3154.2747 | 5451. |
| 3154.5256 | 4712. |
| 3158.5417 | 4792. |
| 3158.8555 | 4710. |
| 3160.0476 | 6169. |
| 3162.6204 | 4671. |
| 3163.7500 | 9911. |
| 3164.3147 | 5616. |
| 3165.0049 | 7972. |
| 3167.3267 | 4843. |
| 3170.3386 | 10102. |
| 3177.2412 | 6747. |


INTENSITY (CTS)
(x10⁴ )
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2.00
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4.00
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3098.00
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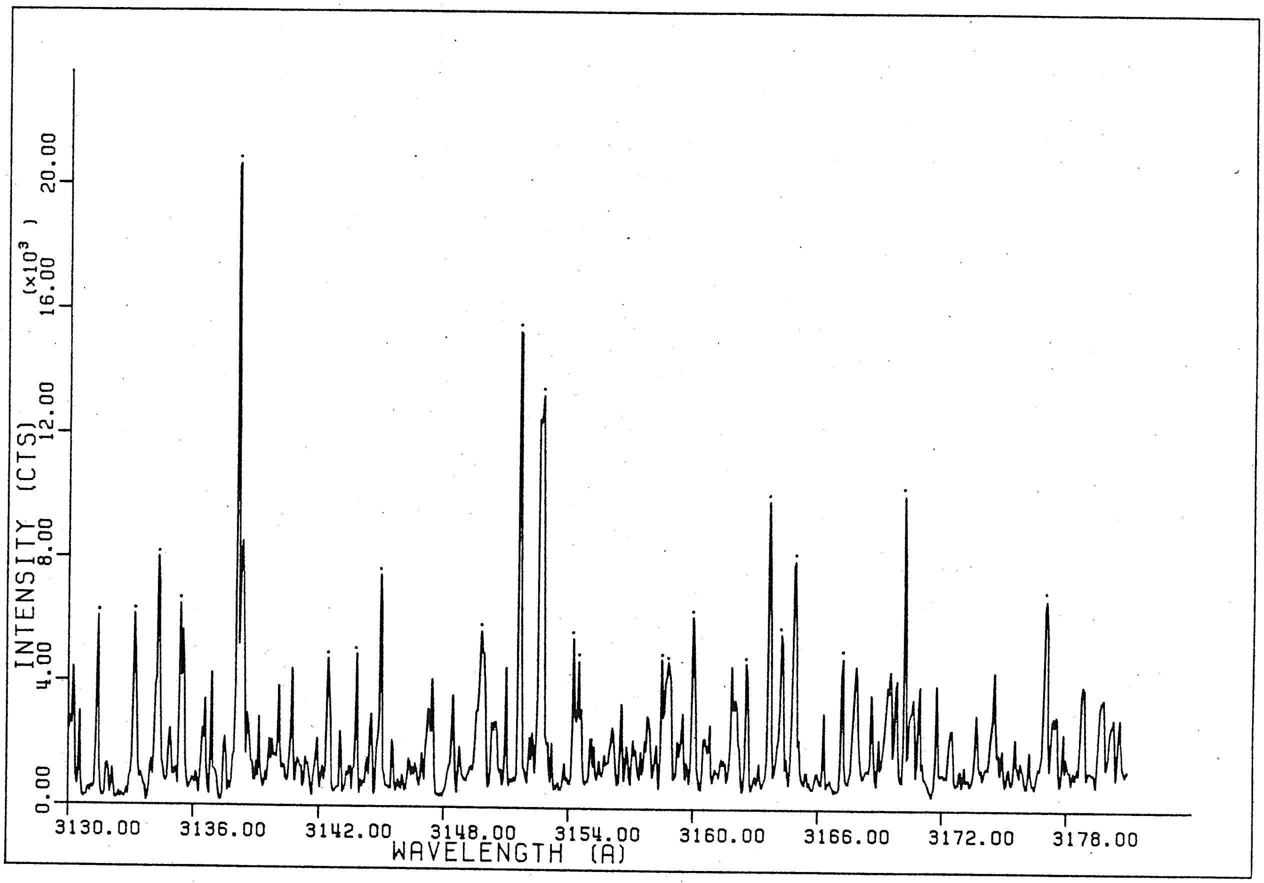
3110.00
3116.00
3122.00
3128.00
WAVELENGTH (A)


INTENSITY (CTS)
(x10³ )
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8.00
12.00
16.00
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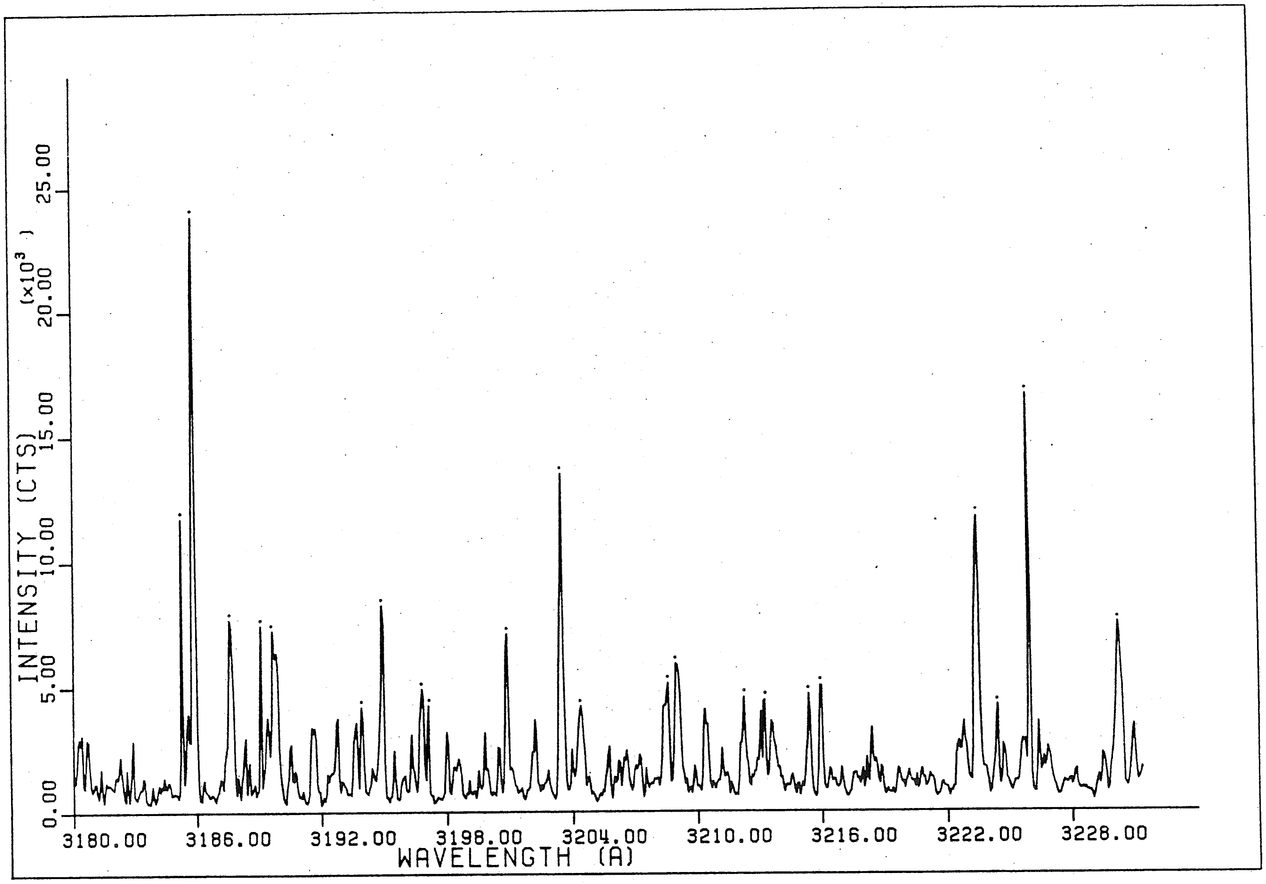
3136.00
3142.00
3148.00
3154.00
3160.00
3166.00
3172.00
3178.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3185.3010 | 11726. |
| 3185.9268 | 23825. |
| 3187.6162 | 7694. |
| 3189.1179 | 7462. |
| 3189.6809 | 7264. |
| 3193.9358 | 4191. |
| 3194.9368 | 8255. |
| 3196.8140 | 4918. |
| 3197.1267 | 4257. |
| 3200.8811 | 7106. |
| 3203.5090 | 13477. |
| 3204.3850 | 4214. |
| 3208.5771 | 5126. |
| 3208.9526 | 5898. |
| 3212.2061 | 4545. |
| 3213.2073 | 4418. |
| 3215.3347 | 4676. |
| 3215.8977 | 5002. |
| 3223.4063 | 11680. |
| 3224.3447 | 4232. |
| 3225.8464 | 16553. |
| 3230.1011 | 7508. |
| 3230.1204 | 6532. |
| 3235.9558 | 3964. |
| 3237.3833 | 5004. |
| 3239.1208 | 3426. |
| 3241.4785 | 8101. |
| 3243.6497 | 3700. |
| 3244.0837 | 5592. |
| 3246.3784 | 8059. |
| 3252.4543 | 5791. |
| 3252.7644 | 3912. |
| 3255.2434 | 10602. |
| 3255.5532 | 3447. |
| 3256.6685 | 6998. |
| 3259.8901 | 4853. |
| 3261.3149 | 5744. |
| 3263.1729 | 6158. |
| 3264.8450 | 3825. |
| 3265.5879 | 5493. |
| 3268.1882 | 3771. |
| 3268.9312 | 6596. |
| 3271.5308 | 7186. |
| 3275.6765 | 4128. |
| 3276.9758 | 3474. |
| 3279.6973 | 8047. |


INTENSITY (CTS) (x10³ )
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10.00
15.00
20.00
25.00
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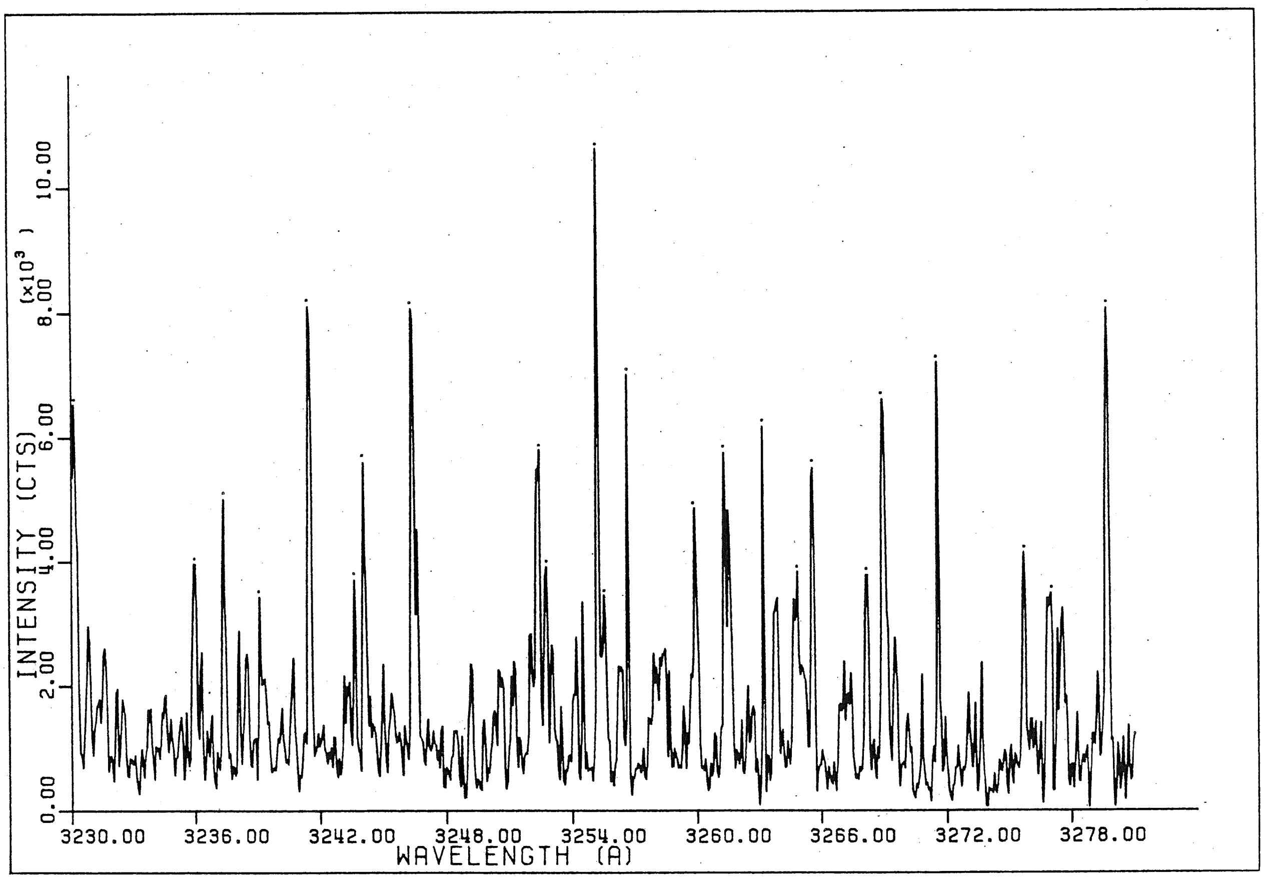
3198.00
3204.00
3210.00
3216.00
3222.00
3228.00
WAVELENGTH (A)


INTENSITY (CTS) (x10³ )
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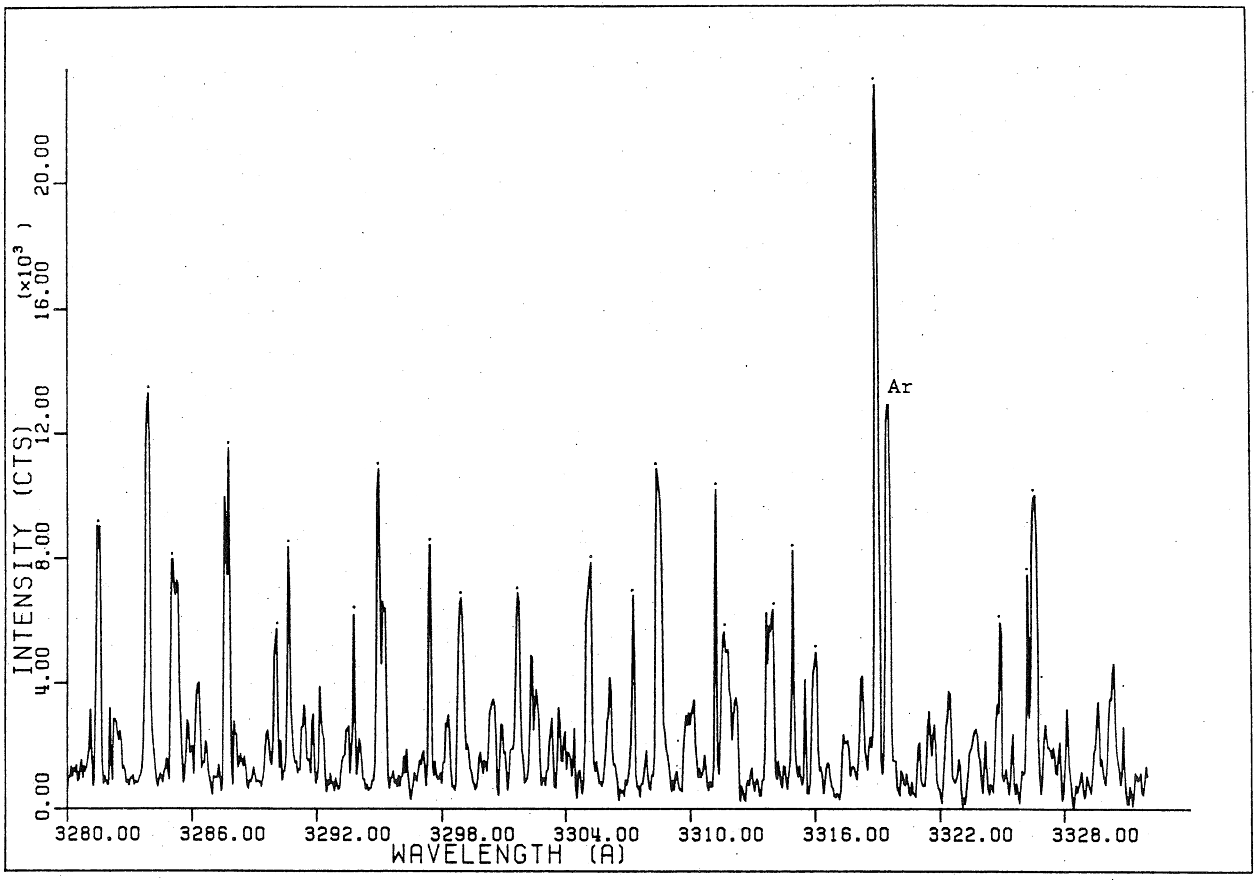
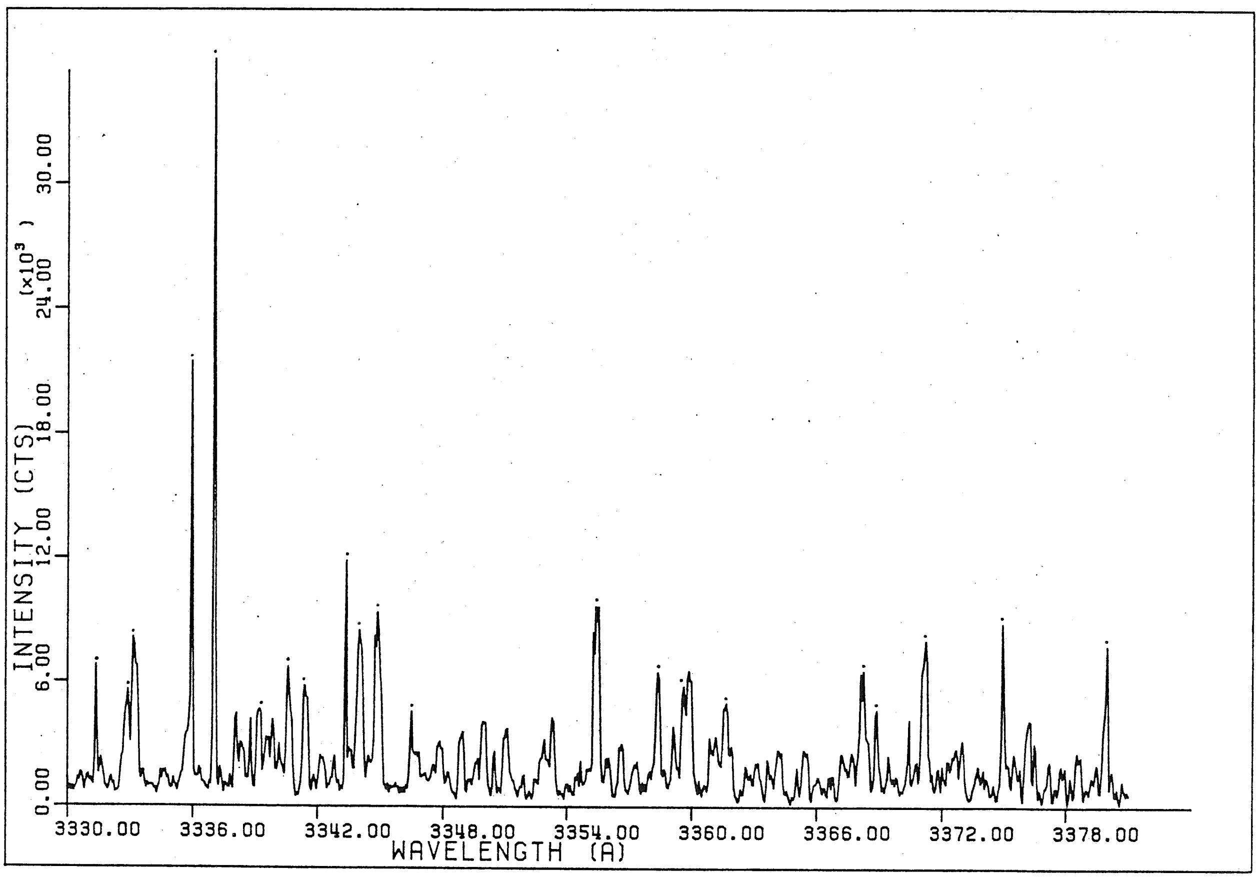
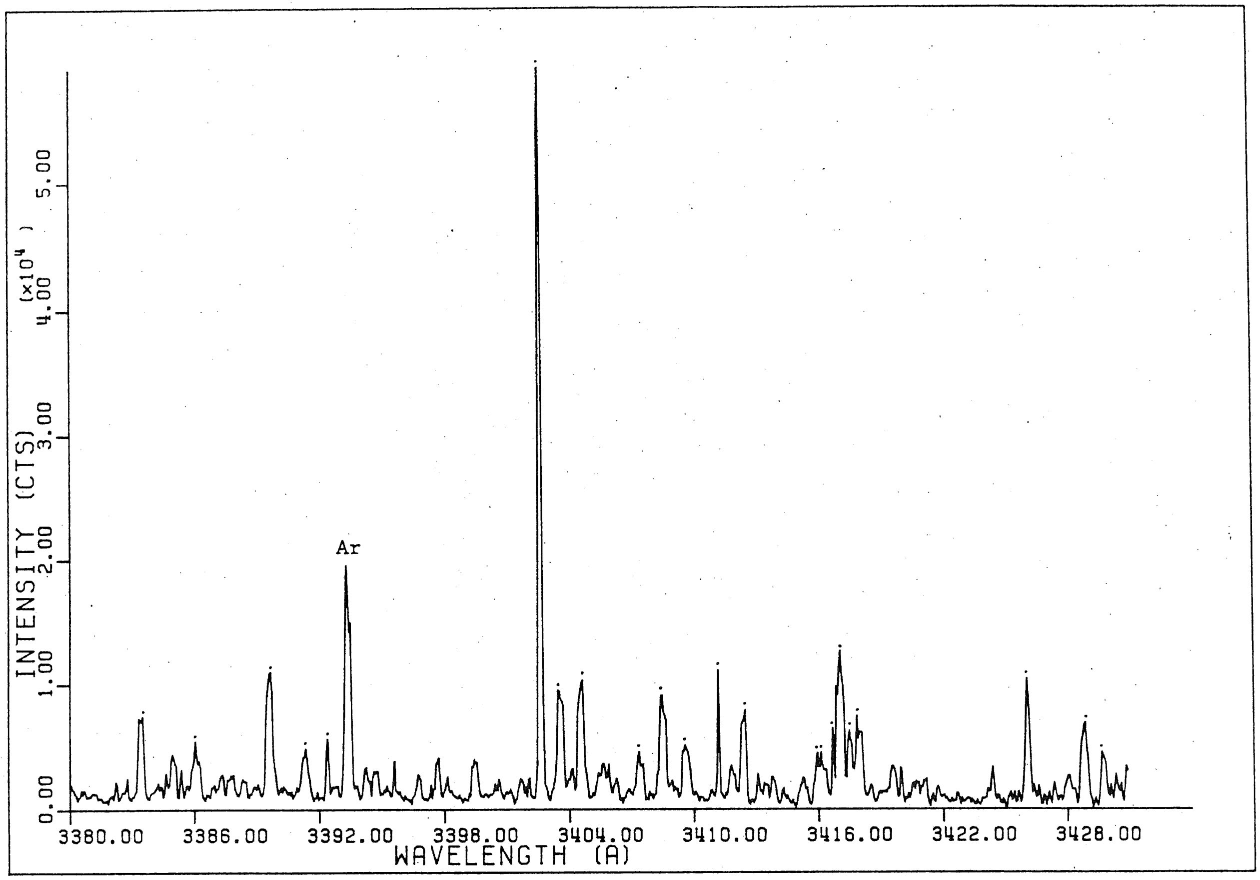
2.00
4.00
6.00
8.00
10.00
3230.00
3236.00
3242.00
3248.00
3254.00
3260.00
3266.00
3272.00
3278.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3281.4353 | 9036. |
| 3283.9214 | 13292. |
| 3285.0415 | 7959. |
| 3287.7837 | 11513. |
| 3290.0940 | 5723. |
| 3290.6565 | 8358. |
| 3293.7859 | 6165. |
| 3294.9768 | 10836. |
| 3297.4250 | 8411. |
| 3298.9336 | 6709. |
| 3301.7036 | 6876. |
| 3305.2373 | 7840. |
| 3307.2607 | 6791. |
| 3308.4001 | 10837. |
| 3311.2524 | 10183. |
| 3311.6333 | 5624. |
| 3313.6658 | 6237. |
| 3314.9377 | 8224. |
| 3316.0195 | 4968. |
| 3318.9514 | 23051. |
| 3319.5256 | 12898. |
| 3324.8972 | 5911. |
| 3326.2432 | 7442. |
| 3326.6279 | 9992. |
| 3331.3696 | 6790. |
| 3332.9182 | 5599. |
| 3333.1660 | 8135. |
| 3335.9539 | 21424. |
| 3337.0688 | 35977. |
| 3339.2373 | 4665. |
| 3340.6001 | 6719. |
| 3341.4055 | 5813. |
| 3343.3879 | 11853. |
| 3344.0073 | 8477. |
| 3344.8748 | 9352. |
| 3346.4854 | 4568. |
| 3355.4063 | 9665. |
| 3358.3796 | 6482. |
| 3359.6187 | 5788. |
| 3361.6631 | 4999. |
| 3368.2297 | 6546. |
| 3368.8494 | 4654. |
| 3371.2034 | 8021. |
| 3374.9204 | 8834. |
| 3379.9382 | 7769. |

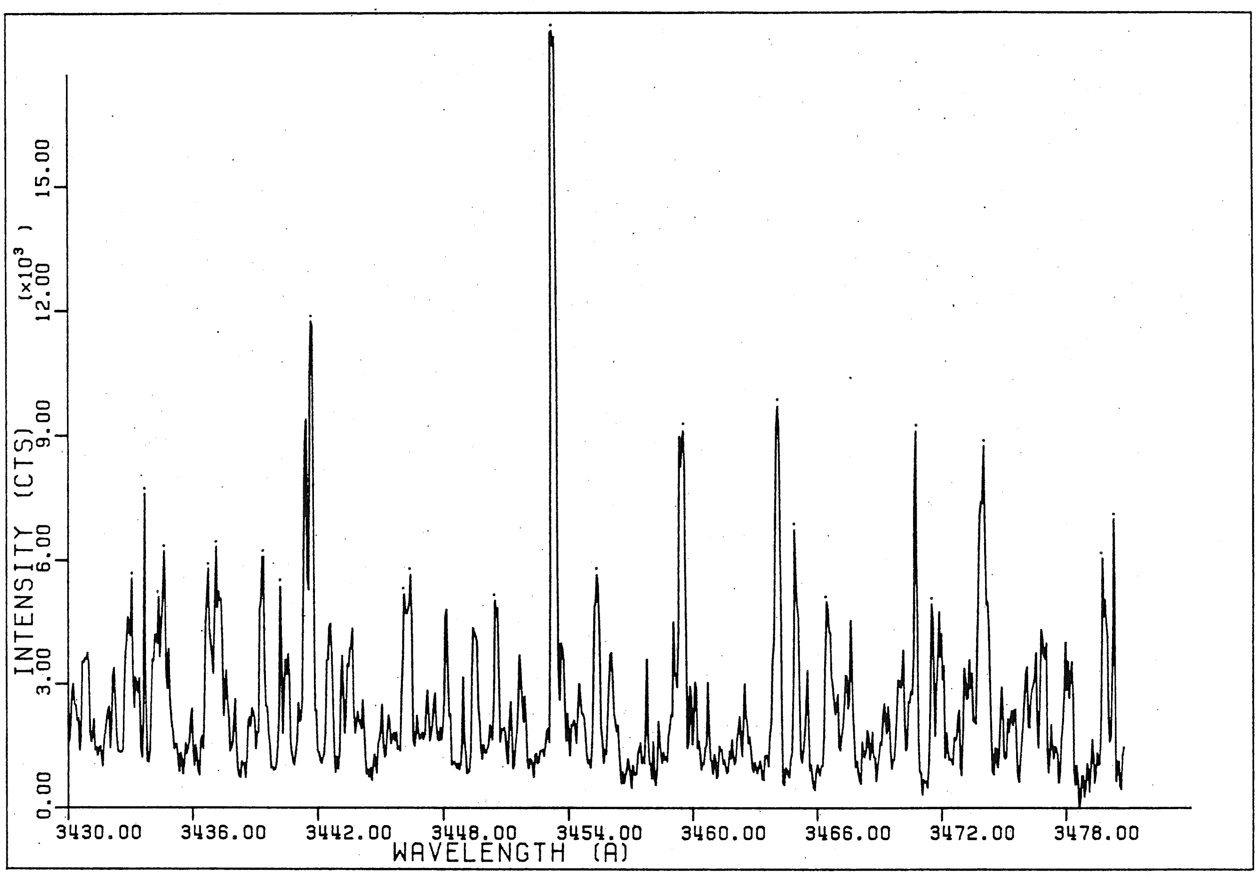

INTENSITY (CTS) (×10³ )
0.00
4.00
8.00
12.00
16.00
20.00
Ar
3280.00
3286.00
3292.00
3298.00
3304.00
3310.00
3316.00
3322.00
3328.00
WAVELENGTH (A)


INTENSITY (CTS) (×10³ )
0.00
6.00
12.00
18.00
24.00
30.00
3330.00
3336.00
3342.00
3348.00
3354.00
3360.00
3366.00
3372.00
3378.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3383.5142 | 7399. |
| 3386.0461 | 5435. |
| 3389.6892 | 10962. |
| 3391.3564 | 4832. |
| 3392.4063 | 5622. |
| 3393.3325 | 19524. |
| 3402.6567 | 59115. |
| 3403.4595 | 9466. |
| 3404.6328 | 10263. |
| 3407.3499 | 4538. |
| 3408.4612 | 9063. |
| 3409.5728 | 5060. |
| 3411.1782 | 11075. |
| 3412.4751 | 7849. |
| 3415.9331 | 4447. |
| 3416.1182 | 4512. |
| 3416.6741 | 6404. |
| 3417.0444 | 12583. |
| 3417.4768 | 6222. |
| 3417.8472 | 7399. |
| 3426.0601 | 10354. |
| 3428.8389 | 6846. |
| 3429.6416 | 4505. |
| 3433.0781 | 5559. |
| 3433.6936 | 7595. |
| 3434.3706 | 5104. |
| 3434.6169 | 6219. |
| 3436.7712 | 5802. |
| 3437.1404 | 6320. |
| 3439.4177 | 6087. |
| 3440.2180 | 5364. |
| 3441.6951 | 11749. |
| 3446.1267 | 5176. |
| 3446.4346 | 5648. |
| 3450.4968 | 5023. |
| 3453.2666 | 18759. |
| 3455.3591 | 5647. |
| 3459.5447 | 9109. |
| 3464.0994 | 9695. |
| 3464.8994 | 6730. |
| 3466.4382 | 4985. |
| 3470.7468 | 9092. |
| 3471.4854 | 4929. |
| 3474.0088 | 8742. |
| 3479.7332 | 6041. |
| 3480.2871 | 6988. |

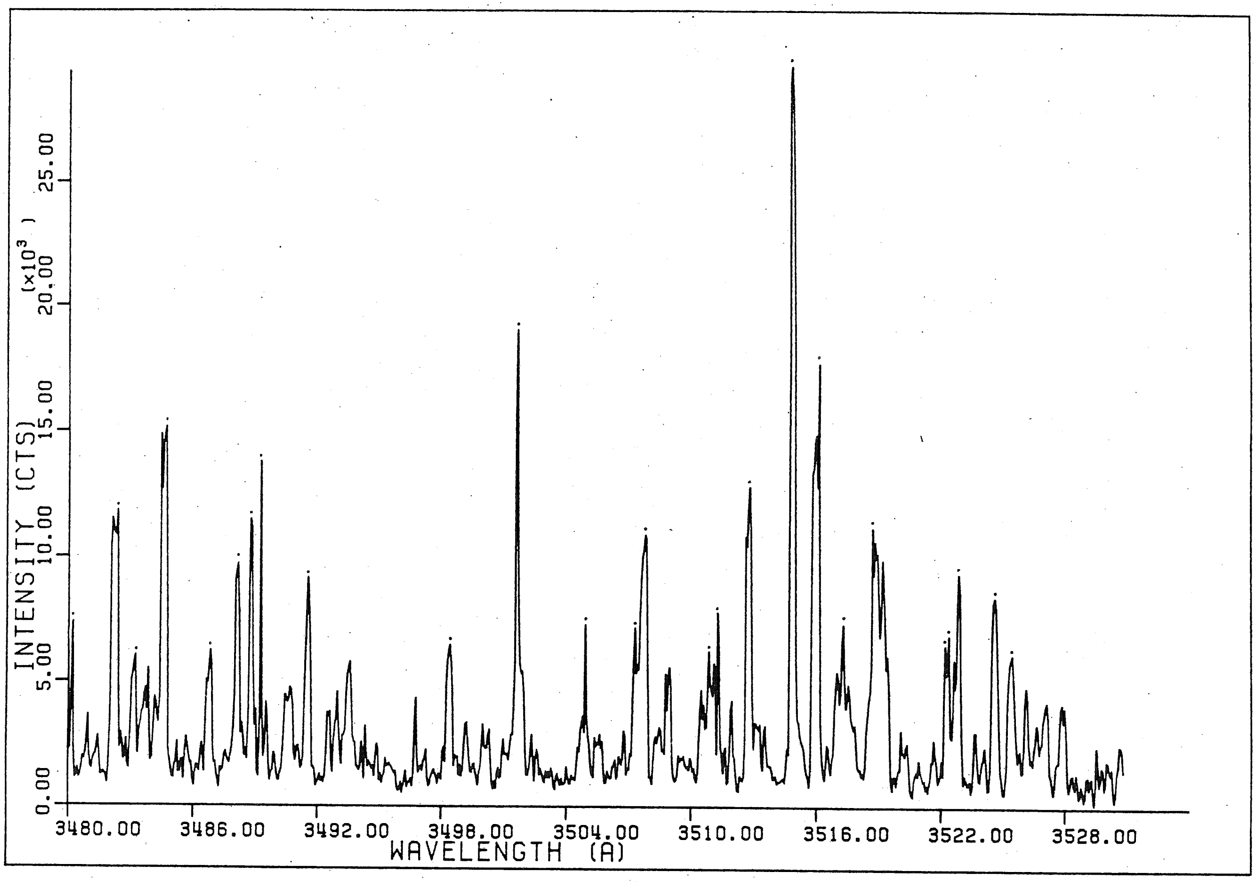


Ar
INTENSITY (CTS)
(x10⁴ )
0.00
1.00
2.00
3.00
4.00
5.00
3380.00
3386.00
3392.00
3398.00
3404.00
3410.00
3416.00
3422.00
3428.00
WAVELENGTH (A)

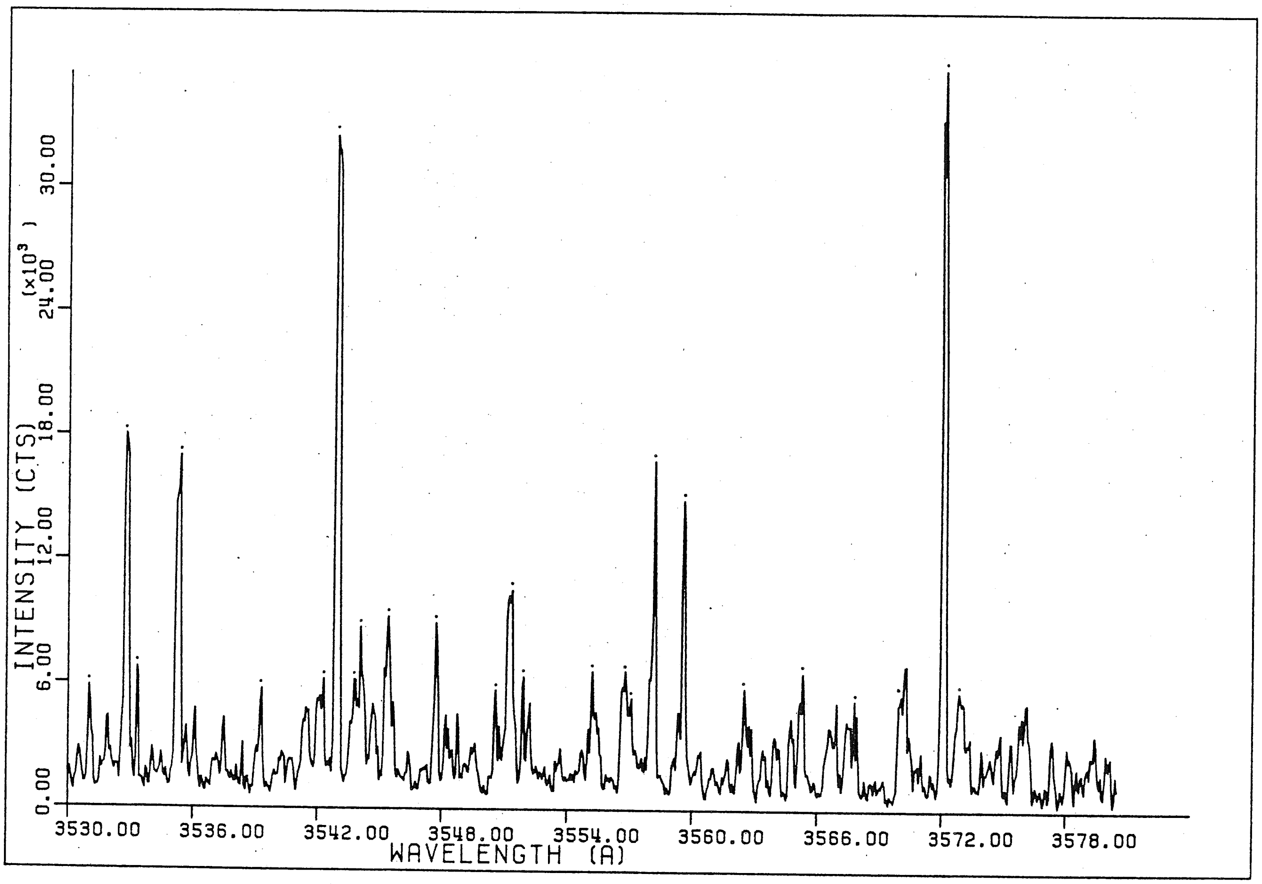



INTENSITY (CTS)
(x10³ )
0.00
3.00
6.00
9.00
12.00
15.00
3430.00
3436.00
3442.00
3448.00
3454.00
3460.00
3466.00
3472.00
3478.00
WAVELENGTH (A)

| $\lambda$(Å) | I |
|---|---|
| 3480.2119 | 7369. |
| 3482.3591 | 11831. |
| 3483.2180 | 6036. |
| 3484.6904 | 15156. |
| 3486.8376 | 6236. |
| 3488.1873 | 9712. |
| 3488.8008 | 11481. |
| 3489.2915 | 13789. |
| 3491.5615 | 9155. |
| 3498.4329 | 6470. |
| 3501.6843 | 19021. |
| 3504.9358 | 7293. |
| 3507.3286 | 7164. |
| 3507.8193 | 10892. |
| 3510.8867 | 6237. |
| 3511.3162 | 7790. |
| 3512.8501 | 12811. |
| 3514.8745 | 29727. |
| 3516.1628 | 17699. |
| 3517.3286 | 7318. |
| 3518.7397 | 11176. |
| 3522.2366 | 6480. |
| 3522.4207 | 6877. |
| 3522.9114 | 9340. |
| 3524.6292 | 8398. |
| 3525.4880 | 6095. |
| 3531.0054 | 5842. |
| 3532.7700 | 18020. |
| 3533.3176 | 6752. |
| 3535.3865 | 16995. |
| 3539.3411 | 5755. |
| 3542.1394 | 5398. |
| 3542.8694 | 32406. |
| 3543.7820 | 6209. |
| 3544.0859 | 8719. |
| 3545.4241 | 9243. |
| 3547.7354 | 8924. |
| 3550.5938 | 5729. |
| 3551.3843 | 10520. |
| 3551.9314 | 6357. |
| 3555.2151 | 6635. |
| 3556.7957 | 6650. |
| 3557.0999 | 5353. |
| 3558.1941 | 16816. |
| 3559.5923 | 14897. |
| 3562.5103 | 5826. |
| 3565.3062 | 6585. |
| 3567.7981 | 5279. |
| 3570.0464 | 5502. |
| 3572.1125 | 35685. |
| 3572.8418 | 5685. |

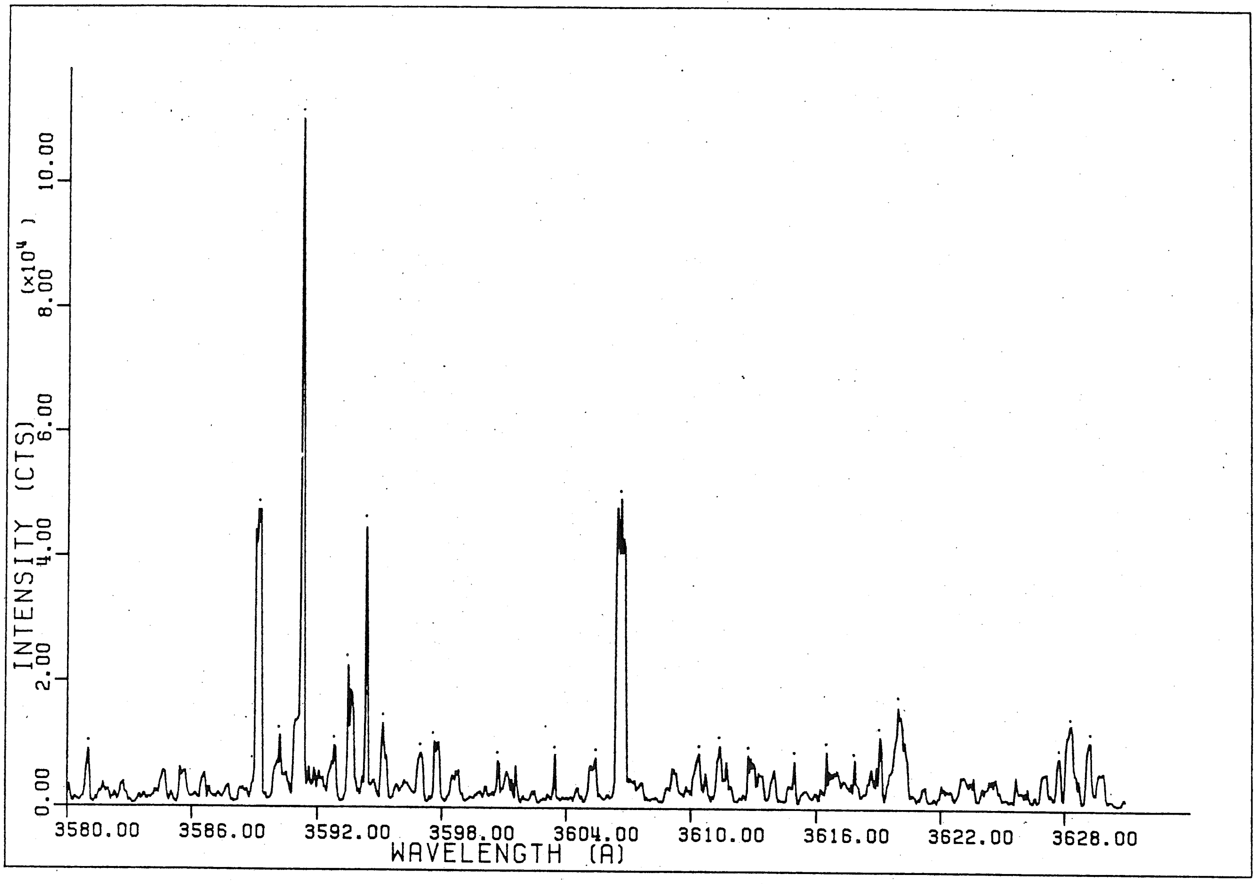


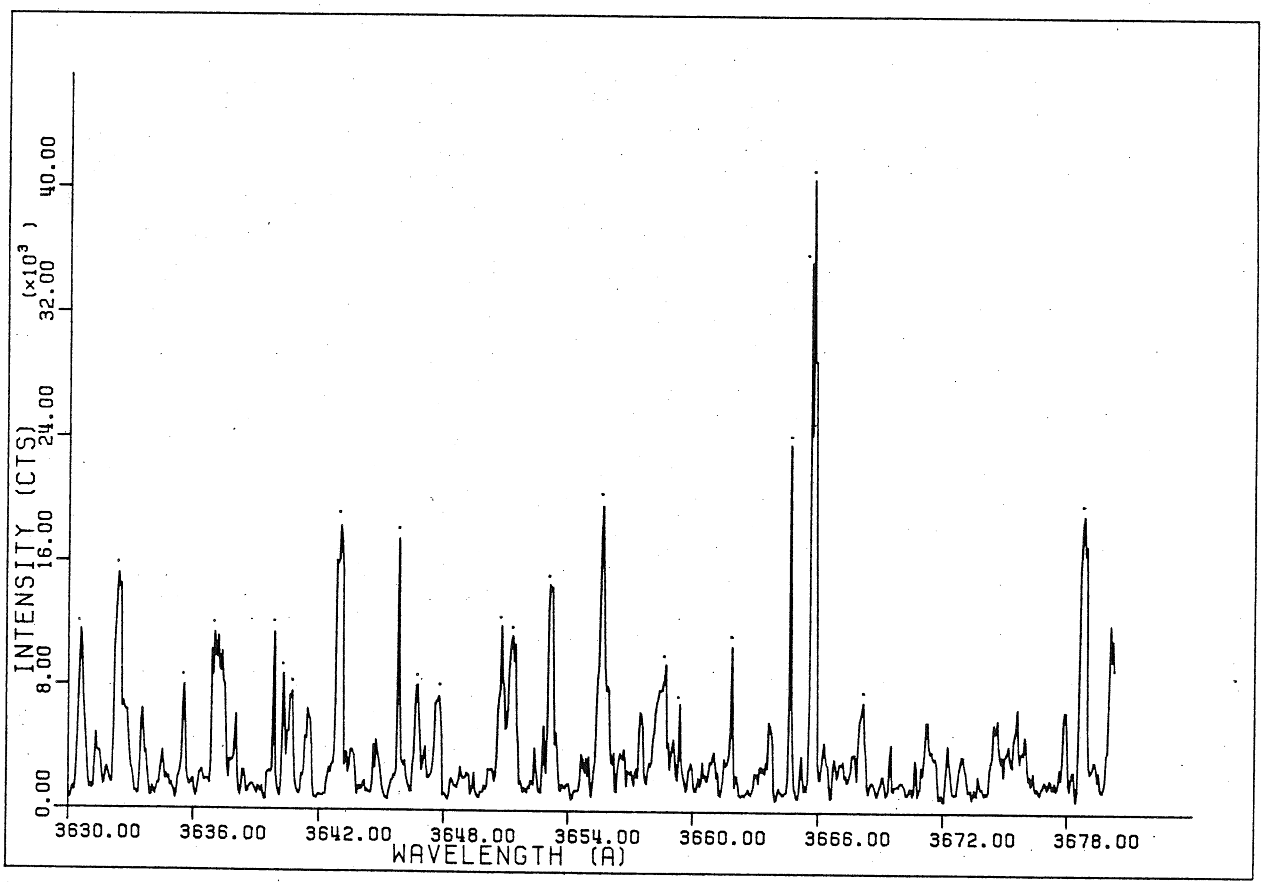
INTENSITY (CTS) (x10³)
0.00
5.00
10.00
15.00
20.00
25.00
3480.00
3486.00
3492.00
3498.00
3504.00
3510.00
3516.00
3522.00
3528.00
WAVELENGTH (A)

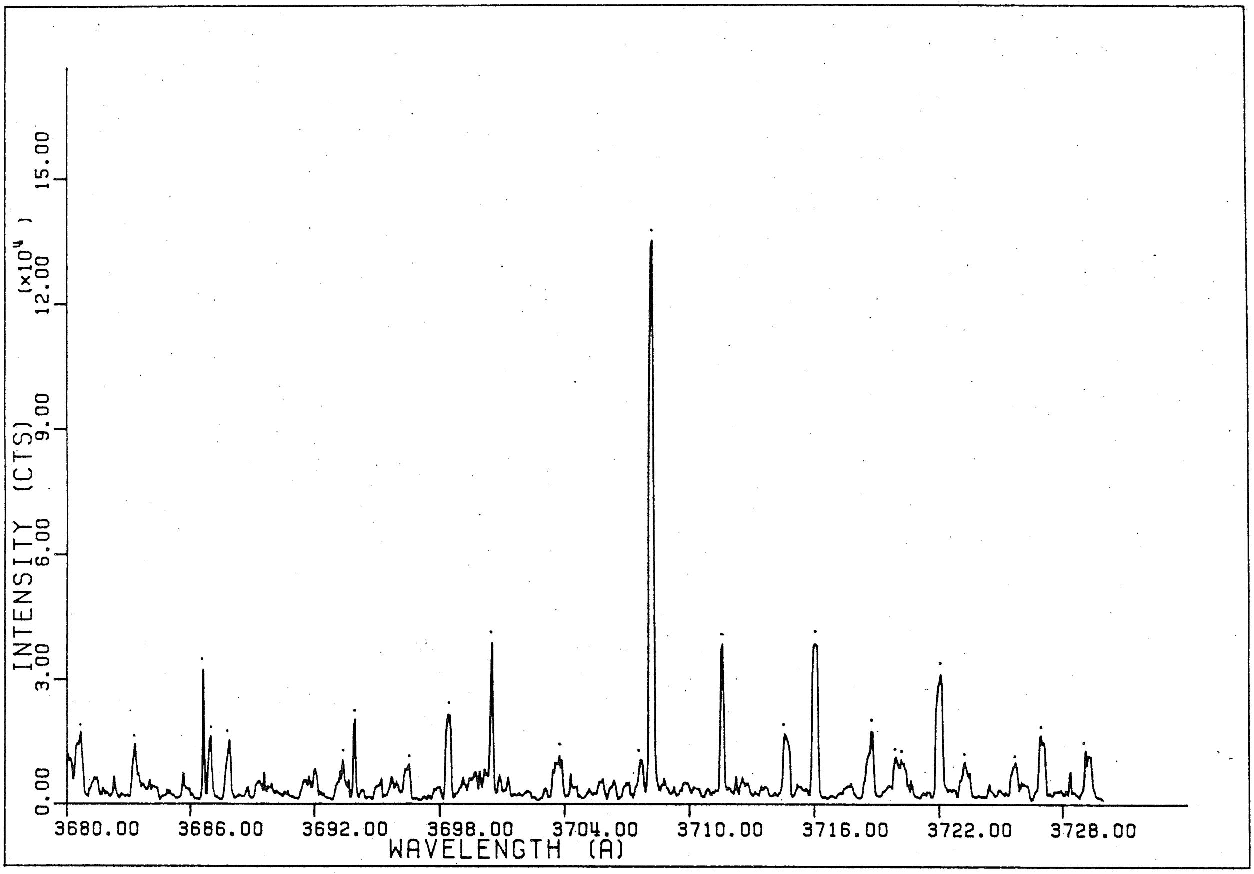
INTENSITY (CTS) (x10³)
0.00
6.00
12.00
18.00
24.00
30.00
3530.00
3536.00
3542.00
3548.00
3554.00
3560.00
3566.00
3572.00
3578.00
WAVELENGTH (A)

| $\lambda$(Å) | I |
|---|---|
| 3581.0027 | 9076. |
| 3589.1633 | 47425. |
| 3590.1987 | 11403. |
| 3591.2949 | 110141. |
| 3592.8174 | 9810. |
| 3593.4873 | 22522. |
| 3594.3398 | 44546. |
| 3595.1316 | 13367. |
| 3596.9585 | 8660. |
| 3597.6284 | 10504. |
| 3600.6733 | 7427. |
| 3603.4138 | 8510. |
| 3605.3628 | 7975. |
| 3606.5808 | 49392. |
| 3610.2957 | 8713. |
| 3611.2700 | 9932. |
| 3612.6099 | 8451. |
| 3614.8022 | 7519. |
| 3616.3247 | 9099. |
| 3617.6646 | 7808. |
| 3618.8826 | 11450. |
| 3619.7351 | 16105. |
| 3627.4084 | 8290. |
| 3627.9565 | 13498. |
| 3628.8093 | 10813. |
| 3630.5996 | 11514. |
| 3632.4207 | 15202. |
| 3635.5771 | 7974. |
| 3637.0339 | 11374. |
| 3639.8867 | 11397. |
| 3640.3118 | 8743. |
| 3640.7366 | 7617. |
| 3643.0432 | 18326. |
| 3645.8354 | 17518. |
| 3646.7458 | 8056. |
| 3647.7778 | 7346. |
| 3650.8127 | 11888. |
| 3651.3591 | 11257. |
| 3653.1194 | 14585. |
| 3655.6687 | 19719. |
| 3658.7039 | 9469. |
| 3659.3716 | 6933. |
| 3661.8601 | 10639. |
| 3664.6523 | 23656. |
| 3665.6235 | 35299. |
| 3665.7449 | 40647. |
| 3668.1729 | 7078. |
| 3678.7954 | 19208. |

