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