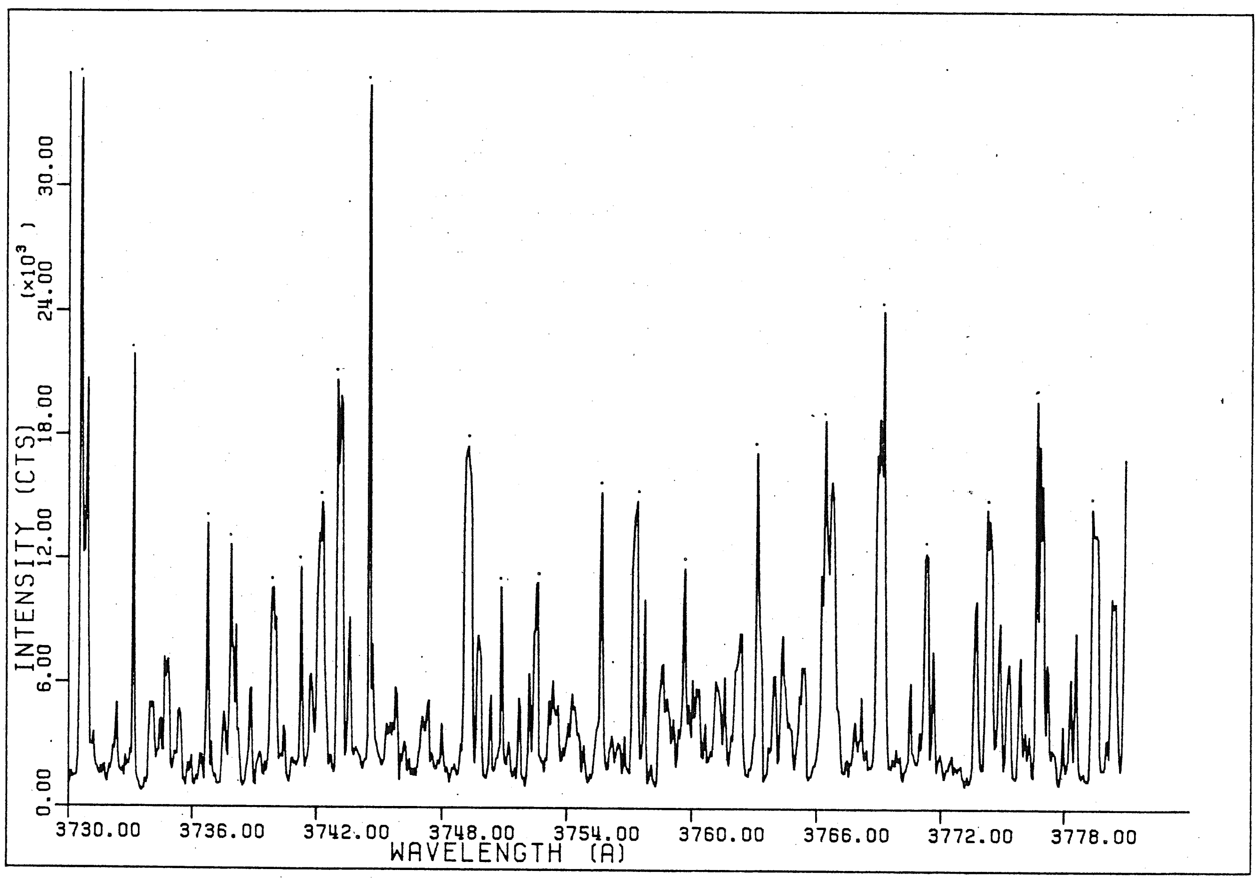

INTENSITY (CTS)
(x10⁴ )
0.00
2.00
4.00
6.00
8.00
10.00
3580.00
3586.00
3592.00
3598.00
3604.00
3610.00
3616.00
3622.00
3628.00
WAVELENGTH (A)


INTENSITY (CTS)
(x10³ )
0.00
8.00
16.00
24.00
32.00
40.00
3630.00
3636.00
3642.00
3648.00
3654.00
3660.00
3666.00
3672.00
3678.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3680.4995 | 17429. |
| 3683.1594 | 14351. |
| 3686.4841 | 32338. |
| 3686.8469 | 16277. |
| 3687.7537 | 15441. |
| 3693.2546 | 10513. |
| 3693.8591 | 20312. |
| 3696.4585 | 9542. |
| 3698.3323 | 21484. |
| 3700.4482 | 38746. |
| 3703.7124 | 11555. |
| 3707.6416 | 10704. |
| 3708.2461 | 135109. |
| 3711.6313 | 38442. |
| 3714.6538 | 16834. |
| 3716.1047 | 38513. |
| 3718.8250 | 17539. |
| 3720.0339 | 11386. |
| 3720.2756 | 10697. |
| 3722.2102 | 31129. |
| 3723.4192 | 10196. |
| 3725.8975 | 10014. |
| 3727.1670 | 16571. |
| 3729.3433 | 12950. |
| 3730.6179 | 35129. |
| 3733.2087 | 21877. |
| 3736.8237 | 13678. |
| 3737.9685 | 12673. |
| 3740.0168 | 10592. |
| 3741.3423 | 11584. |
| 3742.3667 | 14715. |
| 3743.0896 | 20652. |
| 3744.6563 | 34810. |
| 3749.2954 | 17428. |
| 3750.8618 | 10646. |
| 3752.6091 | 10872. |
| 3755.6216 | 15219. |
| 3757.3086 | 14817. |
| 3759.5378 | 11560. |
| 3762.9119 | 17156. |
| 3765.9243 | 11240. |
| 3768.8164 | 24020. |
| 3770.8047 | 12319. |
| 3773.6365 | 14439. |
| 3775.9861 | 19675. |
| 3778.5166 | 14491. |

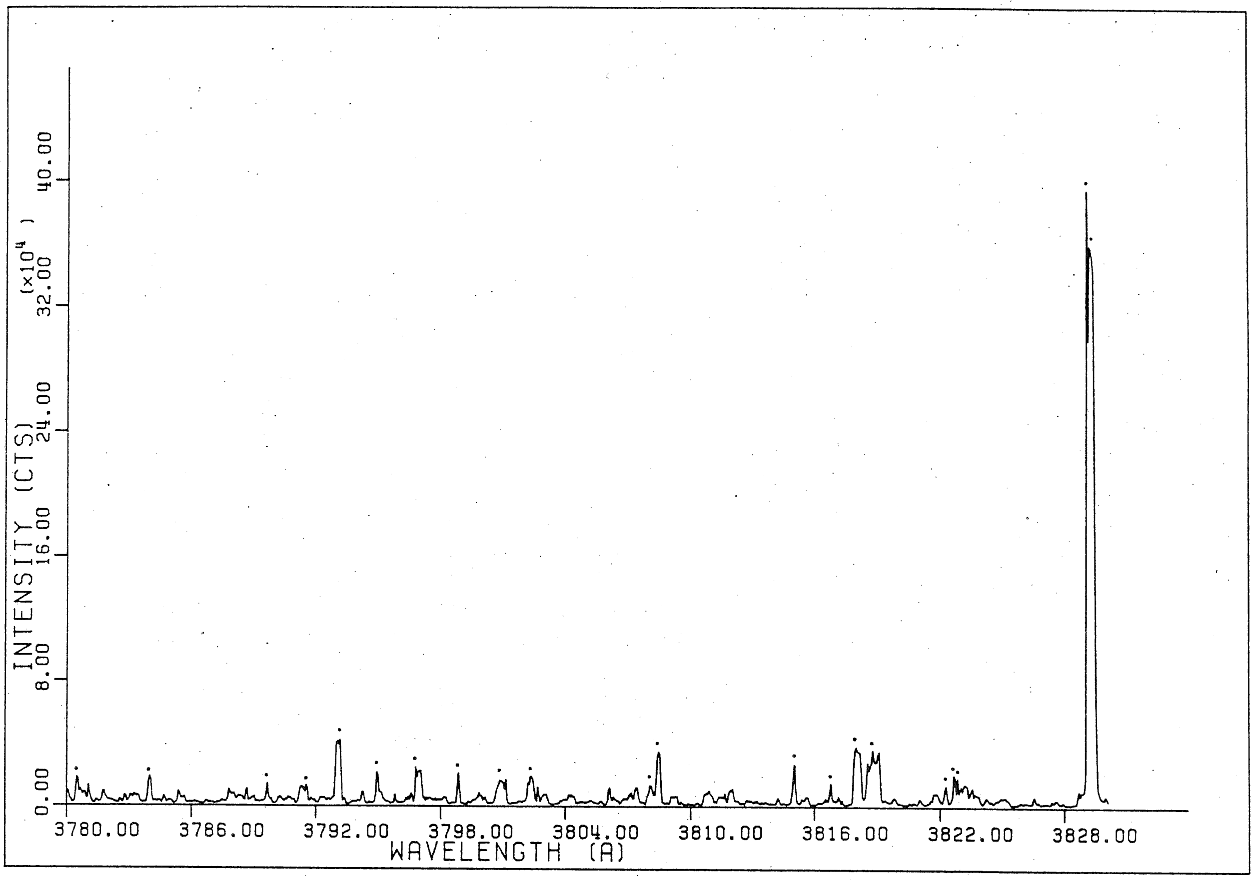


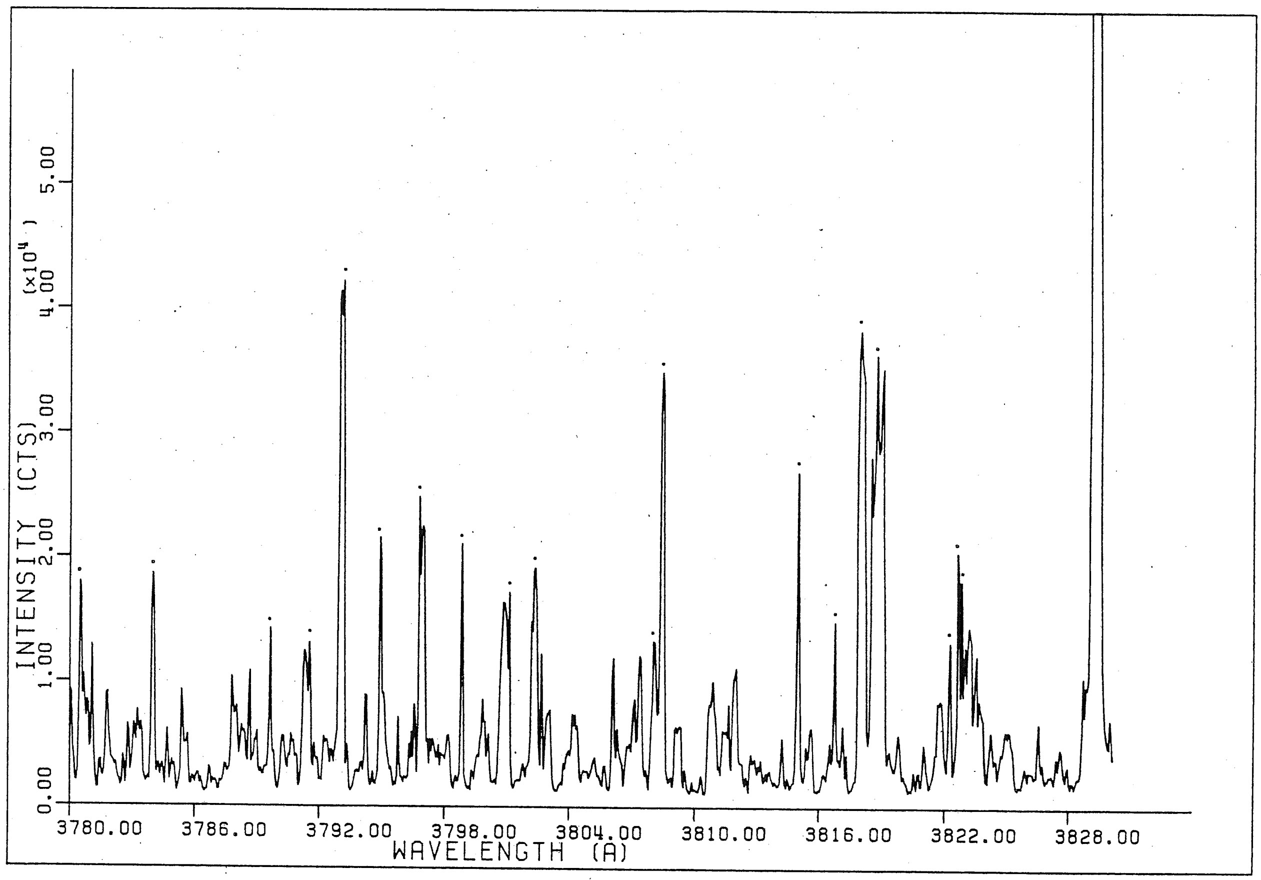
INTENSITY (CTS)
(x10⁴ )
0.00
3.00
6.00
9.00
12.00
15.00
3680.00
3686.00
3692.00
3698.00
3704.00
3710.00
3716.00
3722.00
3728.00
WAVELENGTH (A)

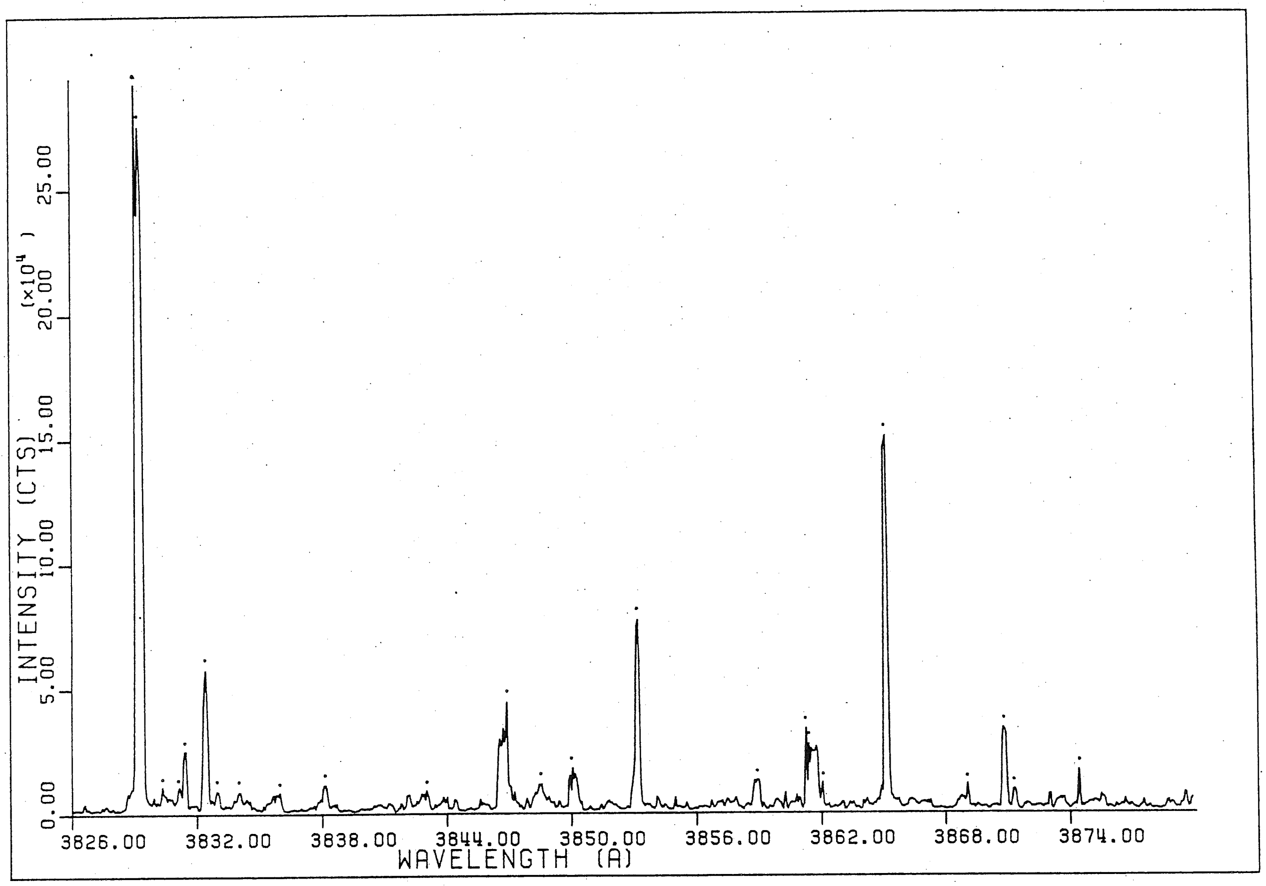
INTENSITY (CTS)
(x10³ )
0.00
6.00
12.00
18.00
24.00
30.00
3730.00
3736.00
3742.00
3748.00
3754.00
3760.00
3766.00
3772.00
3778.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3780.4980 | 17950. |
| 3784.0044 | 18660. |
| 3789.6748 | 14273. |
| 3791.5361 | 13138. |
| 3793.1689 | 42204. |
| 3794.9224 | 21582. |
| 3796.7974 | 24837. |
| 3798.8540 | 21095. |
| 3800.8572 | 16379. |
| 3802.3928 | 19166. |
| 3808.0310 | 13305. |
| 3808.4482 | 34880. |
| 3815.0337 | 26896. |
| 3816.7795 | 14896. |
| 3817.9858 | 38223. |
| 3818.7710 | 36274. |
| 3822.2837 | 13224. |
| 3822.6479 | 20454. |
| 3823.1946 | 14471. |
| 3829.1118 | 394933. |
| 3829.2344 | 359454. |

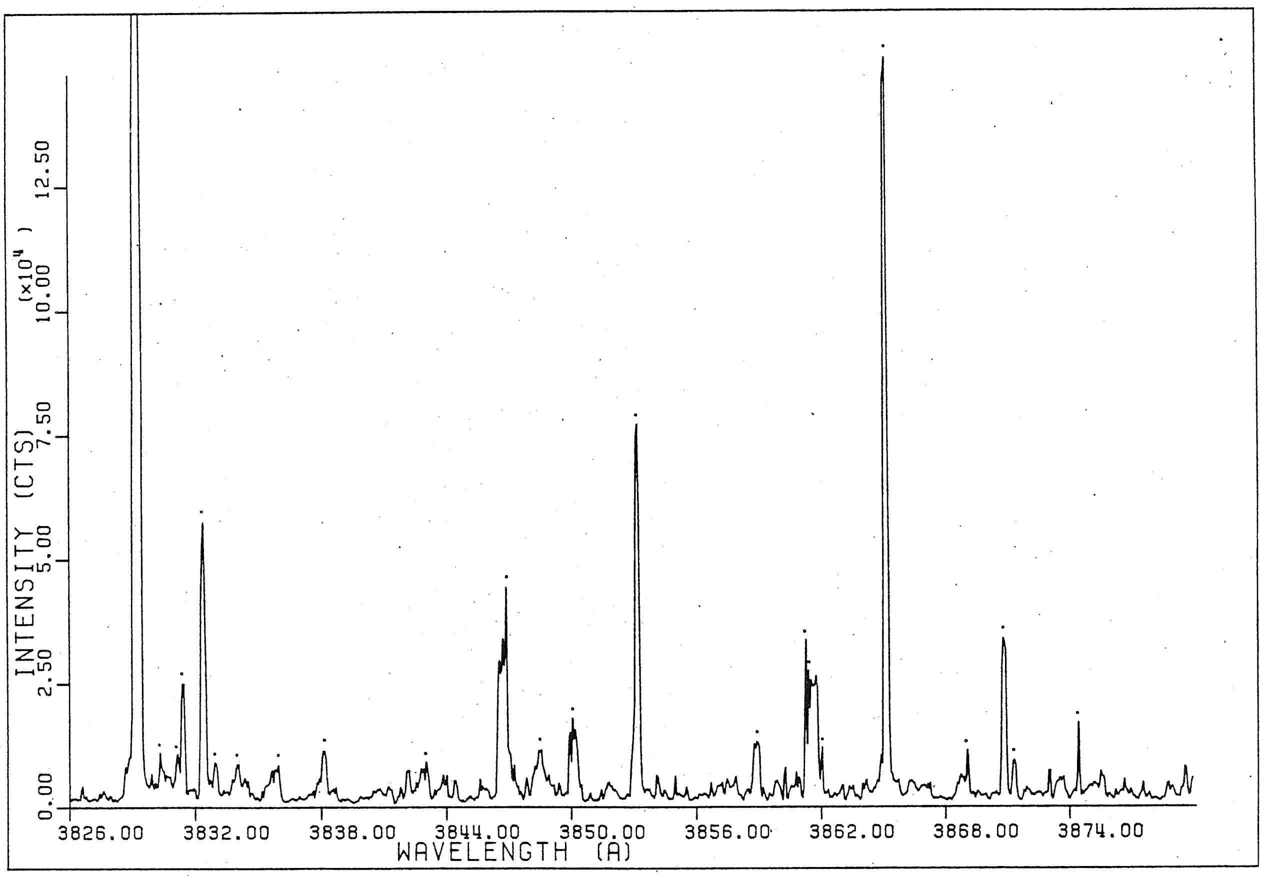

INTENSITY (CTS)
(x10⁴ )
0.00
8.00
16.00
24.00
32.00
40.00
3780.00
3786.00
3792.00
3798.00
3804.00
3810.00
3816.00
3822.00
3828.00
WAVELENGTH (A)


INTENSITY (CTS)
(x10⁴ )
0.00
1.00
2.00
3.00
4.00
5.00
3780.00
3786.00
3792.00
3798.00
3804.00
3810.00
3816.00
3822.00
3828.00
WAVELENGTH (A)

| $\lambda$(Å) | I |
|---|---|
| 3829.1121 | 292684. |
| 3829.2893 | 275531. |
| 3830.3530 | 11061. |
| 3831.1807 | 10745. |
| 3831.4170 | 24987. |
| 3832.4221 | 57450. |
| 3832.9541 | 9075. |
| 3834.0776 | 8688. |
| 3835.9705 | 8495. |
| 3838.1003 | 11360. |
| 3843.0139 | 9157. |
| 3846.9238 | 44233. |
| 3848.5833 | 11478. |
| 3850.0652 | 17906. |
| 3853.2080 | 76994. |
| 3858.9048 | 13105. |
| 3861.2800 | 33666. |
| 3861.3987 | 27498. |
| 3862.0520 | 11997. |
| 3865.2009 | 150496. |
| 3869.0647 | 11369. |
| 3870.7893 | 33856. |
| 3871.3245 | 9330. |
| 3874.4182 | 16965. |



INTENSITY (CTS) (×10⁴ )
0.00
5.00
10.00
15.00
20.00
25.00
3826.00
3832.00
3838.00
3844.00
3850.00
3856.00
3862.00
3868.00
3874.00
WAVELENGTH (A)

INTENSITY (CTS) (×10⁴ )
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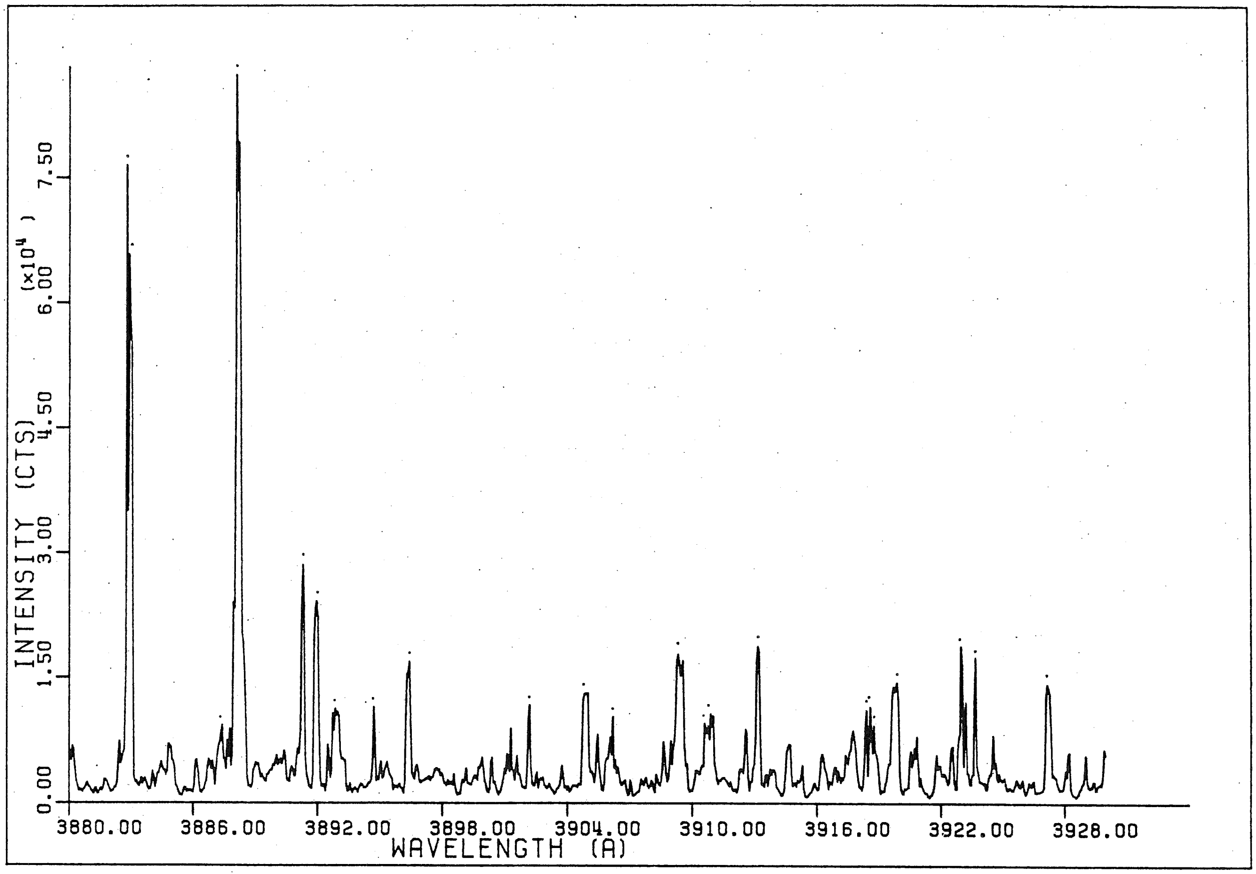
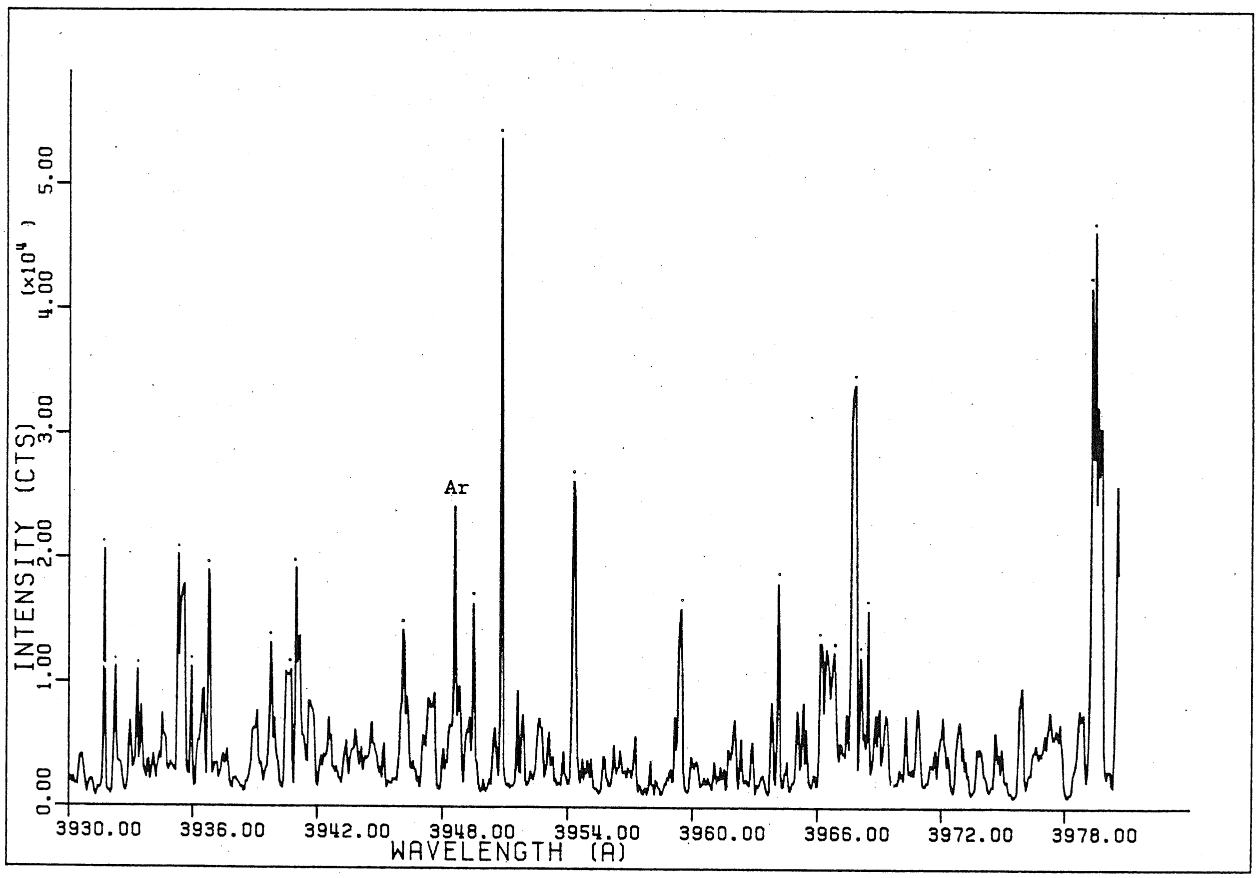
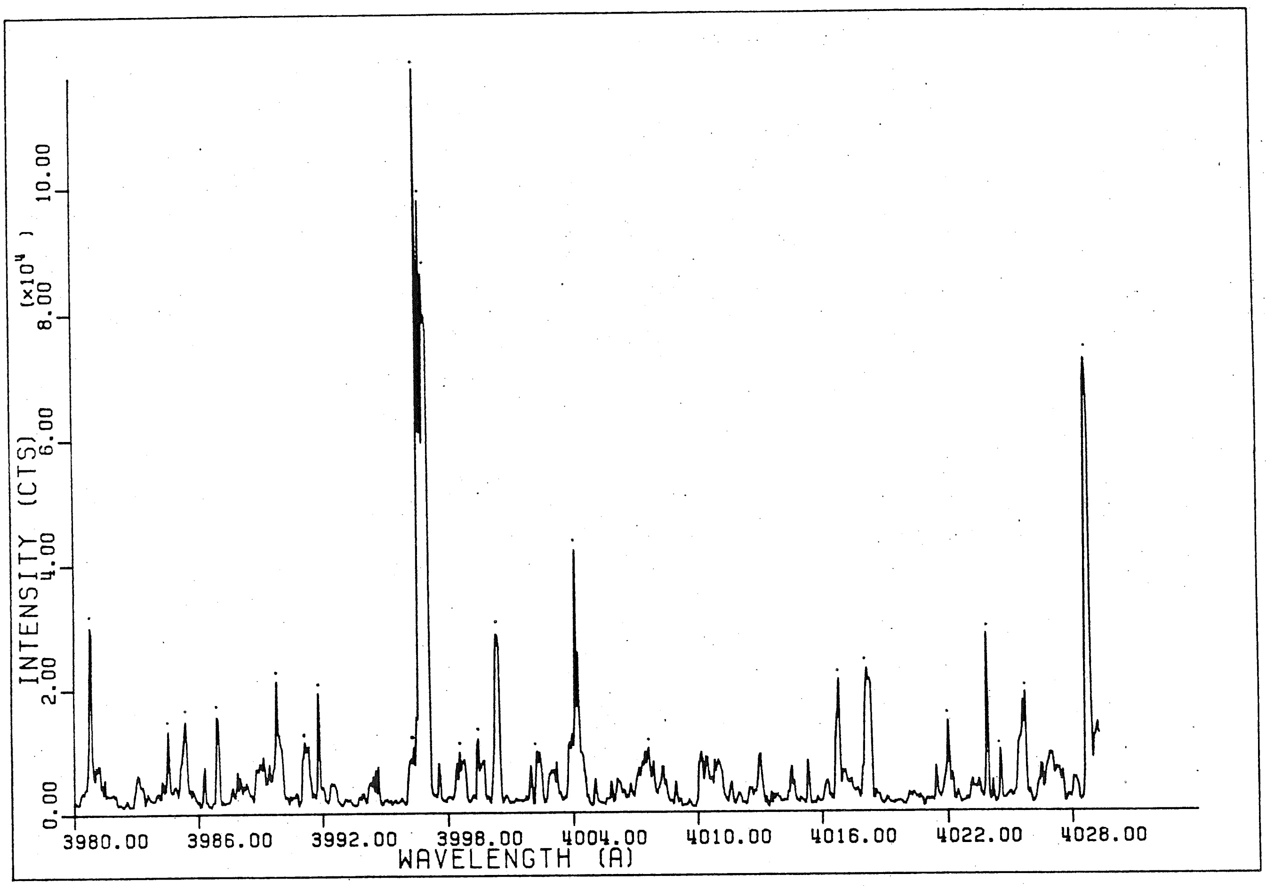
2.50
5.00
7.50
10.00
12.50
3826.00
3832.00
3838.00
3844.00
3850.00
3856.00
3862.00
3868.00
3874.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3882.7944 | 76503. |
| 3882.9136 | 65765. |
| 3887.4392 | 9308. |
| 3888.1538 | 87497. |
| 3891.3101 | 28518. |
| 3891.9651 | 24123. |
| 3892.7393 | 10725. |
| 3894.7043 | 11469. |
| 3896.4314 | 16866. |
| 3902.2078 | 11710. |
| 3904.8875 | 13094. |
| 3906.1975 | 10303. |
| 3909.3538 | 17742. |
| 3910.6042 | 9509. |
| 3910.7830 | 9184. |
| 3913.1648 | 18726. |
| 3918.4053 | 11099. |
| 3918.5840 | 11539. |
| 3918.7625 | 9321. |
| 3919.8940 | 14407. |
| 3922.9907 | 18741. |
| 3923.7053 | 17445. |
| 3927.1592 | 14226. |
| 3932.0564 | 20635. |
| 3932.5901 | 11242. |
| 3933.6575 | 10964. |
| 3935.6145 | 20255. |
| 3936.2668 | 11222. |
| 3937.0969 | 18975. |
| 3940.0620 | 13169. |
| 3941.0107 | 11013. |
| 3941.2480 | 19192. |
| 3946.2886 | 14206. |
| 3948.7197 | 24109. |
| 3949.6094 | 16304. |
| 3950.9138 | 53637. |
| 3954.2939 | 26168. |
| 3959.3345 | 15946. |
| 3963.8413 | 17951. |
| 3965.8574 | 13215. |
| 3966.4504 | 12476. |
| 3967.4585 | 33935. |
| 3967.6958 | 12043. |
| 3968.0515 | 15810. |
| 3978.4290 | 41738. |
| 3978.6069 | 46243. |


INTENSITY (CTS)
(x10⁴ )
0.00
1.50
3.00
4.50
6.00
7.50
3880.00
3886.00
3892.00
3898.00
3904.00
3910.00
3916.00
3922.00
3928.00
WAVELENGTH (A)


INTENSITY (CTS)
(x10⁴ )
0.00
1.00
2.00
3.00
4.00
5.00
Ar
3930.00
3936.00
3942.00
3948.00
3954.00
3960.00
3966.00
3972.00
3978.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 3980.6851 | 30035. |
| 3984.4644 | 13274. |
| 3985.2910 | 14817. |
| 3986.8264 | 15548. |
| 3989.7197 | 21233. |
| 3991.0779 | 11433. |
| 3991.7275 | 19314. |
| 3996.3335 | 10466. |
| 3996.5696 | 119090. |
| 3996.7468 | 97803. |
| 3996.8647 | 86246. |
| 3998.5183 | 9713. |
| 3999.4041 | 11805. |
| 4000.2898 | 28599. |
| 4002.2383 | 9795. |
| 4004.1279 | 42012. |
| 4007.6709 | 10229. |
| 4016.9419 | 21149. |
| 4018.3000 | 22833. |
| 4022.1973 | 14376. |
| 4024.0869 | 28374. |
| 4024.7363 | 9777. |
| 4025.9766 | 18962. |
| 4029.0471 | 72199. |
| 4028.7021 | 107226. |
| 4029.2327 | 20873. |
| 4030.5881 | 19520. |
| 4033.7114 | 19631. |
| 4034.8313 | 50448. |
| 4035.0671 | 55836. |
| 4037.3655 | 54708. |
| 4043.4355 | 36950. |
| 4046.5002 | 16262. |
| 4047.0305 | 29381. |
| 4049.7417 | 132544. |
| 4049.8594 | 105418. |
| 4050.0364 | 101678. |
| 4050.1541 | 93001. |
| 4051.0381 | 172398. |
| 4051.5686 | 26542. |
| 4052.3347 | 25076. |
| 4055.2224 | 16047. |
| 4060.1729 | 16846. |
| 4065.6538 | 23475. |
| 4073.5510 | 82112. |



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(×10⁴ )
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6.00
8.00
10.00
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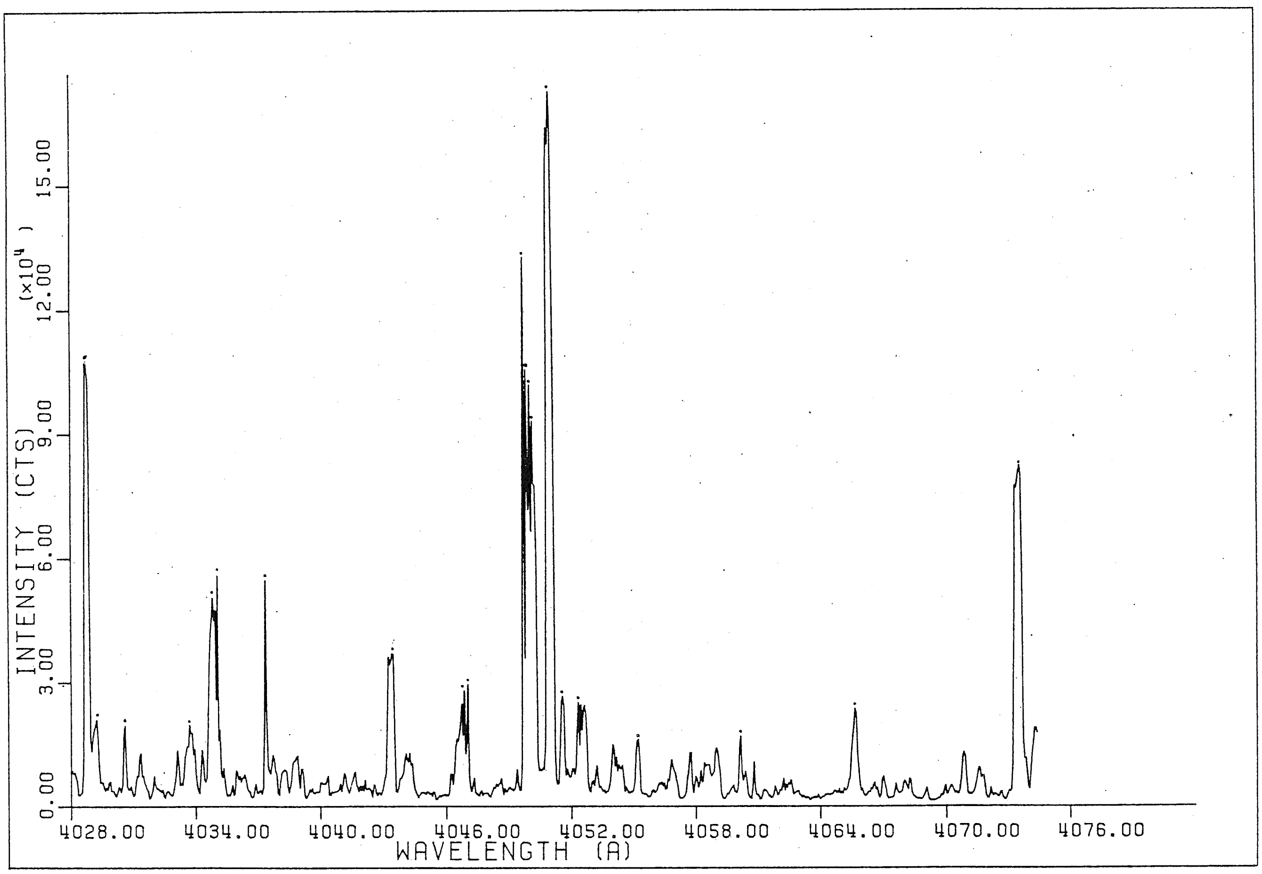
4016.00
4022.00
4028.00
WAVELENGTH (A)

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(×10⁴ )
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9.00
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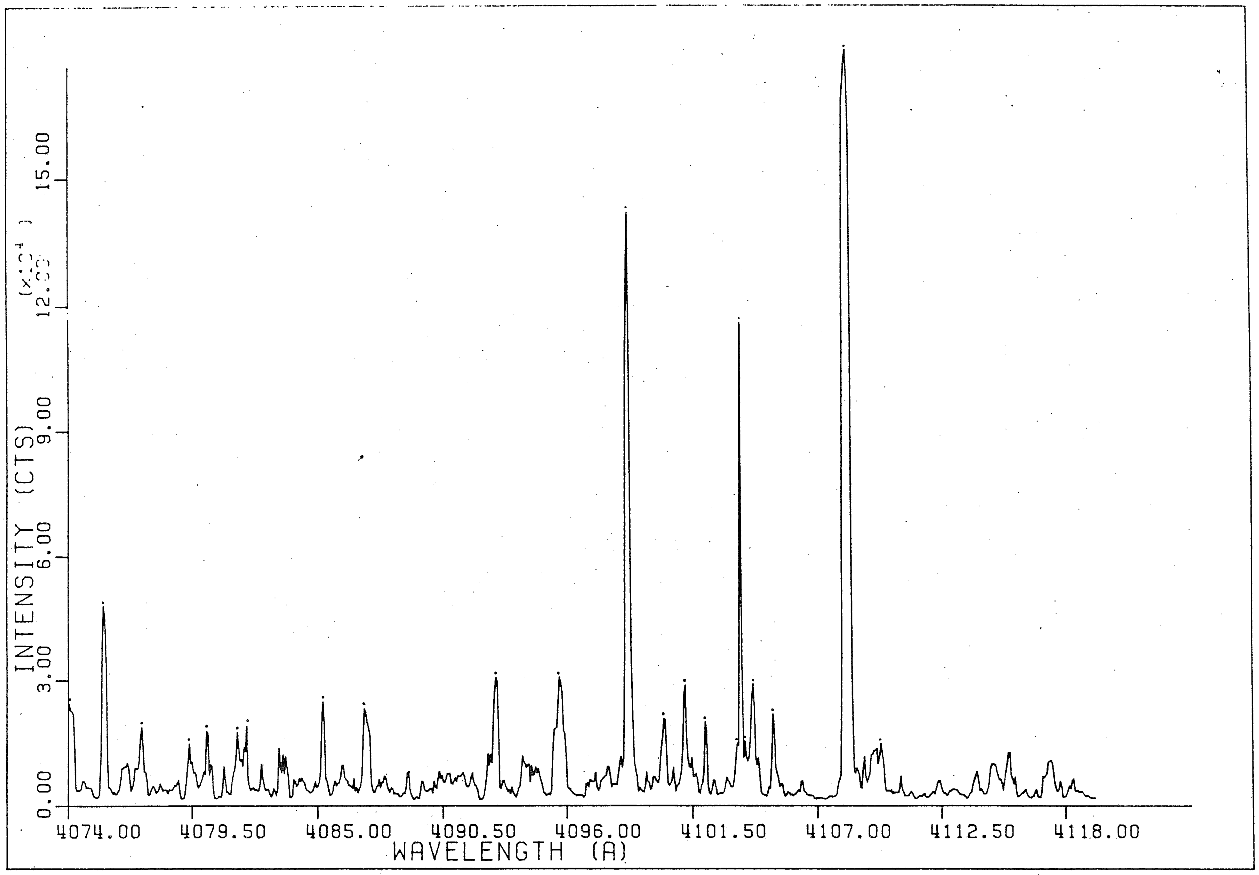
4028.00
4034.00
4040.00
4046.00
4052.00
4058.00
4064.00
4070.00
4076.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4074.0500 | 24302. |
| 4075.5737 | 48027. |
| 4077.2732 | 18732. |
| 4079.3828 | 14782. |
| 4080.1445 | 17830. |
| 4081.4924 | 17593. |
| 4081.9026 | 19058. |
| 4085.2427 | 24823. |
| 4087.0593 | 23136. |
| 4092.8608 | 30587. |
| 4095.6736 | 30652. |
| 4098.7207 | 141941. |
| 4100.2441 | 20764. |
| 4101.1821 | 28721. |
| 4102.0610 | 19900. |
| 4103.4673 | 14836. |
| 4103.6431 | 115793. |
| 4103.8188 | 15306. |
| 4104.1704 | 29056. |
| 4105.0498 | 21831. |
| 4108.3896 | 181038. |
| 4109.7964 | 14805. |
| 4121.0356 | 47154. |
| 4123.9673 | 21164. |
| 4125.3169 | 15210. |
| 4128.7231 | 19914. |
| 4132.0747 | 15878. |
| 4133.3696 | 21630. |
| 4136.8452 | 38630. |
| 4137.4937 | 16513. |
| 4139.2041 | 40100. |
| 4143.6919 | 26096. |
| 4145.9385 | 38578. |
| 4147.1307 | 24694. |
| 4150.3779 | 18030. |
| 4152.4521 | 21784. |
| 4156.7246 | 40406. |
| 4157.3184 | 17184. |
| 4159.1602 | 33320. |
| 4160.1113 | 28473. |
| 4160.4683 | 53728. |
| 4160.5869 | 51182. |
| 4160.7656 | 50145. |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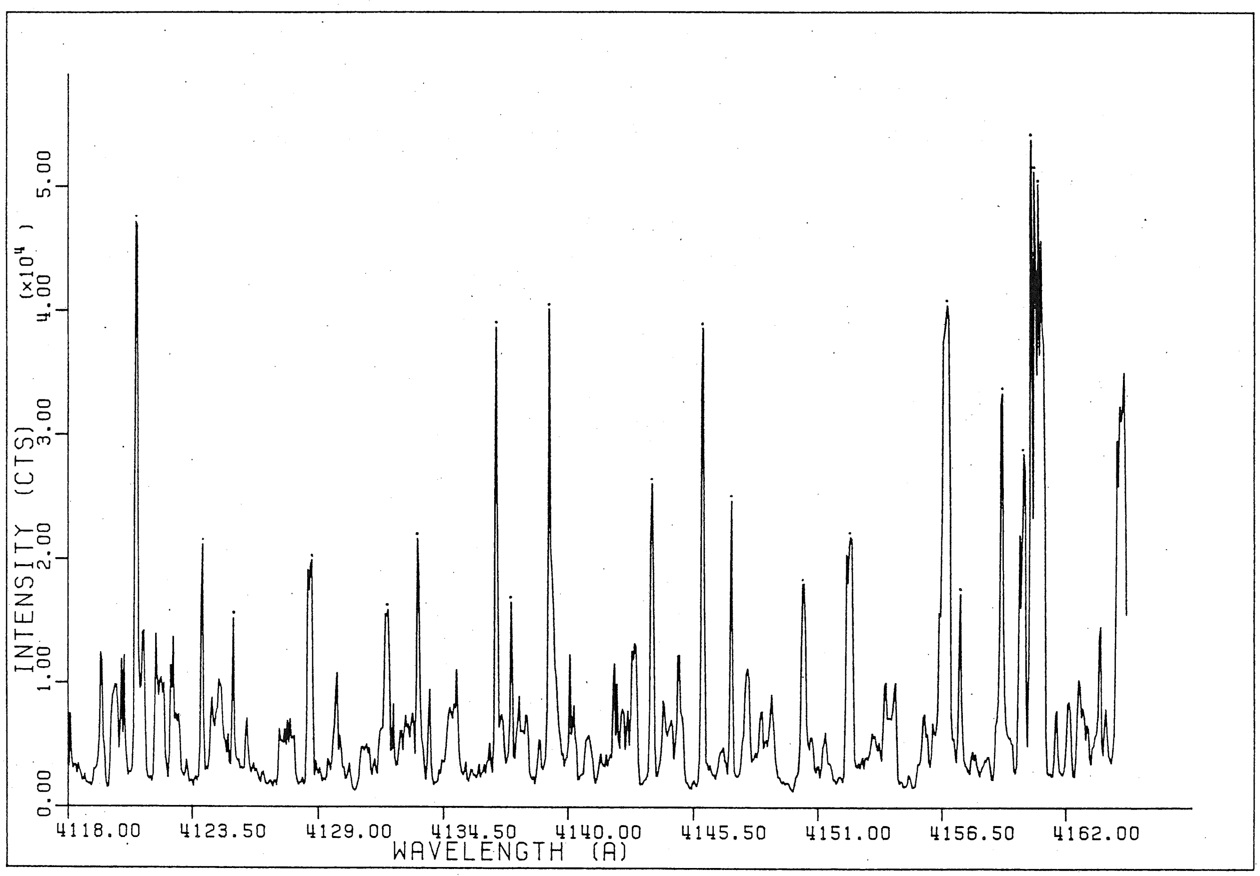
WAVELENGTH (A)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(x10⁴)
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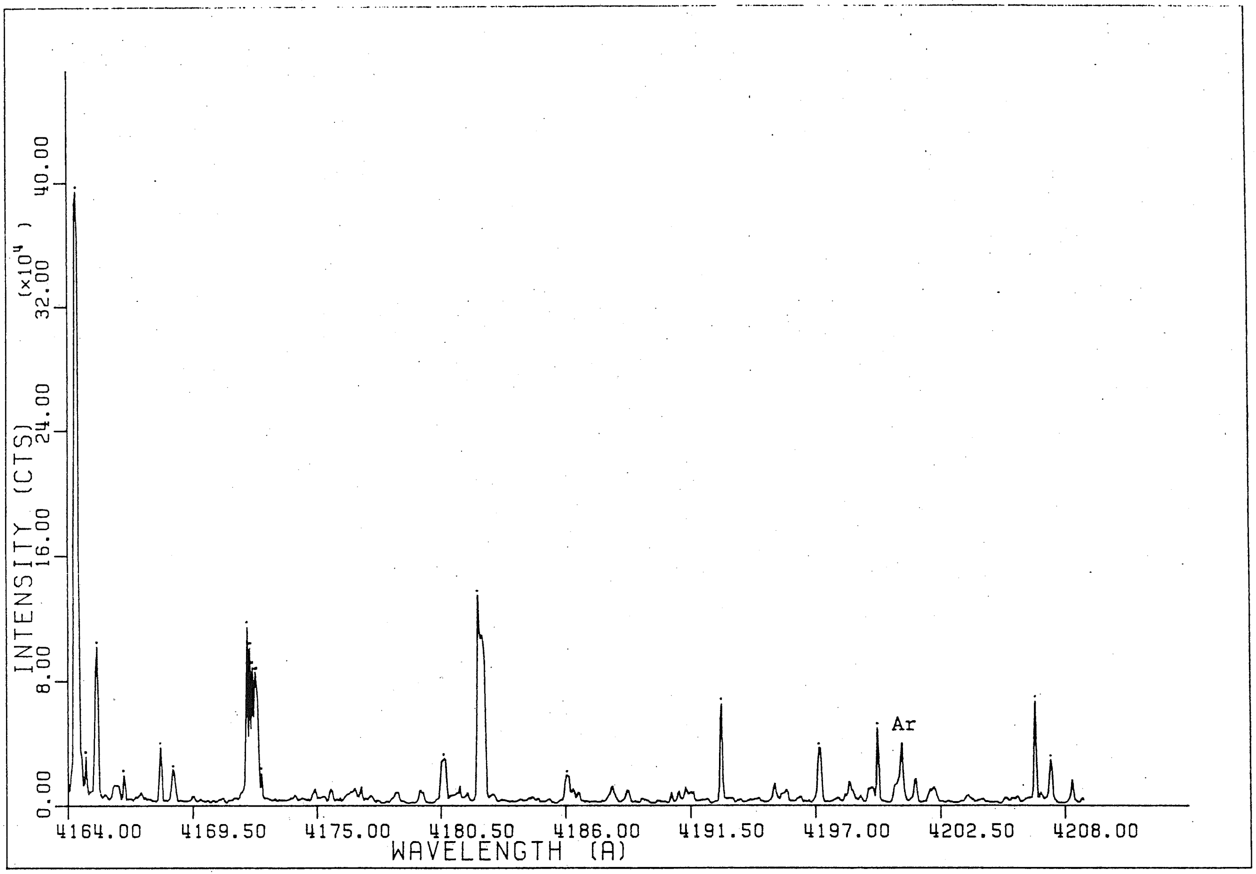
4129.00
4134.50
4140.00
4145.50
4151.00
4156.50
4162.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4164.3838 | 394503. |
| 4164.8008 | 31173. |
| 4165.2769 | 101675. |
| 4166.4658 | 19564. |
| 4168.0674 | 37081. |
| 4168.6006 | 23252. |
| 4171.9097 | 114203. |
| 4172.0273 | 101164. |
| 4172.1455 | 88500. |
| 4172.2632 | 85789. |
| 4172.5576 | 20429. |
| 4180.6401 | 30026. |
| 4182.1523 | 134563. |
| 4186.0347 | 19389. |
| 4192.8774 | 64830. |
| 4197.1548 | 37060. |
| 4199.7080 | 49670. |
| 4200.7832 | 40036. |
| 4206.6938 | 66655. |
| 4207.3662 | 29189. |
| 4208.4985 | 18119. |
| 4209.6675 | 21865. |
| 4211.7676 | 14234. |
| 4212.9321 | 18491. |
| 4216.3574 | 16513. |
| 4217.6313 | 24611. |
| 4221.3833 | 20283. |
| 4224.2002 | 14702. |
| 4227.5220 | 74350. |
| 4229.8047 | 19289. |
| 4234.6914 | 89976. |
| 4235.9365 | 18345. |
| 4236.3887 | 14372. |
| 4237.2925 | 31032. |
| 4237.9697 | 50800. |
| 4238.1392 | 39399. |
| 4243.5908 | 16012. |
| 4245.1572 | 15205. |
| 4247.8911 | 31809. |
| 4250.8374 | 20401. |
| 4251.5029 | 13315. |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32.00
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Ar
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4202.50
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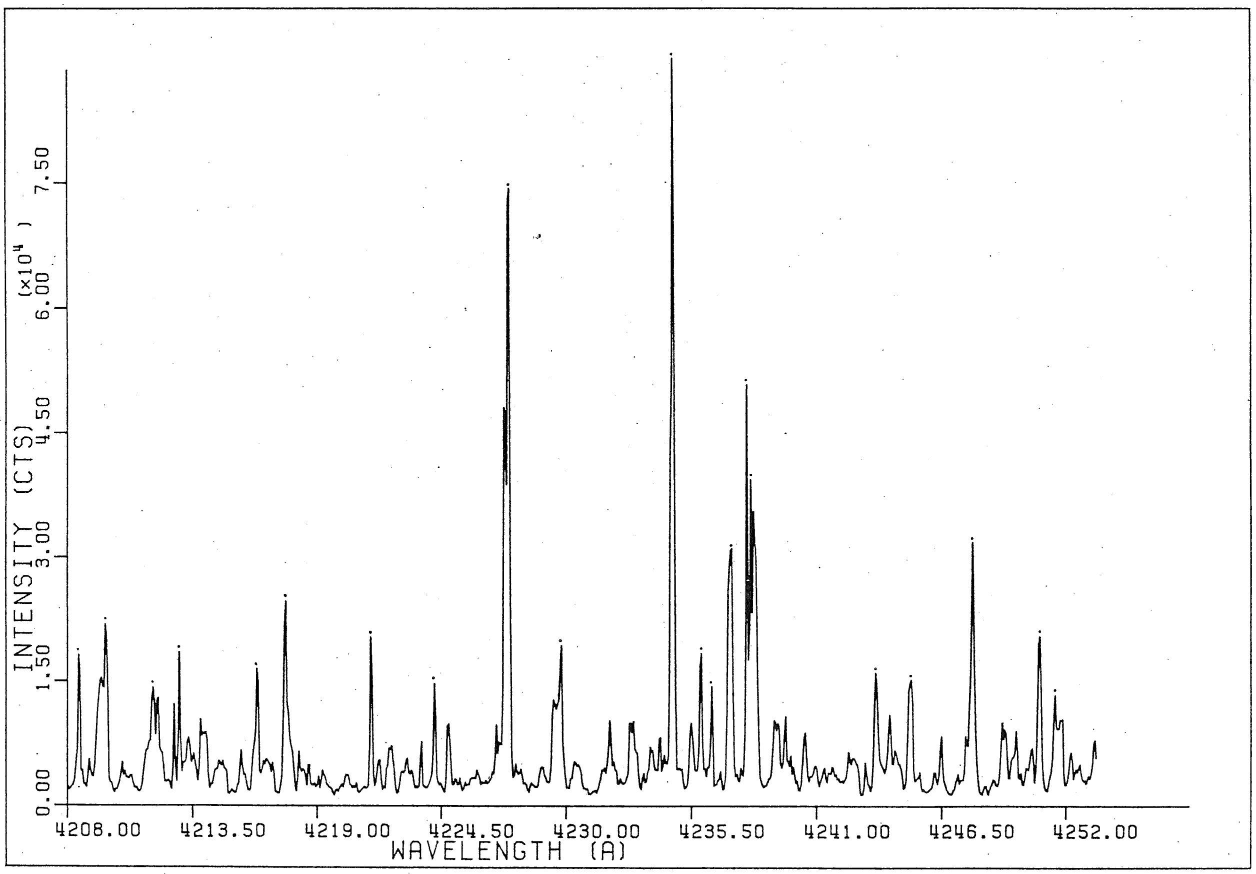
WAVELENGTH (A)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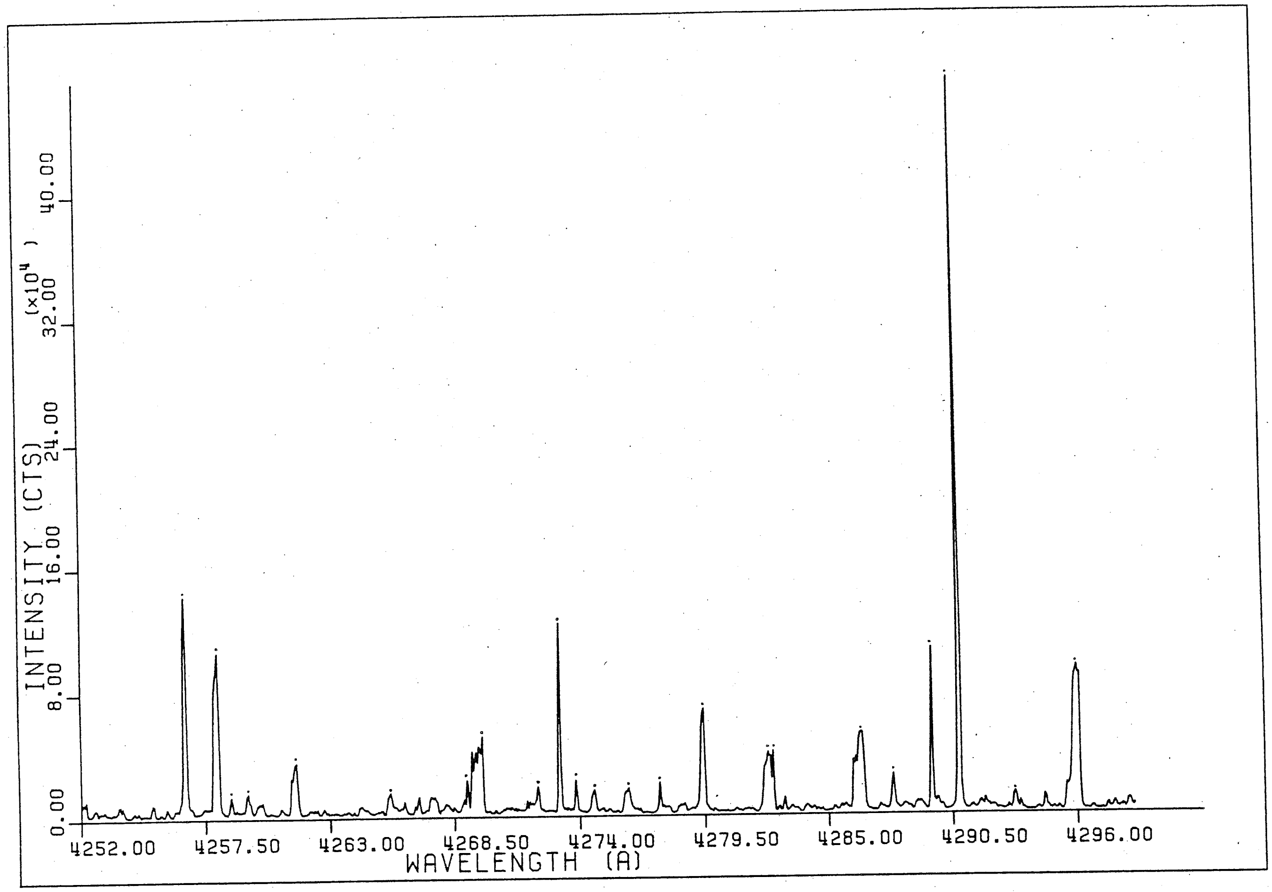
4219.00
4224.50
4230.00
4235.50
4241.00
4246.50
4252.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4256.6108 | 142098. |
| 4258.0537 | 105711. |
| 4258.6304 | 13929. |
| 4259.3804 | 15877. |
| 4261.5137 | 35439. |
| 4265.6611 | 15715. |
| 4269.0557 | 23383. |
| 4269.7461 | 51342. |
| 4272.1602 | 19202. |
| 4273.1367 | 122961. |
| 4273.8262 | 22954. |
| 4274.6299 | 16717. |
| 4276.1226 | 17658. |
| 4277.4995 | 21250. |
| 4279.4497 | 67771. |
| 4282.3154 | 40080. |
| 4282.5444 | 40702. |
| 4286.4380 | 52623. |
| 4287.8682 | 25593. |
| 4289.5835 | 105352. |
| 4290.7837 | 469546. |
| 4293.2402 | 13669. |
| 4295.9805 | 93702. |
| 4301.6870 | 13659. |
| 4302.9478 | 30252. |
| 4304.6665 | 25734. |
| 4307.1865 | 12670. |
| 4307.7017 | 438684. |
| 4307.9878 | 12774. |
| 4311.1357 | 27980. |
| 4311.5361 | 15945. |
| 4313.1377 | 17228. |
| 4314.2817 | 23403. |
| 4316.4541 | 31381. |
| 4318.1113 | 40898. |
| 4319.6543 | 59949. |
| 4321.1963 | 26905. |
| 4322.7383 | 23109. |
| 4325.8774 | 13650. |
| 4327.5322 | 13878. |
| 4332.0937 | 11769. |
| 4333.5757 | 34762. |
| 4336.4810 | 134701. |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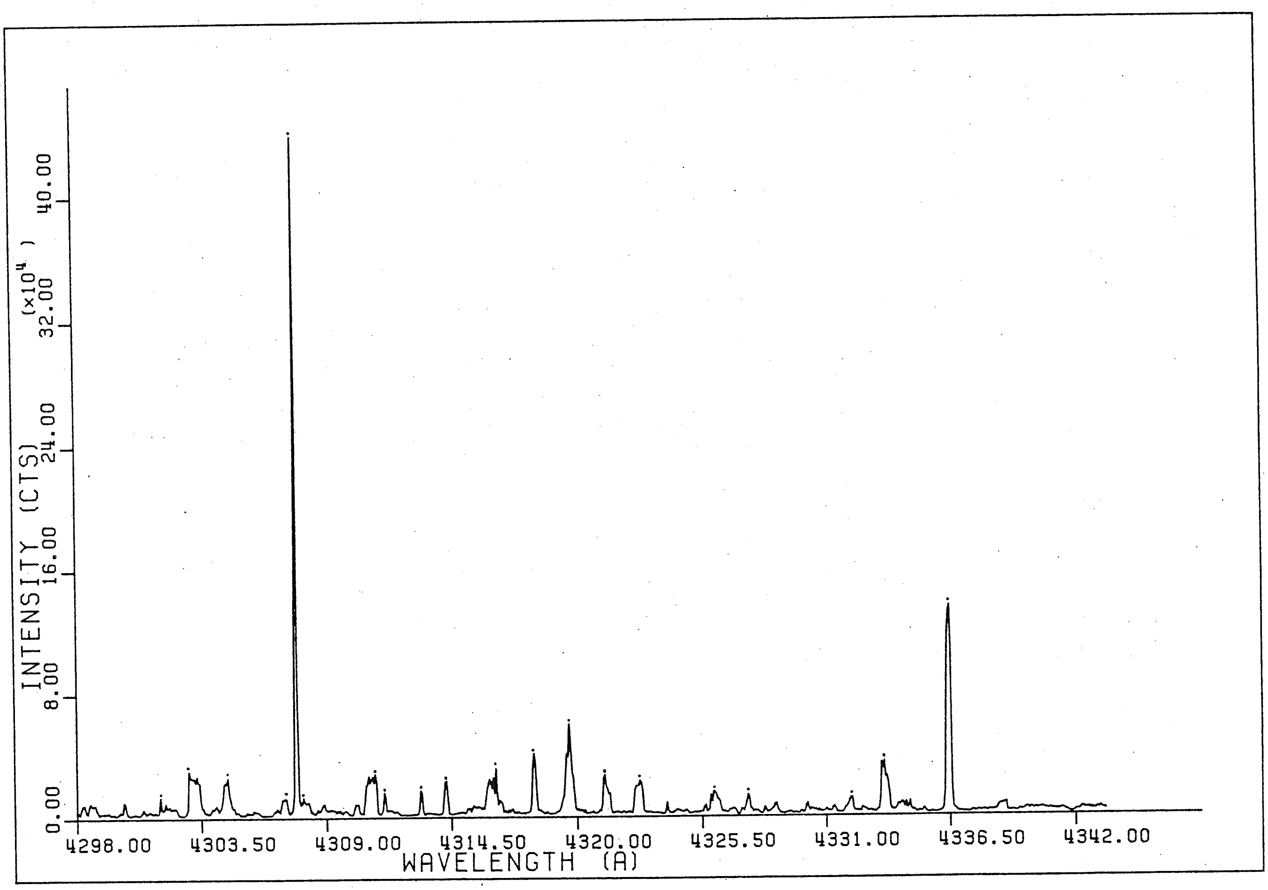
WAVELENGTH (A)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4303.50
4309.00
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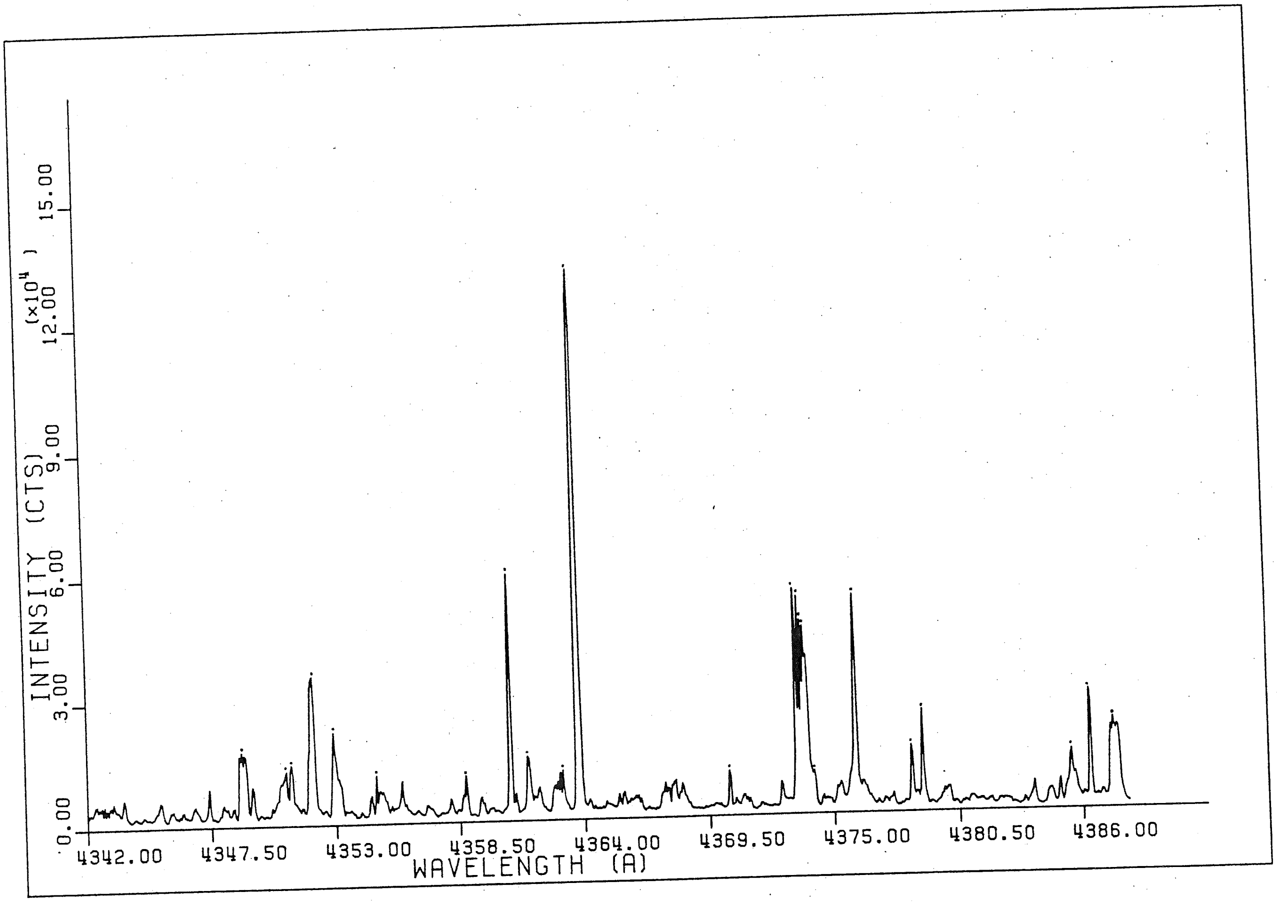
4320.00
4325.50
4331.00
4336.50
4342.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4348.8491 | 17854. |
| 4350.7949 | 12918. |
| 4351.0234 | 14455. |
| 4351.9946 | 35759. |
| 4352.9087 | 22200. |
| 4354.7910 | 11551. |
| 4358.7749 | 11082. |
| 4360.7622 | 59525. |
| 4361.4995 | 15416. |
| 4362.9165 | 11260. |
| 4363.7656 | 131998. |
| 4370.3711 | 10696. |
| 4373.3521 | 54259. |
| 4373.5205 | 52430. |
| 4373.6328 | 46713. |
| 4373.7451 | 45290. |
| 4374.1382 | 10269. |
| 4375.9897 | 52519. |
| 4378.3979 | 15953. |
| 4378.9014 | 24466. |
| 4385.4834 | 14267. |
| 4386.3179 | 28576. |
| 4387.3735 | 21708. |
| 4386.5630 | 32850. |
| 4387.5864 | 24863. |
| 4390.5986 | 36833. |
| 4394.2925 | 32766. |
| 4395.3154 | 14114. |
| 4398.2695 | 14327. |
| 4403.2686 | 15099. |
| 4405.4268 | 68488. |
| 4411.6729 | 18848. |
| 4413.4897 | 33420. |
| 4414.8521 | 13576. |
| 4415.5332 | 274879. |
| 4417.2930 | 50926. |
| 4417.9741 | 19633. |
| 4420.2441 | 40579. |
| 4424.5566 | 12142. |
| 4424.7271 | 13724. |
| 4424.8975 | 15641. |
| 4425.1812 | 22668. |
| 4426.7129 | 15455. |
| 4429.3789 | 28586. |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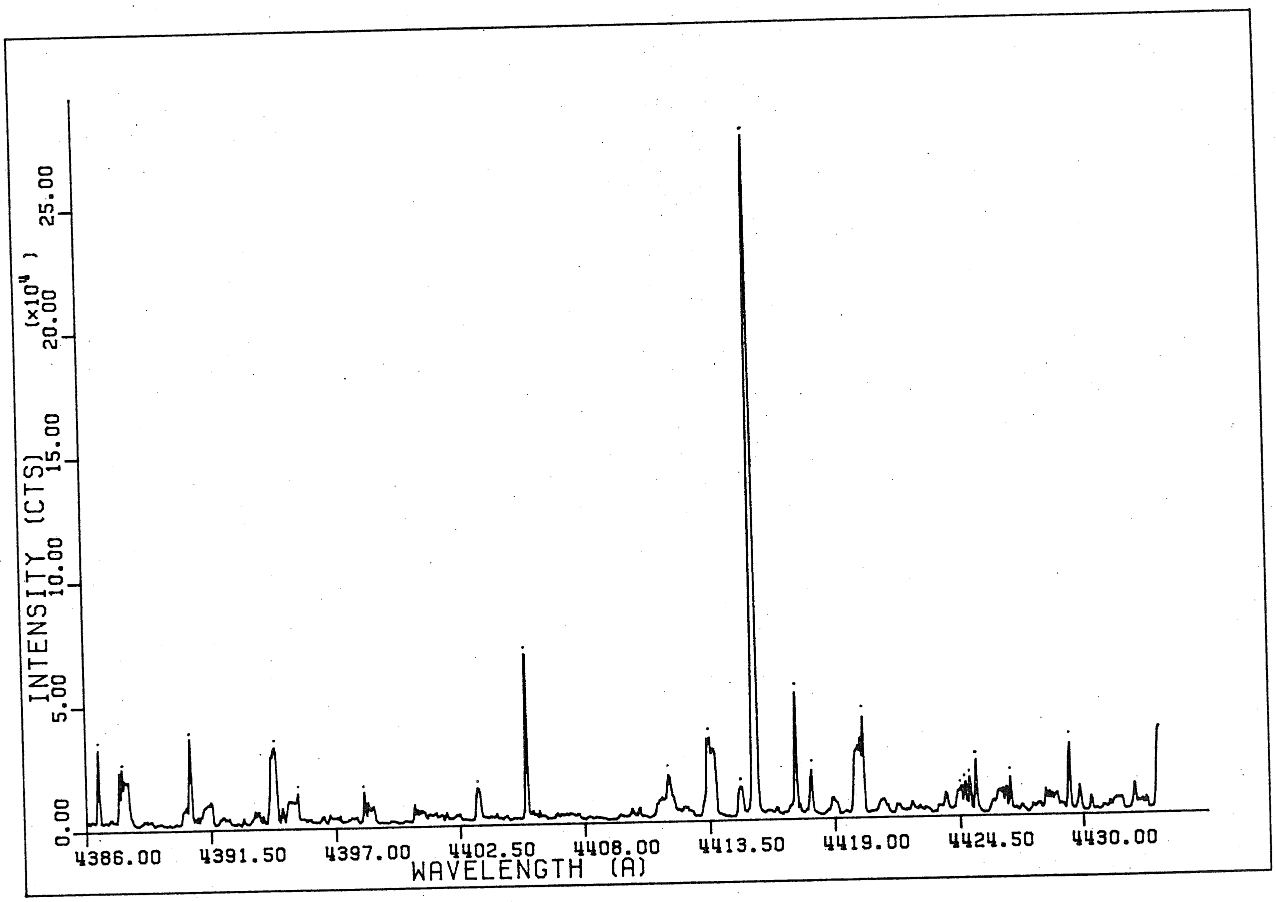
WAVELENGTH (A)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(×10⁴ )
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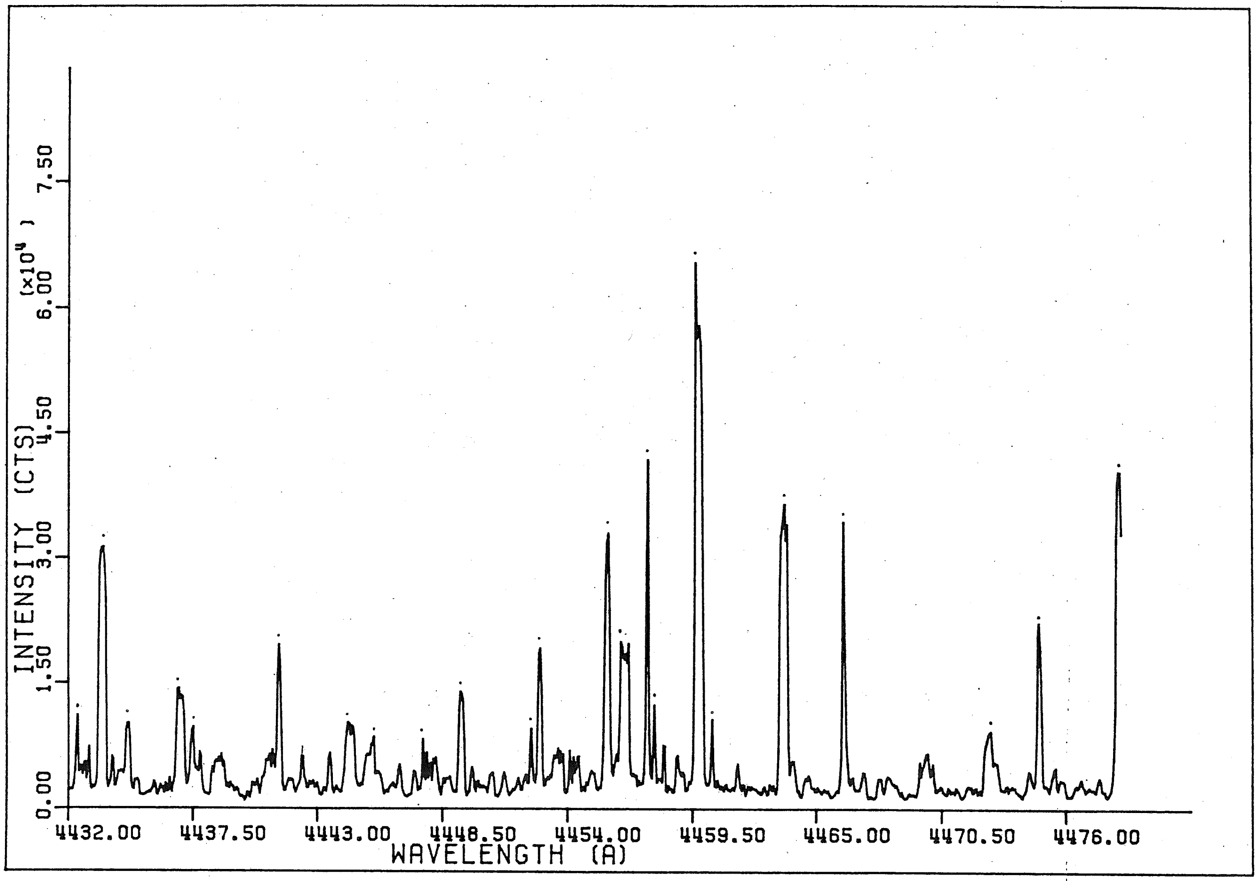
4391.50
4397.00
4402.50
4408.00
4413.50
4419.00
4424.50
4430.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4432.4175 | 11126. |
| 4433.5498 | 31281. |
| 4434.6816 | 10180. |
| 4436.8892 | 14343. |
| 4437.5117 | 9735. |
| 4441.3037 | 19562. |
| 4444.3604 | 10300. |
| 4445.4922 | 8578. |
| 4447.6431 | 8289. |
| 4449.2847 | 13951. |
| 4452.3975 | 9588. |
| 4452.7935 | 19167. |
| 4455.7935 | 33002. |
| 4456.3594 | 19963. |
| 4457.5483 | 41861. |
| 4457.8311 | 12373. |
| 4459.6421 | 65386. |
| 4460.3779 | 10669. |
| 4463.6045 | 36526. |
| 4466.2080 | 34389. |
| 4472.6602 | 9279. |
| 4474.8110 | 22260. |
| 4478.0869 | 40268. |
| 4479.4438 | 8519. |
| 4487.2290 | 21866. |
| 4488.5239 | 10869. |
| 4488.8052 | 46296. |
| 4490.7734 | 15338. |
| 4492.2349 | 14511. |
| 4493.1333 | 9154. |
| 4493.9194 | 16937. |
| 4496.8921 | 8539. |
| 4497.3965 | 94560. |
| 4500.9243 | 10714. |
| 4504.6694 | 8566. |
| 4505.6187 | 92503. |
| 4506.9580 | 32703. |
| 4509.6895 | 8250. |
| 4509.9683 | 18198. |
| 4510.5249 | 132206. |
| 4517.2524 | 11225. |
| 4518.2515 | 10214. |
| 4522.0210 | 30992. |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(x10⁴ )
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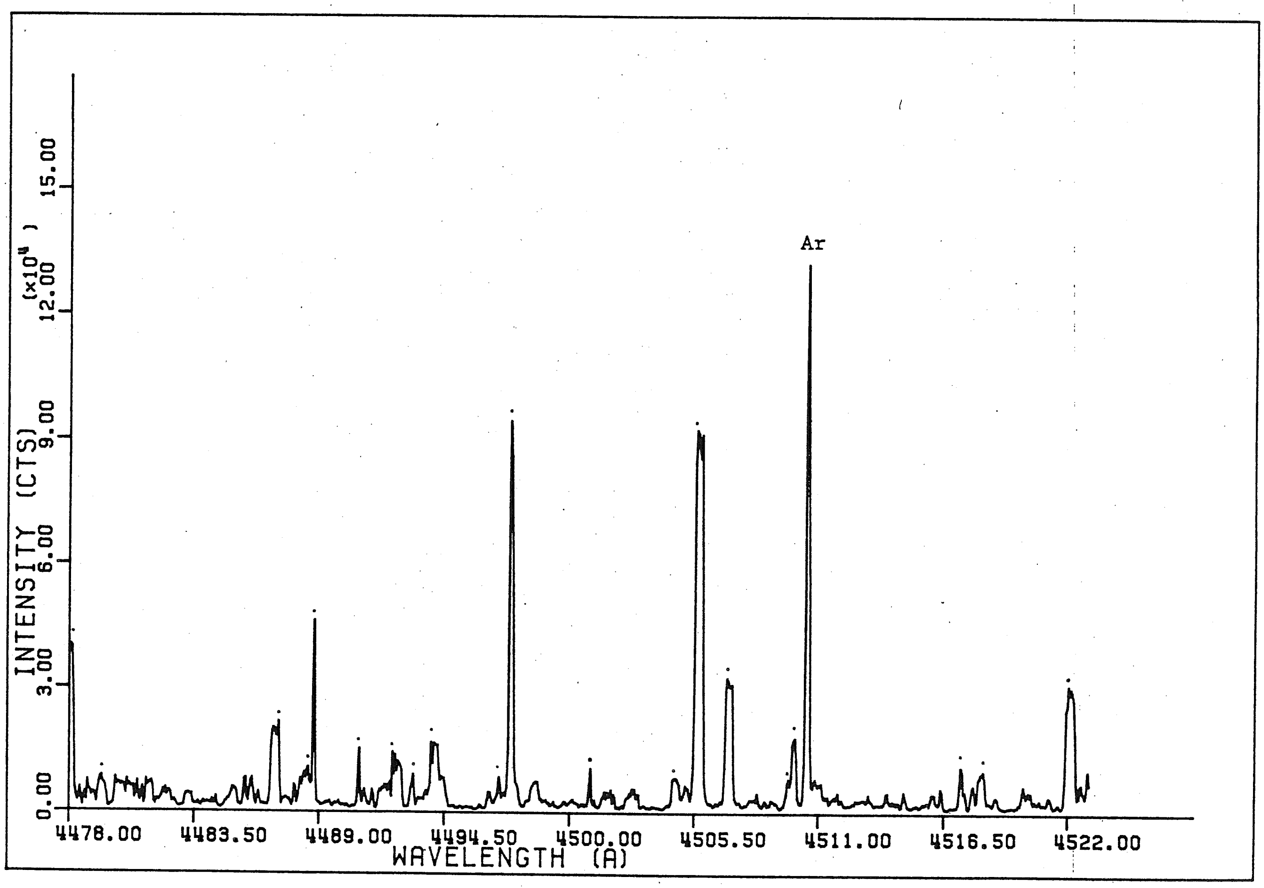
WAVELENGTH (A)


Ar
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(x10⁴ )
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4489.00
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4516.50
4522.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4522.0190 | 35379. |
| 4522.7534 | 12688. |
| 4527.0474 | 35953. |
| 4529.0249 | 16470. |
| 4531.3979 | 25608. |
| 4532.3018 | 14212. |
| 4532.6411 | 31447. |
| 4539.0820 | 10133. |
| 4539.5903 | 53150. |
| 4541.5679 | 21697. |
| 4547.4438 | 10492. |
| 4555.9756 | 24708. |
| 4556.2012 | 21629. |
| 4557.6138 | 20806. |
| 4559.0264 | 15263. |
| 4560.0435 | 11147. |
| 4560.4390 | 436155. |
| 4561.5122 | 13839. |
| 4565.0718 | 10561. |
| 4565.7500 | 95498. |
| 4566.4844 | 11535. |
| 4569.1191 | 115275. |
| 4570.4634 | 26047. |
| 4570.9111 | 10868. |
| 4571.0791 | 11939. |
| 4571.5273 | 15014. |
| 4575.3911 | 43909. |
| 4577.1270 | 10190. |
| 4578.1353 | 16137. |
| 4578.5830 | 44875. |
| 4579.8711 | 9487. |
| 4583.8472 | 10674. |
| 4587.7671 | 10929. |
| 4590.5112 | 154902. |
| 4592.4150 | 11981. |
| 4593.7031 | 10051. |
| 4595.8311 | 54655. |
| 4597.5112 | 9621. |
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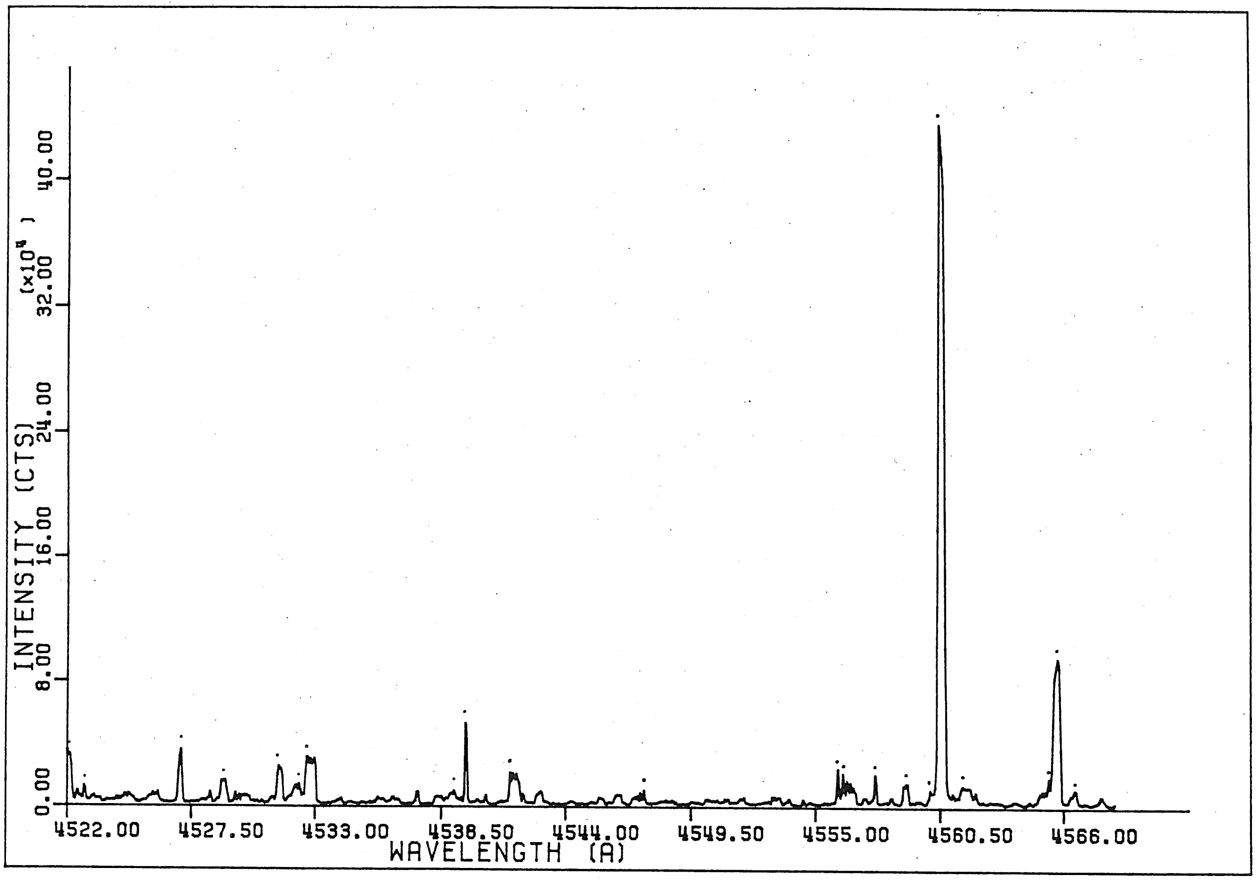
| 4607.3672 | 10503. |
| 4609.5513 | 21292. |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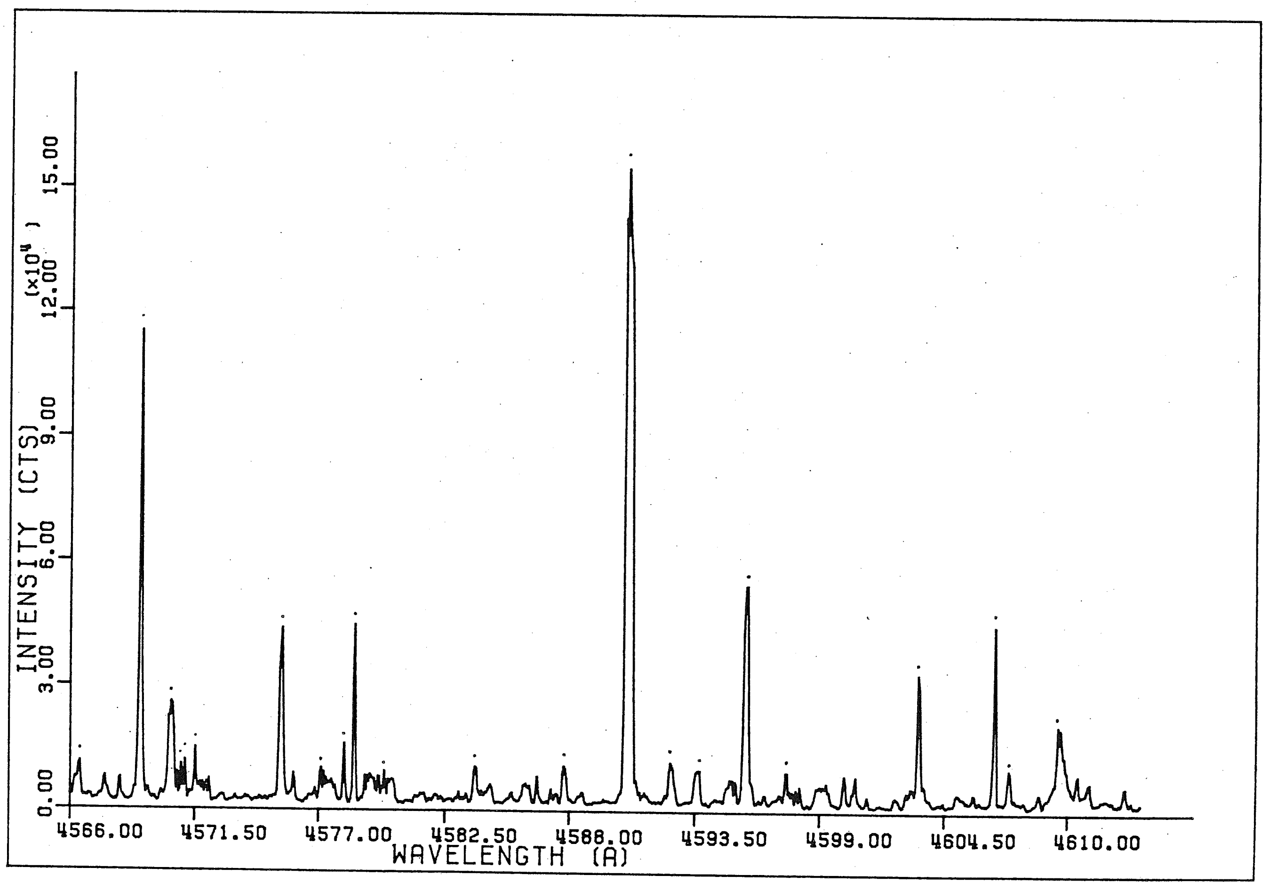
WAVELENGTH (A)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4593.50
4599.00
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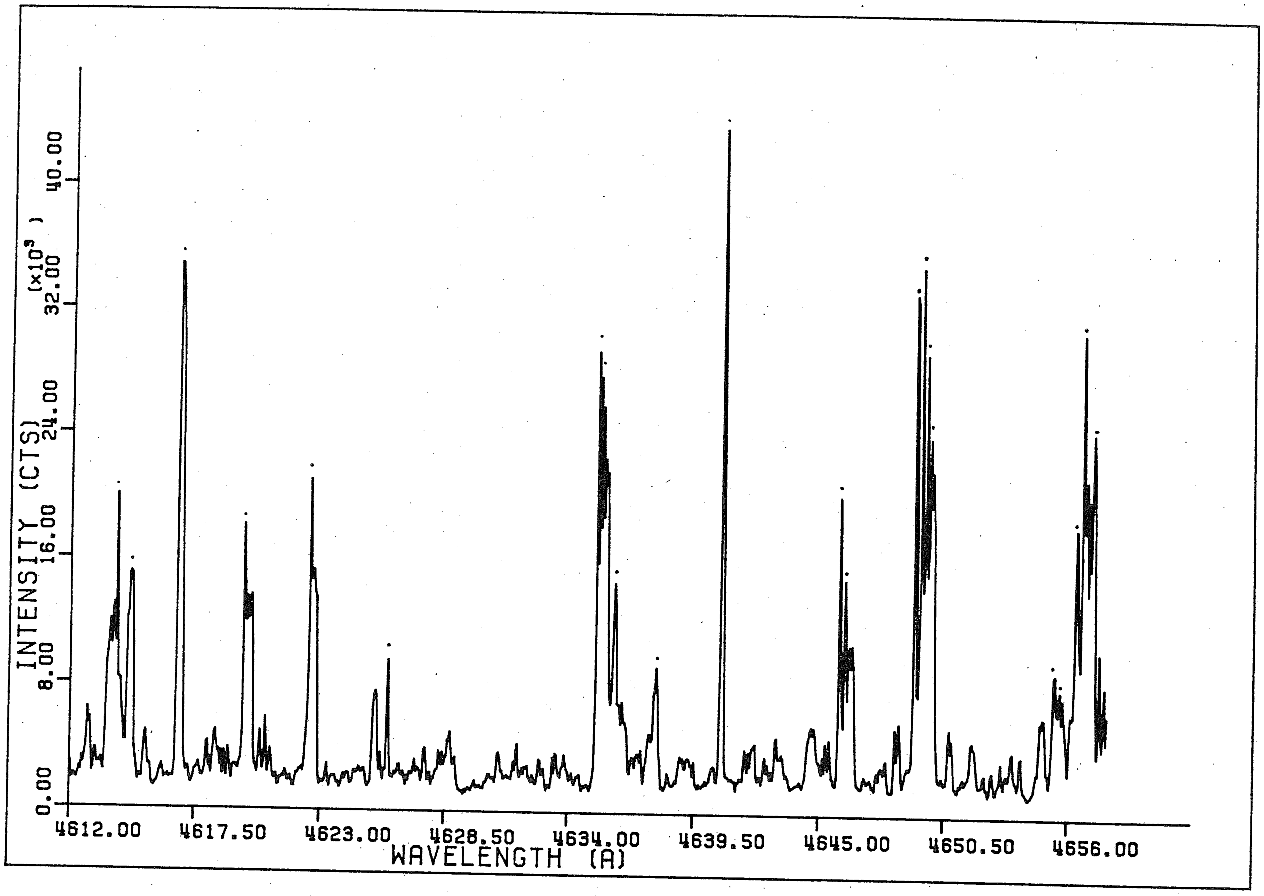
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4614.0537 | 20060. |
| 4614.6685 | 15117. |
| 4616.7368 | 34845. |
| 4619.6436 | 18177. |
| 4622.5503 | 21089. |
| 4626.0161 | 9627. |
| 4635.2397 | 29450. |
| 4635.3516 | 27838. |
| 4636.0225 | 14663. |
| 4637.8672 | 9300. |
| 4640.7739 | 43801. |
| 4645.9165 | 20295. |
| 4646.1401 | 15007. |
| 4649.2148 | 33272. |
| 4649.4941 | 35032. |
| 4649.7178 | 29465. |
| 4649.8857 | 24112. |
| 4655.4756 | 9126. |
| 4655.6992 | 8089. |
| 4656.4258 | 18432. |
| 4656.7056 | 30907. |
| 4657.4321 | 10530. |
| 4660.8682 | 13249. |
| 4661.1465 | 13381. |
| 4664.4888 | 47249. |
| 4664.8228 | 33563. |
| 4665.5469 | 14995. |
| 4665.8252 | 12970. |
| 4666.5493 | 11420. |
| 4667.8862 | 22629. |
| 4668.3320 | 22829. |
| 4668.6660 | 31385. |
| 4675.0161 | 12043. |
| 4680.6416 | 16485. |
| 4681.5327 | 13533. |
| 4682.1455 | 8235. |
| 4684.3179 | 10143. |
| 4701.6406 | 25227. |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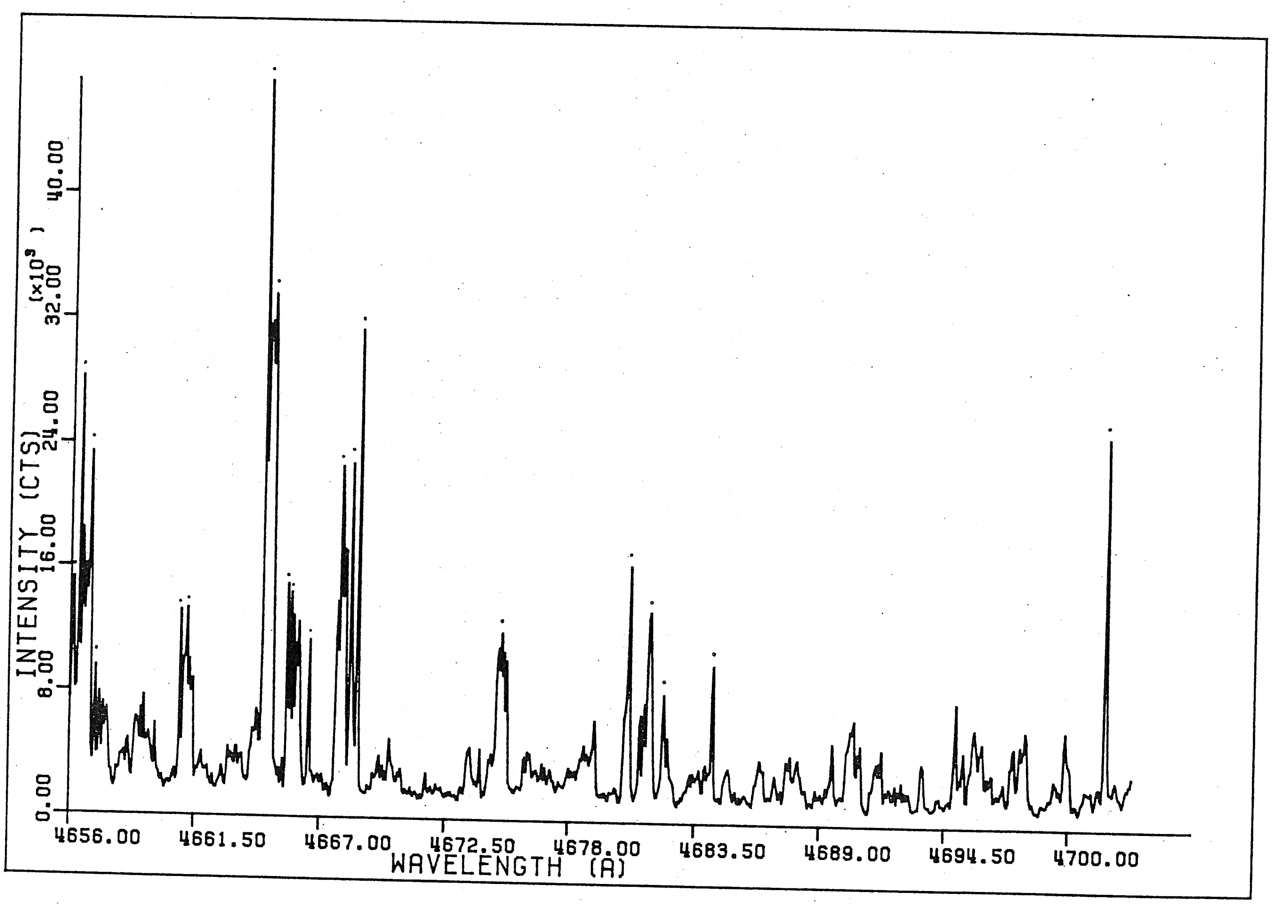
WAVELENGTH (A)


INTENSITY (CTS) (x10³)
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40.00
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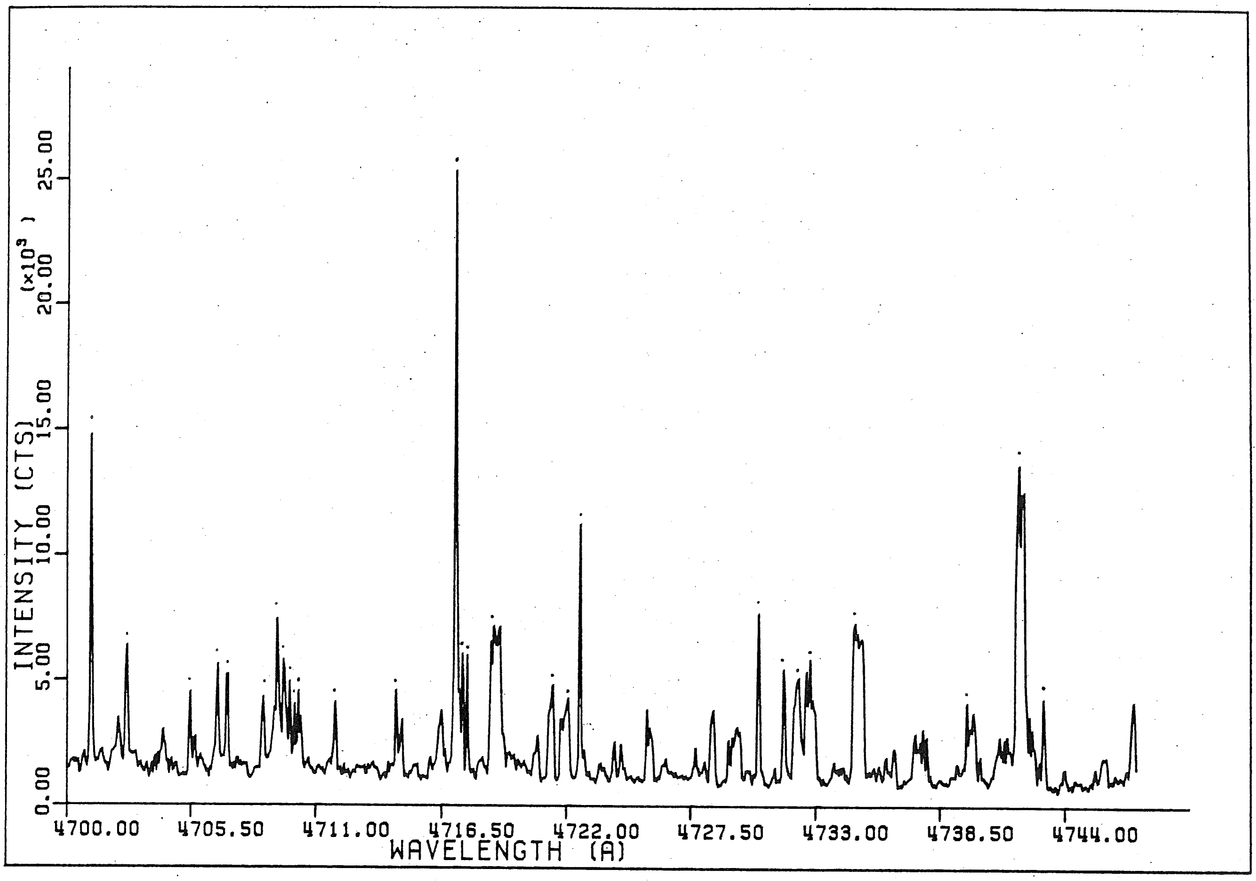
4672.50
4678.00
4683.50
4689.00
4694.50
4700.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4701.0503 | 14771. |
| 4702.6553 | 6377. |
| 4705.4785 | 4511. |
| 4706.6963 | 5641. |
| 4707.1387 | 5228. |
| 4708.6885 | 4313. |
| 4709.2974 | 7454. |
| 4709.5742 | 5826. |
| 4709.8511 | 4944. |
| 4710.0723 | 4039. |
| 4710.2383 | 4554. |
| 4711.8438 | 4122. |
| 4714.5005 | 4600. |
| 4717.1572 | 25337. |
| 4717.4341 | 6092. |
| 4717.6553 | 6033. |
| 4718.8179 | 7184. |
| 4721.4189 | 4815. |
| 4722.0835 | 4289. |
| 4722.6367 | 11238. |
| 4730.4966 | 7706. |
| 4731.6035 | 5467. |
| 4732.2676 | 5124. |
| 4732.7661 | 5881. |
| 4734.7583 | 7313. |
| 4739.6846 | 4121. |
| 4742.0093 | 13613. |
| 4743.0610 | 4301. |
| 4746.6914 | 5343. |
| 4749.3335 | 39183. |
| 4751.5908 | 90454. |
| 4756.2148 | 6547. |
| 4757.9766 | 8401. |
| 4758.1968 | 4297. |
| 4758.4170 | 5331. |
| 4761.4448 | 4974. |
| 4766.7295 | 7720. |
| 4767.2251 | 3913. |
| 4769.1519 | 3954. |
| 4769.4819 | 4426. |
| 4769.9775 | 4979. |
| 4770.8032 | 4296. |
| 4772.6748 | 10925. |
| 4773.4458 | 8704. |
| 4774.3262 | 5836. |
| 4774.4365 | 6703. |
| 4774.9868 | 33777. |
| 4776.4731 | 9637. |
| 4779.8315 | 5174. |
| 4780.2720 | 3902. |
| 4780.8774 | 10914. |
| 4781.0977 | 4145. |
| 4782.0884 | 7756. |
| 4788.8047 | 3894. |
| 4789.5200 | 4342. |


INTENSITY (CTS)
(×10³ )
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10.00
15.00
20.00
25.00
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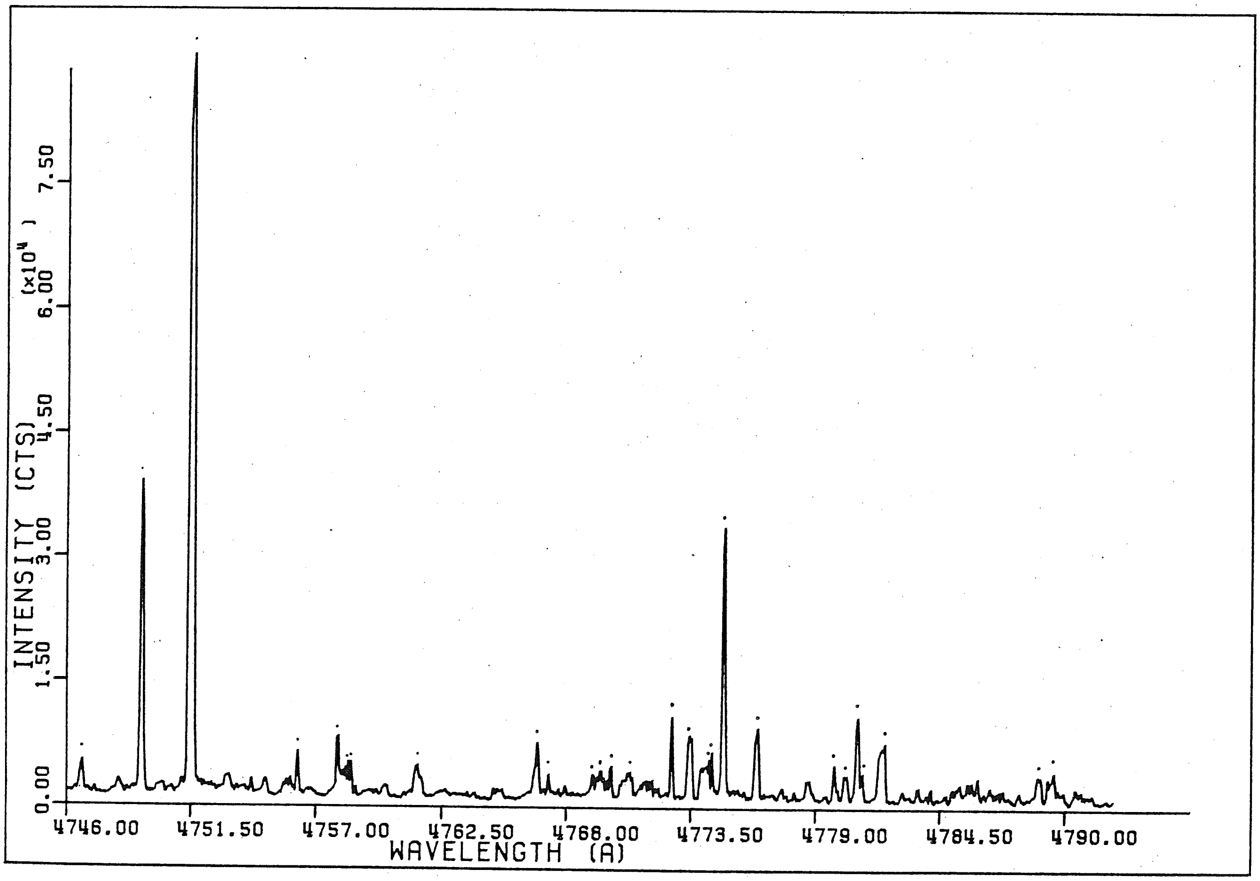
4722.00
4727.50
4733.00
4738.50
4744.00
WAVELENGTH (A)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(×10⁴ )
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4.50
6.00
7.50
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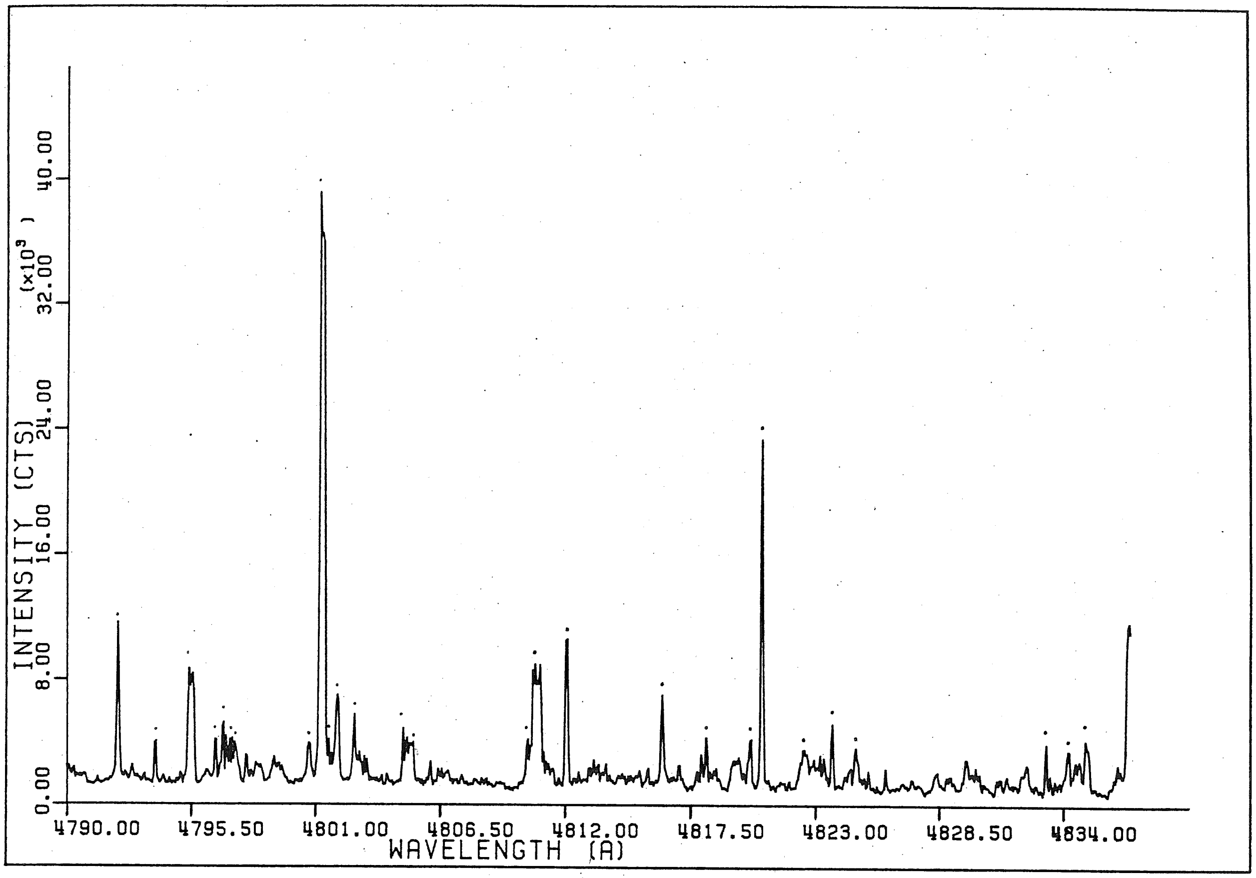
4751.50
4757.00
4762.50
4768.00
4773.50
4779.00
4784.50
4790.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4792.2349 | 11645. |
| 4793.9321 | 4022. |
| 4795.4106 | 8705. |
| 4796.5605 | 4155. |
| 4796.9438 | 5250. |
| 4797.2173 | 4169. |
| 4797.4365 | 4002. |
| 4800.7212 | 3942. |
| 4801.2139 | 39132. |
| 4801.5972 | 4159. |
| 4801.9805 | 7018. |
| 4802.7471 | 5773. |
| 4804.8823 | 4895. |
| 4805.3203 | 4001. |
| 4810.3574 | 4207. |
| 4810.6860 | 9028. |
| 4812.1094 | 10621. |
| 4816.2705 | 7074. |
| 4818.1865 | 4337. |
| 4820.1577 | 4204. |
| 4820.6504 | 23358. |
| 4822.5117 | 3560. |
| 4823.7710 | 5205. |
| 4824.8115 | 3665. |
| 4833.2427 | 3955. |
| 4834.2285 | 3525. |
| 4834.9946 | 4181. |
| 4836.1934 | 9694. |
| 4840.3862 | 20240. |
| 4840.9307 | 6927. |
| 4842.7817 | 4500. |
| 4843.0542 | 6578. |
| 4843.2720 | 6288. |
| 4843.4351 | 7729. |
| 4848.6079 | 5934. |
| 4849.1523 | 6808. |
| 4851.5483 | 22076. |
| 4851.6572 | 18971. |
| 4855.5229 | 8094. |
| 4857.2109 | 6674. |
| 4860.0425 | 6814. |
| 4860.3691 | 8882. |
| 4860.5327 | 8108. |
| 4860.8047 | 11932. |
| 4861.3491 | 17695. |
| 4861.8394 | 19243. |
| 4865.1064 | 19664. |
| 4865.3242 | 4126. |
| 4866.2500 | 4569. |
| 4867.0122 | 7294. |
| 4868.2100 | 4249. |
| 4869.6802 | 4463. |
| 4869.9526 | 7744. |
| 4873.8730 | 4168. |
| 4878.3921 | 45658. |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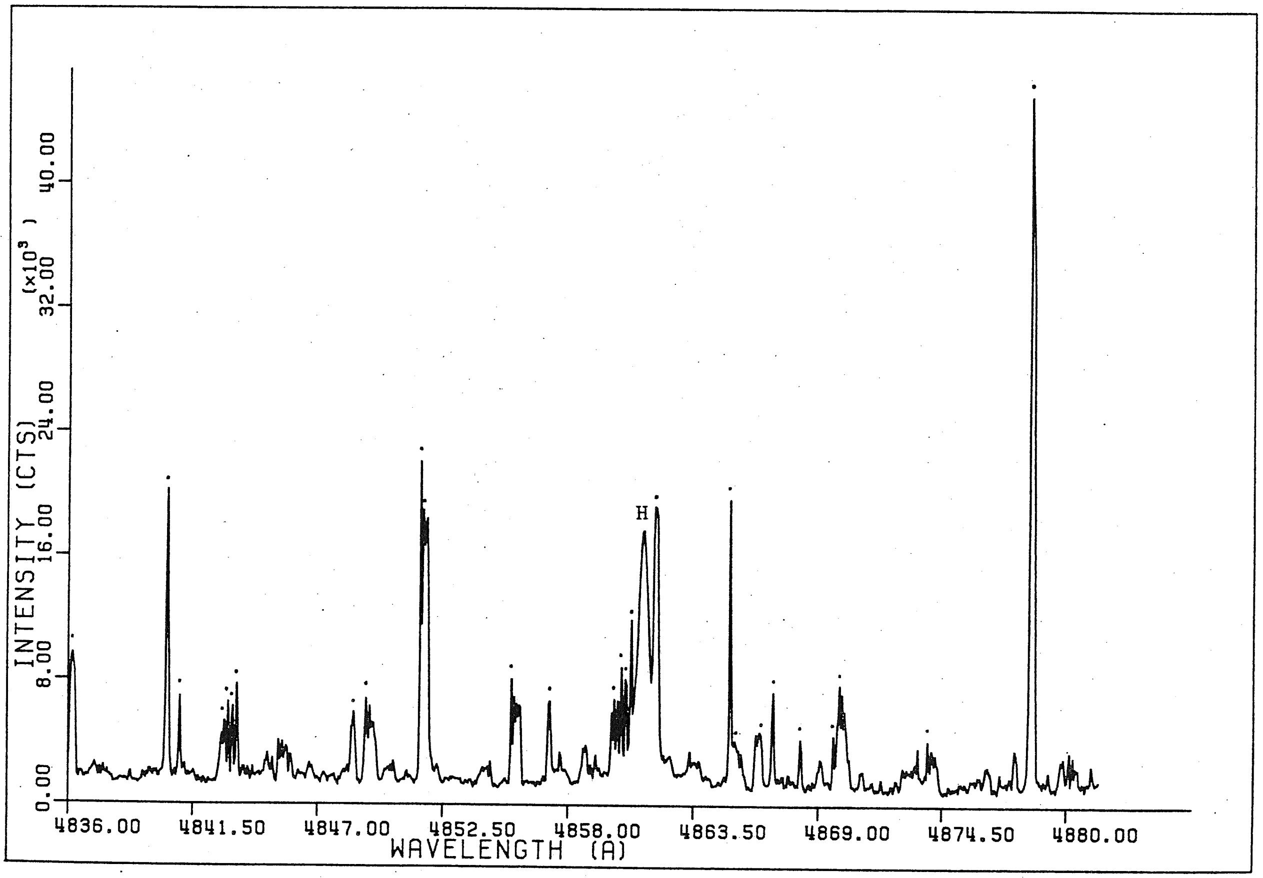
4823.00
4828.50
4834.00
WAVELENGTH (A)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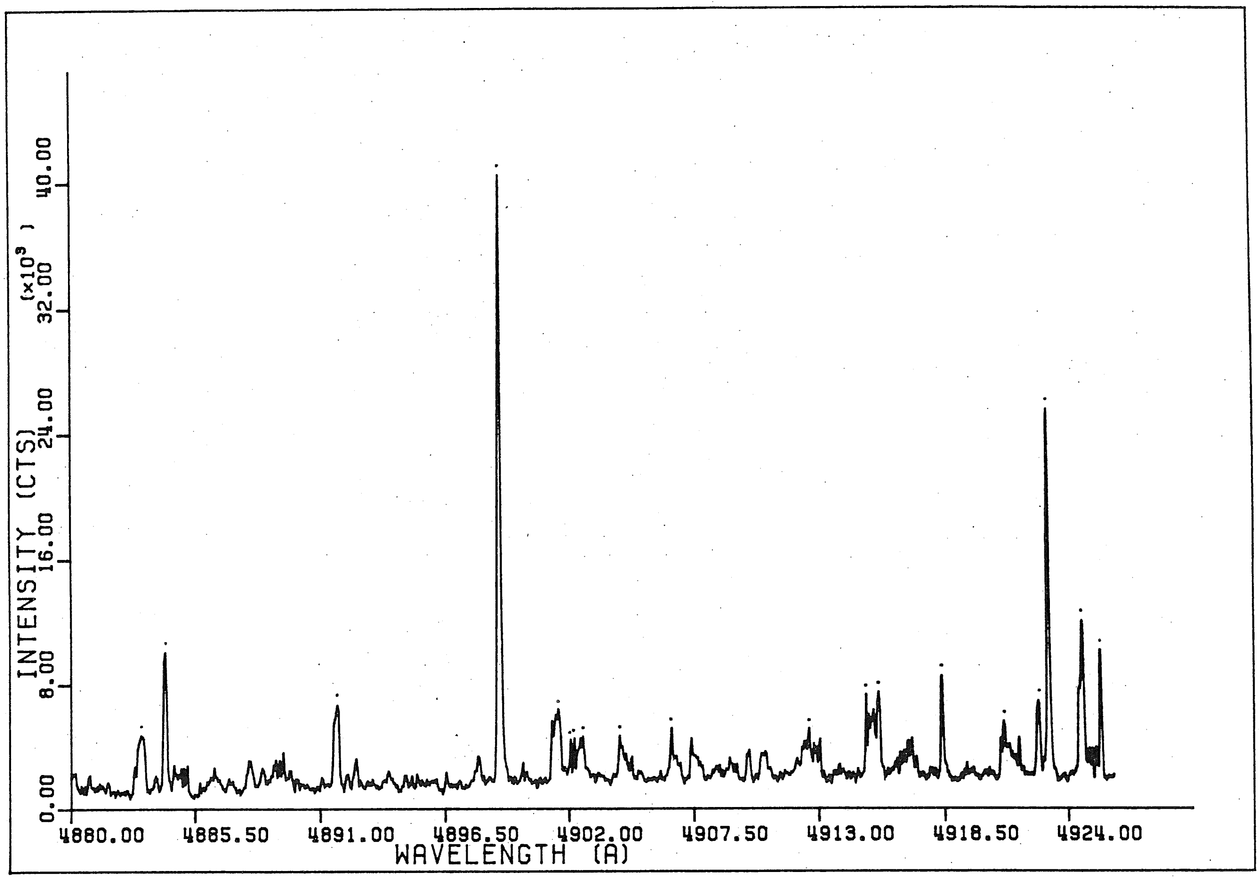
4852.50
4858.00
4863.50
4869.00
4874.50
4880.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4883.0640 | 5345. |
| 4884.2012 | 10501. |
| 4891.7822 | 6576. |
| 4898.7134 | 39892. |
| 4901.1499 | 5761. |
| 4901.7998 | 4084. |
| 4901.9624 | 3832. |
| 4902.2329 | 4246. |
| 4903.9658 | 4142. |
| 4906.2402 | 4419. |
| 4912.3047 | 3748. |
| 4914.8501 | 6331. |
| 4915.3916 | 5996. |
| 4918.3799 | 8175. |
| 4921.1104 | 5160. |
| 4922.6699 | 6503. |
| 4923.1602 | 25704. |
| 4924.6304 | 11745. |
| 4925.4199 | 9846. |
| 4924.2676 | 7004. |
| 4925.0210 | 6856. |
| 4928.0337 | 4299. |
| 4933.4136 | 3461. |
| 4934.7588 | 6136. |
| 4937.8252 | 5430. |
| 4938.8472 | 10077. |
| 4939.6543 | 4543. |
| 4940.0308 | 5216. |
| 4940.1924 | 5094. |
| 4941.4297 | 4355. |
| 4949.1768 | 3288. |
| 4949.6611 | 9679. |
| 4950.6836 | 8066. |
| 4953.2656 | 3662. |
| 4954.1265 | 5238. |
| 4955.2026 | 4375. |
| 4956.6553 | 3763. |
| 4957.8926 | 3404. |
| 4958.2153 | 5443. |
| 4960.3135 | 5815. |
| 4964.5640 | 3504. |
| 4966.7158 | 17398. |
| 4966.9849 | 18805. |
| 4967.5767 | 4268. |
| 4969.0293 | 8840. |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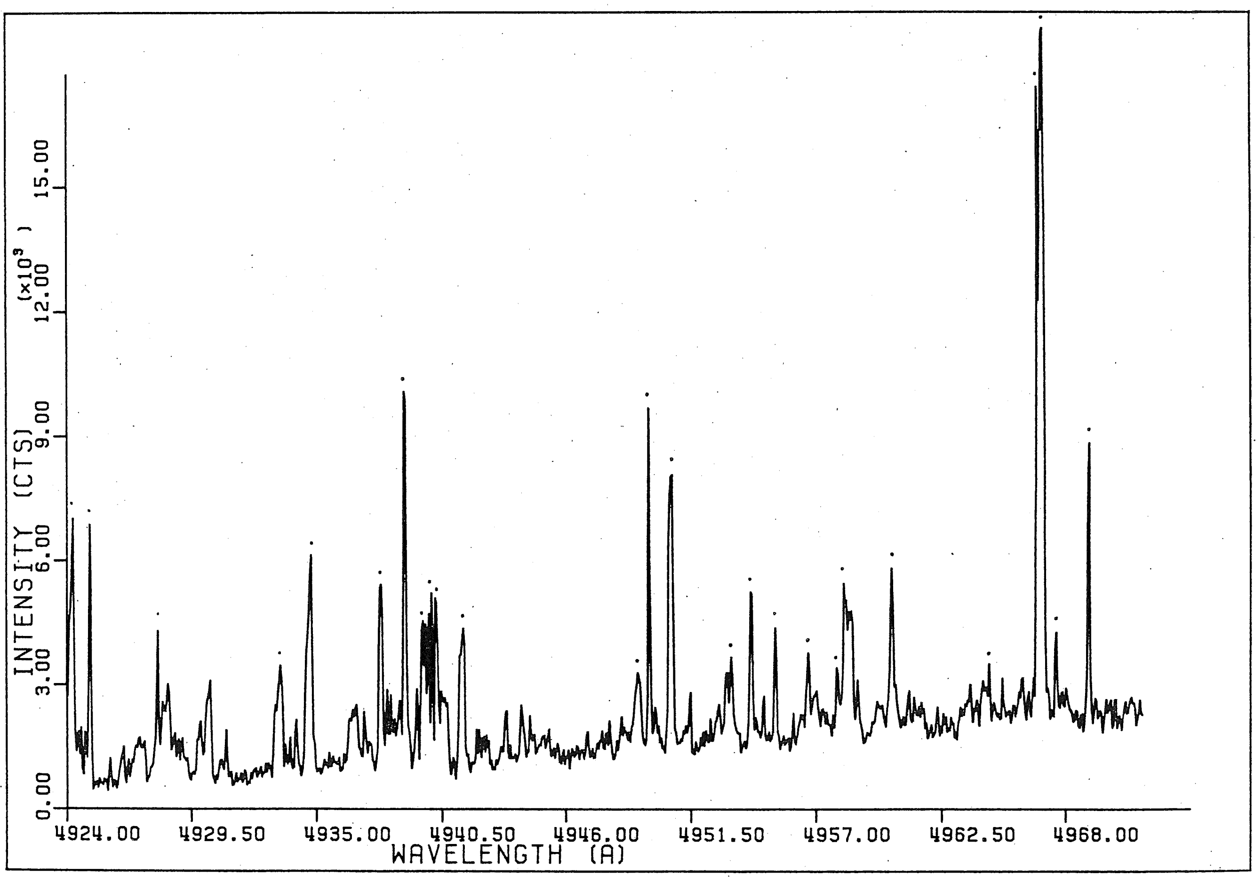
WAVELENGTH (A)


INTENSITY (CTS)
(x10³ )
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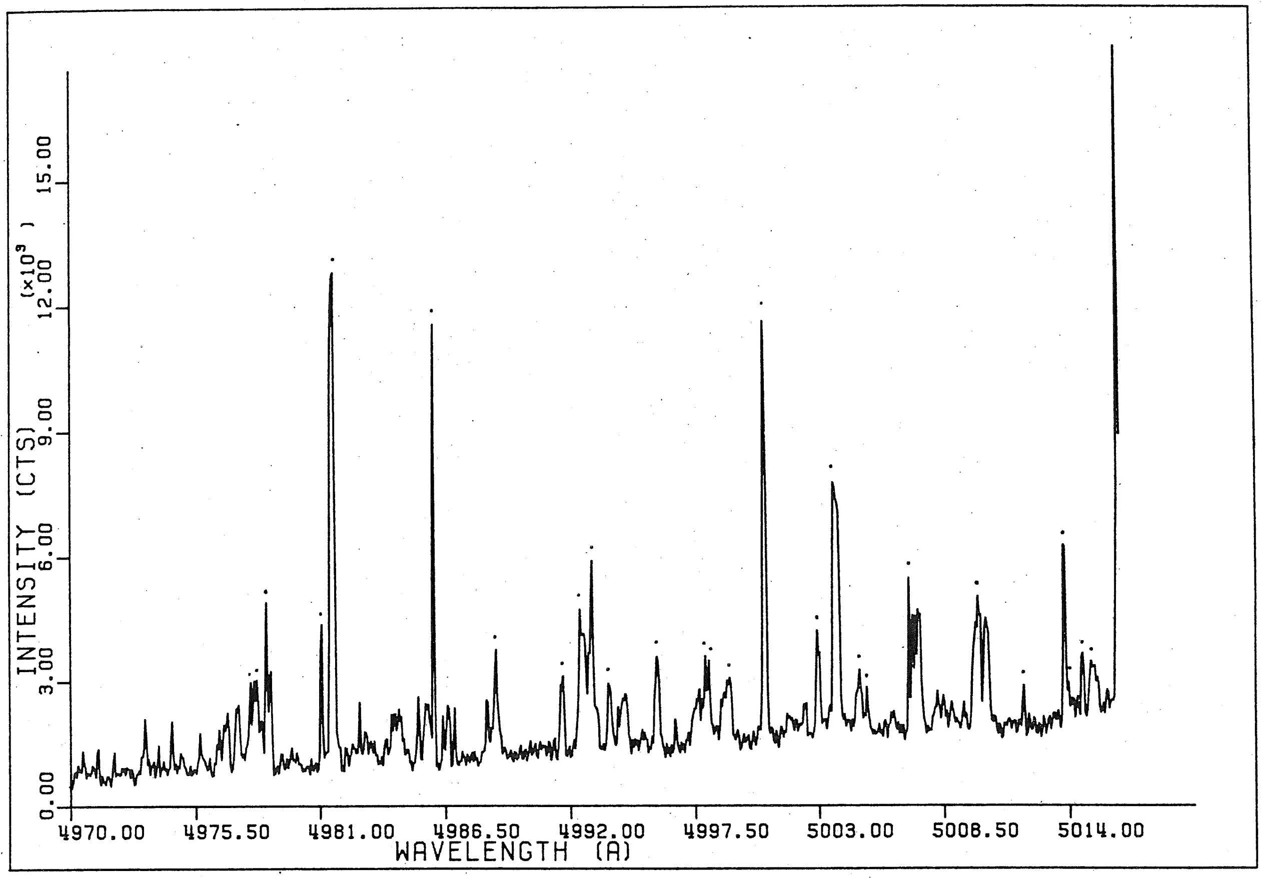
12.00
15.00
4924.00
4929.50
4935.00
4940.50
4946.00
4951.50
4957.00
4962.50
4968.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 4977.9292 | 2971. |
| 4978.0898 | 3009. |
| 4978.6245 | 4896. |
| 4981.0854 | 4369. |
| 4981.6206 | 12779. |
| 4986.0078 | 11554. |
| 4988.7363 | 3761. |
| 4991.6787 | 3116. |
| 4992.4277 | 4717. |
| 4992.9629 | 5887. |
| 4993.6582 | 2932. |
| 4995.7983 | 3579. |
| 4997.9380 | 3591. |
| 4998.0986 | 3491. |
| 4999.0083 | 3068. |
| 5000.5596 | 11618. |
| 5002.9136 | 4204. |
| 5003.6626 | 7752. |
| 5004.7861 | 3259. |
| 5005.1069 | 2842. |
| 5006.9795 | 5464. |
| 5010.0293 | 5024. |
| 5012.0088 | 2885. |
| 5013.7744 | 6247. |
| 5013.9883 | 2949. |
| 5014.5767 | 3661. |
| 5014.9512 | 3477. |
| 5015.8174 | 11407. |
| 5024.2764 | 7695. |
| 5024.3828 | 9625. |
| 5024.4888 | 8135. |
| 5024.6484 | 10911. |
| 5024.8081 | 4325. |
| 5026.0850 | 3457. |
| 5026.2979 | 3479. |
| 5026.5107 | 4912. |
| 5030.6602 | 5051. |
| 5031.5112 | 10633. |
| 5032.0435 | 13625. |
| 5036.4590 | 3479. |
| 5039.1191 | 3438. |
| 5039.7573 | 3804. |
| 5040.0767 | 4125. |
| 5040.2896 | 4136. |
| 5040.8745 | 3791. |
| 5041.7788 | 3424. |
| 5043.8008 | 8065. |
| 5043.9072 | 9925. |
| 5044.0664 | 5271. |
| 5044.2793 | 7172. |
| 5046.8330 | 3447. |
| 5048.6948 | 4560. |
| 5054.4937 | 8142. |
| 5054.6001 | 8174. |
| 5055.5044 | 4224. |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(×10³)
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4997.50
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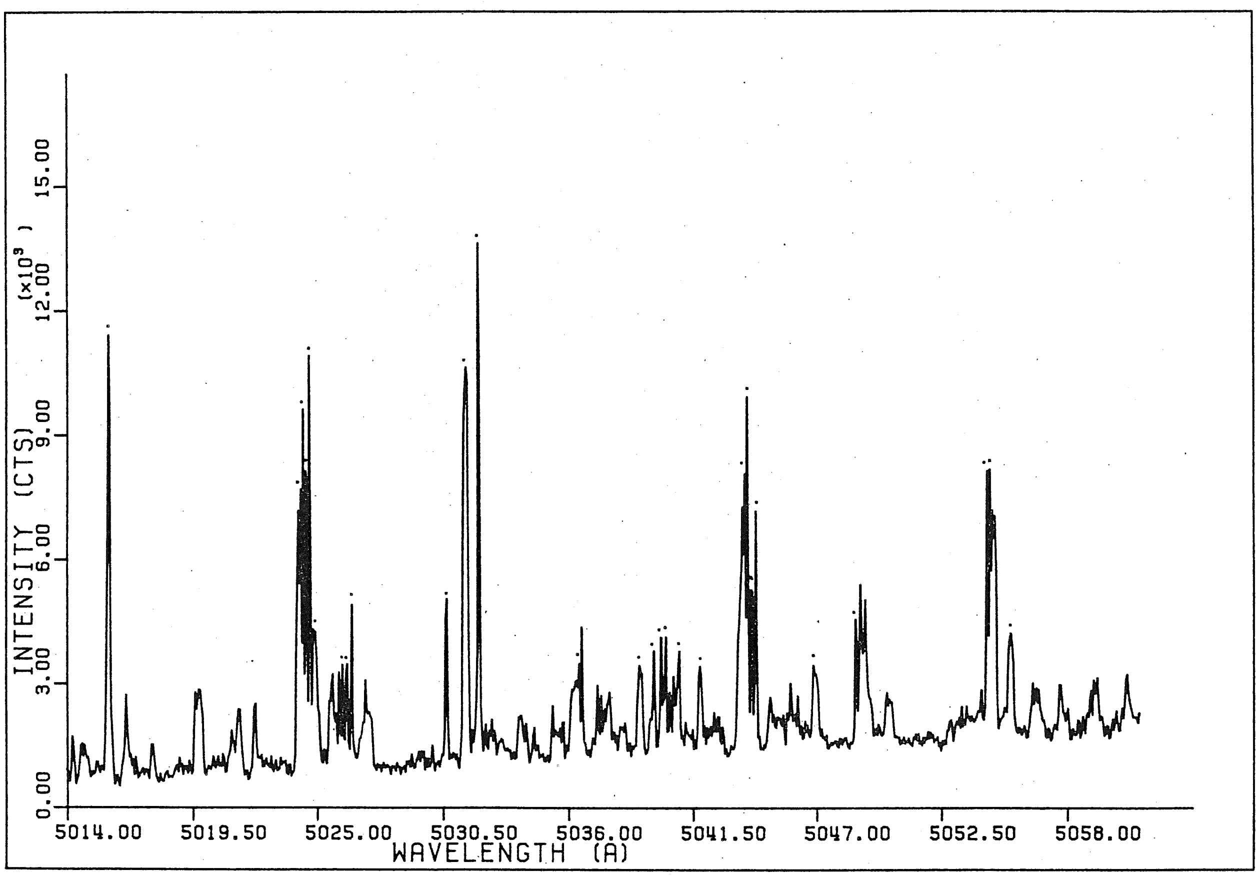
5008.50
5014.00
WAVELENGTH (A)


INTENSITY (CTS)
(×10³)
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6.00
9.00
12.00
15.00
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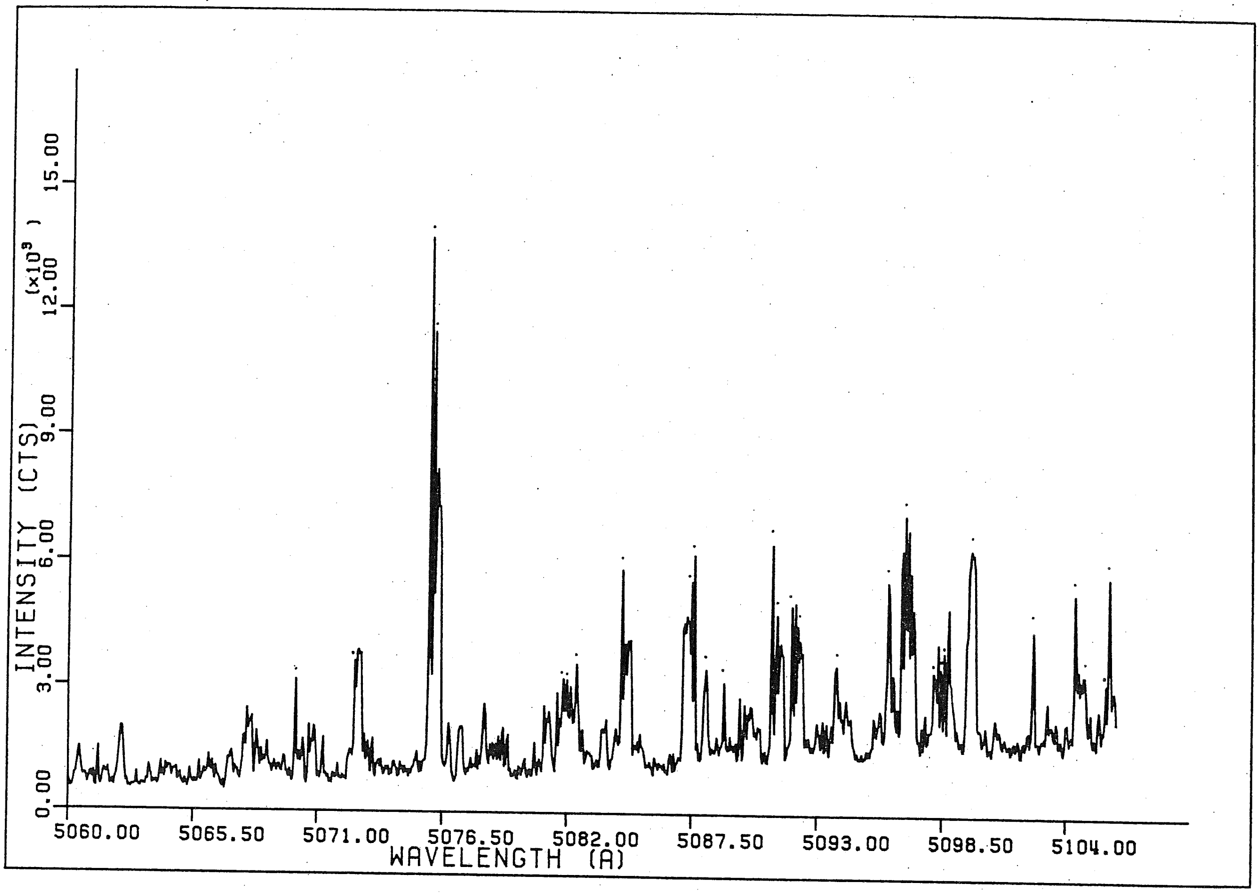
5030.50
5036.00
5041.50
5047.00
5052.50
5058.00
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5070.0654 | 3159. |
| 5072.6553 | 3600. |
| 5075.9321 | 13750. |
| 5076.0903 | 11481. |
| 5081.8511 | 3215. |
| 5082.0098 | 3188. |
| 5082.4326 | 3567. |
| 5084.4409 | 5830. |
| 5087.5059 | 5562. |
| 5087.6118 | 6199. |
| 5088.1401 | 3475. |
| 5088.9331 | 3158. |
| 5091.0469 | 6461. |
| 5091.2583 | 4783. |
| 5091.8926 | 4998. |
| 5092.1567 | 4526. |
| 5093.8481 | 3565. |
| 5096.1206 | 5588. |
| 5096.8604 | 7184. |
| 5098.1289 | 3436. |
| 5098.4458 | 3533. |
| 5098.6045 | 3912. |
| 5099.8203 | 6371. |
| 5102.5684 | 4437. |
| 5104.4180 | 5332. |
| 5104.6821 | 3255. |
| 5105.7920 | 3190. |
| 5105.9507 | 5722. |
| 5105.3008 | 3748. |
| 5105.8789 | 4516. |
| 5112.7632 | 3795. |
| 5117.0195 | 4191. |
| 5120.1201 | 8050. |
| 5120.3301 | 8730. |
| 5120.4878 | 7864. |
| 5125.4277 | 7192. |
| 5130.2622 | 5478. |
| 5131.6284 | 3656. |
| 5133.8882 | 12031. |
| 5138.5127 | 5457. |
| 5139.1958 | 3698. |
| 5139.3535 | 4134. |
| 5140.0889 | 55191. |
| 5140.2993 | 49518. |
| 5142.5063 | 3518. |
| 5144.3457 | 4003. |
| 5145.3965 | 9152. |
| 5145.6069 | 8709. |
| 5145.7646 | 10347. |
| 5148.9702 | 3669. |
| 5149.3906 | 4044. |
| 5150.1260 | 4779. |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(x10³ )
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6.00
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12.00
15.00
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5082.00
5087.50
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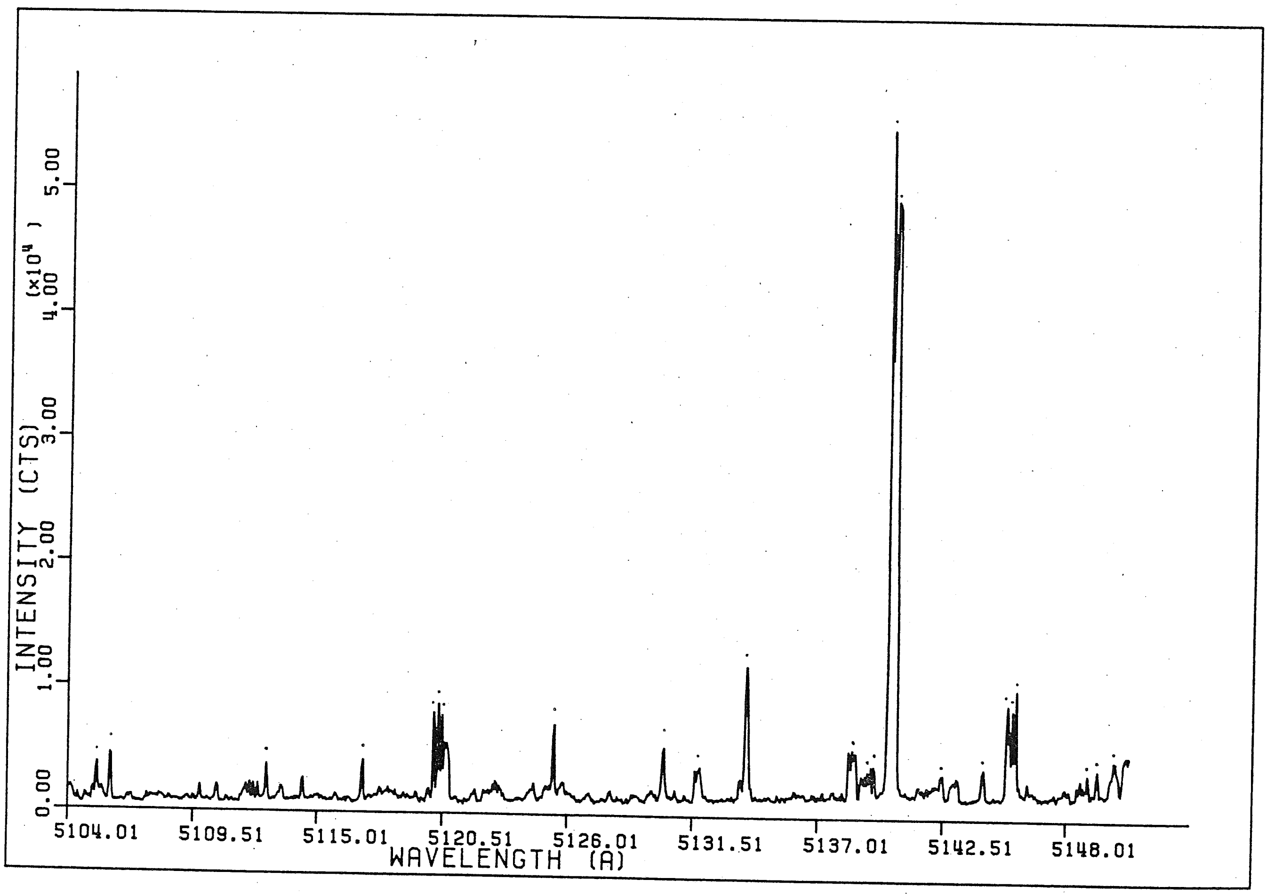
5104.00
WAVELENGTH (A)


INTENSITY (CTS)
(x10⁴ )
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3.00
4.00
5.00
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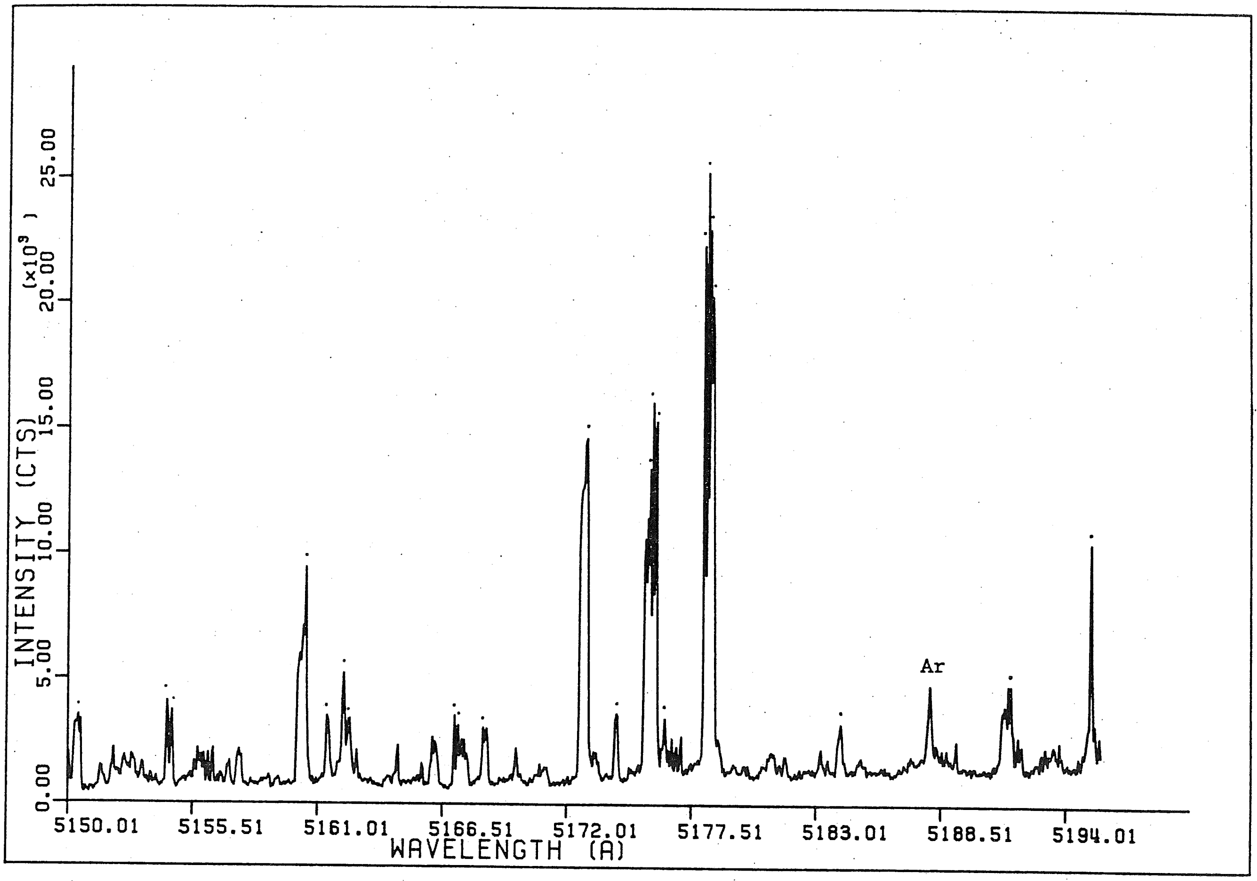
5115.01
5120.51
5126.01
5131.51
5137.01
5142.51
5148.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5150.4648 | 3509. |
| 5154.3799 | 4082. |
| 5154.5884 | 3715. |
| 5160.4873 | 9440. |
| 5161.4268 | 3522. |
| 5162.1577 | 5220. |
| 5162.4185 | 3408. |
| 5167.0645 | 3542. |
| 5167.2212 | 3162. |
| 5168.3174 | 3058. |
| 5172.9106 | 14641. |
| 5174.2158 | 3651. |
| 5175.7295 | 13429. |
| 5175.8340 | 16066. |
| 5175.9907 | 15330. |
| 5176.3560 | 3455. |
| 5178.0786 | 22301. |
| 5178.2354 | 25262. |
| 5178.3394 | 22937. |
| 5178.4438 | 20277. |
| 5184.1338 | 3245. |
| 5188.0488 | 4812. |
| 5191.5986 | 4817. |
| 5195.1479 | 10523. |
| 5194.8652 | 6788. |
| 5200.2627 | 14945. |
| 5200.5225 | 16832. |
| 5201.7158 | 13278. |
| 5201.9233 | 4450. |
| 5209.2412 | 4152. |
| 5216.4038 | 2886. |
| 5218.7393 | 3199. |
| 5219.6216 | 5544. |
| 5221.5938 | 4036. |
| 5222.0605 | 5363. |
| 5222.2163 | 6119. |
| 5222.4761 | 7105. |
| 5222.6836 | 7741. |
| 5223.8252 | 6499. |
| 5227.5620 | 3333. |
| 5228.1328 | 4299. |
| 5229.3784 | 2858. |
| 5232.4409 | 10734. |
| 5232.7002 | 2927. |
| 5232.8560 | 3019. |
| 5233.2710 | 4917. |
| 5234.2056 | 3289. |
| 5235.8662 | 7972. |
| 5236.0737 | 6173. |
| 5238.2017 | 27540. |
| 5238.4092 | 23570. |
| 5238.8242 | 4732. |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20.00
25.00
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5177.51
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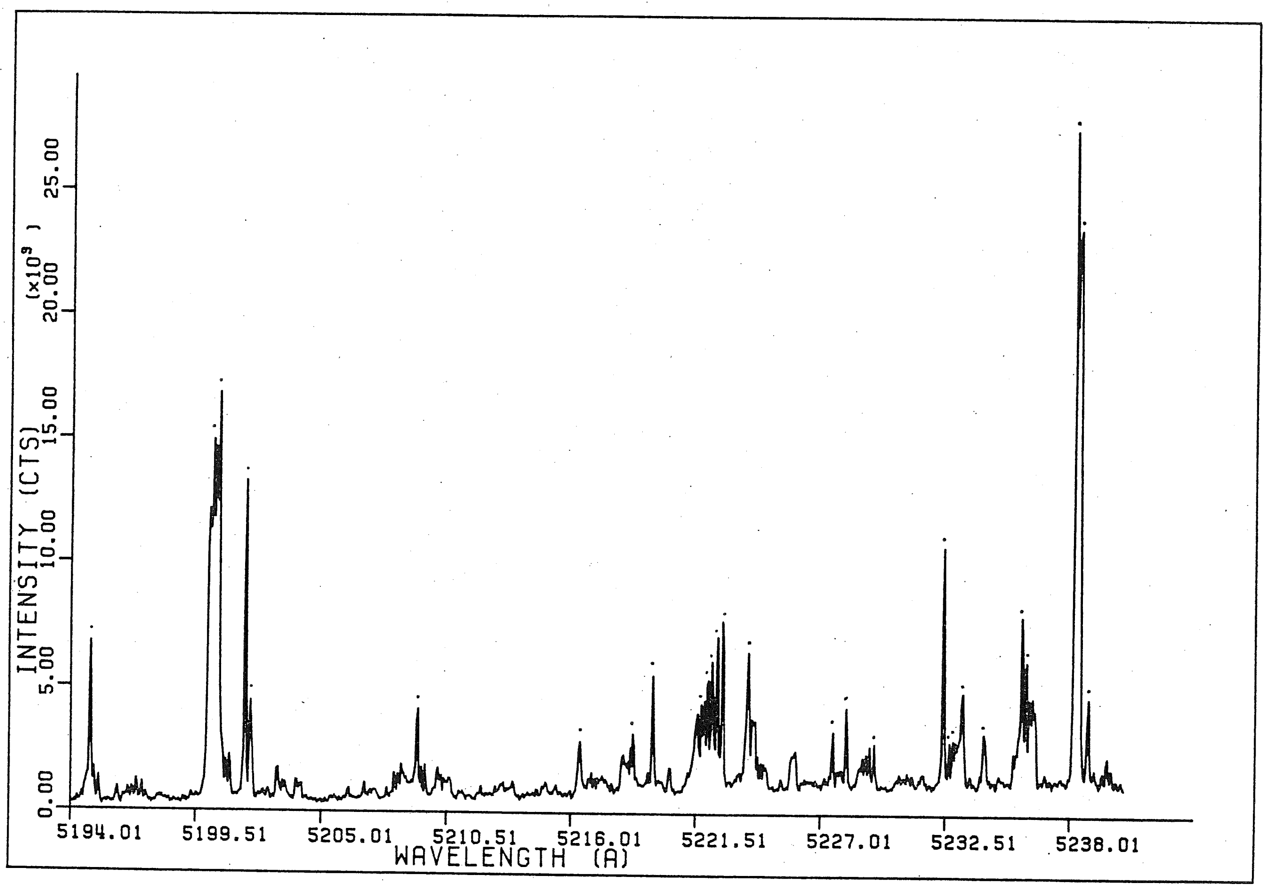
5188.51
5194.01
WAVELENGTH (A)


INTENSITY (CTS) (x10³)
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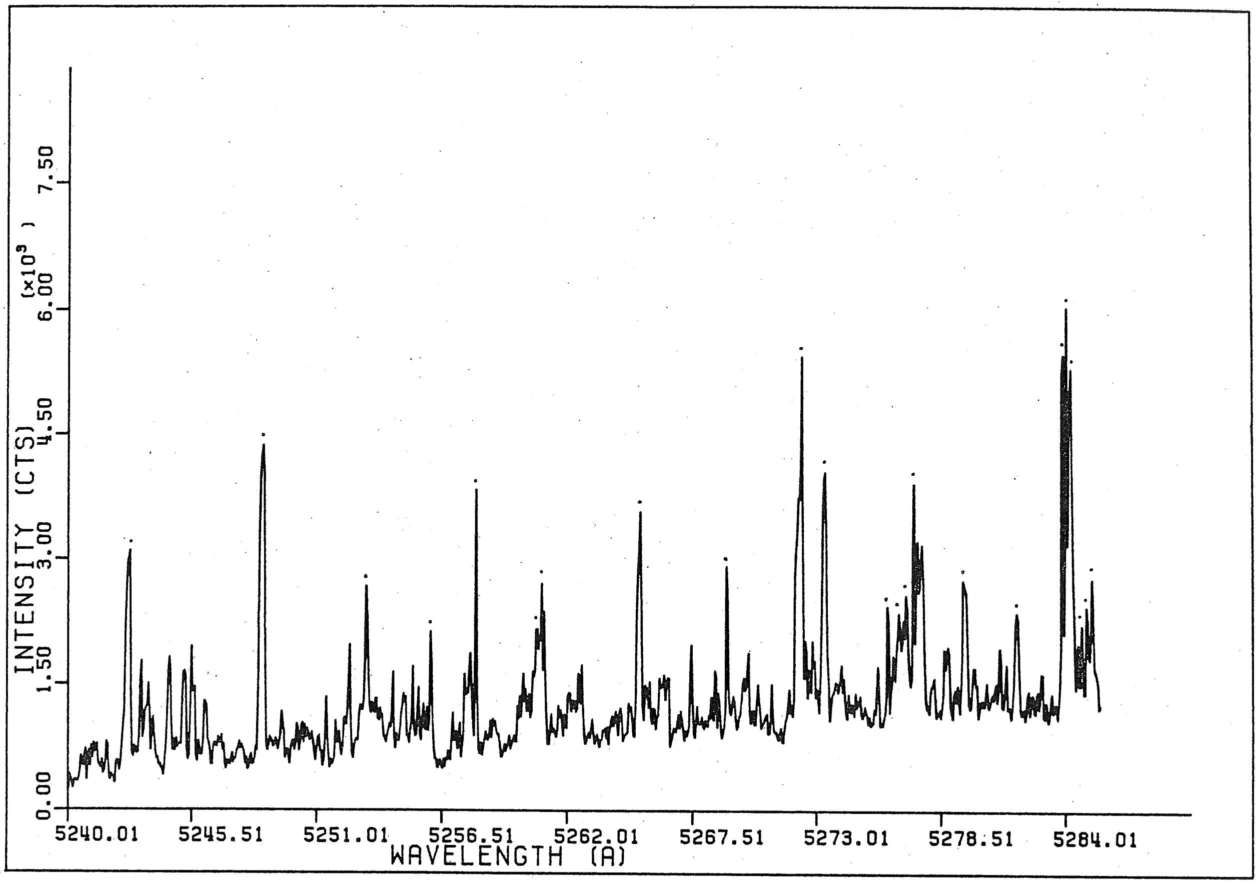
5210.51
5216.01
5221.51
5227.01
5232.51
5238.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5242.7646 | 3098. |
| 5248.6416 | 4365. |
| 5253.1777 | 2675. |
| 5256.0132 | 2131. |
| 5258.0234 | 3835. |
| 5260.7041 | 2164. |
| 5260.9106 | 2706. |
| 5265.2407 | 3575. |
| 5269.0039 | 2915. |
| 5272.3545 | 5449. |
| 5273.3857 | 4052. |
| 5276.1177 | 2441. |
| 5276.6333 | 2357. |
| 5276.9424 | 2573. |
| 5277.3032 | 3915. |
| 5279.4683 | 2748. |
| 5281.8398 | 2363. |
| 5283.9019 | 5473. |
| 5284.0566 | 6044. |
| 5284.2627 | 5303. |
| 5284.7266 | 2216. |
| 5284.9326 | 2438. |
| 5285.1904 | 2771. |
| 5286.1875 | 2621. |
| 5288.3916 | 19479. |
| 5290.9028 | 20982. |
| 5291.0054 | 20868. |
| 5295.9253 | 2502. |
| 5296.8477 | 5490. |
| 5298.0776 | 16014. |
| 5298.2314 | 13375. |
| 5298.3340 | 12263. |
| 5301.9727 | 2685. |
| 5302.7925 | 5834. |
| 5303.3052 | 2841. |
| 5308.5327 | 2933. |
| 5308.7891 | 4111. |
| 5308.9941 | 4746. |
| 5309.1987 | 6821. |
| 5310.5313 | 2430. |
| 5311.3516 | 2665. |
| 5314.0679 | 2743. |
| 5314.2217 | 2603. |
| 5314.4775 | 2451. |
| 5327.7002 | 4701. |
| 5328.4688 | 2639. |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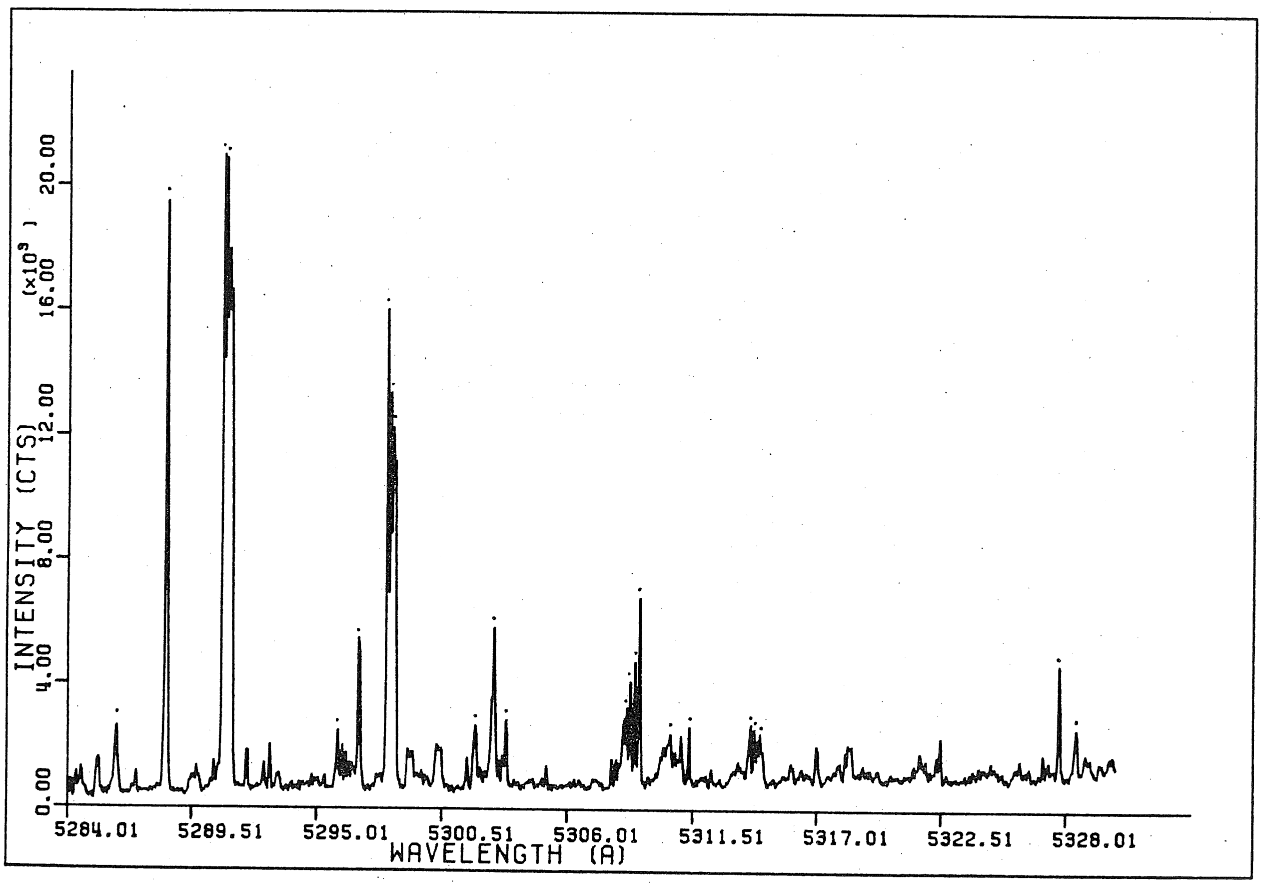
5284.01
WAVELENGTH (A)


INTENSITY (CTS)
(x10³ )
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20.00
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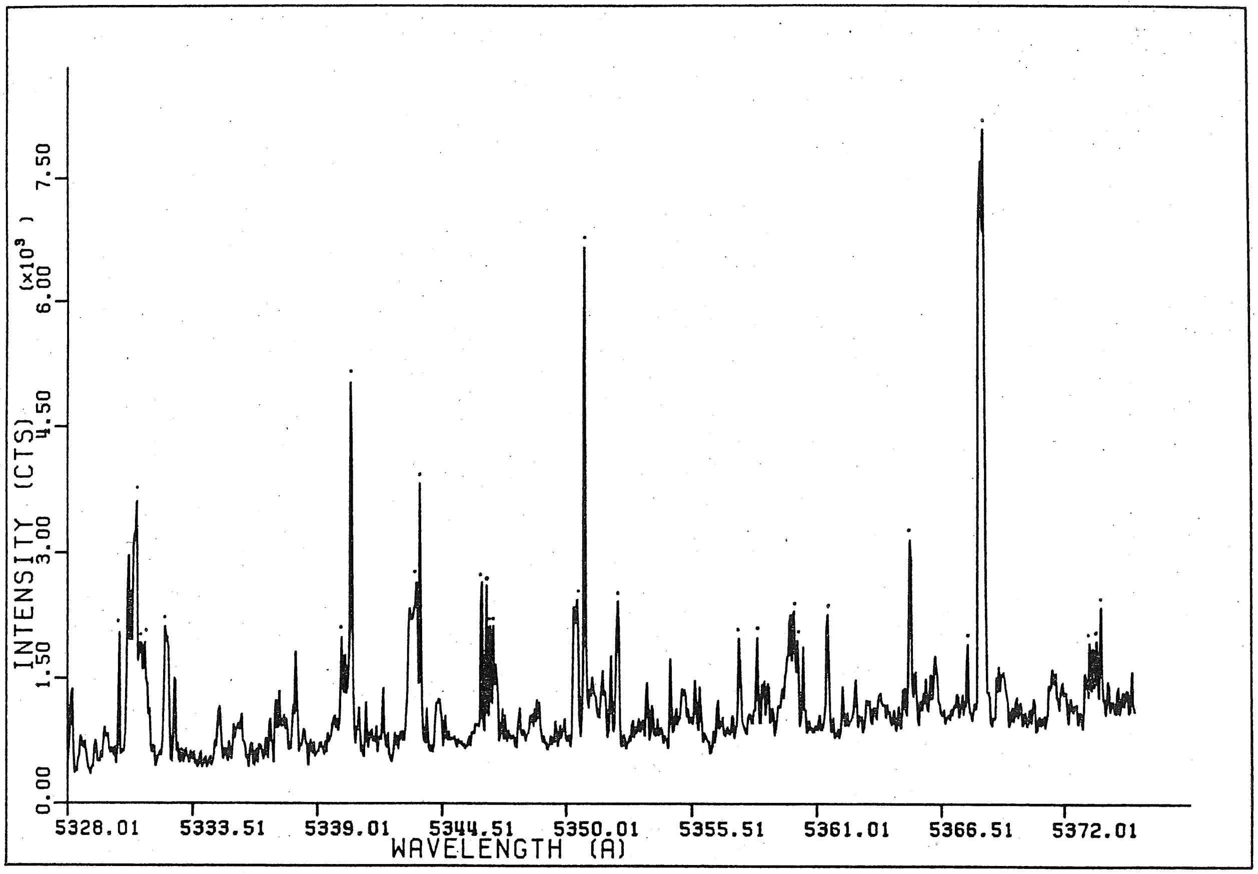
5300.51
5306.01
5311.51
5317.01
5322.51
5328.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5330.3062 | 2050. |
| 5331.0698 | 3613. |
| 5331.2222 | 1926. |
| 5331.4258 | 1929. |
| 5332.2915 | 2120. |
| 5340.0791 | 1994. |
| 5340.4863 | 5022. |
| 5343.3877 | 2646. |
| 5343.5400 | 3823. |
| 5346.2886 | 2651. |
| 5346.4922 | 2616. |
| 5346.6450 | 2131. |
| 5346.7979 | 2132. |
| 5350.5137 | 2443. |
| 5350.8696 | 6653. |
| 5352.2949 | 2428. |
| 5357.5884 | 1984. |
| 5358.4028 | 1988. |
| 5359.8789 | 2267. |
| 5360.1846 | 1959. |
| 5361.5078 | 2269. |
| 5365.1216 | 3158. |
| 5367.7178 | 1914. |
| 5368.4810 | 8098. |
| 5373.1133 | 1930. |
| 5373.4185 | 1955. |
| 5373.6221 | 2360. |
| 5380.8760 | 27650. |
| 5380.9771 | 36150. |
| 5381.0781 | 44438. |
| 5381.9375 | 6719. |
| 5386.6895 | 15326. |
| 5391.6431 | 4185. |
| 5396.2432 | 29870. |
| 5401.8545 | 3046. |
| 5402.1069 | 3126. |
| 5402.4102 | 3417. |
| 5405.6963 | 3011. |
| 5405.9487 | 3746. |
| 5407.0103 | 24324. |
| 5407.7183 | 4613. |
| 5408.9312 | 8971. |
| 5411.3579 | 3440. |
| 5417.1709 | 7175. |
| 5417.5249 | 3246. |
| 5417.8281 | 4640. |
| 5418.0303 | 6337. |
| 5418.2324 | 6488. |
| 5418.4854 | 4832. |
| 5418.7383 | 3026. |
| 5419.0415 | 3272. |


INTENSITY (CTS) (x10³ )
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7.50
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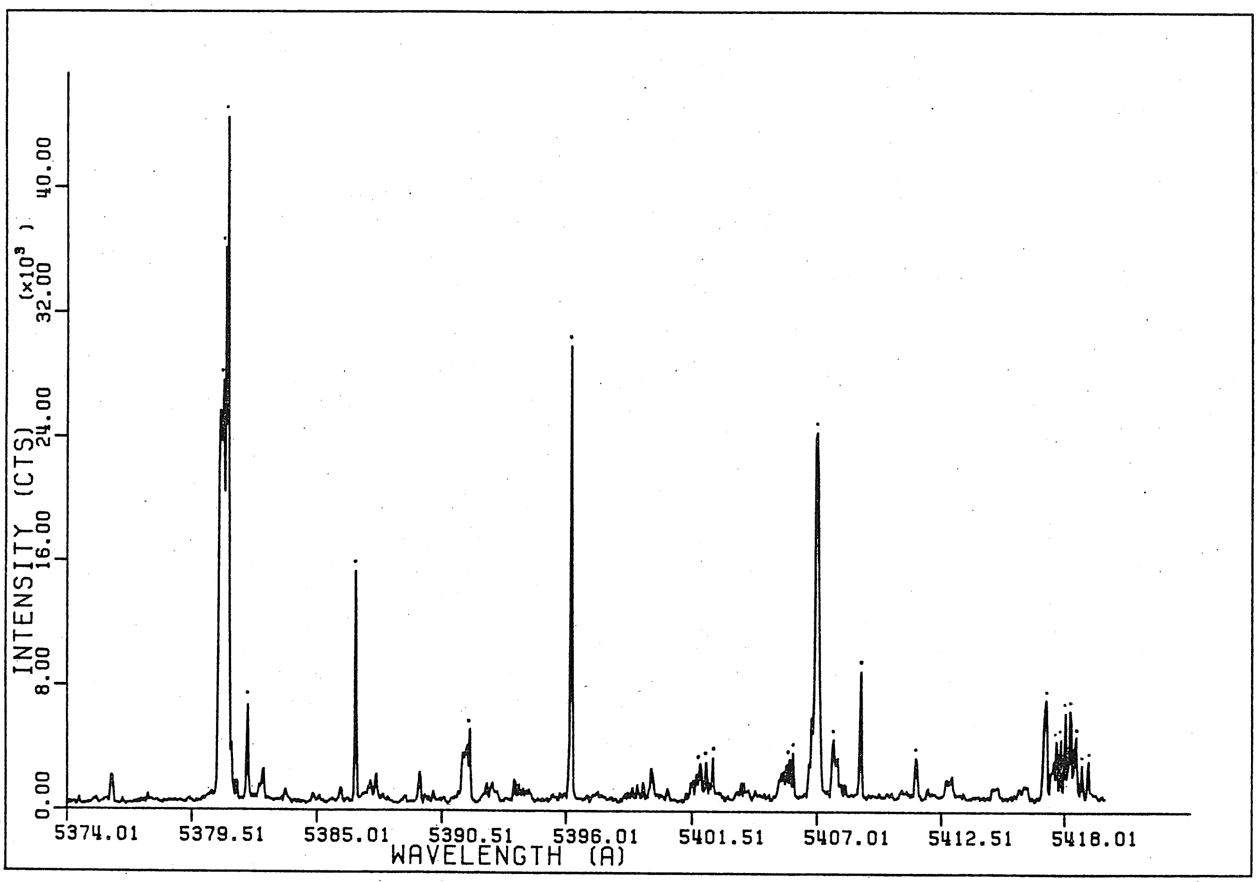
5361.01
5366.51
5372.01
WAVELENGTH (A)


INTENSITY (CTS) (x10³ )
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24.00
32.00
40.00
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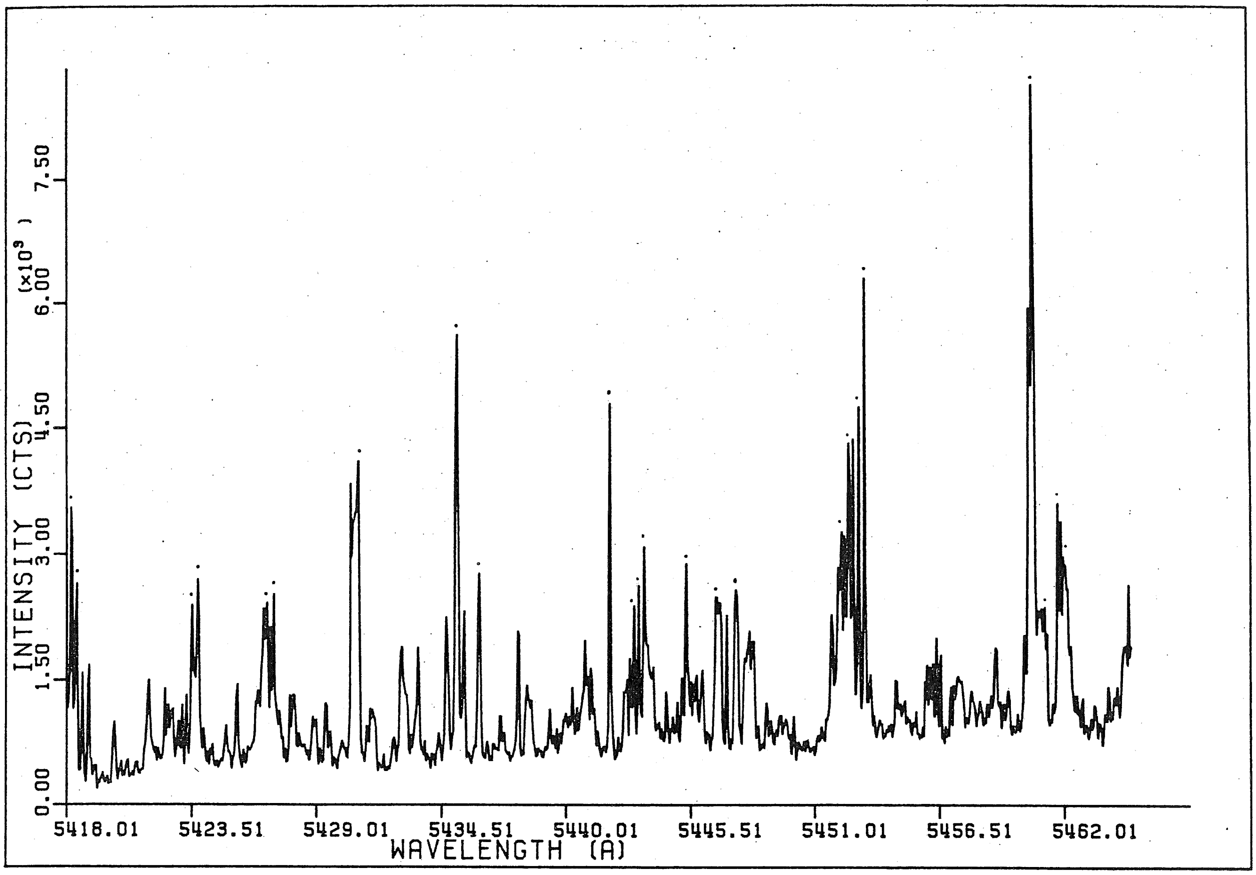
5390.51
5396.01
5401.51
5407.01
5412.51
5418.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5418.1958 | 3548. |
| 5418.4468 | 2651. |
| 5423.5220 | 2395. |
| 5423.7734 | 2698. |
| 5426.8389 | 2419. |
| 5427.1401 | 2523. |
| 5430.8589 | 4100. |
| 5435.2305 | 5610. |
| 5436.1851 | 2766. |
| 5441.9639 | 4787. |
| 5443.0190 | 2383. |
| 5443.2202 | 2626. |
| 5443.4712 | 3085. |
| 5445.3306 | 2885. |
| 5446.6372 | 2489. |
| 5447.5415 | 2574. |
| 5452.2148 | 3262. |
| 5452.5166 | 4313. |
| 5452.9687 | 4748. |
| 5453.2197 | 6297. |
| 5460.6567 | 8643. |
| 5461.1592 | 2368. |
| 5461.7124 | 3602. |
| 5461.9634 | 2970. |
| 5468.9287 | 1961. |
| 5471.6235 | 1542. |
| 5472.5215 | 2165. |
| 5473.3701 | 1808. |
| 5475.5654 | 1601. |
| 5477.1621 | 1616. |
| 5481.1543 | 1628. |
| 5481.5034 | 2231. |
| 5484.9468 | 2143. |
| 5487.1924 | 1556. |
| 5488.7393 | 1535. |
| 5490.4355 | 3849. |
| 5491.0845 | 3321. |
| 5491.9824 | 1517. |
| 5492.1323 | 1601. |
| 5492.3320 | 2272. |
| 5494.4277 | 1631. |
| 5496.0742 | 8049. |
| 5497.7212 | 1718. |
| 5499.2183 | 1503. |
| 5502.2119 | 2108. |
| 5502.5117 | 2831. |
| 5502.9106 | 10343. |
| 5505.5054 | 2836. |
| 5505.7549 | 1743. |
| 5506.4536 | 2596. |
| 5508.2500 | 2528. |



INTENSITY (CTS)
(x10³ )
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3.00
4.50
6.00
7.50
5418.01
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5429.01
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5445.51
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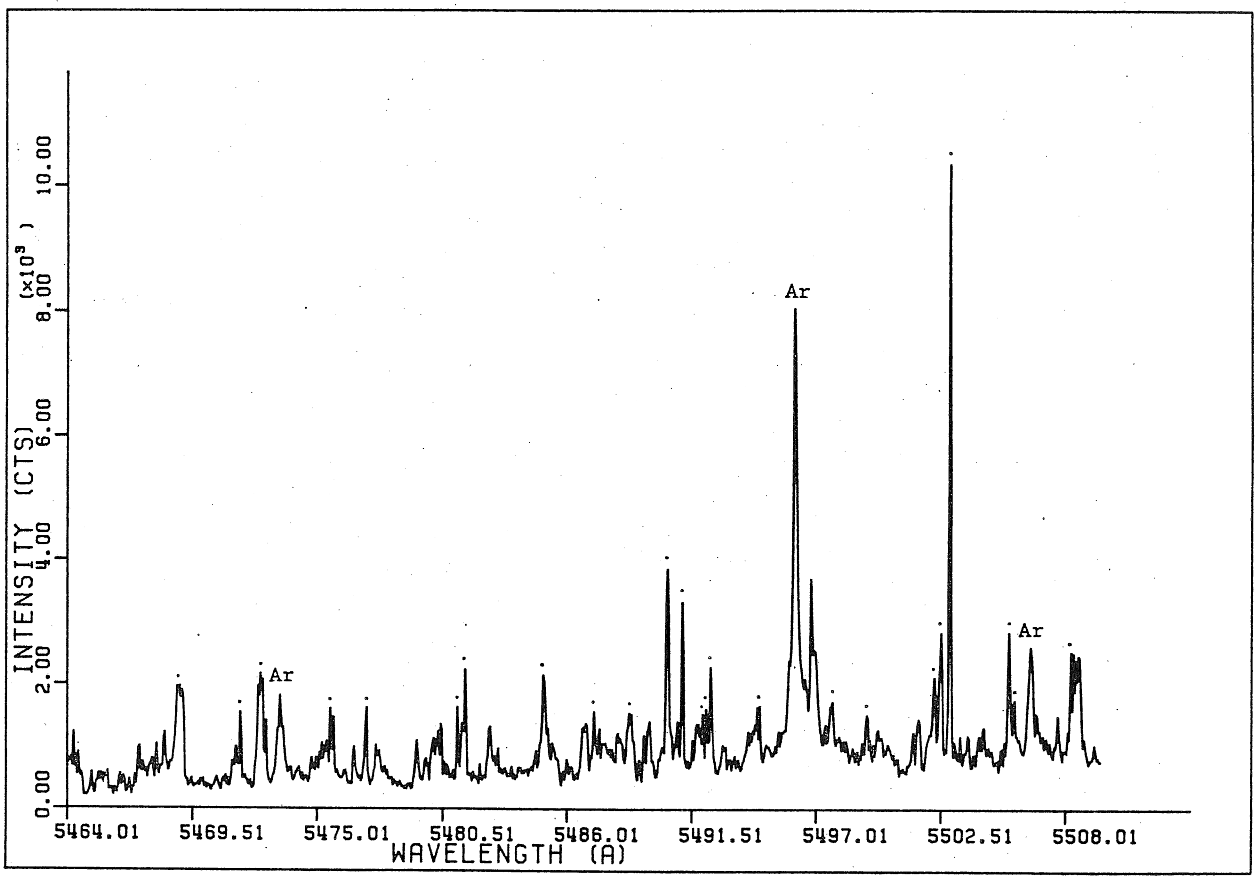
WAVELENGTH (A)

INTENSITY (CTS)
(x10³ )
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4.00
6.00
8.00
10.00
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Ar
Ar
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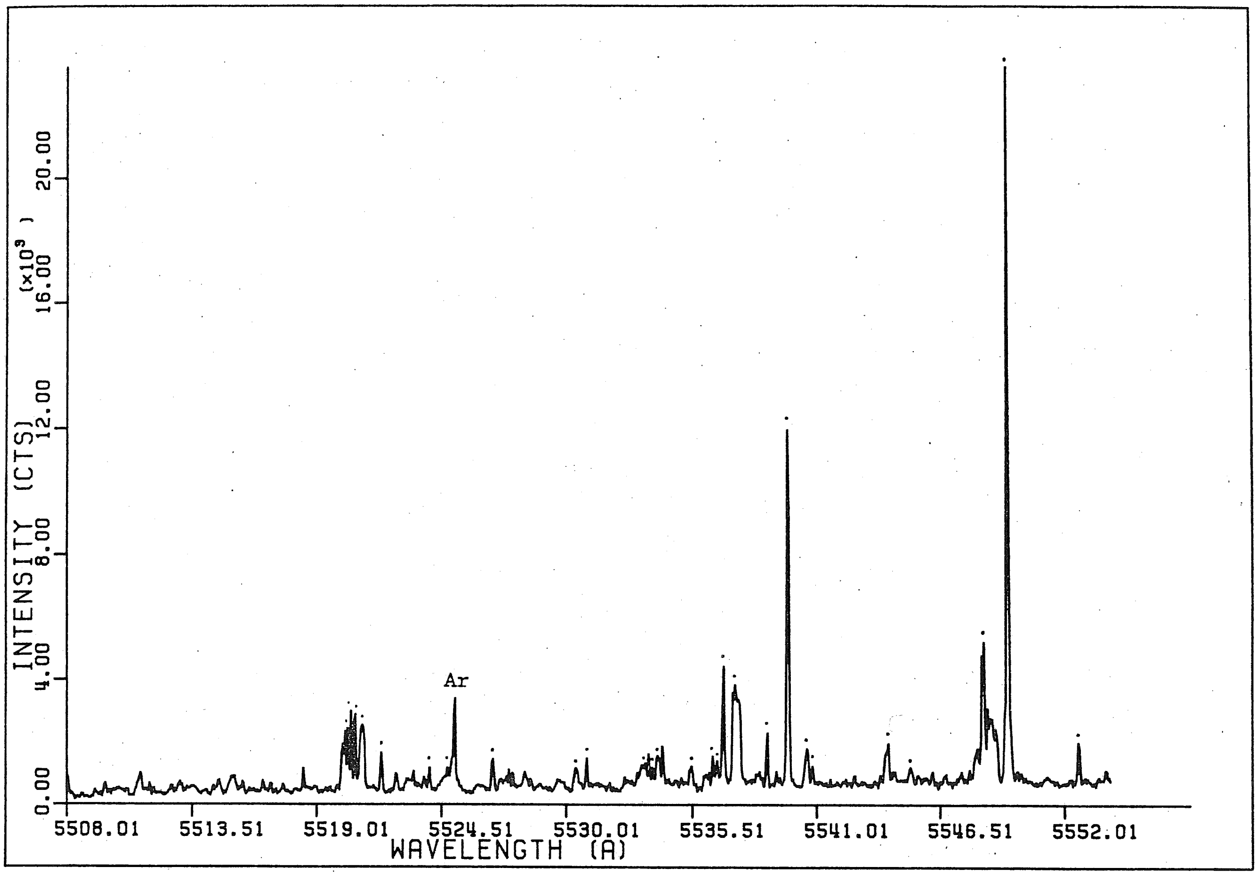
5469.51
5475.01
5480.51
5486.01
5491.51
5497.01
5502.51
5508.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5520.3569 | 2434. |
| 5520.5054 | 2993. |
| 5520.7036 | 2883. |
| 5521.0010 | 2544. |
| 5521.8433 | 1652. |
| 5523.9741 | 1171. |
| 5524.7671 | 1166. |
| 5525.1138 | 3393. |
| 5526.7983 | 1446. |
| 5530.4155 | 1155. |
| 5530.9111 | 1479. |
| 5533.4380 | 1323. |
| 5533.7354 | 1182. |
| 5533.9834 | 1565. |
| 5535.4697 | 1231. |
| 5536.4111 | 1553. |
| 5536.6094 | 1403. |
| 5536.9067 | 4435. |
| 5537.4023 | 3839. |
| 5538.8389 | 2294. |
| 5539.7310 | 11969. |
| 5540.5732 | 1789. |
| 5540.8213 | 1235. |
| 5544.1904 | 1952. |
| 5545.1816 | 1194. |
| 5548.4517 | 5223. |
| 5549.4922 | 23627. |
| 5552.6138 | 1993. |
| 5556.0850 | 2483. |
| 5558.2969 | 4583. |
| 5558.6406 | 5360. |
| 5559.6240 | 3455. |
| 5560.1152 | 1757. |
| 5564.5879 | 10270. |
| 5566.6523 | 2547. |
| 5568.5693 | 5411. |
| 5568.7168 | 7771. |
| 5568.9131 | 10378. |
| 5569.1592 | 11622. |
| 5569.4048 | 10156. |
| 5572.5010 | 2702. |
| 5573.8774 | 1969. |
| 5577.4653 | 2605. |
| 5582.5771 | 10460. |
| 5583.2651 | 2015. |
| 5584.2480 | 10719. |
| 5586.4106 | 15581. |
| 5589.8018 | 1802. |
| 5589.9492 | 1710. |
| 5590.0967 | 2165. |
| 5594.0288 | 6458. |
| 5594.2256 | 2008. |
| 5596.4863 | 2589. |
| 5597.7642 | 2682. |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(x10³ )
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8.00
12.00
16.00
20.00
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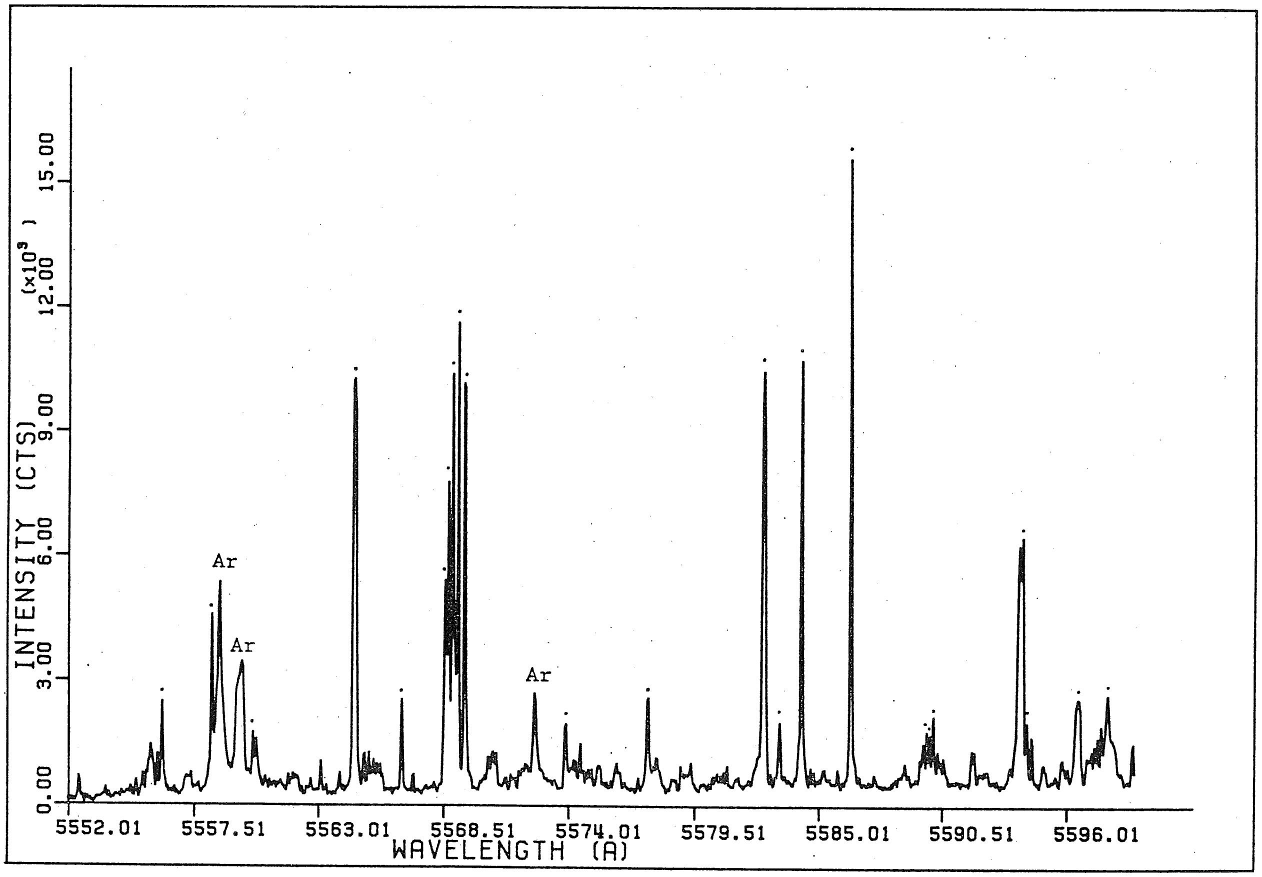
5535.51
5541.01
5546.51
5552.01
WAVELENGTH (A)


INTENSITY (CTS)
(x10³ )
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6.00
9.00
12.00
15.00
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Ar
Ar
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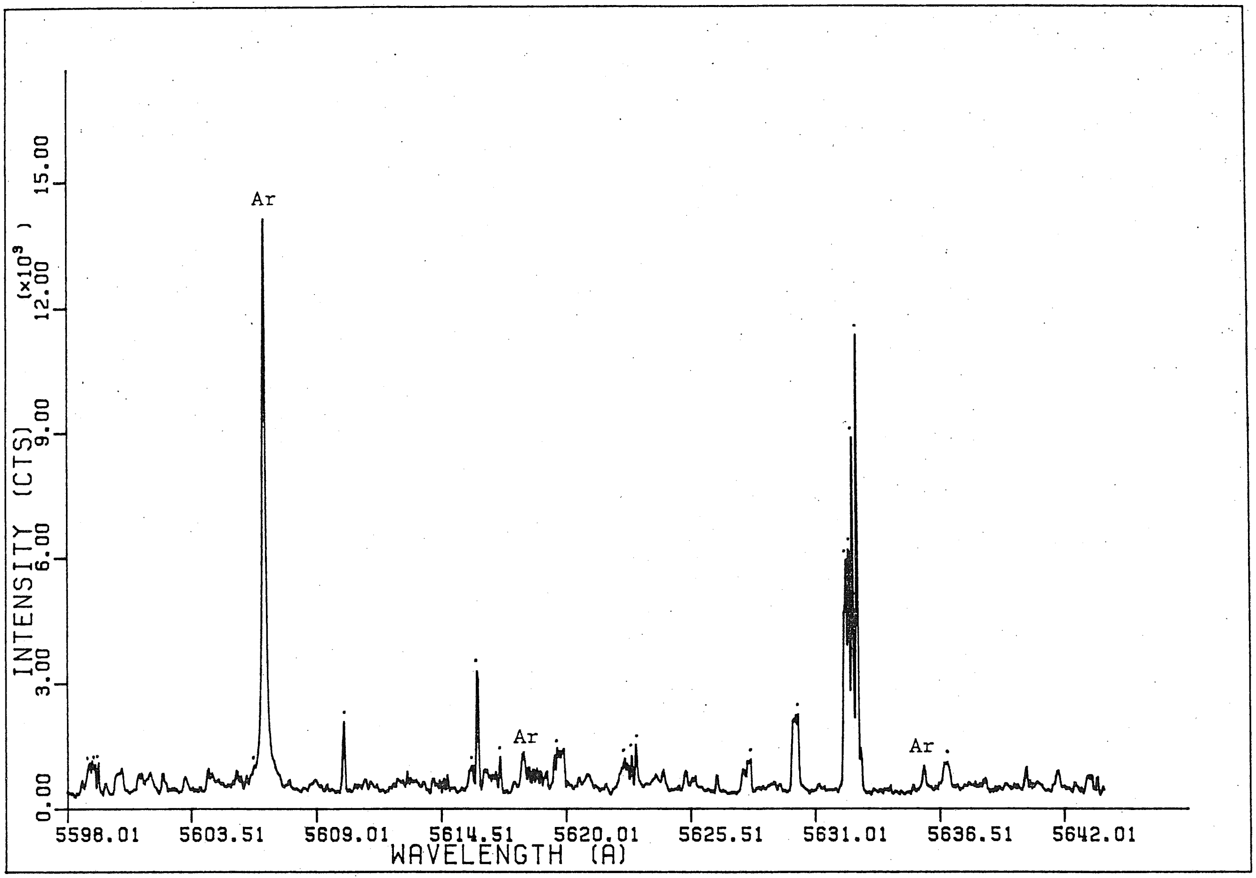
5557.51
5563.01
5568.51
5574.01
5579.51
5585.01
5590.51
5596.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5598.9878 | 1087. |
| 5599.2319 | 1046. |
| 5599.3784 | 1097. |
| 5606.2661 | 1029. |
| 5606.7061 | 14123. |
| 5610.2231 | 2073. |
| 5615.8896 | 1016. |
| 5616.0850 | 3287. |
| 5617.1108 | 1231. |
| 5618.1367 | 1341. |
| 5619.5049 | 1265. |
| 5622.5820 | 1193. |
| 5622.8755 | 1256. |
| 5623.0708 | 1529. |
| 5628.1514 | 1174. |
| 5630.2515 | 2255. |
| 5632.4009 | 5934. |
| 5632.4990 | 6179. |
| 5632.6943 | 8873. |
| 5632.8896 | 11342. |
| 5635.8208 | 1015. |
| 5636.8467 | 1100. |
| 5644.0913 | 1014. |
| 5646.0313 | 1622. |
| 5648.8442 | 1559. |
| 5650.1055 | 1192. |
| 5650.7842 | 7092. |
| 5656.9922 | 1770. |
| 5657.2349 | 1540. |
| 5657.3804 | 1507. |
| 5658.1562 | 966. |
| 5659.2720 | 1740. |
| 5660.7271 | 974. |
| 5670.3784 | 1029. |
| 5670.5723 | 960. |
| 5672.5122 | 2478. |
| 5672.7549 | 2593. |
| 5673.0459 | 2784. |
| 5673.3853 | 3796. |
| 5676.4893 | 2058. |
| 5682.0669 | 9576. |


Ar
Ar
Ar
INTENSITY (CTS)
(×10³ )
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3.00
6.00
9.00
12.00
15.00
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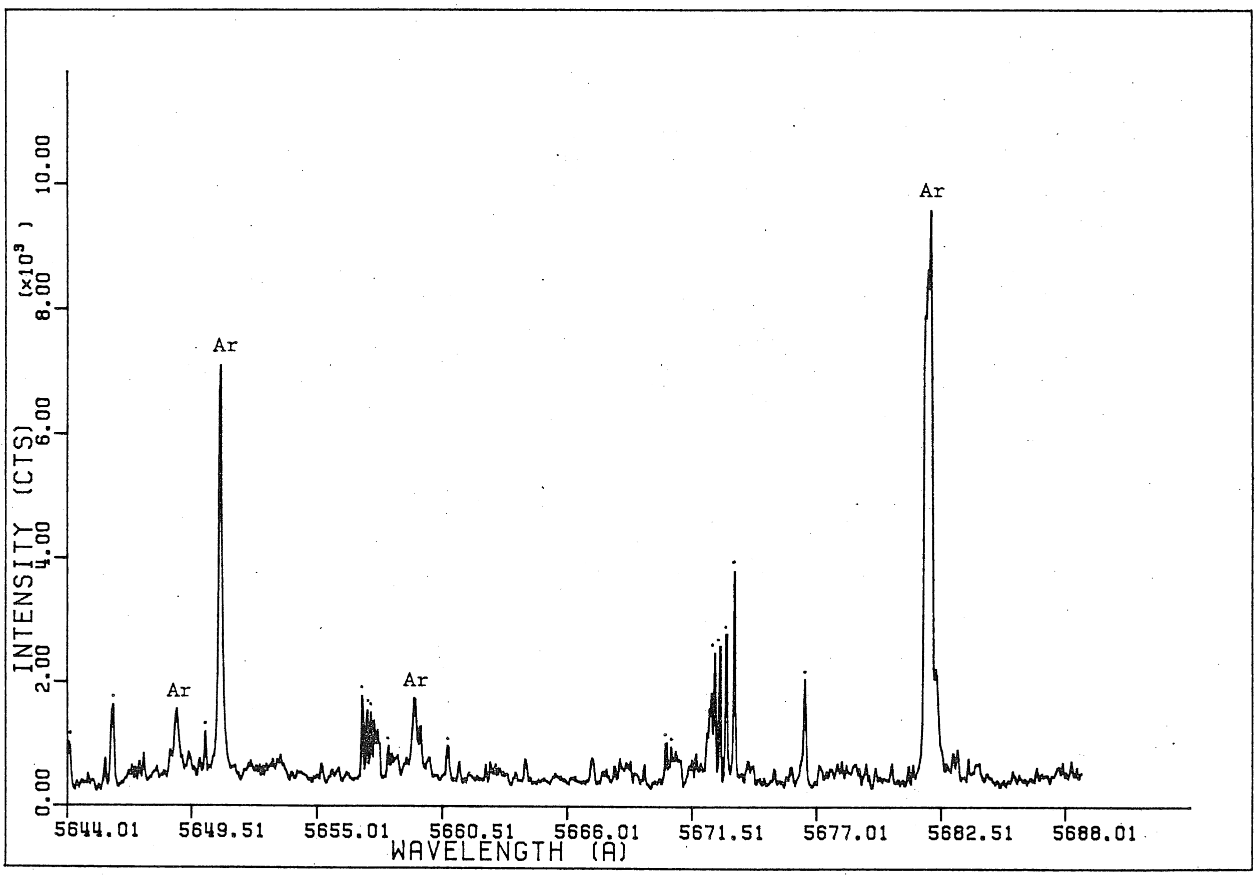
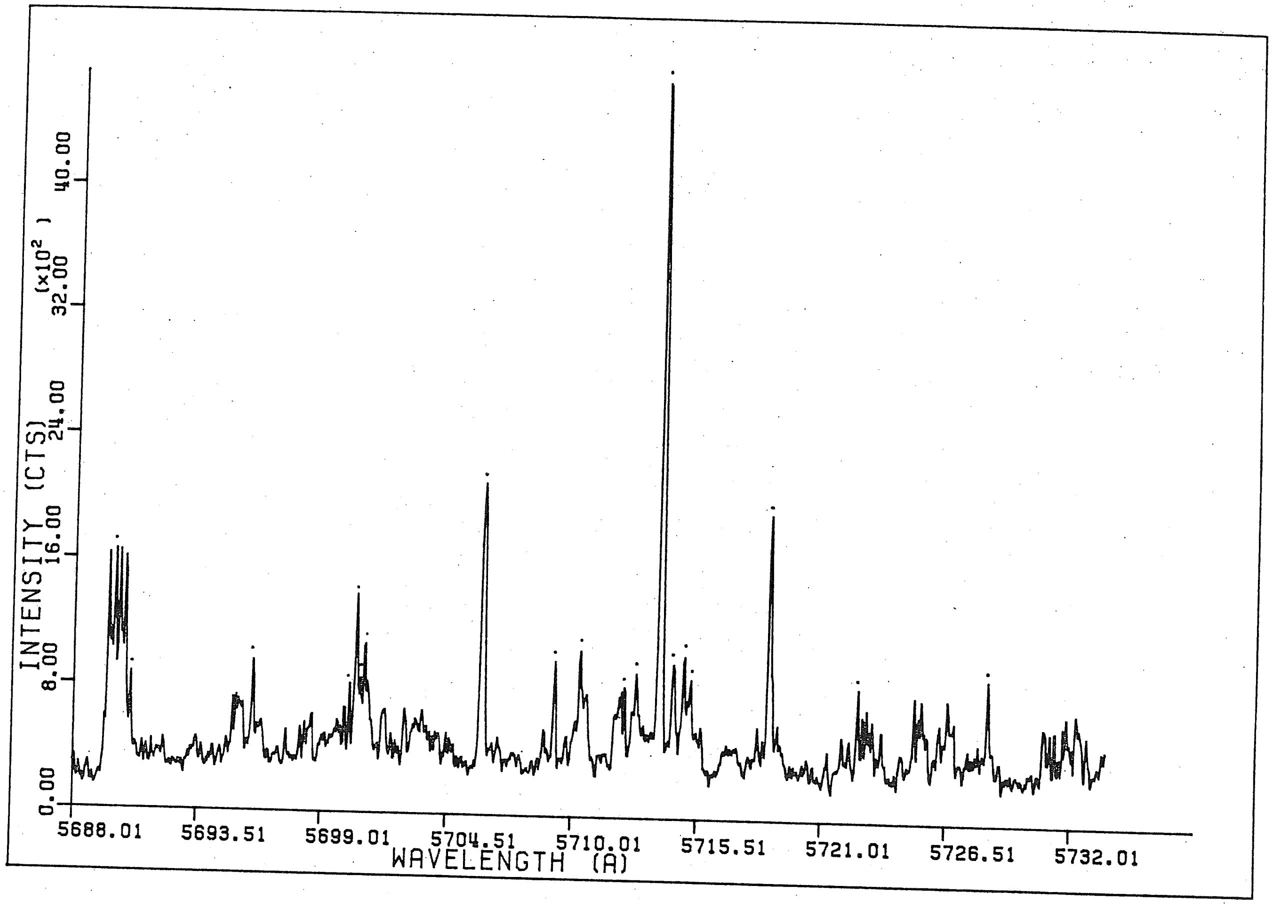
5609.01
5614.51
5620.01
5625.51
5631.01
5636.51
5642.01
WAVELENGTH (A)


Ar
Ar
Ar
Ar
INTENSITY (CTS)
(×10³ )
0.00
2.00
4.00
6.00
8.00
10.00
5644.01
5649.51
5655.01
5660.51
5666.01
5671.51
5677.01
5682.51
5688.01
WAVELENGTH (A)

| $\lambda$(Å) | I |
|---|---|
| 5689.8008 | 1657. |
| 5690.5229 | 874. |
| 5695.9644 | 961. |
| 5700.2495 | 822. |
| 5700.5386 | 1393. |
| 5700.7310 | 857. |
| 5700.9233 | 1078. |
| 5706.0757 | 2116. |
| 5709.2534 | 988. |
| 5710.3608 | 1059. |
| 5712.2871 | 832. |
| 5712.8164 | 922. |
| 5713.8276 | 4706. |
| 5714.4536 | 983. |
| 5714.9351 | 1033. |
| 5715.2241 | 888. |
| 5718.6909 | 1948. |
| 5722.6392 | 849. |
| 5728.3691 | 920. |
| 5738.5815 | 1147. |
| 5739.7275 | 5820. |
| 5740.3960 | 1884. |
| 5744.4072 | 1413. |
| 5744.6460 | 1224. |
| 5744.8369 | 1129. |
| 5744.9800 | 1025. |
| 5745.1235 | 966. |
| 5745.4575 | 1028. |
| 5745.6963 | 974. |
| 5754.6255 | 1146. |
| 5757.1562 | 1402. |
| 5757.5386 | 1124. |
| 5758.7319 | 1450. |
| 5772.5317 | 2242. |
| 5776.0654 | 2440. |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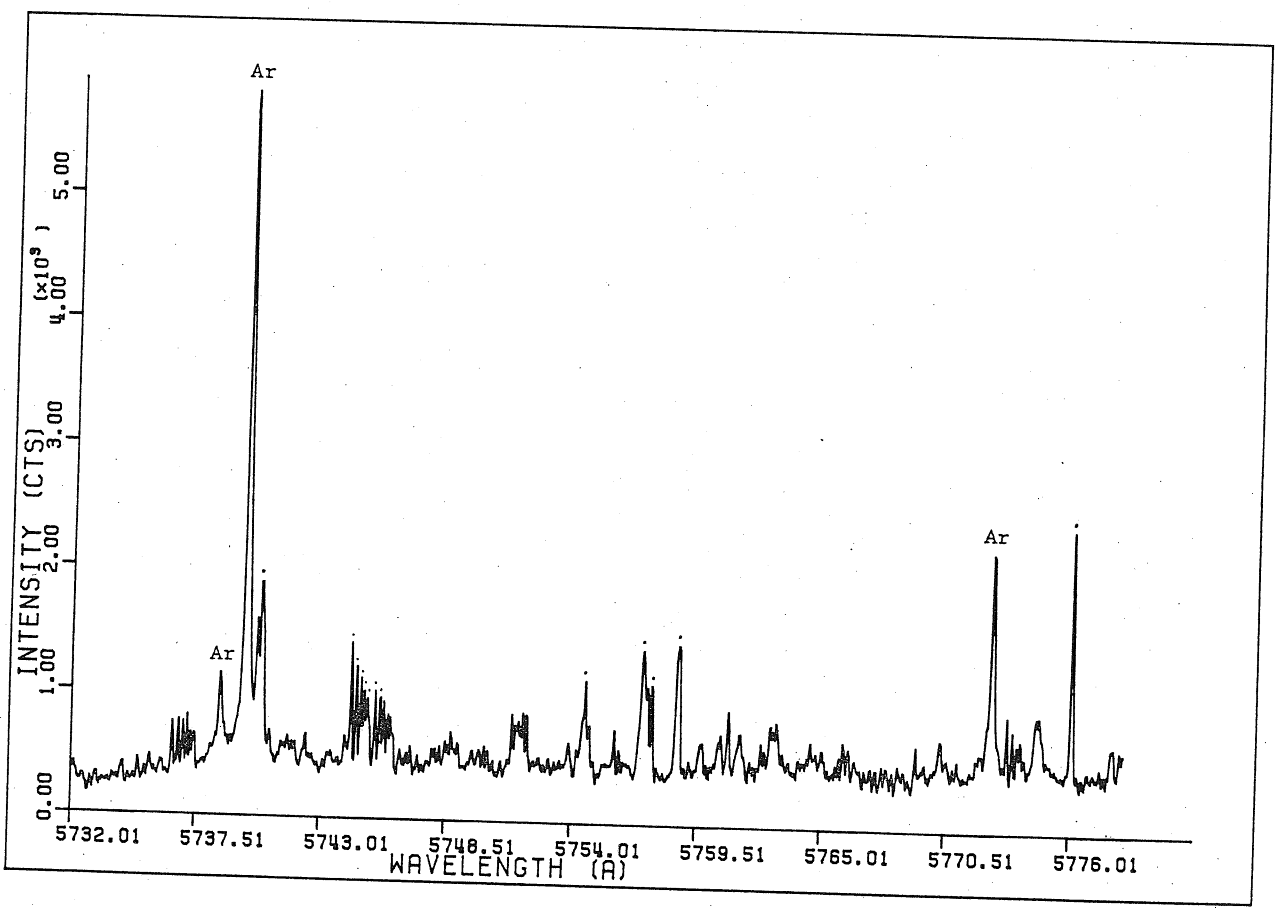
5726.51
5732.01
WAVELENGTH (A)


Ar
Ar
Ar
INTENSITY (CTS)
(x10³)
0.00
1.00
2.00
3.00
4.00
5.00
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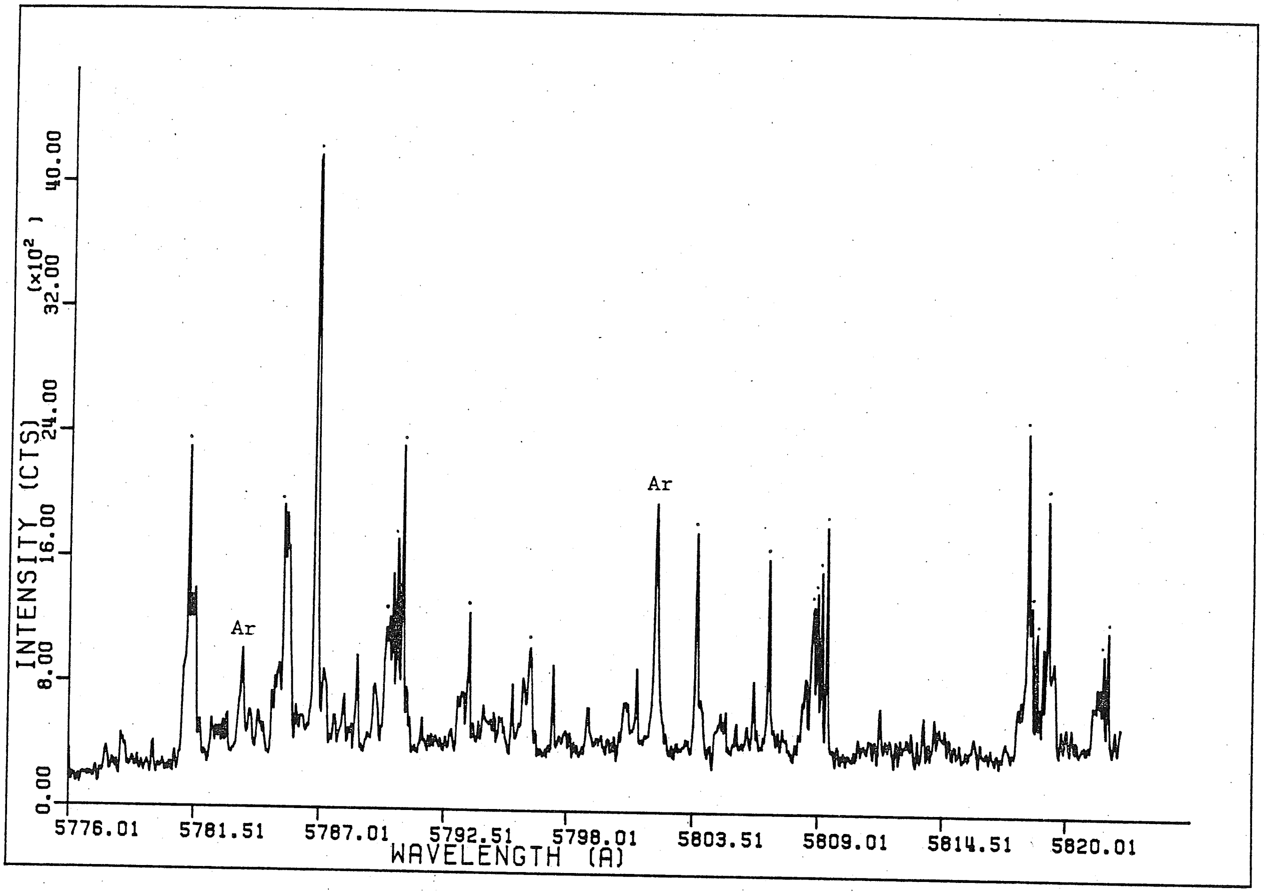
5737.51
5743.01
5748.51
5754.01
5759.51
5765.01
5770.51
5776.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5781.2573 | 2299. |
| 5783.6177 | 1013. |
| 5785.4233 | 1933. |
| 5786.8589 | 4177. |
| 5790.1035 | 1226. |
| 5790.4282 | 1725. |
| 5790.6602 | 2319. |
| 5793.6294 | 1258. |
| 5796.3691 | 1039. |
| 5801.9014 | 1972. |
| 5803.6694 | 1787. |
| 5806.8359 | 1622. |
| 5808.8398 | 1321. |
| 5808.9795 | 1410. |
| 5809.1660 | 1544. |
| 5809.3994 | 1832. |
| 5818.3145 | 2447. |
| 5818.7354 | 1173. |
| 5819.0156 | 1075. |
| 5819.2026 | 2018. |
| 5821.6812 | 1036. |
| 5821.8682 | 1186. |
| 5825.1177 | 666. |
| 5825.5879 | 2895. |
| 5827.4209 | 1381. |
| 5829.3008 | 662. |
| 5833.2490 | 794. |
| 5834.2827 | 3387. |
| 5836.7739 | 891. |
| 5838.9829 | 2117. |
| 5840.2520 | 747. |
| 5840.9097 | 667. |
| 5842.3198 | 4866. |
| 5844.9990 | 708. |
| 5845.4688 | 869. |
| 5845.6567 | 794. |
| 5847.6309 | 1418. |
| 5848.0537 | 1082. |
| 5848.3359 | 1463. |
| 5852.8008 | 721. |
| 5856.9370 | 784. |
| 5857.8301 | 1591. |
| 5860.5088 | 2132. |
| 5864.3628 | 623. |
| 5866.5718 | 2154. |



INTENSITY (CTS)
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24.00
32.00
40.00
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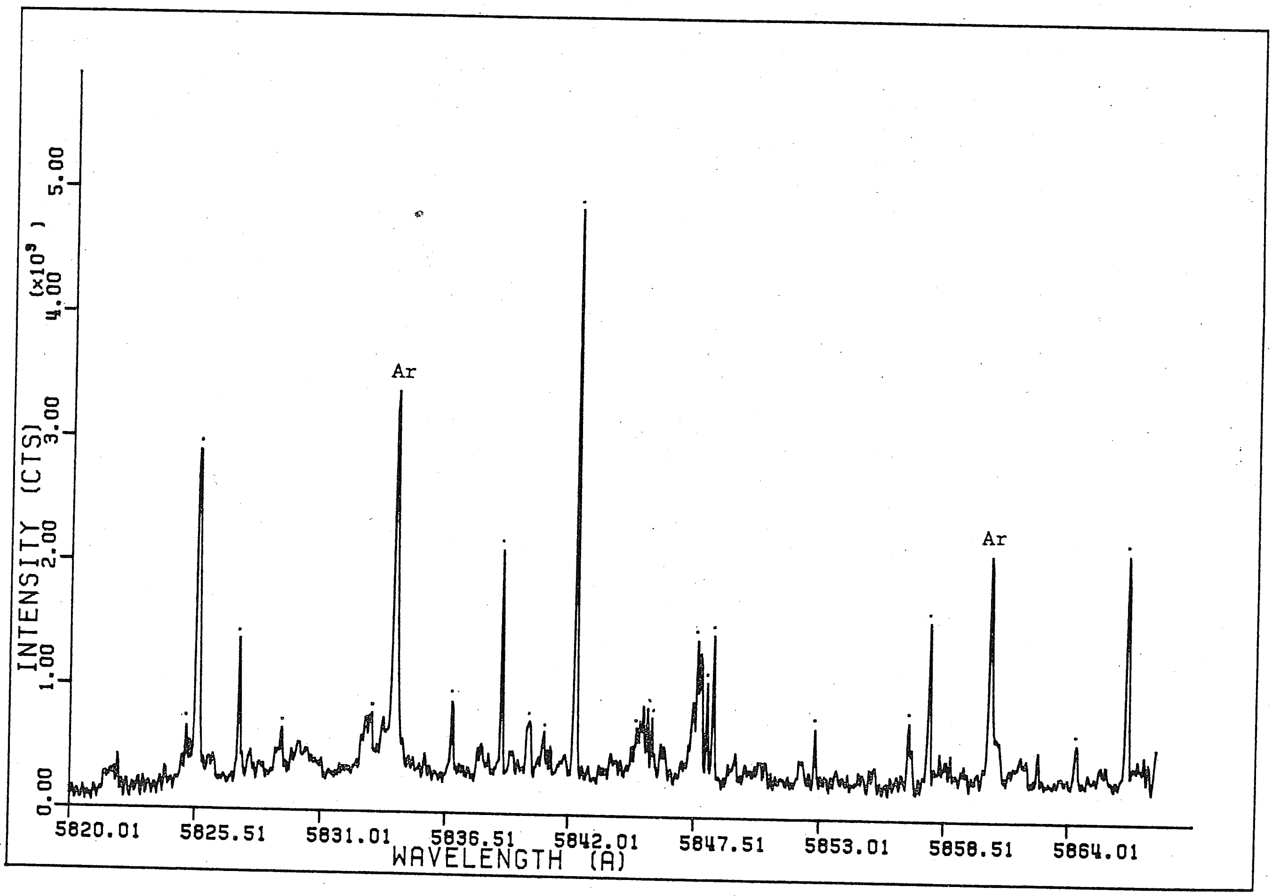
WAVELENGTH (A)

INTENSITY (CTS)
(x10³)
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1.00
2.00
3.00
4.00
5.00
Ar
Ar
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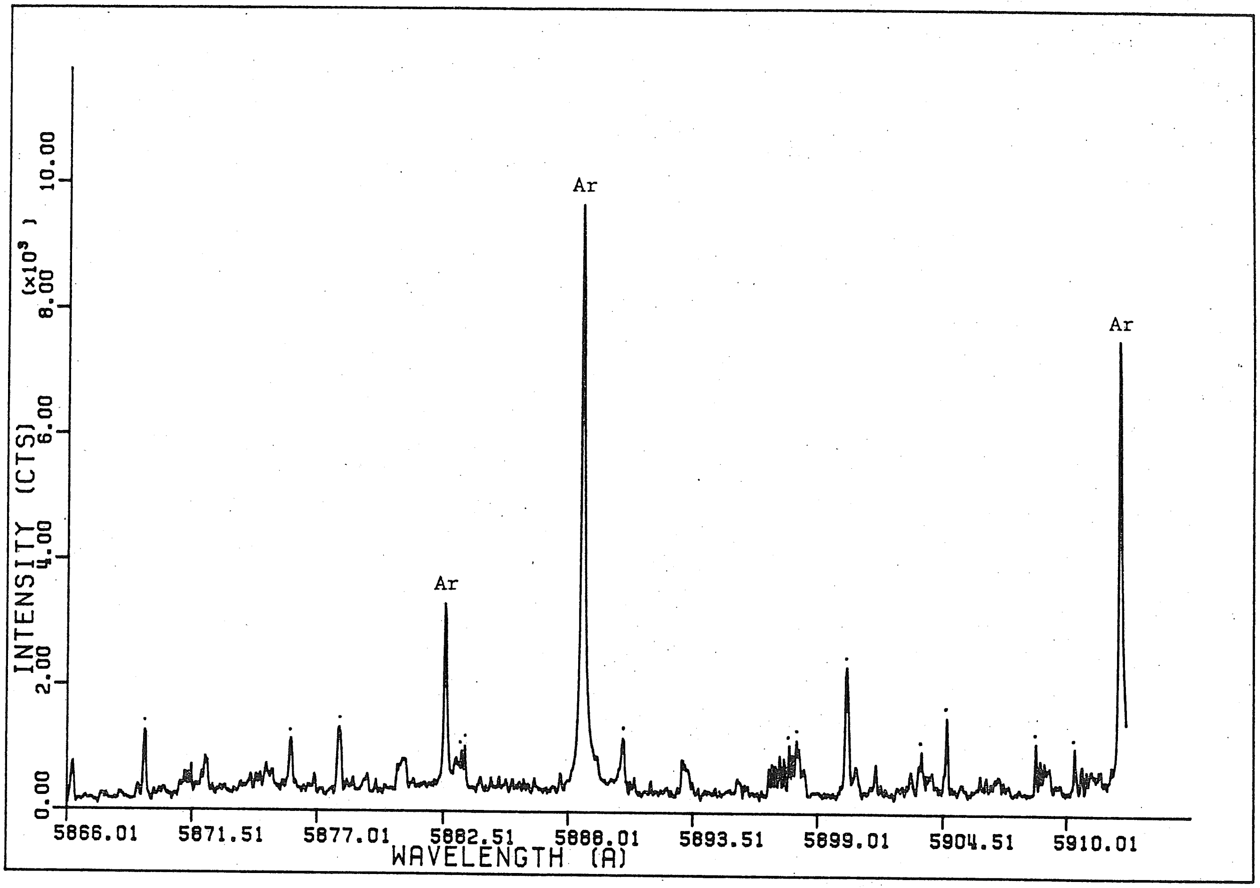
5831.01
5836.51
5842.01
5847.51
5853.01
5858.51
5864.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 5869.4380 | 1264. |
| 5875.8691 | 1144. |
| 5877.9658 | 1330. |
| 5882.5796 | 3303. |
| 5883.3252 | 956. |
| 5883.4648 | 1034. |
| 5888.6372 | 9663. |
| 5890.4082 | 1173. |
| 5897.7710 | 1081. |
| 5898.0972 | 1158. |
| 5900.2876 | 2334. |
| 5903.5493 | 989. |
| 5904.6680 | 1532. |
| 5908.6289 | 1130. |
| 5910.3530 | 1060. |
| 5912.4033 | 6999. |
| 5912.2041 | 3061. |
| 5916.5005 | 852. |
| 5918.3486 | 1141. |
| 5922.7837 | 1558. |
| 5923.0610 | 882. |
| 5925.6021 | 1068. |
| 5927.2651 | 991. |
| 5929.0205 | 4639. |
| 5934.9341 | 960. |
| 5936.3667 | 1305. |
| 5941.0327 | 1294. |
| 5942.1875 | 964. |
| 5942.9731 | 1920. |
| 5945.1445 | 3187. |
| 5947.6392 | 959. |
| 5948.1938 | 4991. |
| 5952.7212 | 1361. |


Ar
Ar
Ar
INTENSITY (CTS)
(x10³)
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2.00
4.00
6.00
8.00
10.00
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5888.01
5893.51
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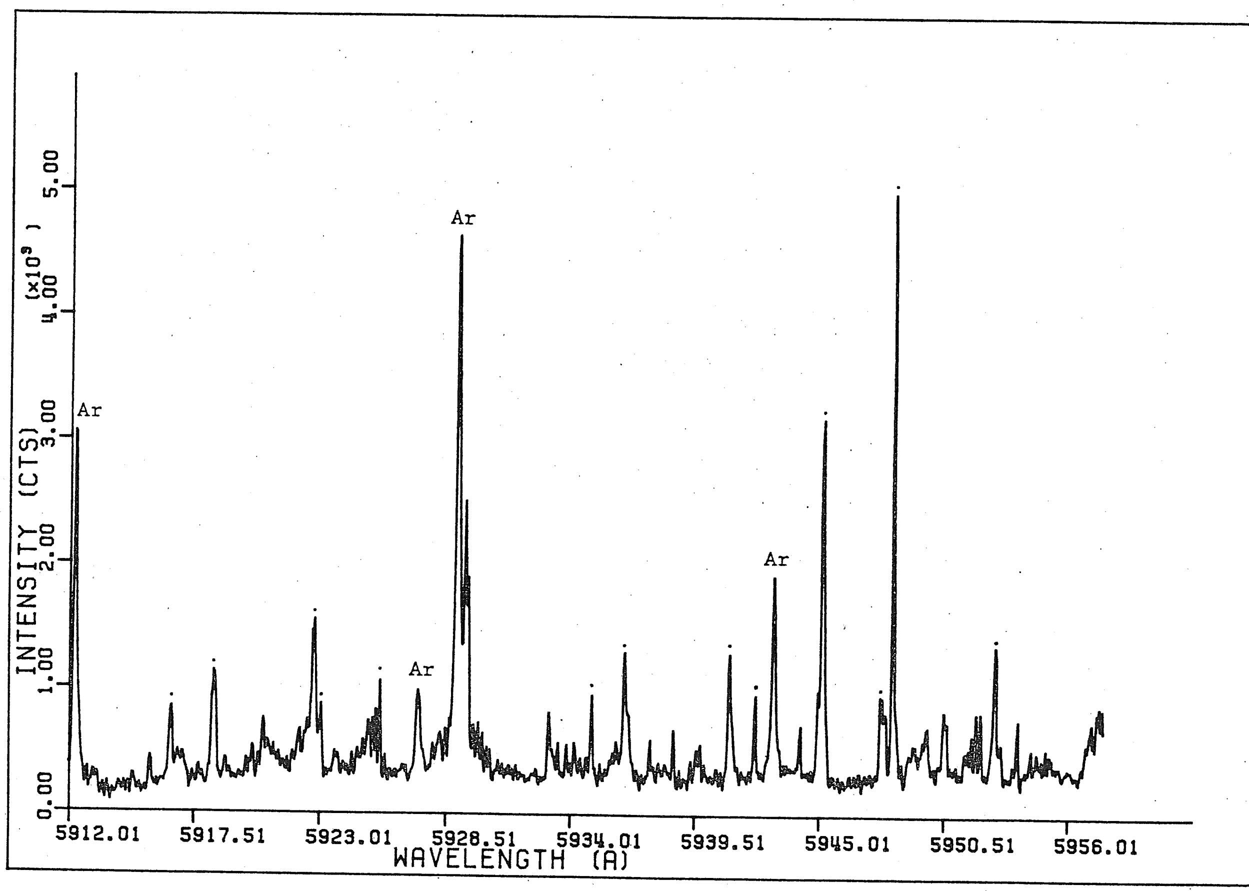
5904.51
5910.01
WAVELENGTH (A)


Ar
Ar
Ar
Ar
INTENSITY (CTS)
(x10³)
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1.00
2.00
3.00
4.00
5.00
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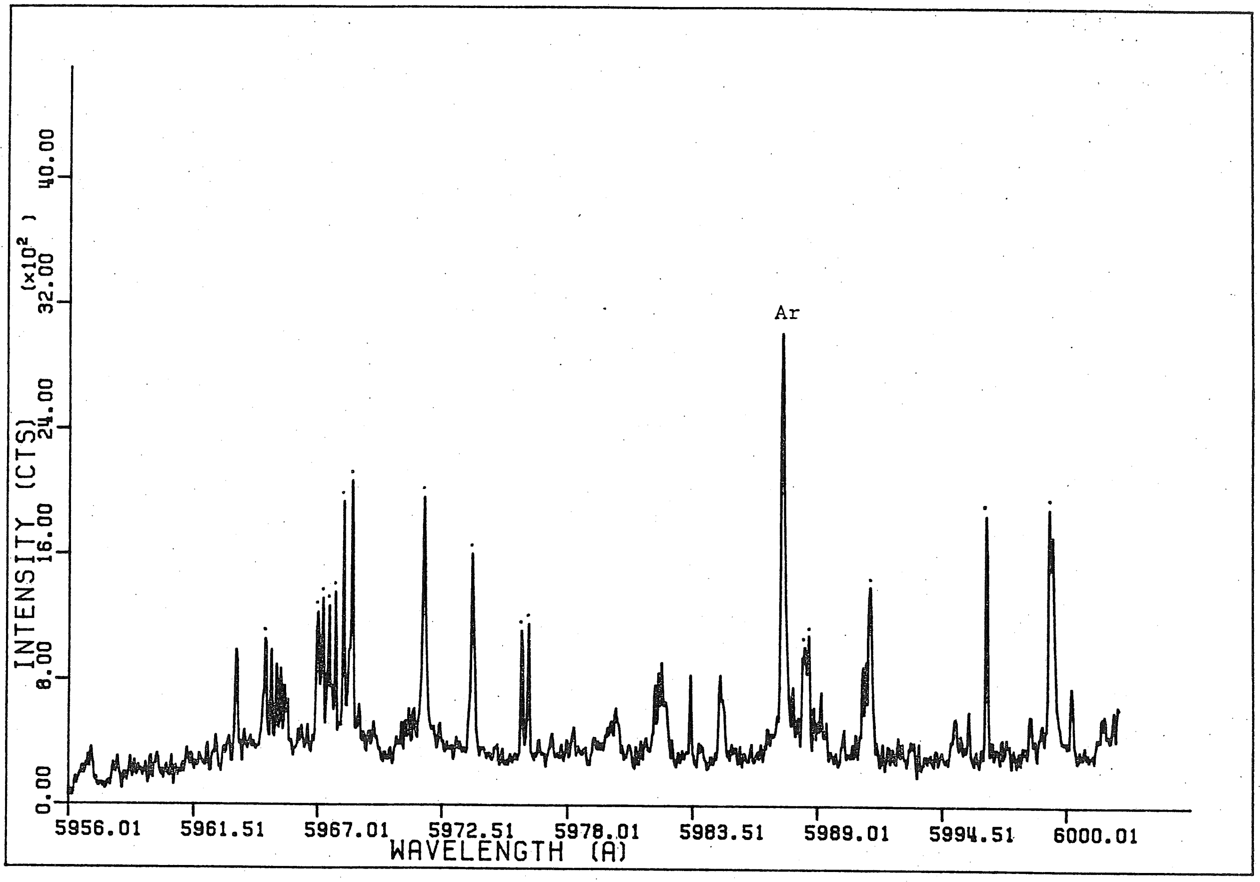
5917.51
5923.01
5928.51
5934.01
5939.51
5945.01
5950.51
5956.01
WAVELENGTH (A)

| $\lambda$(Å) | I |
|---|---|
| 5964.6841 | 1059. |
| 5967.0200 | 1230. |
| 5967.2490 | 1317. |
| 5967.5239 | 1271. |
| 5967.7988 | 1357. |
| 5968.1650 | 1937. |
| 5968.5313 | 2070. |
| 5971.7373 | 1963. |
| 5973.8442 | 1602. |
| 5975.9966 | 1114. |
| 5976.3174 | 1156. |
| 5987.4927 | 3017. |
| 5988.4546 | 1016. |
| 5988.6377 | 1089. |
| 5991.3398 | 1399. |
| 5996.4692 | 1855. |
| 5999.2632 | 1898. |
| | |
| 5984.6606 | 1119. |
| 5987.3965 | 4110. |
| 5988.3545 | 1367. |
| 5989.0381 | 1032. |
| 5990.8623 | 1367. |
| 5991.1357 | 1981. |
| 5996.2886 | 2638. |
| 5999.0249 | 2522. |
| 6002.3081 | 1155. |
| 6002.9009 | 1109. |
| 6003.2656 | 1298. |
| 6005.2720 | 1482. |
| 6006.0015 | 2059. |
| 6013.0239 | 1907. |
| 6013.9814 | 1899. |
| 6019.0889 | 1065. |
| 6019.2710 | 1019. |
| 6021.9614 | 2191. |



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INTENSITY (CTS) (x10²)
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32.00
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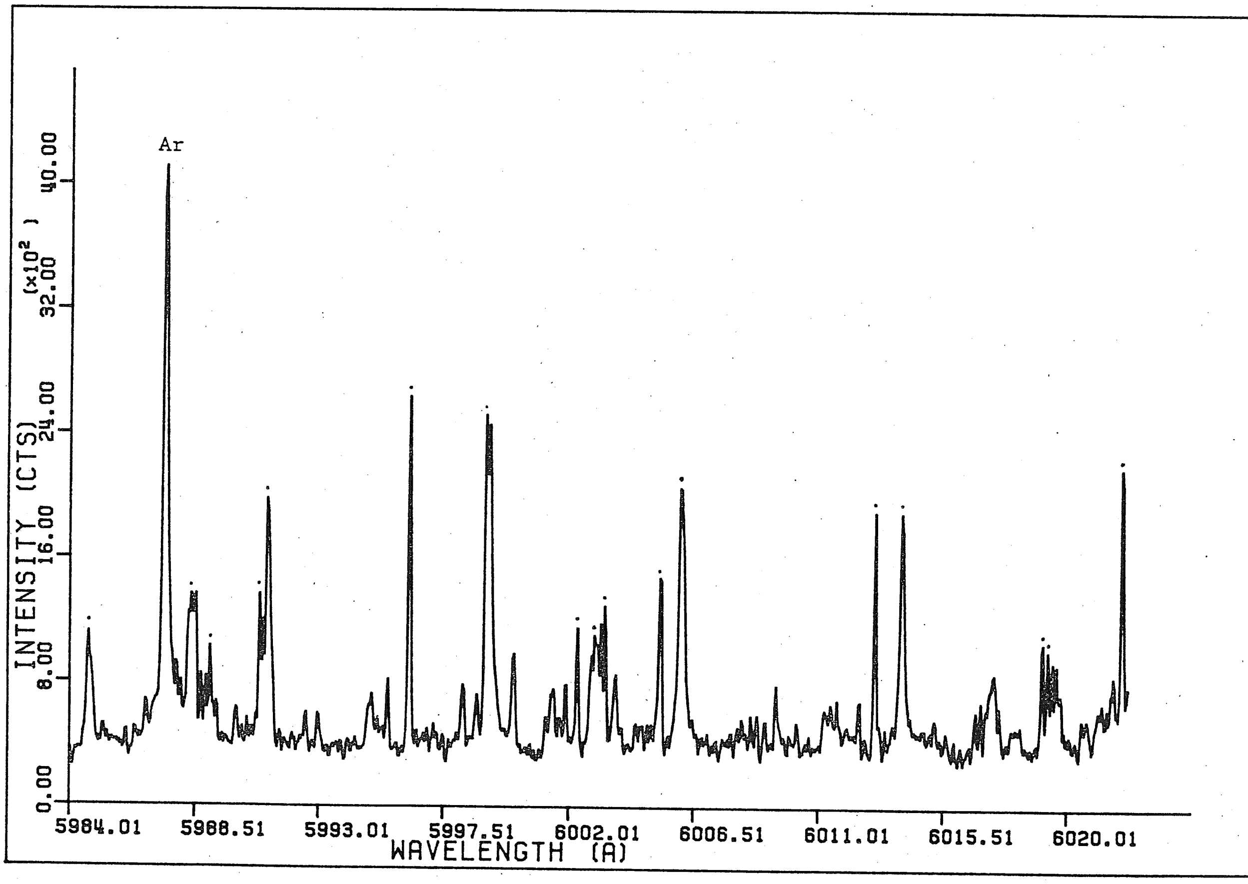
WAVELENGTH (A)

Ar
INTENSITY (CTS) (x10²)
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32.00
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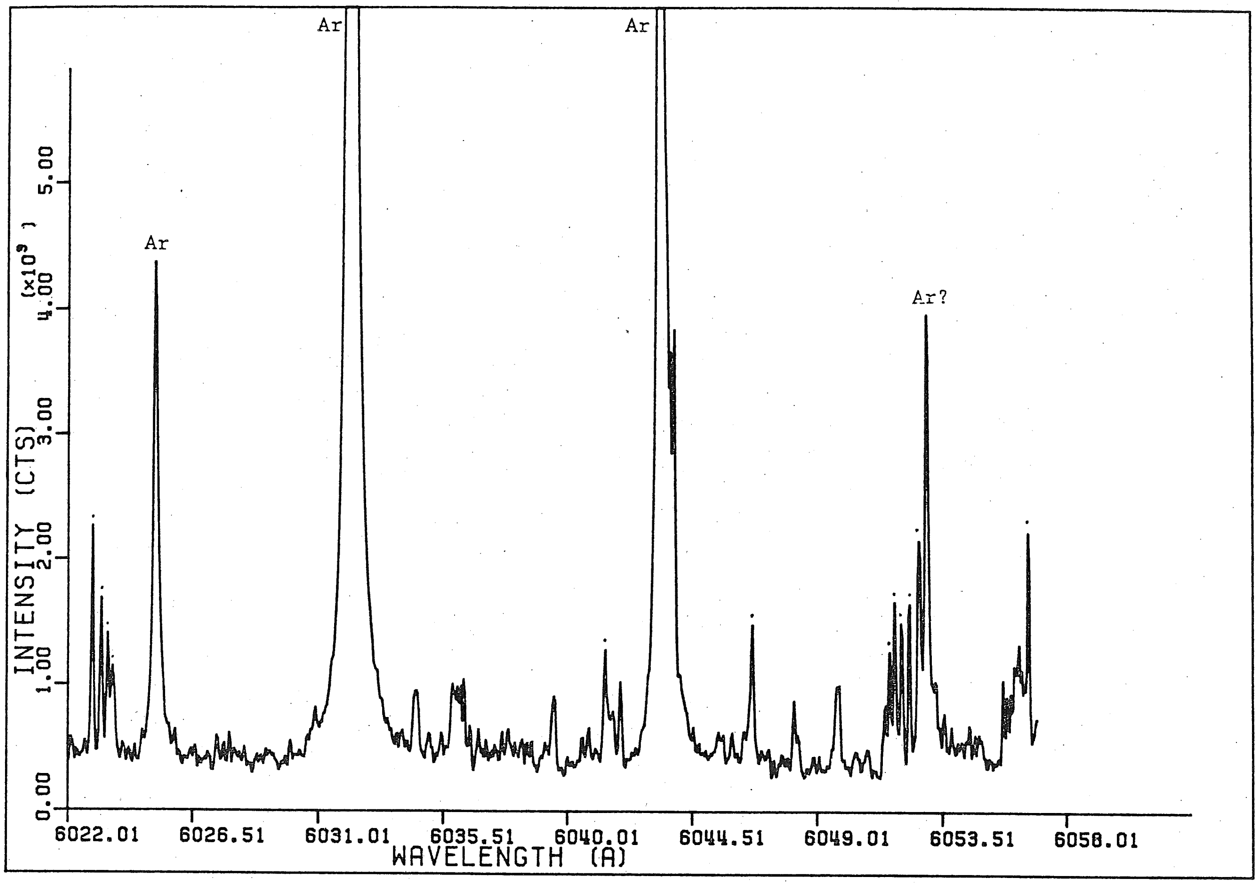
5993.01
5997.51
6002.01
6006.51
6011.01
6015.51
6020.01
WAVELENGTH (A)

| $\lambda$(Å) | I |
|---|---|
| 6022.8857 | 2265. |
| 6023.2031 | 1687. |
| 6023.4297 | 1407. |
| 6023.6108 | 1145. |
| 6025.1509 | 4375. |
| 6032.1270 | 49236. |
| 6041.3682 | 1280. |
| 6043.3613 | 20067. |
| 6046.6685 | 1480. |
| 6051.6060 | 1265. |
| 6051.7871 | 1662. |
| 6052.0137 | 1494. |
| 6052.3311 | 1646. |
| 6052.6479 | 2153. |
| 6052.9199 | 3965. |
| 6056.5894 | 2219. |
| 6056.0020 | 1267. |
| 6056.3618 | 2024. |
| 6059.3735 | 7345. |
| 6064.9023 | 1739. |
| 6074.2520 | 2313. |
| 6076.8140 | 1301. |
| 6077.3984 | 1990. |
| 6082.4775 | 1052. |
| 6082.7021 | 1450. |
| 6082.9722 | 1605. |
| 6083.3315 | 1647. |
| 6091.1528 | 1901. |


Ar
Ar
Ar
Ar?
INTENSITY (CTS)
(x10³ )
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2.00
3.00
4.00
5.00
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6035.51
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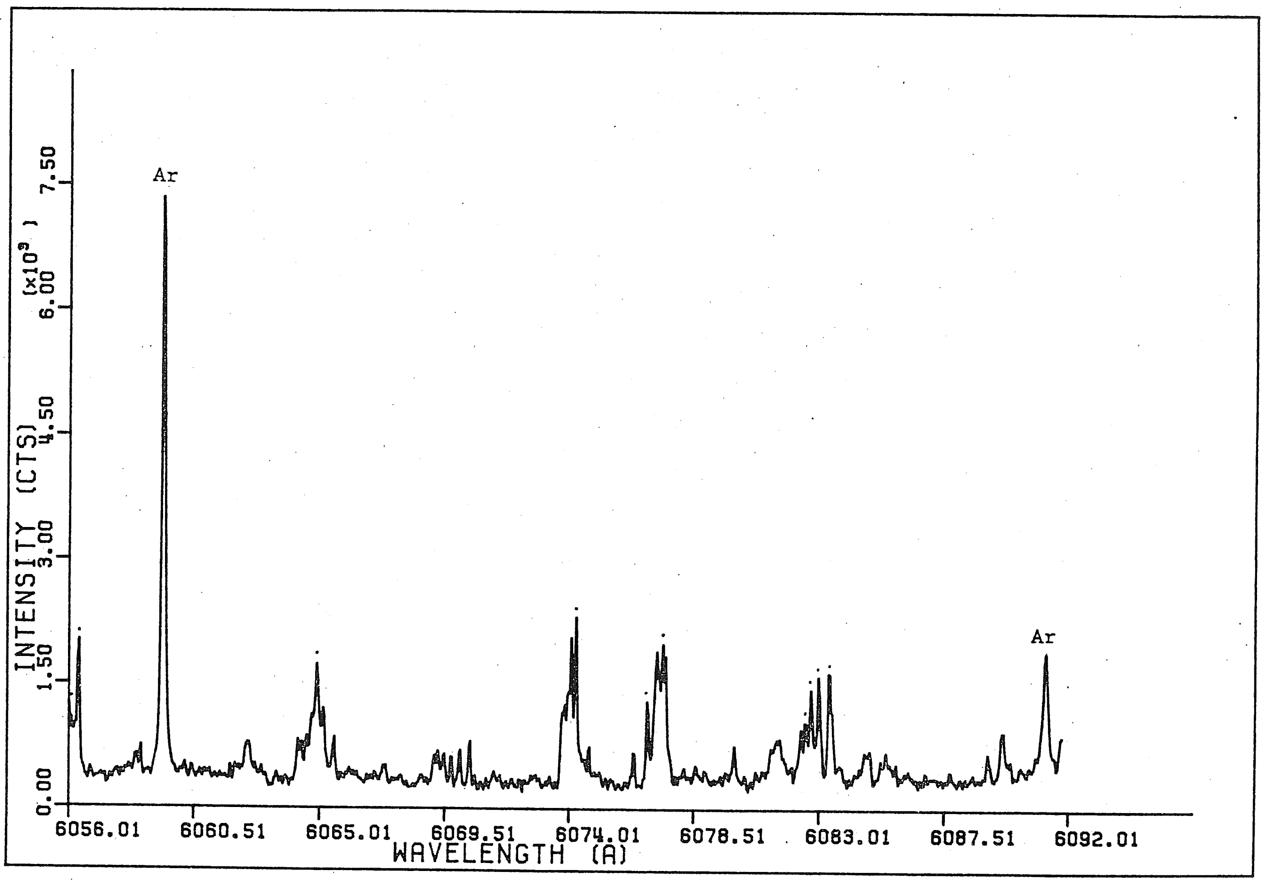
6053.51
6058.01
WAVELENGTH (A)


Ar
Ar
INTENSITY (CTS)
(x10³ )
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3.00
4.50
6.00
7.50
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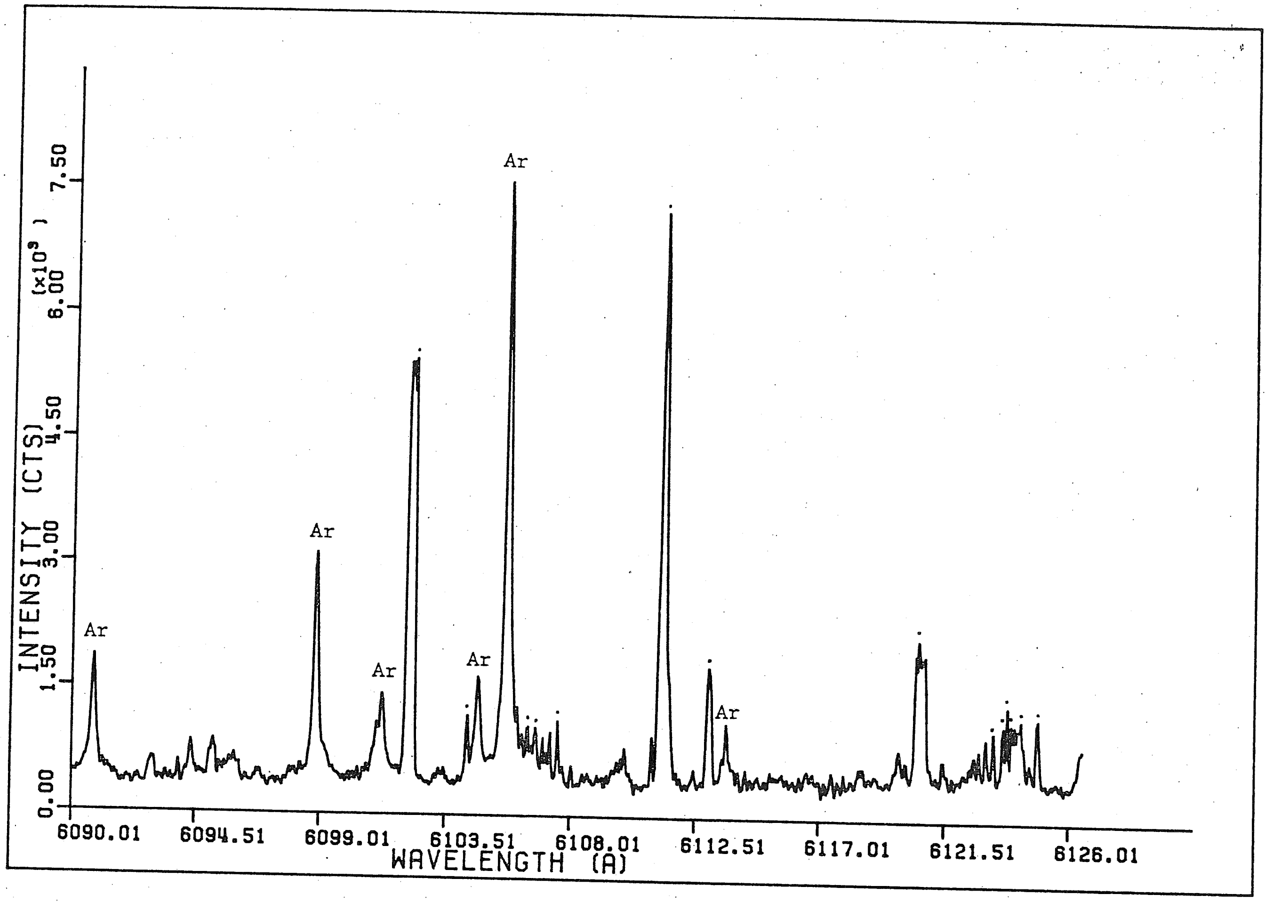
6060.51
6065.01
6069.51
6074.01
6078.51
6083.01
6087.51
6092.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6090.7837 | 1862. |
| 6098.8564 | 3127. |
| 6101.2202 | 1440. |
| 6102.3350 | 5464. |
| 6104.2974 | 1187. |
| 6104.6543 | 1654. |
| 6105.6802 | 7571. |
| 6106.4829 | 1065. |
| 6106.7505 | 1051. |
| 6107.5532 | 1134. |
| 6111.3442 | 7231. |
| 6112.9946 | 1800. |
| 6113.6187 | 1125. |
| 6120.5767 | 2155. |
| 6123.2969 | 1066. |
| 6123.6538 | 1134. |
| 6123.7876 | 1372. |
| 6123.9214 | 1162. |
| 6124.2783 | 1212. |
| 6124.9028 | 1228. |
| 6127.4790 | 1089. |
| 6128.8066 | 1034. |
| 6129.1162 | 1407. |
| 6132.5679 | 1344. |
| 6139.0728 | 1189. |
| 6139.3823 | 1387. |
| 6145.6216 | 6363. |
| 6155.5337 | 2157. |
| 6156.2417 | 3312. |
| 6157.0381 | 5070. |
| 6158.4985 | 7056. |


INTENSITY (CTS) (x10³)
WAVELENGTH (A)
0.00
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3.00
4.50
6.00
7.50
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6094.51
6099.01
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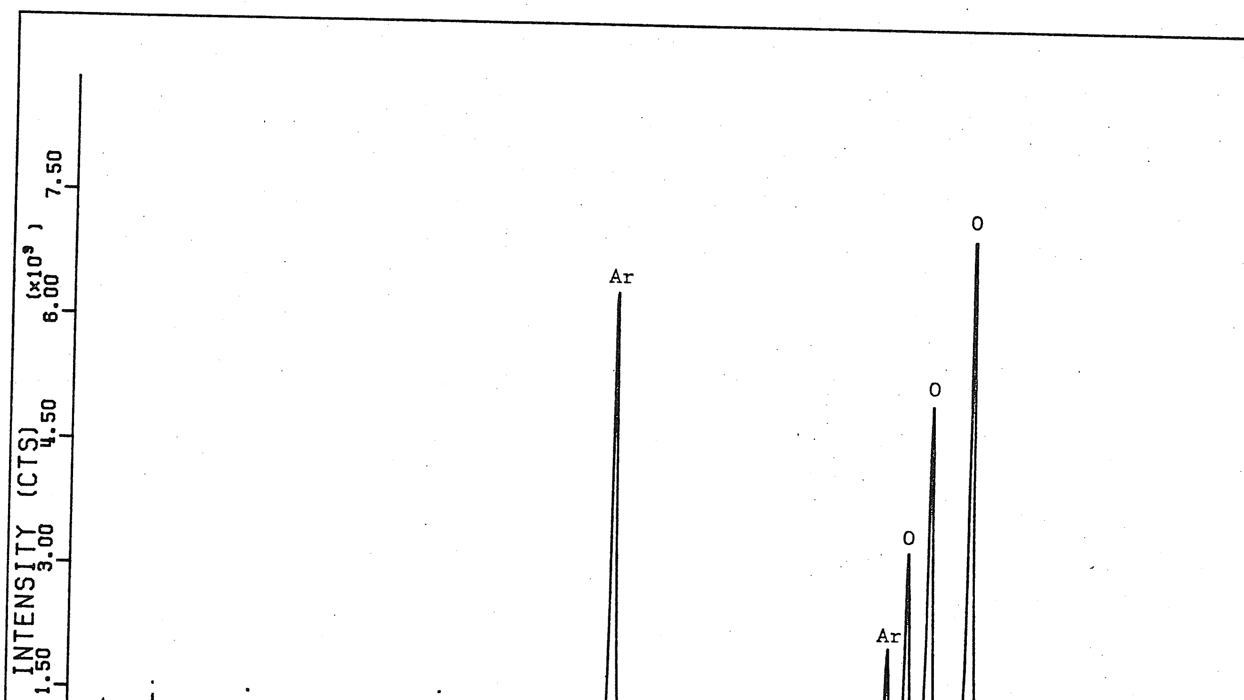
6108.01
6112.51
6117.01
6121.51
6126.01
Ar
Ar
Ar
Ar
Ar
Ar


INTENSITY (CTS) (x10³)
WAVELENGTH (A)
0.00
1.50
3.00
4.50
6.00
7.50
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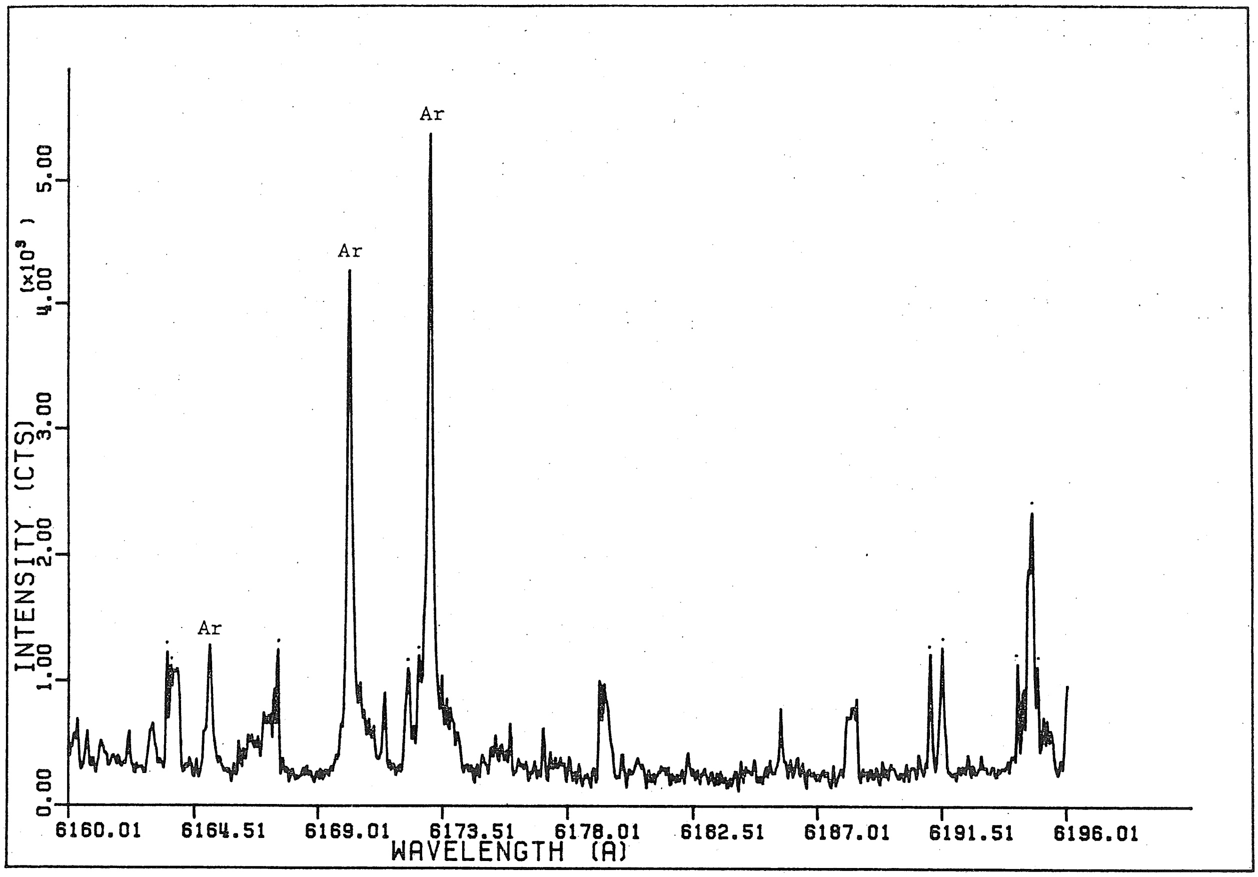
6130.51
6135.01
6139.51
6144.01
6148.51
6153.01
6157.51
6162.01
Ar
Ar
Ar
Ar
O
O
O

| λ(Å) | I |
|---|---|
| 6163.5278 | 1227. |
| 6163.6592 | 1120. |
| 6165.0640 | 1283. |
| 6167.5664 | 1248. |
| 6170.1567 | 4265. |
| 6172.2637 | 1099. |
| 6172.6587 | 1202. |
| 6173.0981 | 5374. |
| 6191.0967 | 1214. |
| 6191.5361 | 1265. |
| 6194.2578 | 1136. |
| 6194.7847 | 2337. |
| 6194.9600 | 1114. |
| 6206.5542 | 982. |
| 6207.2075 | 844. |
| 6211.7363 | 930. |
| 6212.4331 | 5072. |
| 6213.8271 | 1025. |
| 6214.0884 | 1029. |
| 6215.8735 | 4385. |
| 6218.9658 | 1070. |
| 6222.6675 | 957. |
| 6226.1953 | 888. |



Ar
Ar
Ar
INTENSITY (CTS)
(x10³)
0.00
1.00
2.00
3.00
4.00
5.00
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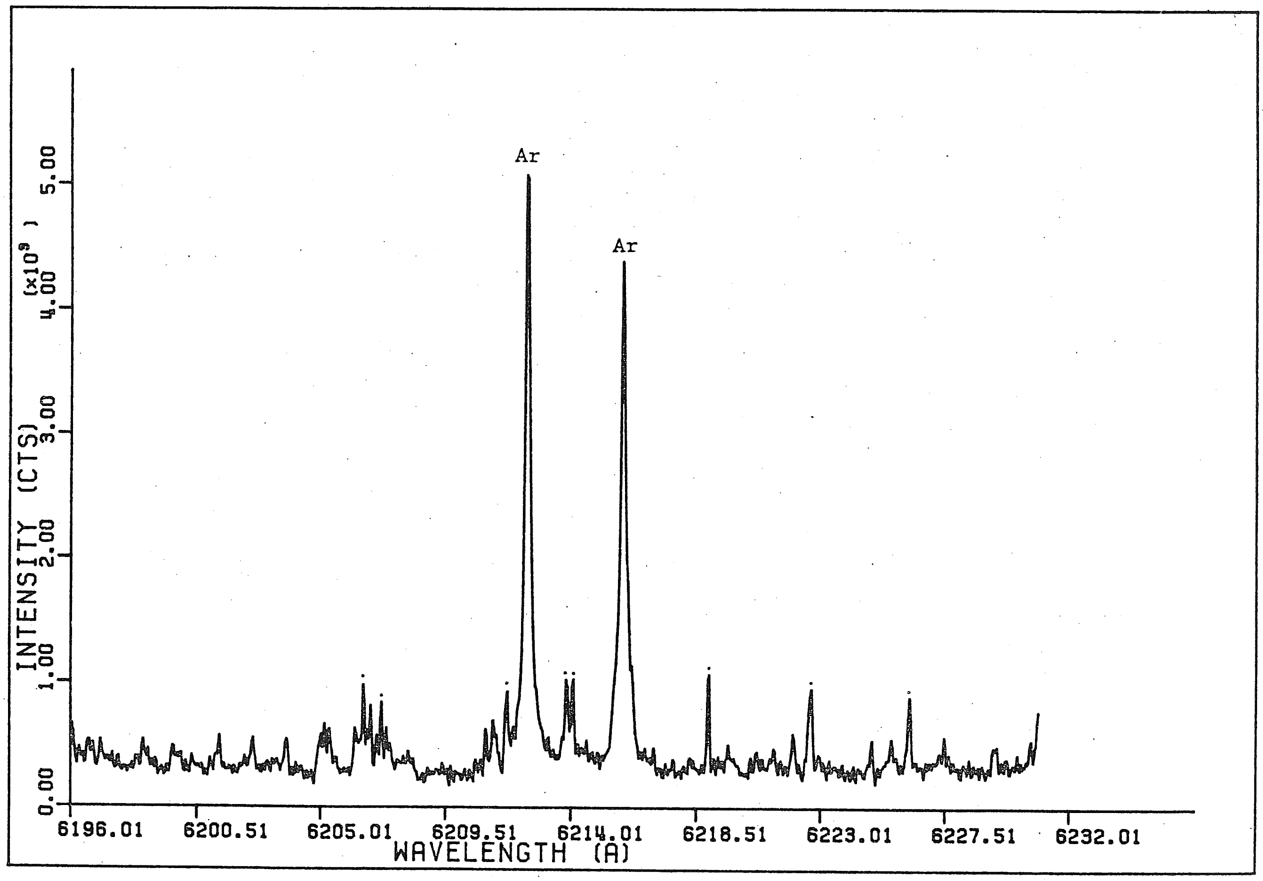
6173.51
6178.01
6182.51
6187.01
6191.51
6196.01
WAVELENGTH (A)

Ar
Ar
INTENSITY (CTS)
(x10³)
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1.00
2.00
3.00
4.00
5.00
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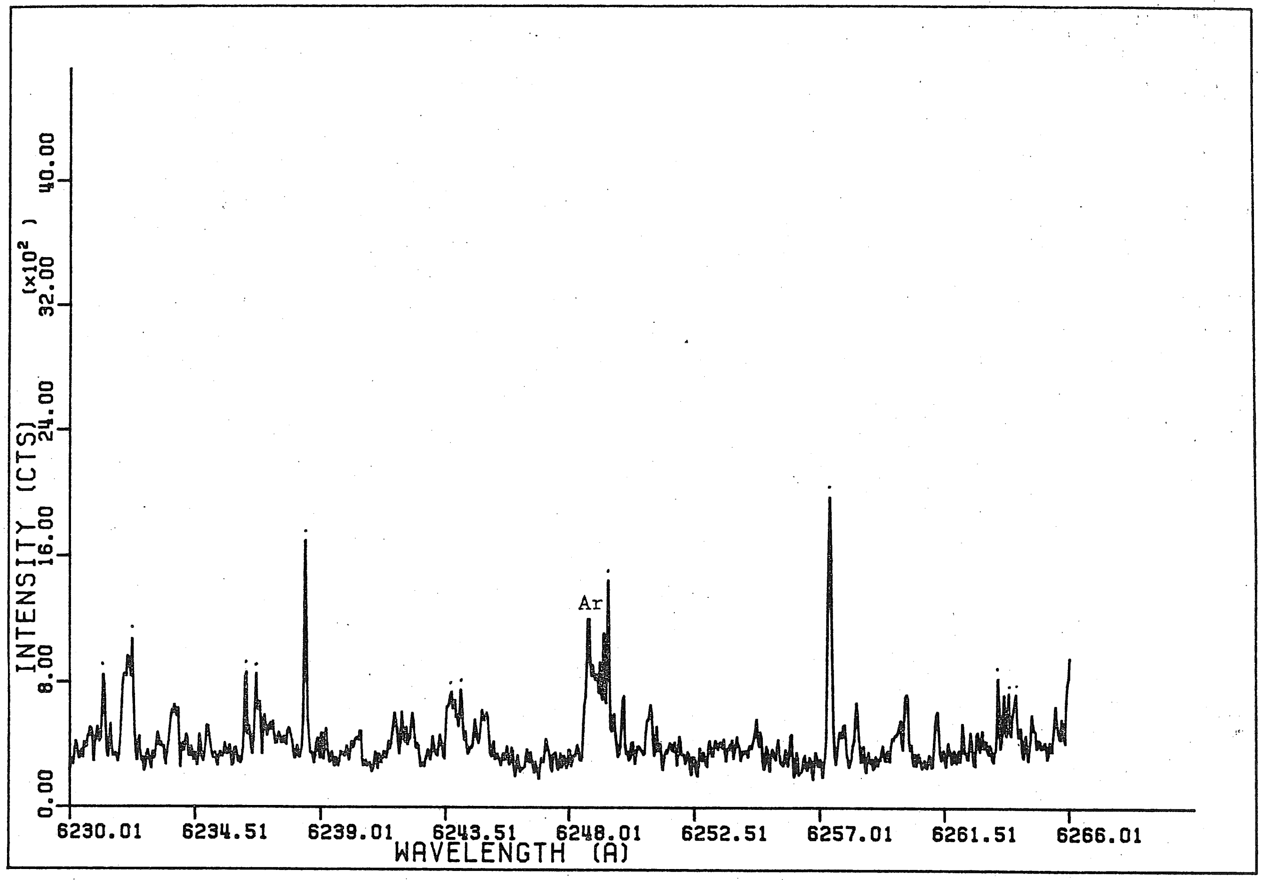
6200.51
6205.01
6209.51
6214.01
6218.51
6223.01
6227.51
6232.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6231.2085 | 845. |
| 6232.2437 | 1072. |
| 6236.3433 | 862. |
| 6236.6885 | 852. |
| 6238.4575 | 1695. |
| 6243.7217 | 738. |
| 6244.0669 | 751. |
| 6248.6841 | 1202. |
| 6249.4175 | 1447. |
| 6257.3574 | 1976. |
| 6263.4414 | 827. |
| 6263.8296 | 733. |
| 6264.0884 | 727. |
| 6269.9971 | 915. |
| 6273.0889 | 1006. |
| 6273.3008 | 866. |
| 6275.9687 | 1992. |
| 6276.5615 | 1234. |
| 6279.3564 | 856. |
| 6286.3867 | 1339. |
| 6288.8008 | 1984. |
| 6290.5371 | 955. |
| 6297.1436 | 5615. |


(x10²)
INTENSITY (CTS)
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8.00
16.00
24.00
32.00
40.00
Ar
6230.01
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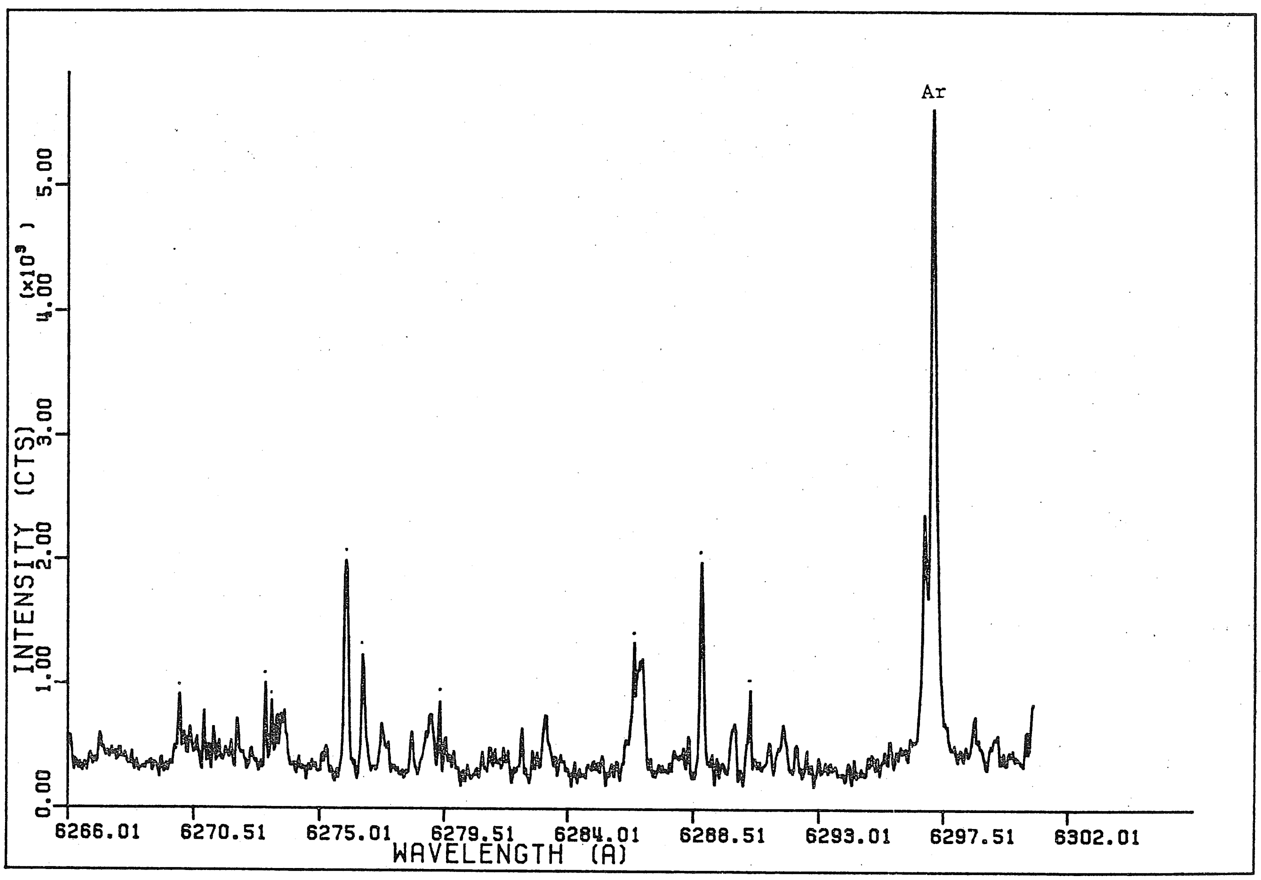
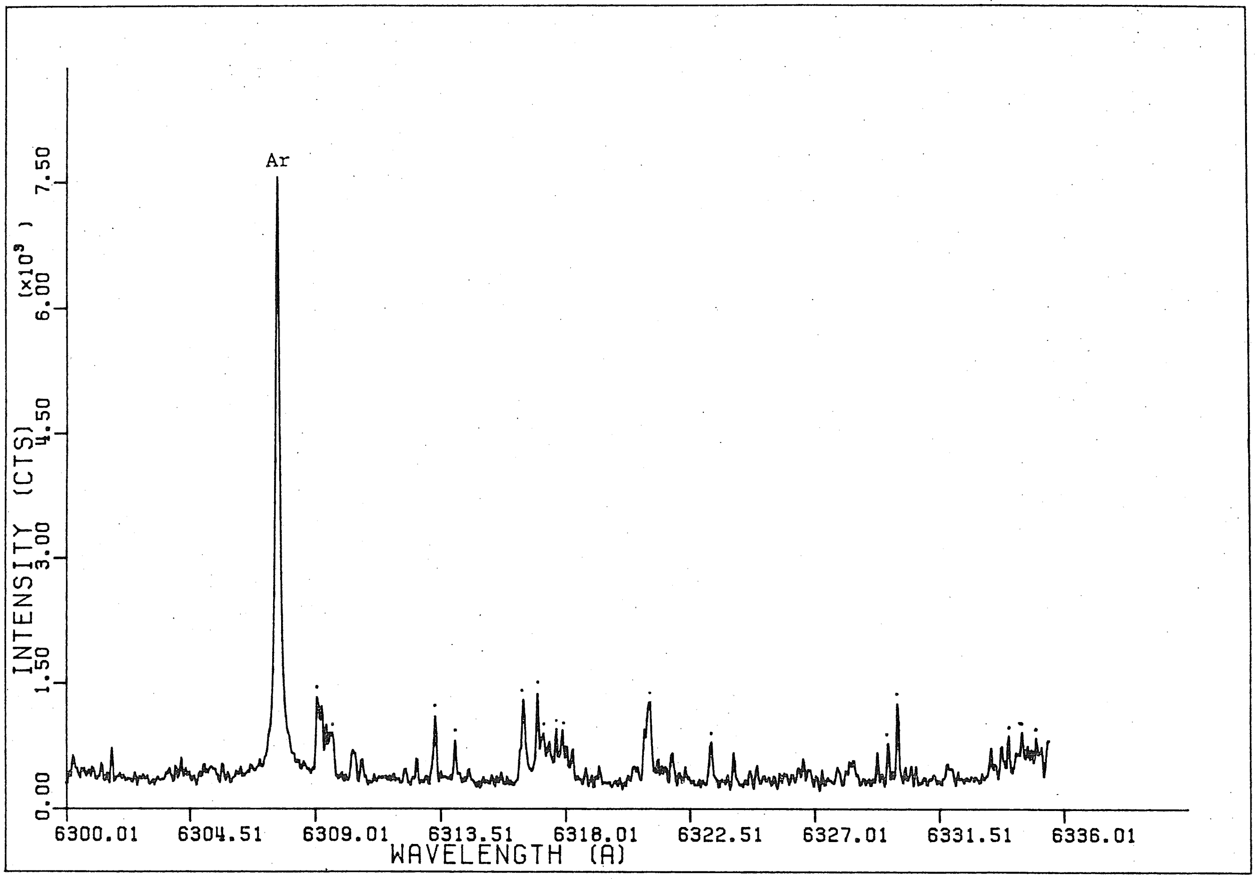
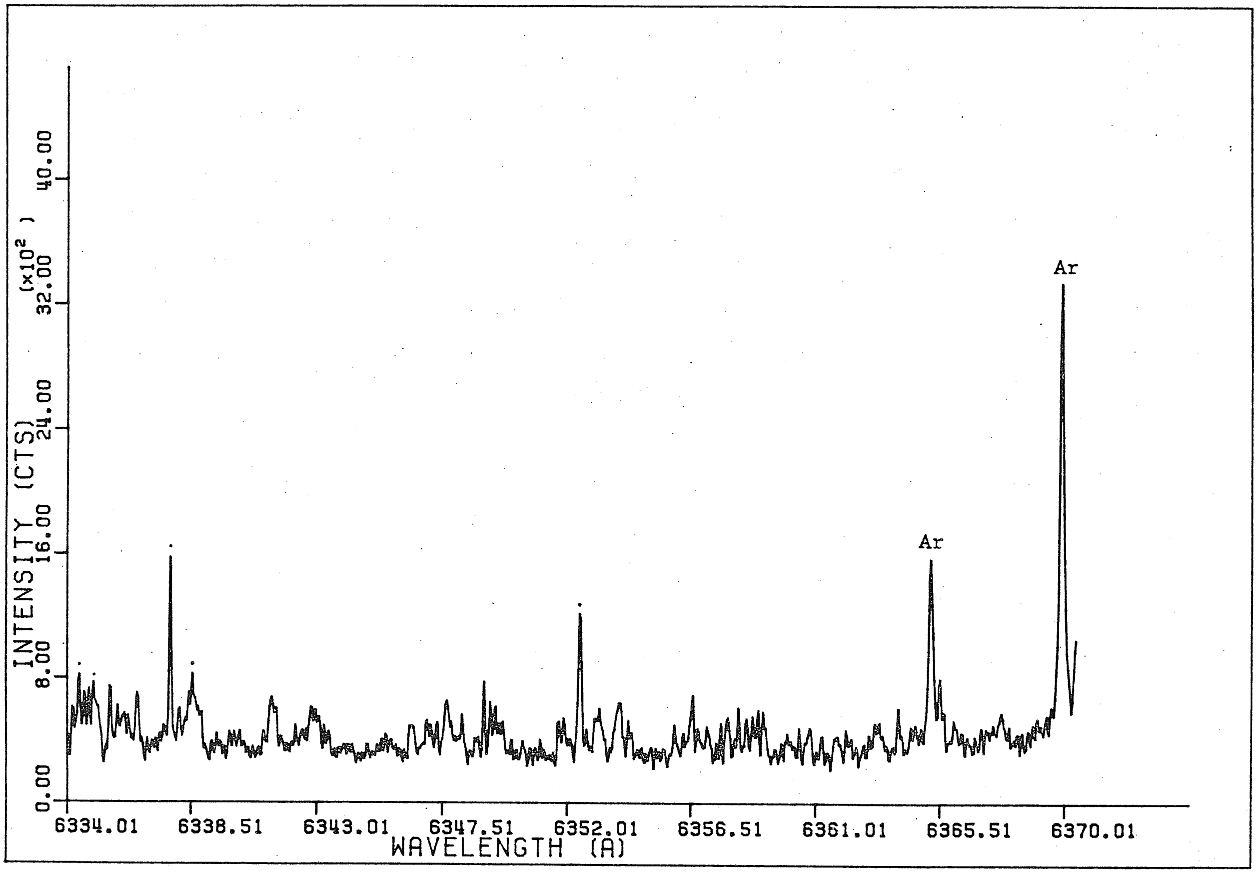
6239.01
6243.51
6248.01
6252.51
6257.01
6261.51
6266.01
WAVELENGTH (A)

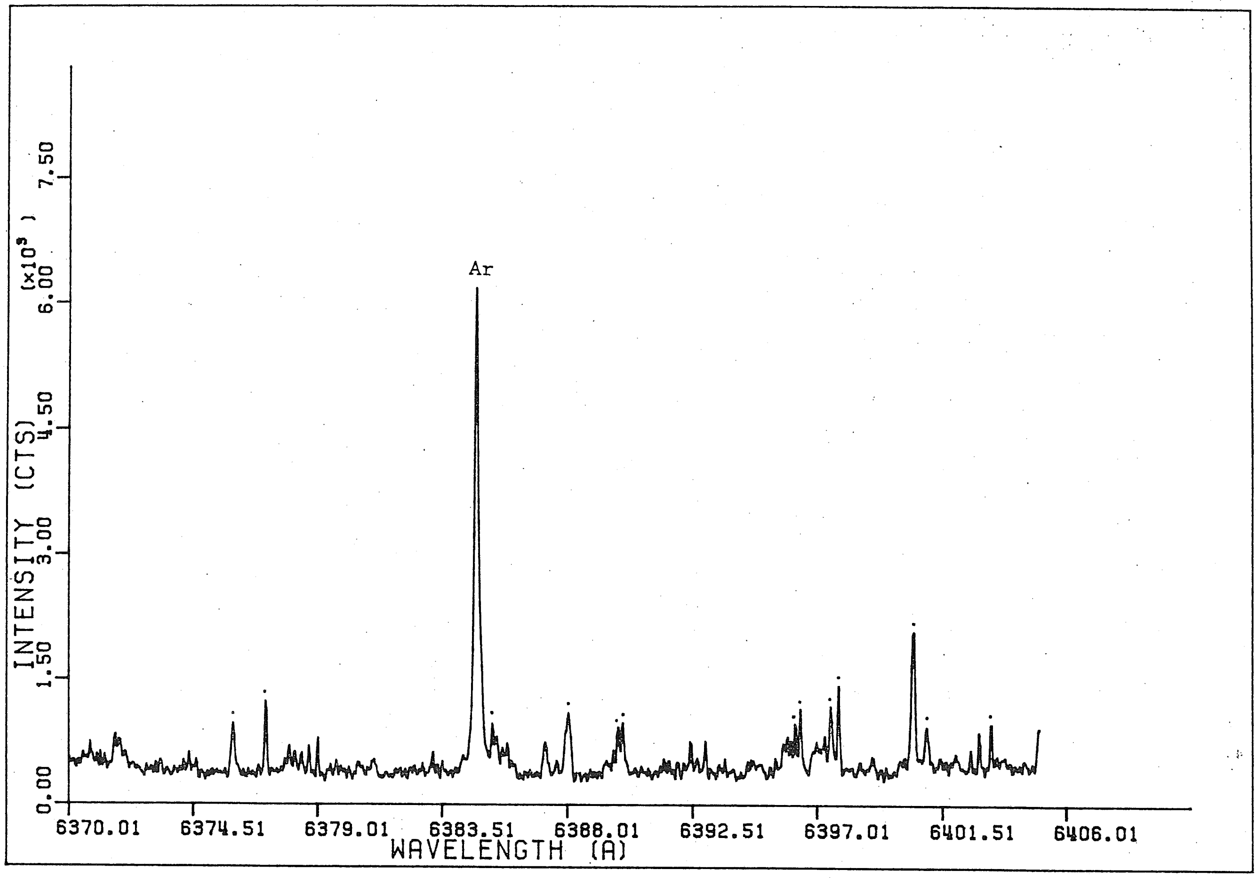

(x10³)
INTENSITY (CTS)
0.00
1.00
2.00
3.00
4.00
5.00
Ar
6266.01
6270.51
6275.01
6279.51
6284.01
6288.51
6293.01
6297.51
6302.01
WAVELENGTH (A)

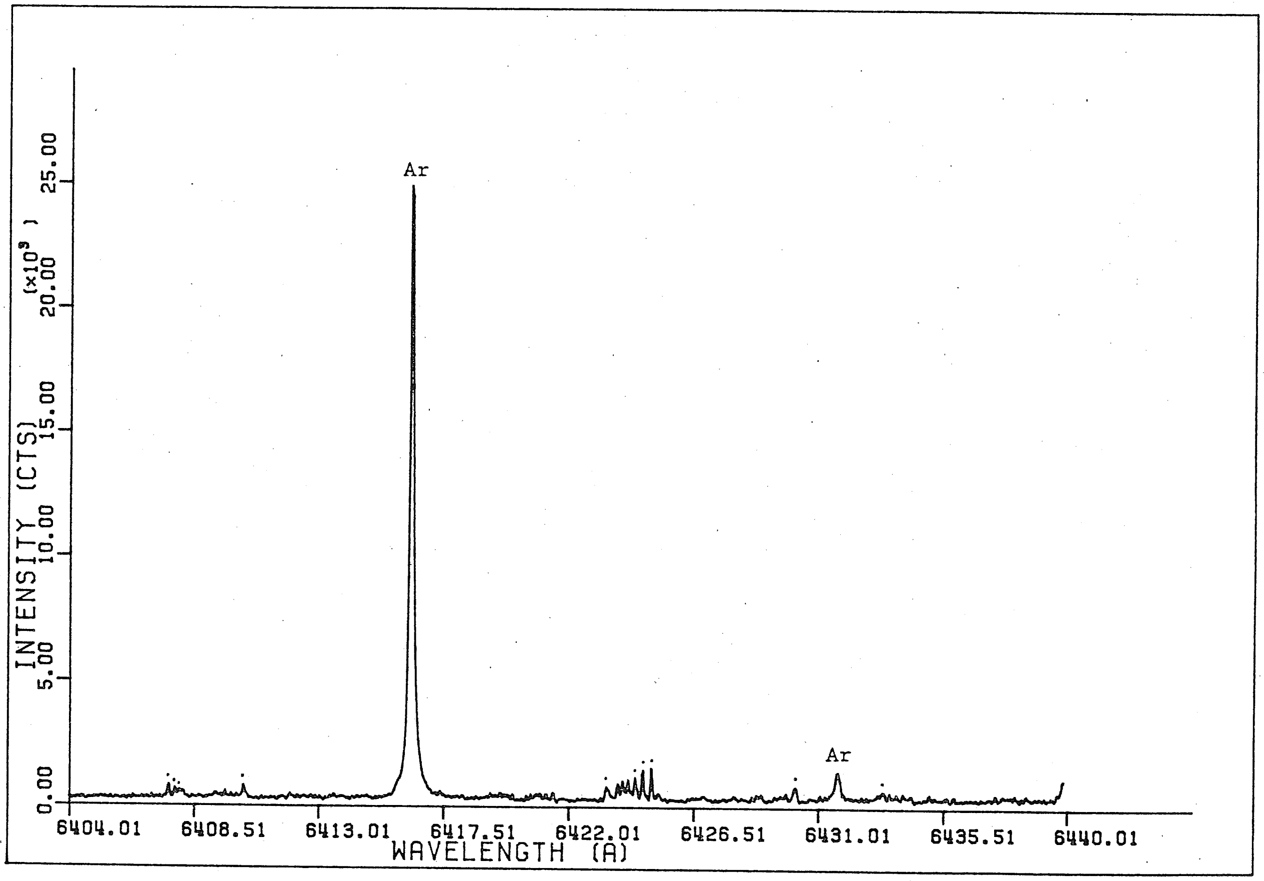
| λ(Å) | I |
|---|---|
| 6307.6597 | 7567. |
| 6309.0591 | 1332. |
| 6309.5254 | 911. |
| 6313.2988 | 1098. |
| 6314.0195 | 813. |
| 6316.4790 | 1301. |
| 6316.9878 | 1372. |
| 6317.4116 | 801. |
| 6317.6660 | 956. |
| 6317.8779 | 940. |
| 6321.0581 | 1275. |
| 6323.2632 | 796. |
| 6329.6230 | 782. |
| 6329.9624 | 1256. |
| 6333.9902 | 873. |
| 6334.4565 | 916. |
| 6334.9653 | 848. |
| 6334.1304 | 967. |
| 6334.6343 | 937. |
| 6337.4482 | 1641. |
| 6338.2461 | 925. |
| 6352.1484 | 1391. |
| 6364.8320 | 1645. |
| 6369.5781 | 3337. |


Ar
INTENSITY (CTS)
(x10³)
7.50
6.00
4.50
3.00
1.50
0.00
6300.01
6304.51
6309.01
6313.51
6318.01
6322.51
6327.01
6331.51
6336.01
WAVELENGTH (A)

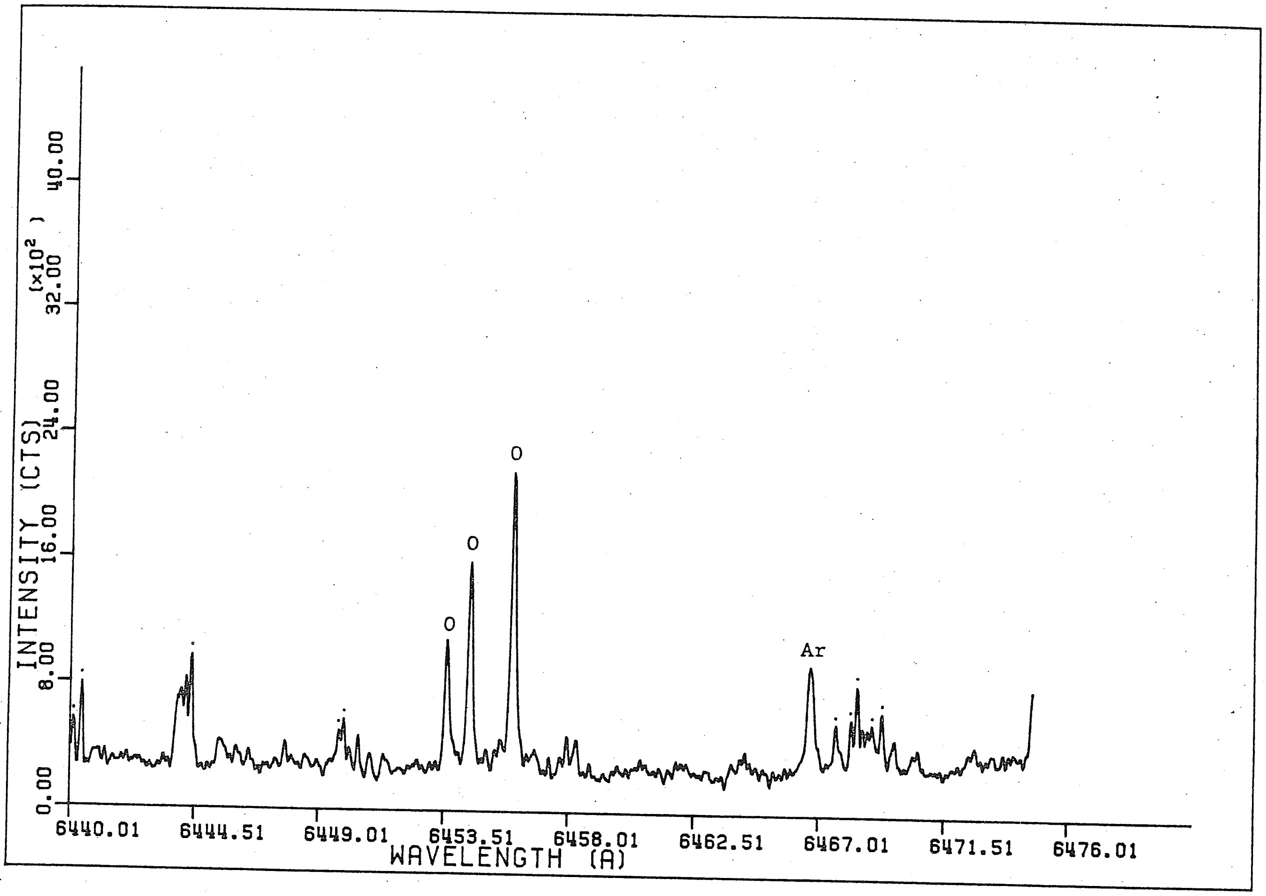

Ar
Ar
INTENSITY (CTS)
(x10²)
40.00
32.00
24.00
16.00
8.00
0.00
6334.01
6338.51
6343.01
6347.51
6352.01
6356.51
6361.01
6365.51
6370.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6375.9014 | 869. |
| 6377.0654 | 1029. |
| 6384.6782 | 5472. |
| 6385.3022 | 857. |
| 6388.0063 | 1028. |
| 6389.7959 | 836. |
| 6389.9614 | 877. |
| 6396.1602 | 847. |
| 6396.3687 | 938. |
| 6397.4502 | 1034. |
| 6397.7407 | 1134. |
| 6400.4033 | 1933. |
| 6400.9023 | 866. |
| 6403.2319 | 840. |
| 6407.6035 | 688. |
| 6407.8101 | 602. |
| 6408.0161 | 574. |
| 6410.2852 | 694. |
| 6416.3486 | 22118. |
| 6423.4023 | 740. |
| 6424.3931 | 974. |
| 6424.6812 | 1178. |
| 6424.9697 | 1126. |
| 6430.1680 | 807. |
| 6431.6934 | 1384. |
| 6433.3022 | 646. |

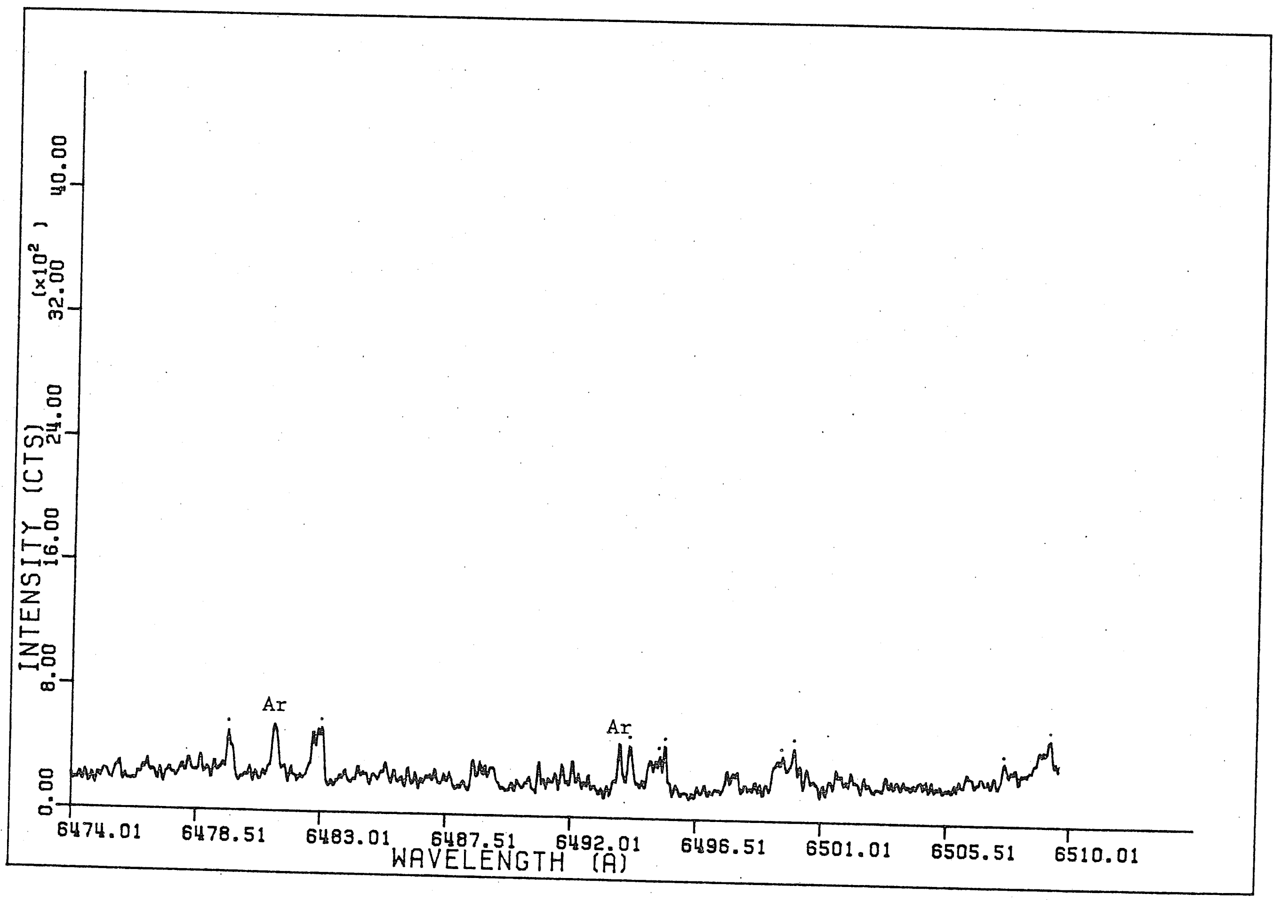

Ar
INTENSITY (CTS) (x10³)
0.00
1.50
3.00
4.50
6.00
7.50
6370.01
6374.51
6379.01
6383.51
6388.01
6392.51
6397.01
6401.51
6406.01
WAVELENGTH (A)


Ar
Ar
INTENSITY (CTS) (x10³)
0.00
5.00
10.00
15.00
20.00
25.00
6404.01
6408.51
6413.01
6417.51
6422.01
6426.51
6431.01
6435.51
6440.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6440.1270 | 567. |
| 6440.4141 | 792. |
| 6444.3857 | 977. |
| 6449.7505 | 507. |
| 6449.9146 | 580. |
| 6453.6001 | 1092. |
| 6454.4600 | 1589. |
| 6455.9751 | 2166. |
| 6466.7036 | 956. |
| 6467.6460 | 586. |
| 6468.1777 | 618. |
| 6468.3823 | 832. |
| 6468.9146 | 589. |
| 6469.2837 | 661. |
| 6479.6885 | 511. |
| 6481.3511 | 557. |
| 6483.0542 | 543. |
| 6493.7593 | 477. |
| 6494.1240 | 464. |
| 6495.2188 | 400. |
| 6495.3809 | 466. |
| 6499.6392 | 416. |
| 6500.0439 | 467. |
| 6507.6270 | 397. |
| 6509.2896 | 548. |

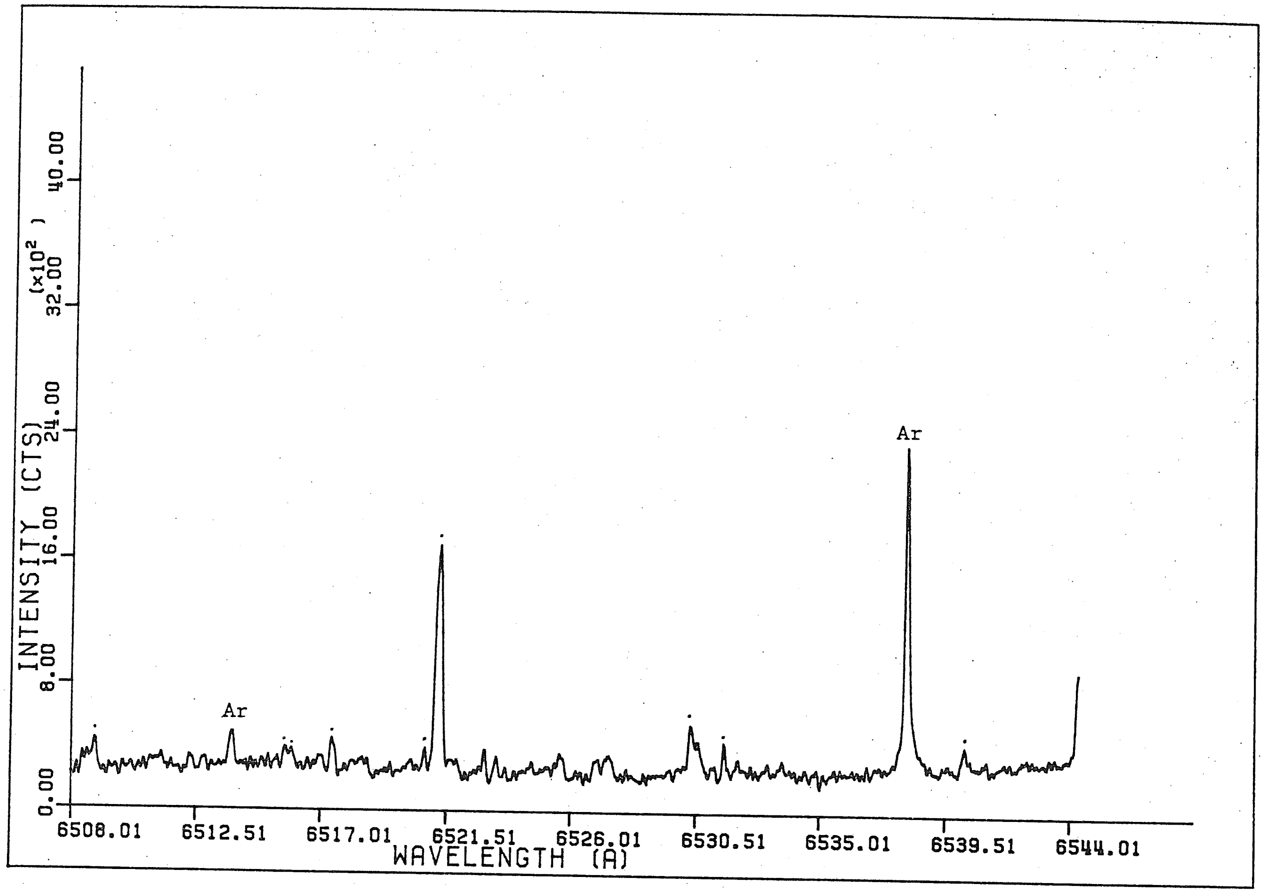


INTENSITY (CTS)
(x10²)
0.00
8.00
16.00
24.00
32.00
40.00
O
O
O
Ar
6440.01
6444.51
6449.01
6453.51
6458.01
6462.51
6467.01
6471.51
6476.01
WAVELENGTH (A)

INTENSITY (CTS)
(x10²)
0.00
8.00
16.00
24.00
32.00
40.00
Ar
Ar
6474.01
6478.51
6483.01
6487.51
6492.01
6496.51
6501.01
6505.51
6510.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6508.8477 | 445. |
| 6513.7925 | 497. |
| 6515.7222 | 405. |
| 6515.9634 | 394. |
| 6517.4102 | 462. |
| 6520.7471 | 402. |
| 6521.2695 | 1697. |
| 6530.3145 | 564. |
| 6531.5210 | 453. |
| 6538.1138 | 2361. |
| 6540.2036 | 441. |
| 6538.0737 | 2425. |
| 6558.9019 | 1048. |
| 6559.8989 | 1123. |
| 6562.8521 | 226941. |
| 6566.0840 | 1211. |
| 6568.7173 | 1019. |



INTENSITY (CTS)
(x10²)
0.00
8.00
16.00
24.00
32.00
40.00
Ar
Ar
6508.01
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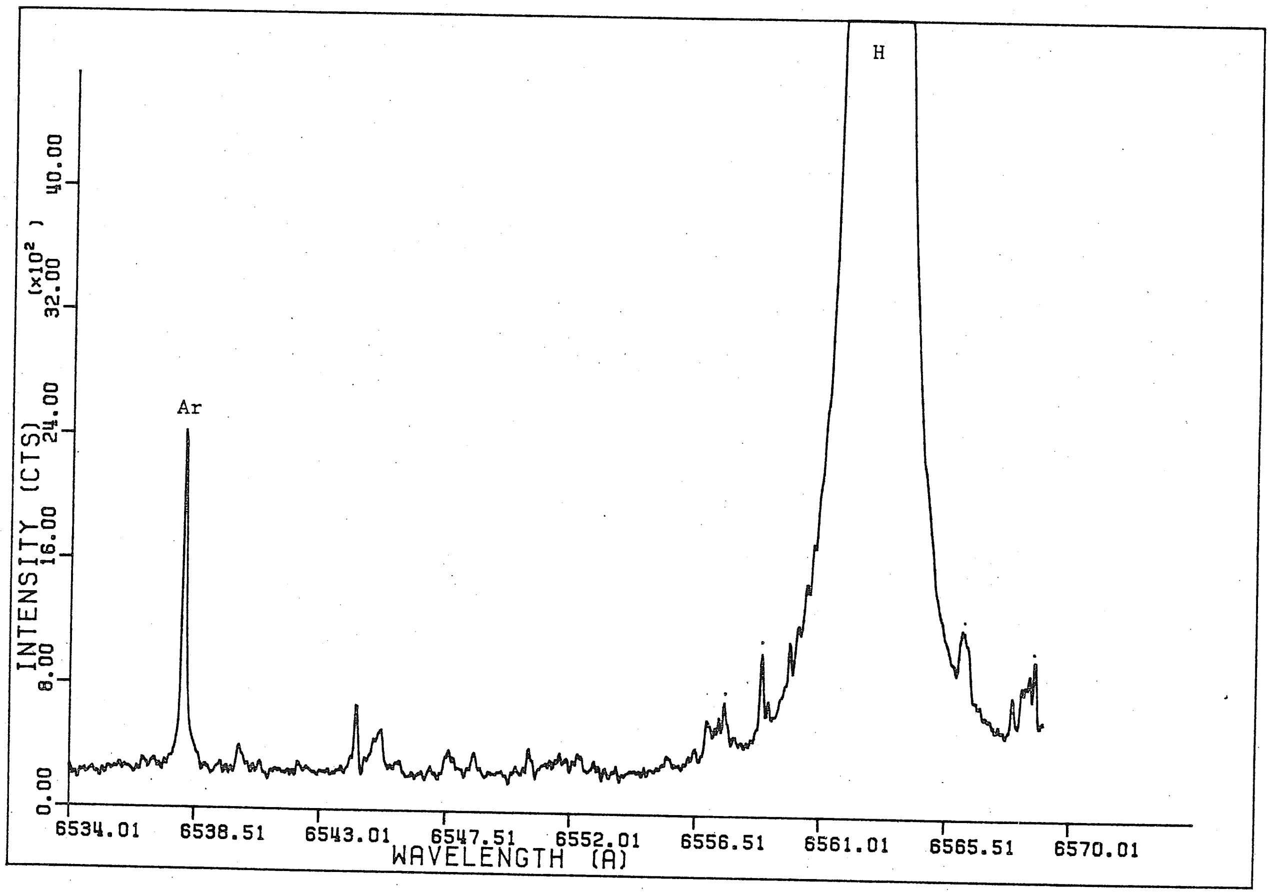
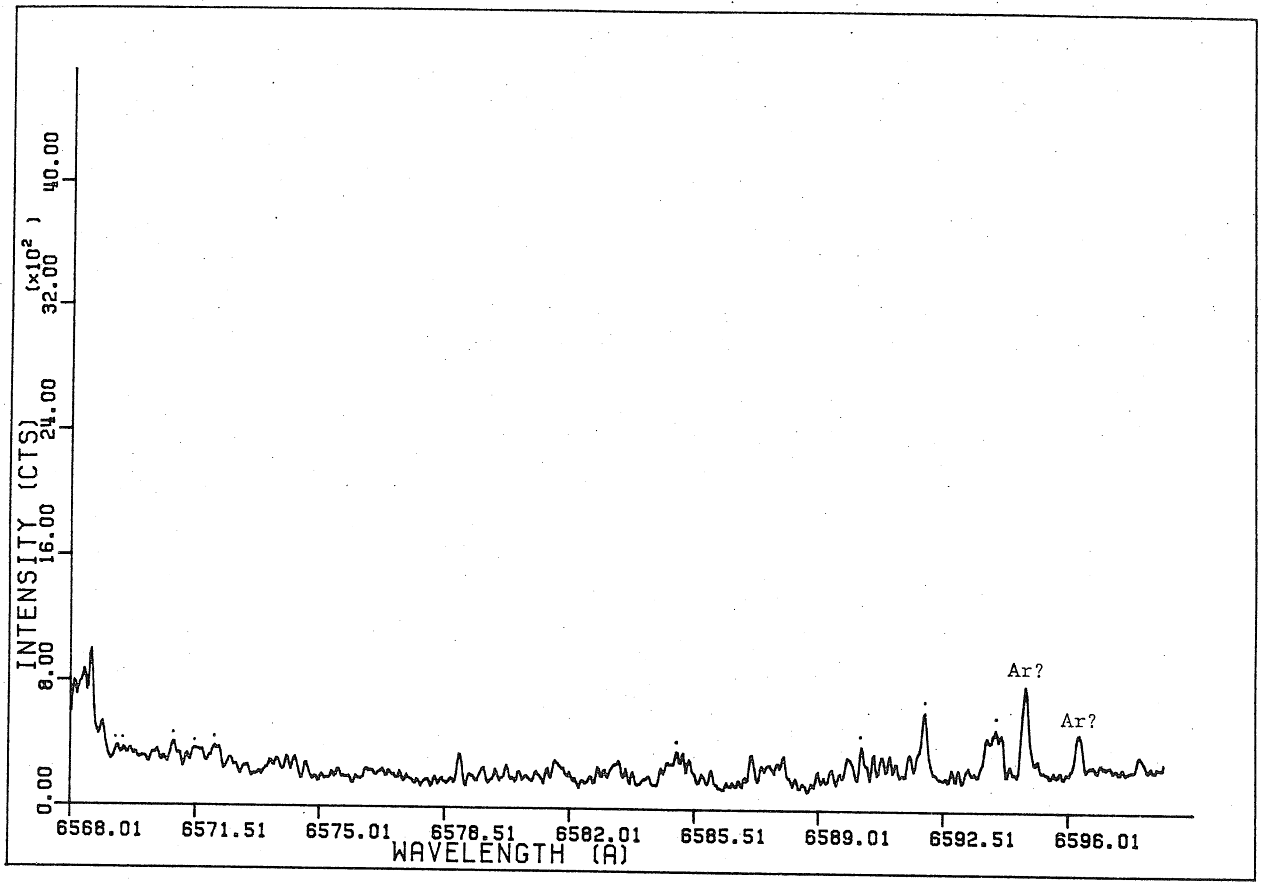
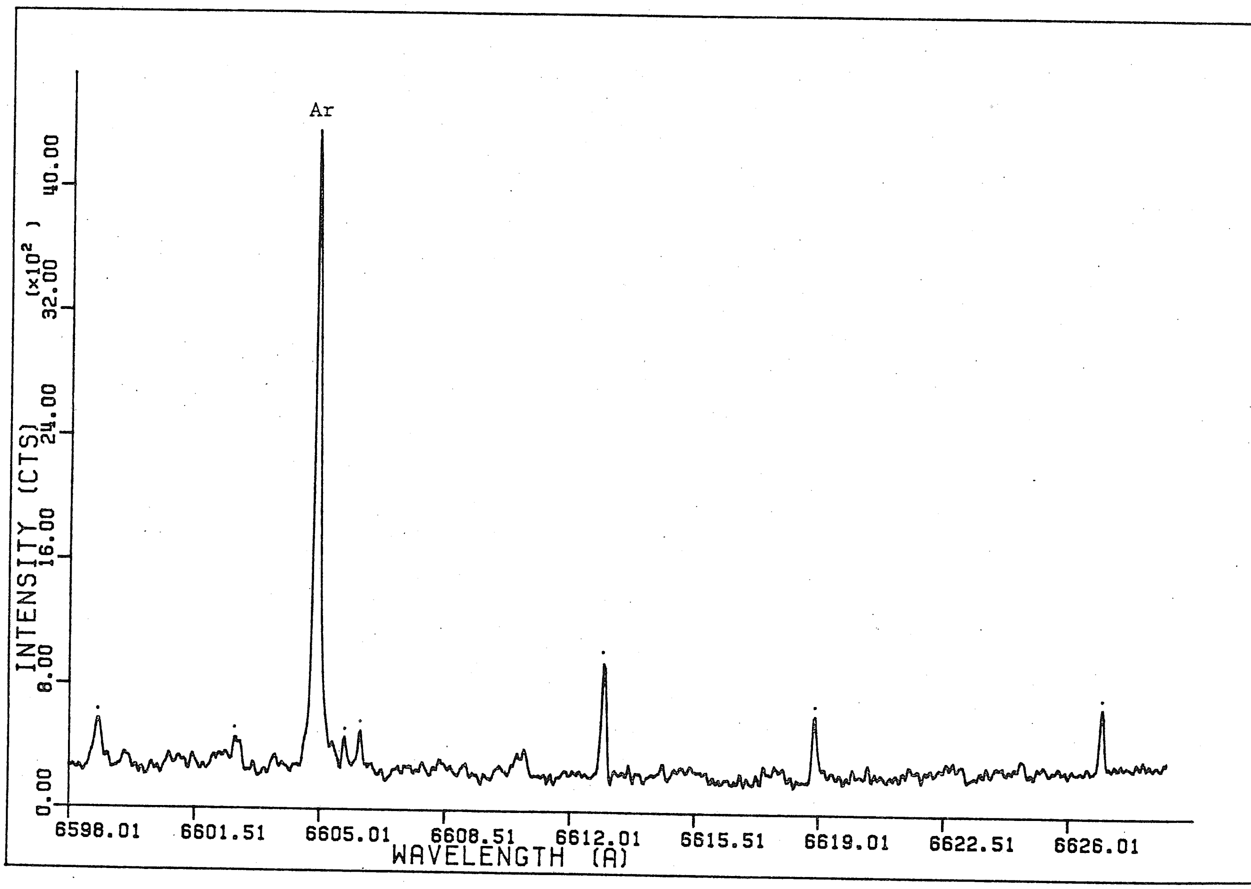
6517.01
6521.51
6526.01
6530.51
6535.01
6539.51
6544.01
WAVELENGTH (A)

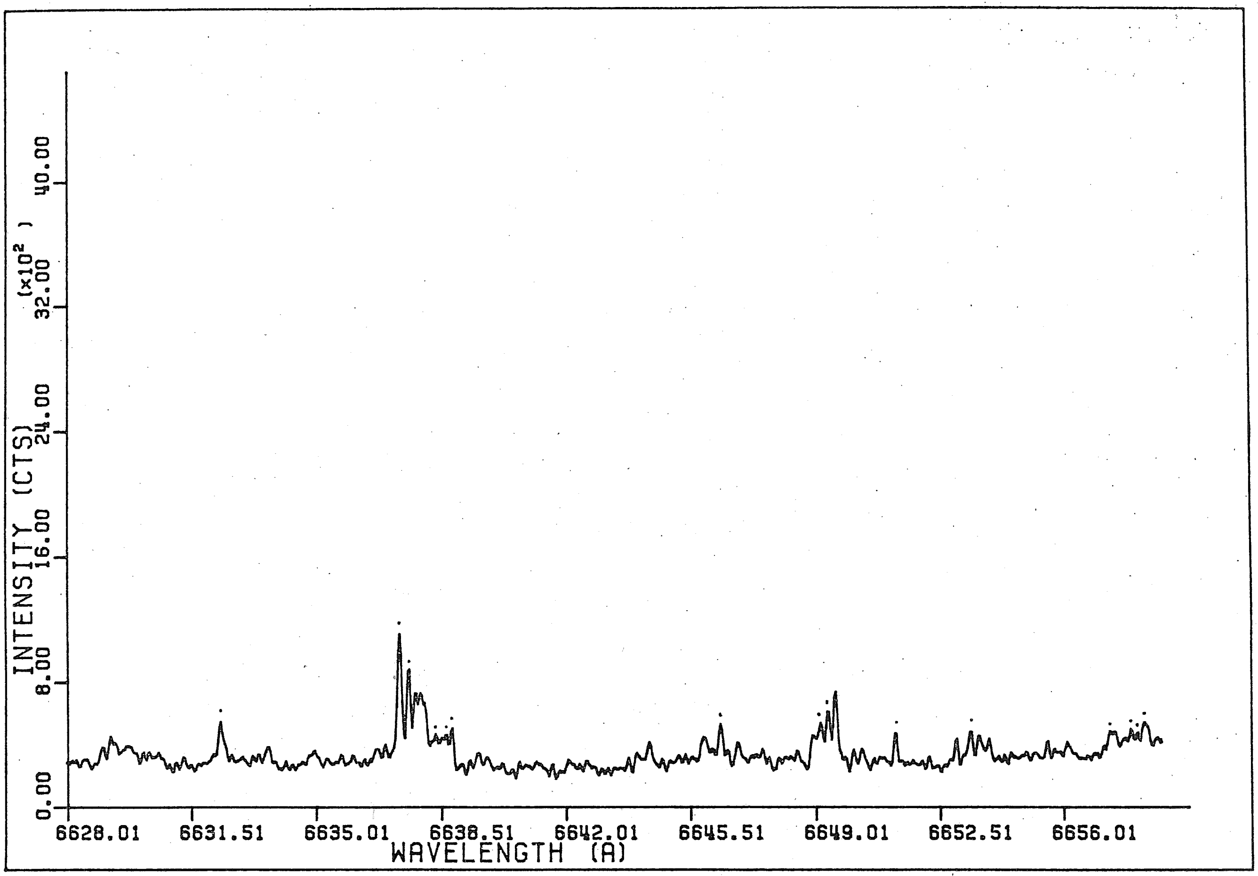
INTENSITY (CTS)
(x10²)
0.00
8.00
16.00
24.00
32.00
40.00
Ar
H
6534.01
6538.51
6543.01
6547.51
6552.01
6556.51
6561.01
6565.51
6570.01
WAVELENGTH (A)

| $\lambda$(Å) | I |
|---|---|
| 6569.3384 | 381. |
| 6569.4966 | 370. |
| 6570.8804 | 407. |
| 6571.4731 | 367. |
| 6572.0669 | 385. |
| 6585.0000 | 370. |
| 6590.2202 | 410. |
| 6592.0005 | 633. |
| 6593.9775 | 525. |
| 6594.8086 | 804. |
| 6596.3105 | 500. |
| 6598.8174 | 572. |
| 6602.6191 | 459. |
| 6604.8936 | 4360. |
| 6605.7168 | 467. |
| 6606.1475 | 508. |
| 6612.9292 | 959. |
| 6618.8877 | 635. |
| 6626.9233 | 702. |


Ar?
Ar?
INTENSITY (CTS)
(×10²)
0.00
8.00
16.00
24.00
32.00
40.00
6568.01
6571.51
6575.01
6578.51
6582.01
6585.51
6589.01
6592.51
6596.01
WAVELENGTH (A)


Ar
INTENSITY (CTS)
(×10²)
0.00
8.00
16.00
24.00
32.00
40.00
6598.01
6601.51
6605.01
6608.51
6612.01
6615.51
6619.01
6622.51
6626.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6632.3159 | 545. |
| 6637.3213 | 1109. |
| 6637.5933 | 881. |
| 6638.3301 | 467. |
| 6638.6401 | 462. |
| 6638.7959 | 505. |
| 6646.3228 | 530. |
| 6649.1167 | 538. |
| 6649.3101 | 612. |
| 6651.2114 | 472. |
| 6653.3848 | 481. |
| 6657.3032 | 487. |
| 6657.8853 | 501. |
| 6658.0796 | 478. |
| 6658.2729 | 544. |
| 6660.7090 | 2199. |
| 6661.1318 | 541. |
| 6664.0542 | 2413. |
| 6669.4756 | 1060. |
| 6677.2813 | 9716. |
| 6678.7808 | 506. |
| 6678.9346 | 538. |
| 6684.9321 | 654. |
| 6686.2017 | 583. |


INTENSITY (CTS)
(x10²)
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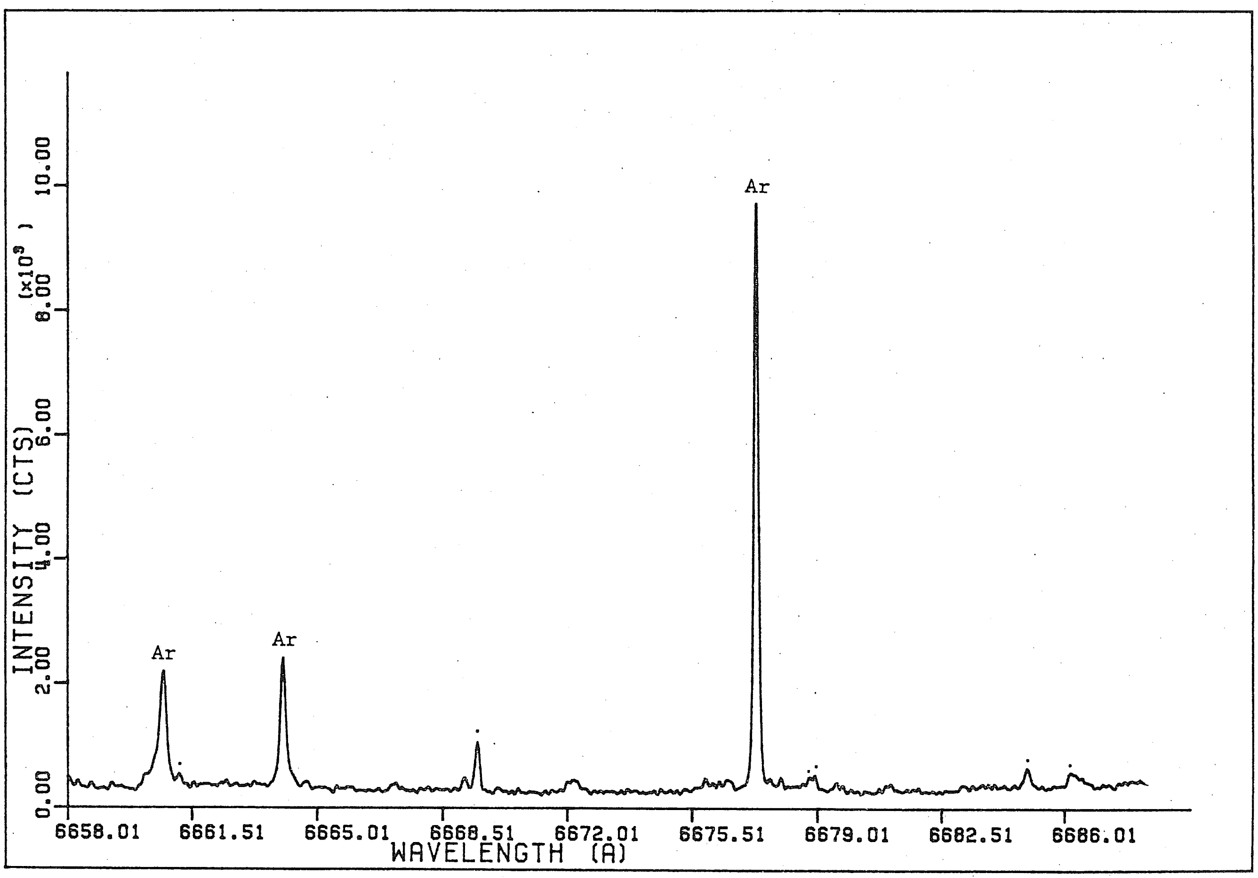
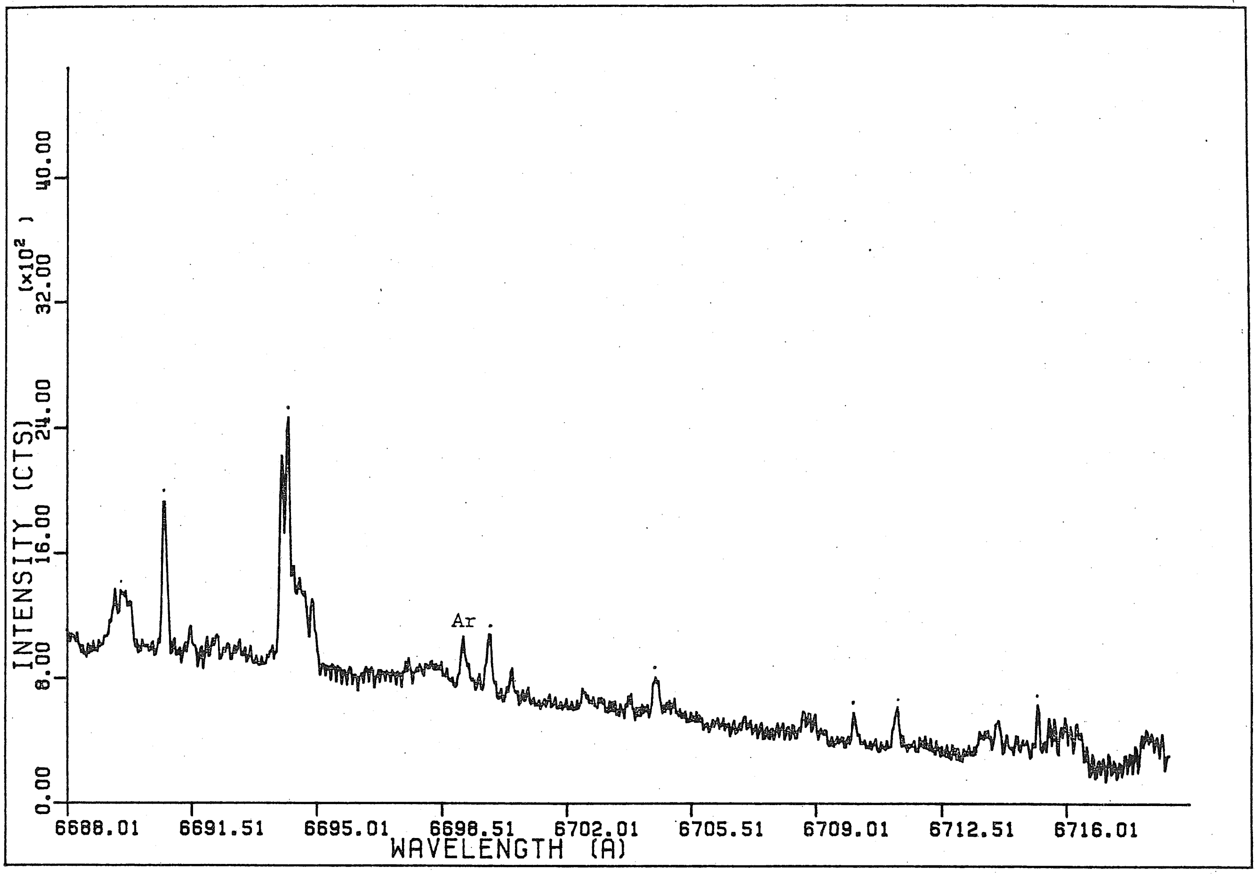
8.00
16.00
24.00
32.00
40.00
6628.01
6631.51
6635.01
6638.51
6642.01
6645.51
6649.01
6652.51
6656.01
WAVELENGTH (A)


INTENSITY (CTS)
(x10³)
0.00
2.00
4.00
6.00
8.00
10.00
Ar
Ar
Ar
6658.01
6661.51
6665.01
6668.51
6672.01
6675.51
6679.01
6682.51
6686.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6689.3438 | 1369. |
| 6690.7148 | 1927. |
| 6694.2202 | 2466. |
| 6699.0977 | 1066. |
| 6699.8213 | 1082. |
| 6704.5073 | 806. |
| 6710.0698 | 580. |
| 6711.2896 | 617. |
| 6715.2139 | 632. |
| 6719.4971 | 1576. |
| 6721.0444 | 2244. |
| 6730.3311 | 1243. |
| 6738.8252 | 777. |
| 6739.0894 | 733. |
| 6746.8276 | 611. |
| 6747.9980 | 611. |


INTENSITY (CTS)
(x10² )
0.00
8.00
16.00
24.00
32.00
40.00
Ar
6688.01
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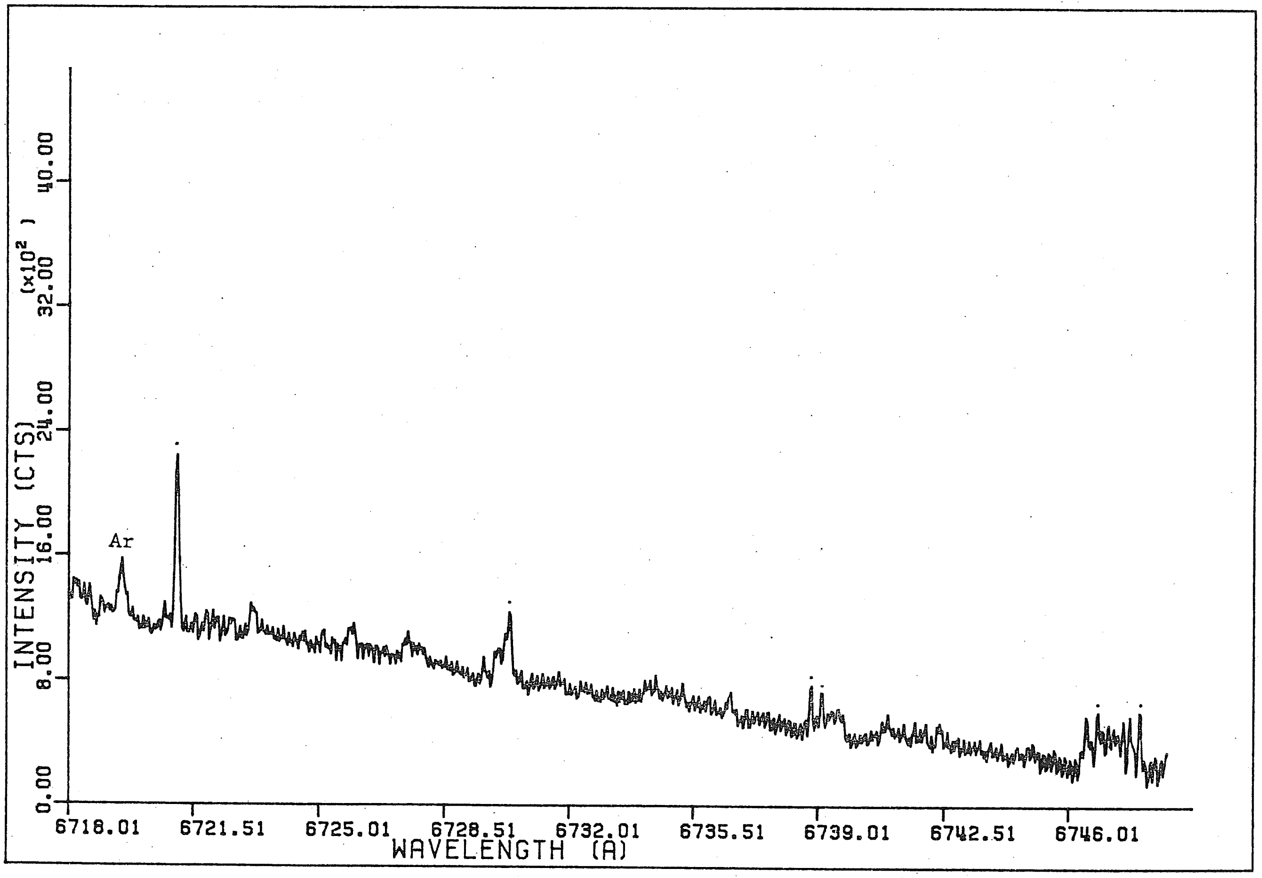
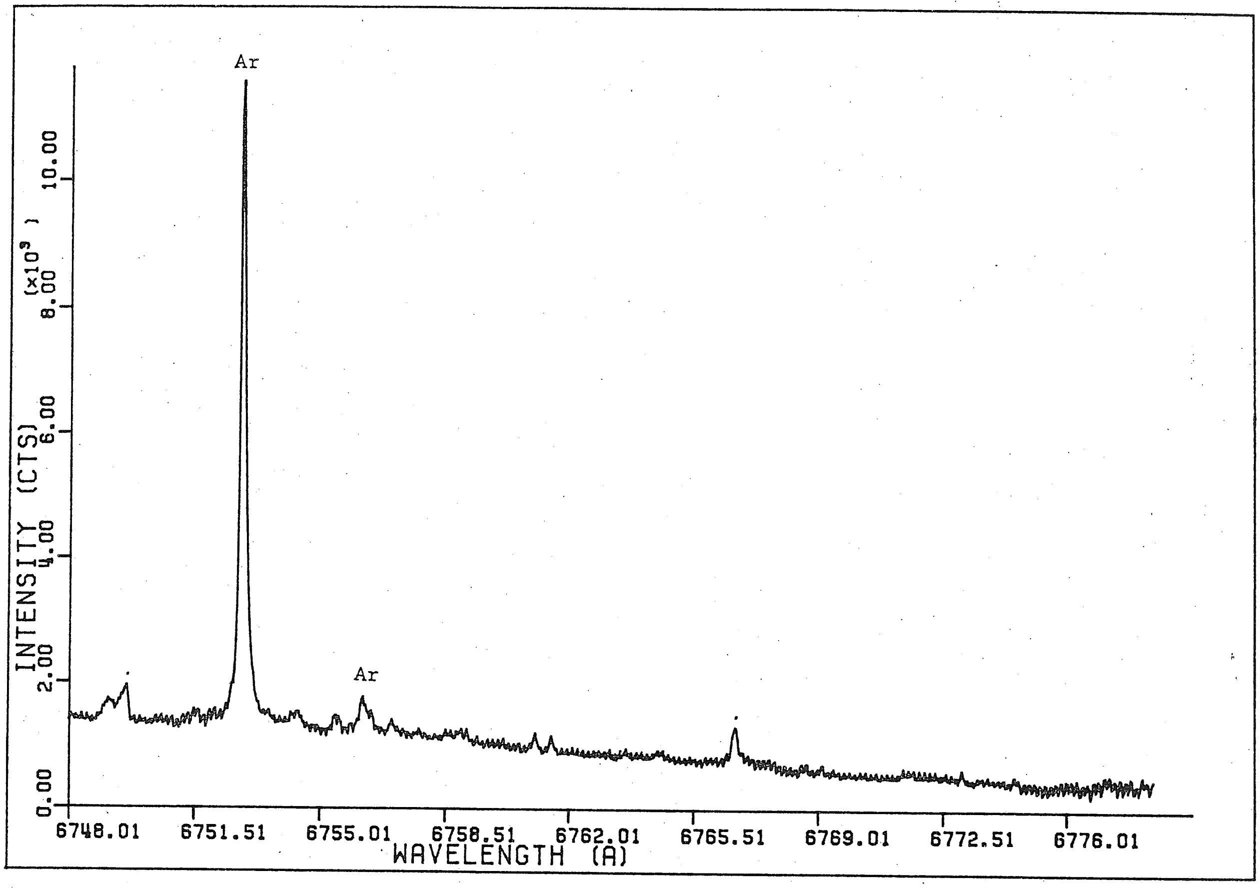
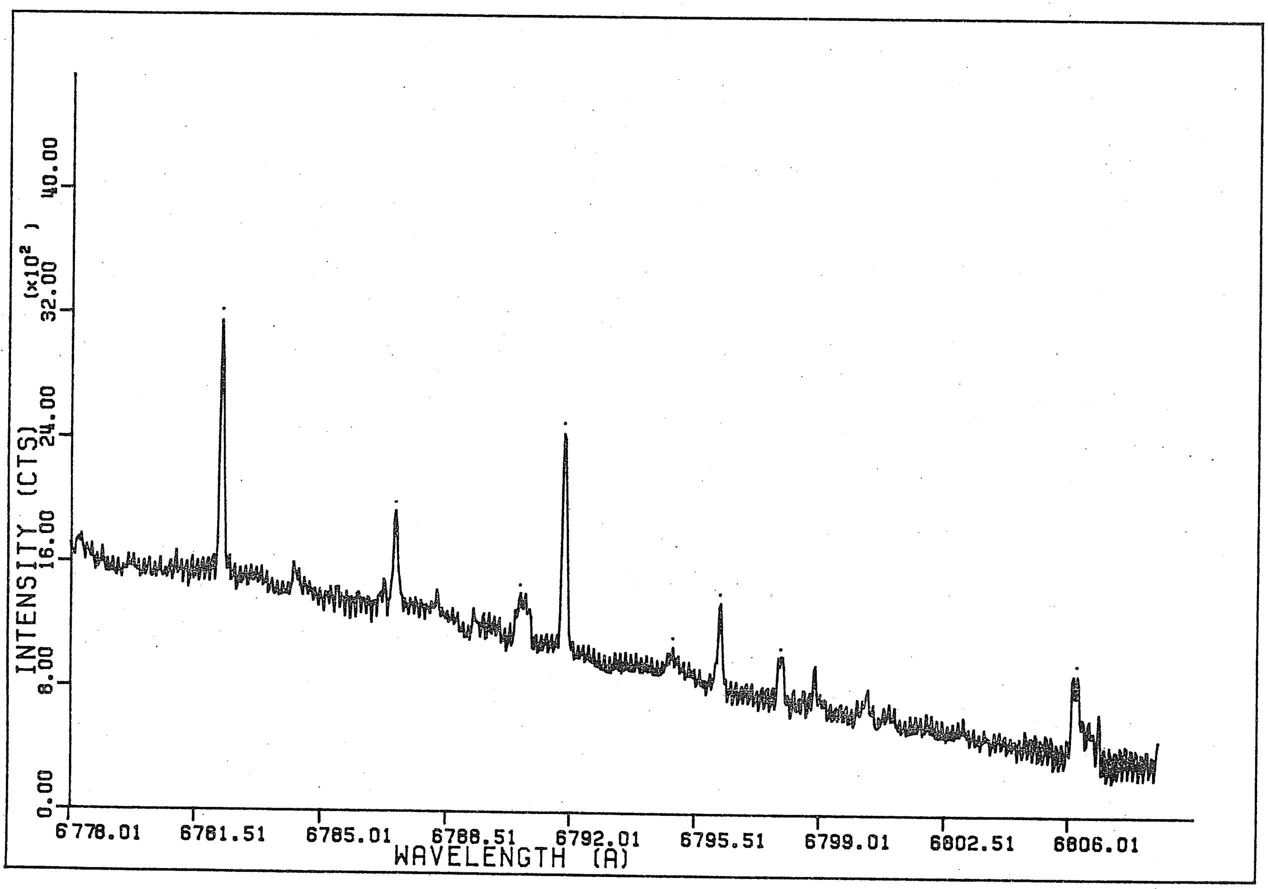
6698.51
6702.01
6705.51
6709.01
6712.51
6716.01
WAVELENGTH (A)


INTENSITY (CTS)
(x10² )
0.00
8.00
16.00
24.00
32.00
40.00
Ar
6718.01
6721.51
6725.01
6728.51
6732.01
6735.51
6739.01
6742.51
6746.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6749.6182 | 1963. |
| 6752.8345 | 11589. |
| 6756.2007 | 1781. |
| 6766.6729 | 1322. |
| 6782.2227 | 3149. |
| 6787.0688 | 1937. |
| 6790.5845 | 1414. |
| 6791.8057 | 2440. |
| 6794.8765 | 1075. |
| 6796.2085 | 1361. |
| 6797.9102 | 1021. |
| 6806.1240 | 906. |

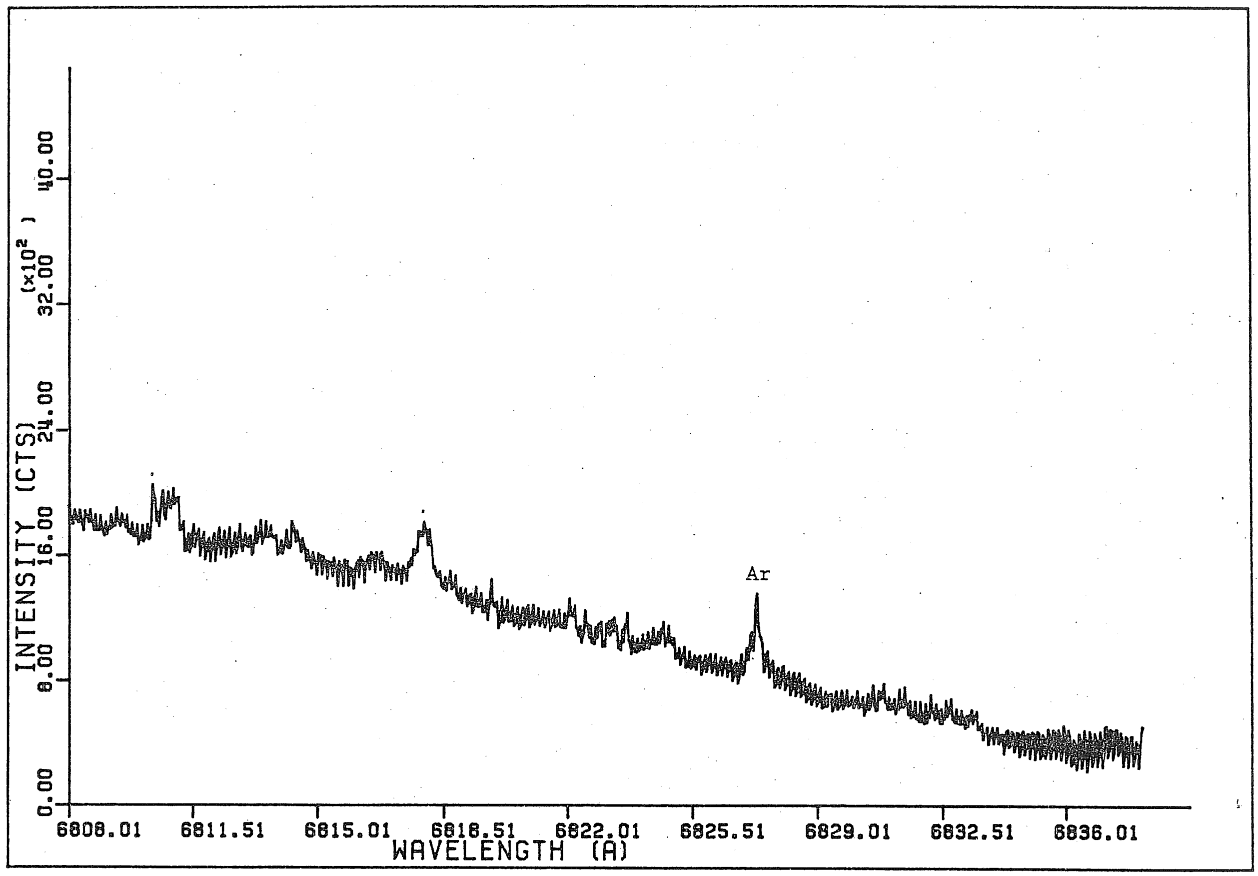


Ar
Ar
INTENSITY (CTS)
(x10³ )
0.00
2.00
4.00
6.00
8.00
10.00
6748.01
6751.51
6755.01
6758.51
6762.01
6765.51
6769.01
6772.51
6776.01
WAVELENGTH (A)

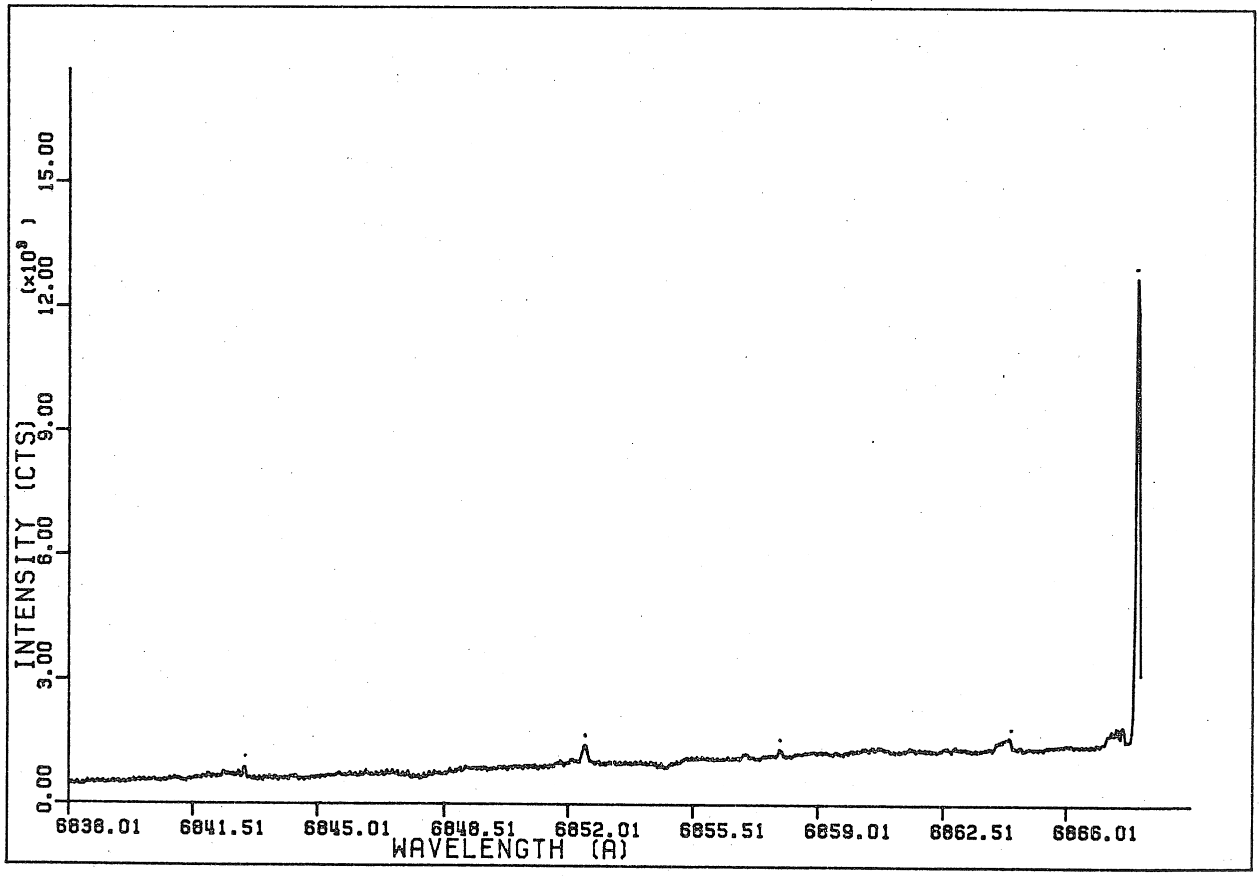



INTENSITY (CTS)
(x10² )
0.00
8.00
16.00
24.00
32.00
40.00
6778.01
6781.51
6785.01
6788.51
6792.01
6795.51
6799.01
6802.51
6806.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6810.3433 | 2050. |
| 6817.9561 | 1814. |
| 6827.3262 | 1358. |
| 6842.9810 | 872. |
| 6852.4653 | 1429. |
| 6857.9316 | 1352. |
| 6864.3760 | 1647. |
| 6867.9951 | 12714. |

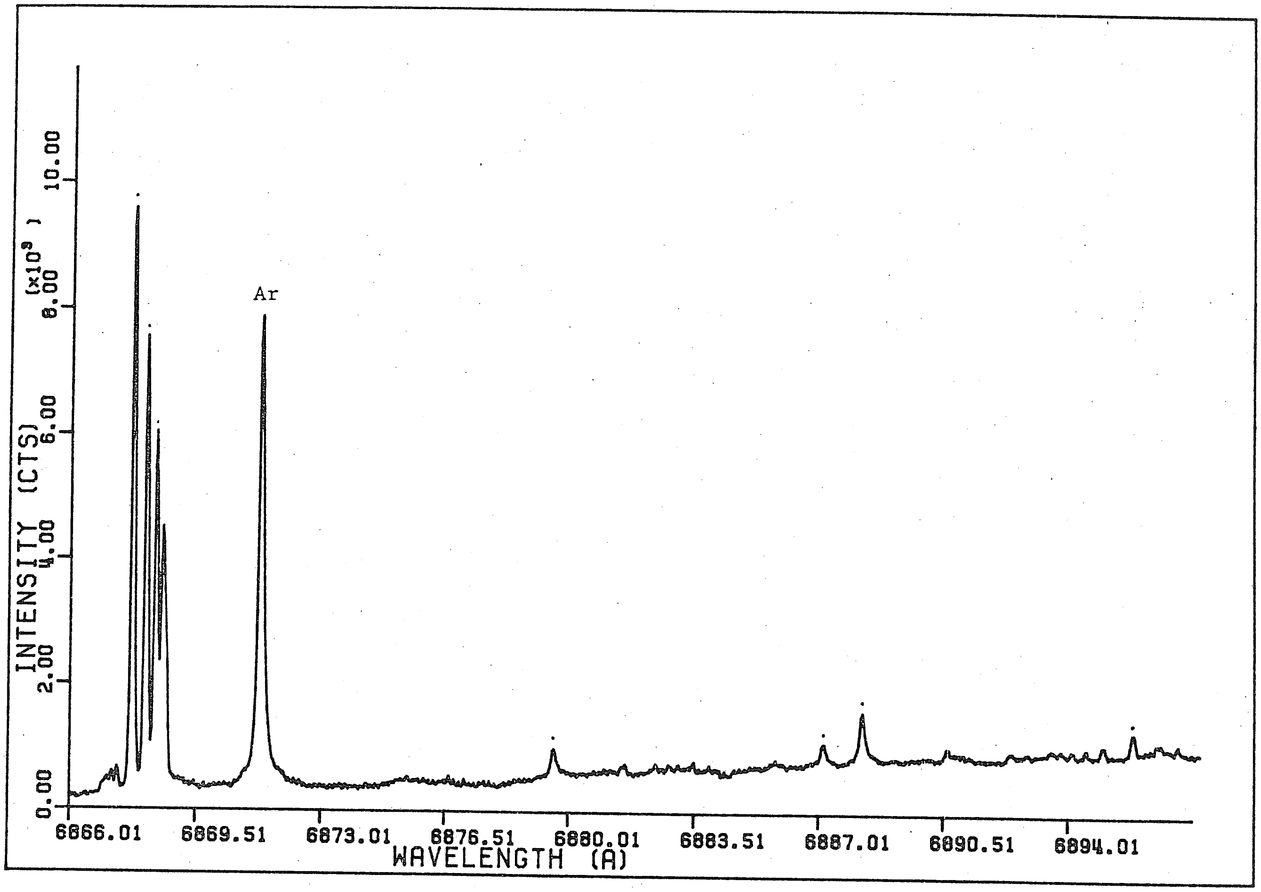


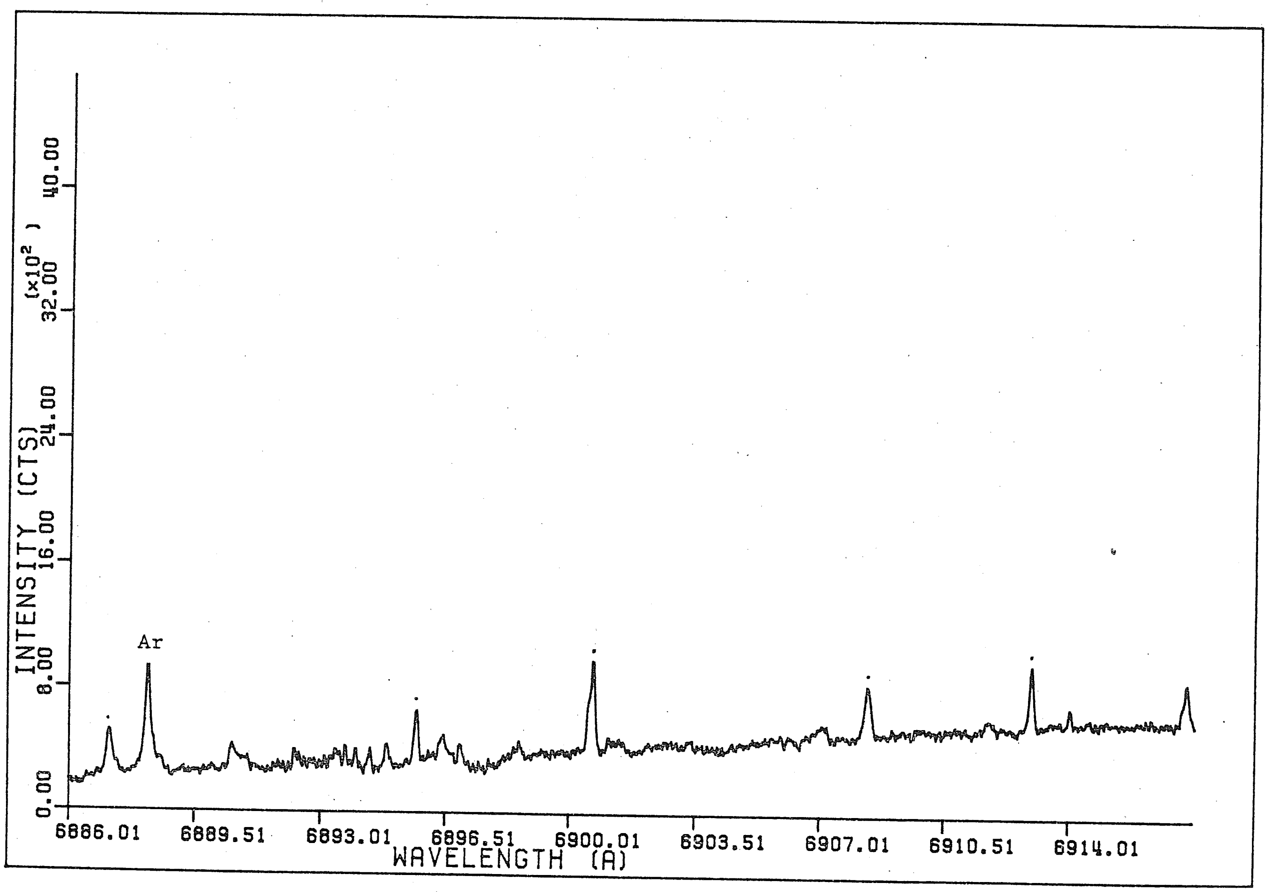
INTENSITY (CTS)
(×10²)
0.00
8.00
16.00
24.00
32.00
40.00
Ar
6808.01
6811.51
6815.01
6818.51
6822.01
6825.51
6829.01
6832.51
6836.01
WAVELENGTH (A)

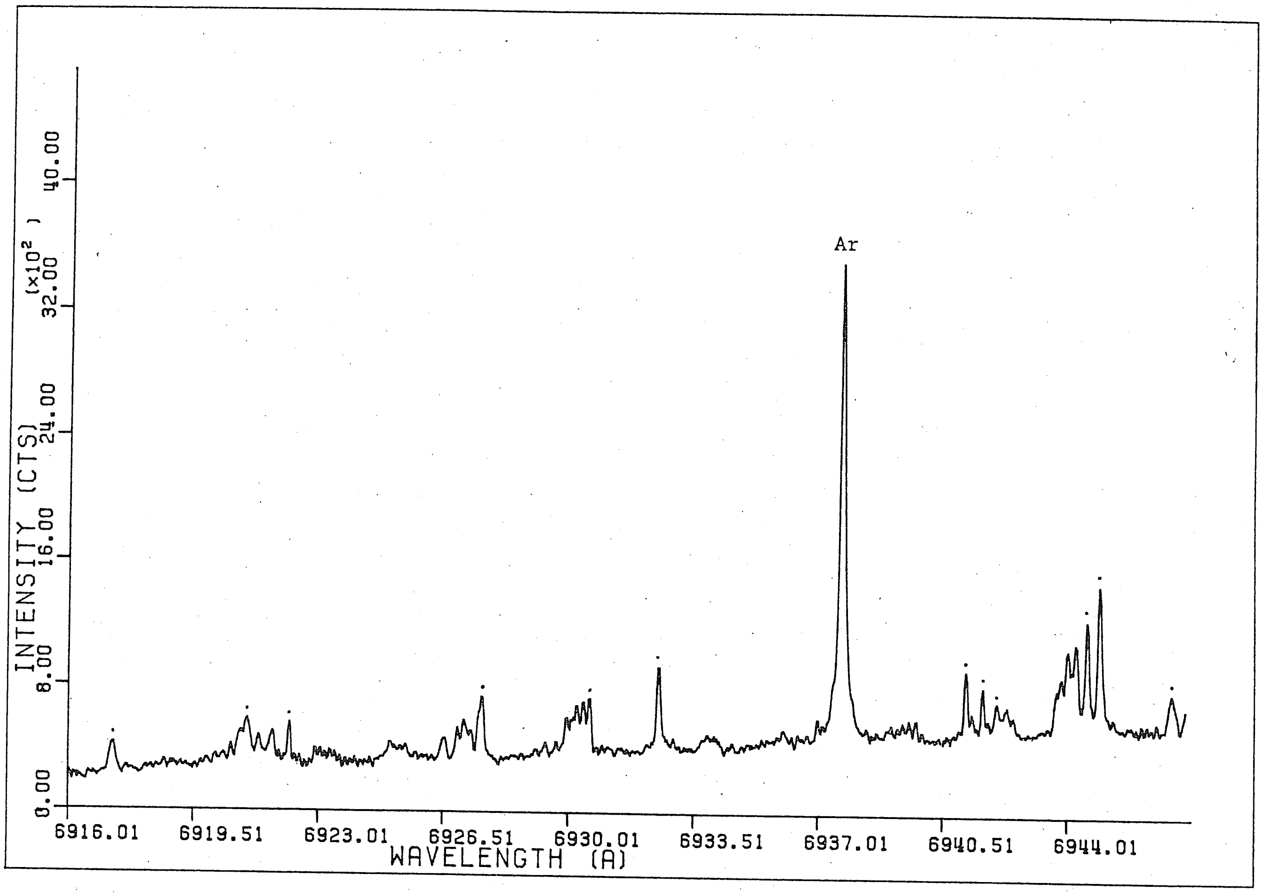
INTENSITY (CTS)
(×10³)
0.00
3.00
6.00
9.00
12.00
15.00
6838.01
6841.51
6845.01
6848.51
6852.01
6855.51
6859.01
6862.51
6866.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6867.7461 | 9593. |
| 6868.1035 | 7566. |
| 6868.3896 | 6052. |
| 6871.3257 | 7891. |
| 6879.5952 | 1005. |
| 6887.1489 | 1118. |
| 6888.2231 | 1620. |
| 6895.8481 | 1321. |
| 6887.1030 | 518. |
| 6888.1699 | 932. |
| 6895.7065 | 657. |
| 6900.6479 | 988. |
| 6908.3267 | 843. |
| 6912.9482 | 986. |


Ar
INTENSITY (CTS) (x10³)
0.00
2.00
4.00
6.00
8.00
10.00
6866.01
6869.51
6873.01
6876.51
6880.01
6883.51
6887.01
6890.51
6894.01
WAVELENGTH (A)


Ar
INTENSITY (CTS) (x10²)
0.00
8.00
16.00
24.00
32.00
40.00
6886.01
6889.51
6893.01
6896.51
6900.01
6903.51
6907.01
6910.51
6914.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6917.2793 | 428. |
| 6921.0396 | 590. |
| 6922.2002 | 566. |
| 6927.5776 | 738. |
| 6930.4253 | 710. |
| 6932.5342 | 937. |
| 6937.6655 | 3526. |
| 6941.1460 | 925. |
| 6941.6382 | 821. |
| 6942.0244 | 724. |
| 6944.5557 | 1252. |
| 6944.9067 | 1480. |
| 6946.9453 | 791. |
| 6951.5850 | 771. |
| 6952.9028 | 792. |
| 6956.0952 | 954. |
| 6960.3286 | 817. |
| 6965.4644 | 205742. |
| 6972.3350 | 1636. |
| 6972.5088 | 1842. |



Ar
INTENSITY (CTS) (x10² )
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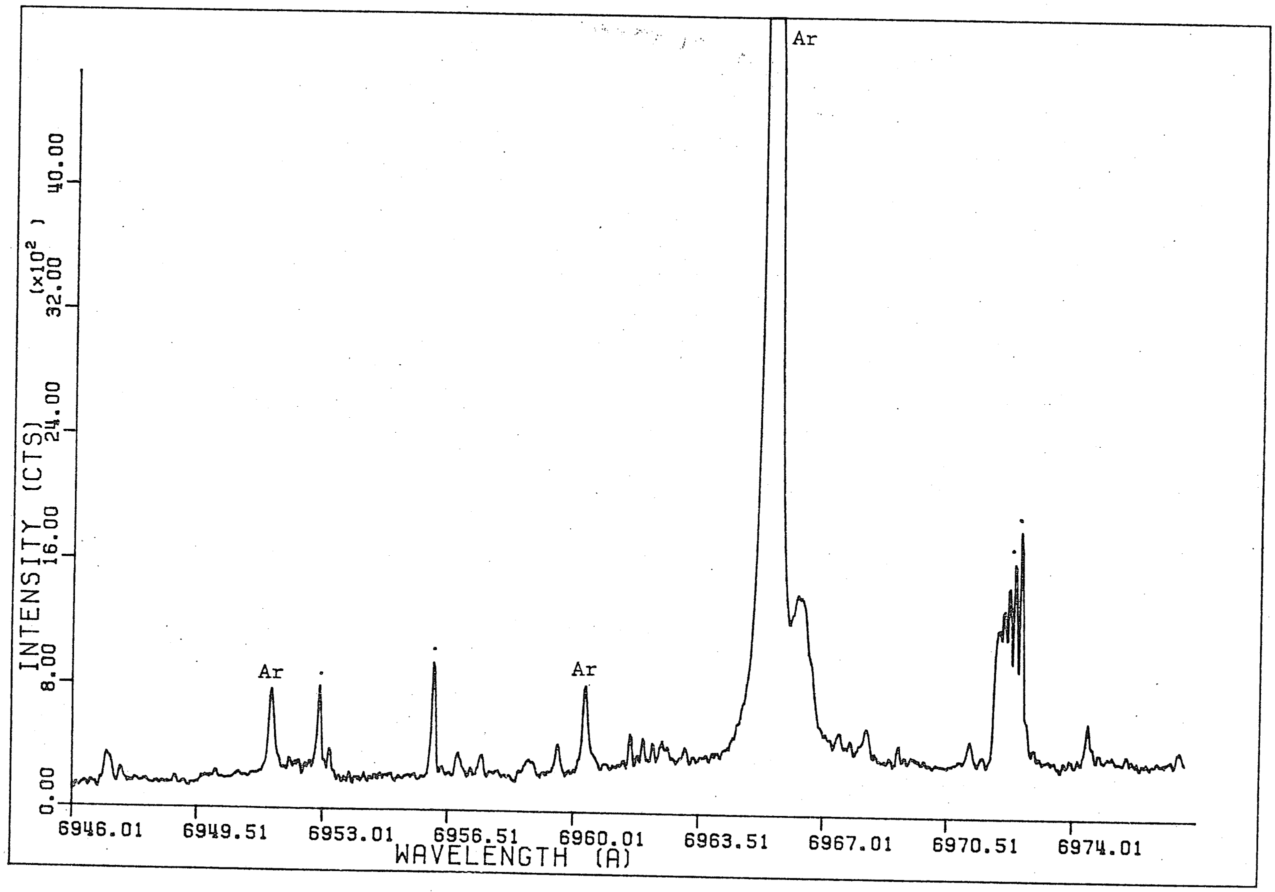
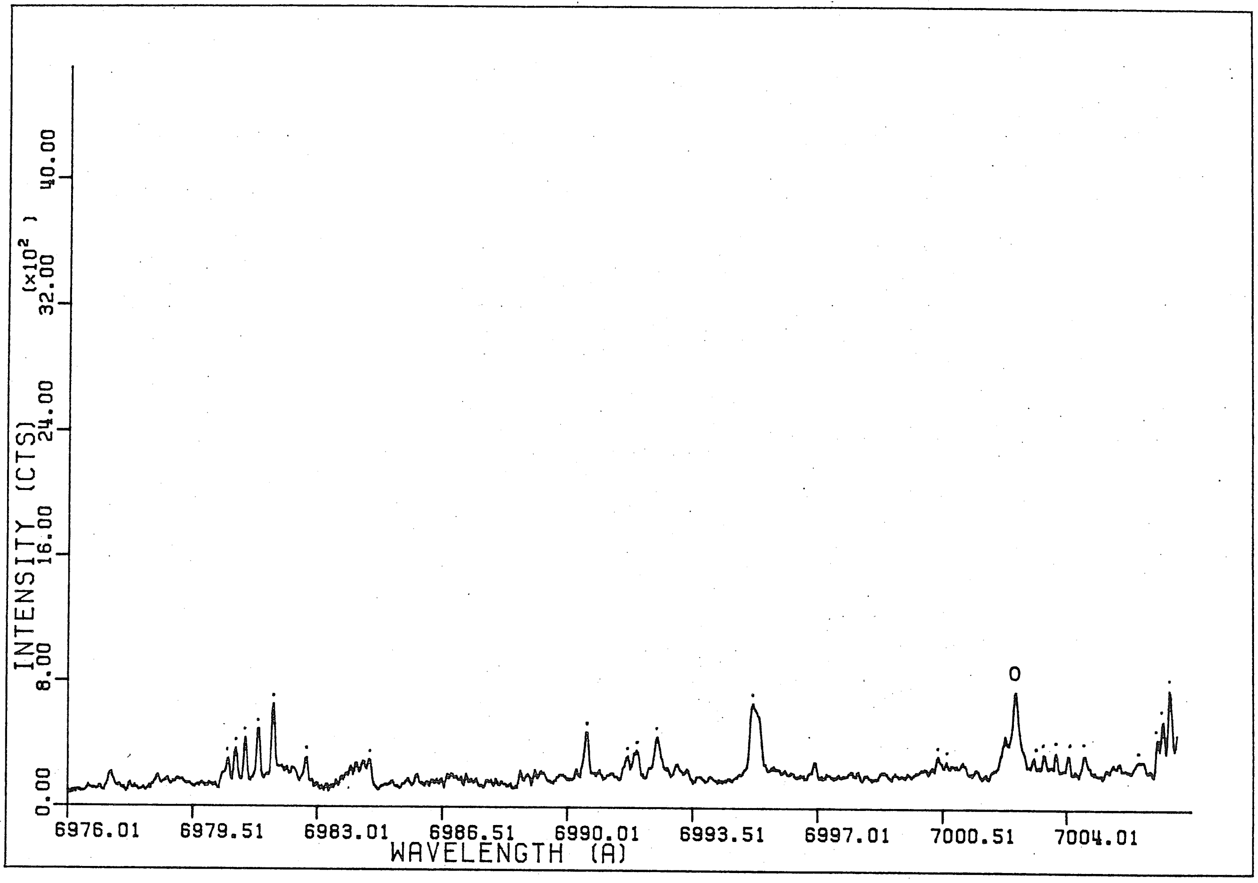
8.00
16.00
24.00
32.00
40.00
6916.01
6919.51
6923.01
6926.51
6930.01
6933.51
6937.01
6940.51
6944.01
WAVELENGTH (A)

Ar
Ar
Ar
INTENSITY (CTS) (x10² )
0.00
8.00
16.00
24.00
32.00
40.00
6946.01
6949.51
6953.01
6956.51
6960.01
6963.51
6967.01
6970.51
6974.01
WAVELENGTH (A)

| λ(Å) | I |
|---|---|
| 6980.5142 | 305. |
| 6980.7197 | 370. |
| 6980.9941 | 438. |
| 6981.3721 | 494. |
| 6981.7827 | 655. |
| 6982.7095 | 313. |
| 6984.4590 | 303. |
| 6990.5298 | 480. |
| 6991.6963 | 329. |
| 6991.9355 | 366. |
| 6992.5190 | 450. |
| 6995.1943 | 667. |
| 7000.3735 | 336. |
| 7000.6143 | 302. |
| 7002.5688 | 747. |
| 7003.0835 | 331. |
| 7003.3574 | 351. |
| 7003.7012 | 361. |
| 7004.0435 | 344. |
| 7004.5239 | 344. |
| 7006.0337 | 307. |
| 7006.5479 | 447. |
| 7006.7192 | 564. |
| 7006.8906 | 765. |



INTENSITY (CTS)
(x10²)
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8.00
16.00
24.00
32.00
40.00
6976.01
6979.51
6983.01
6986.51
6990.01
6993.51
6997.01
7000.51
7004.01
WAVELENGTH (A)
O

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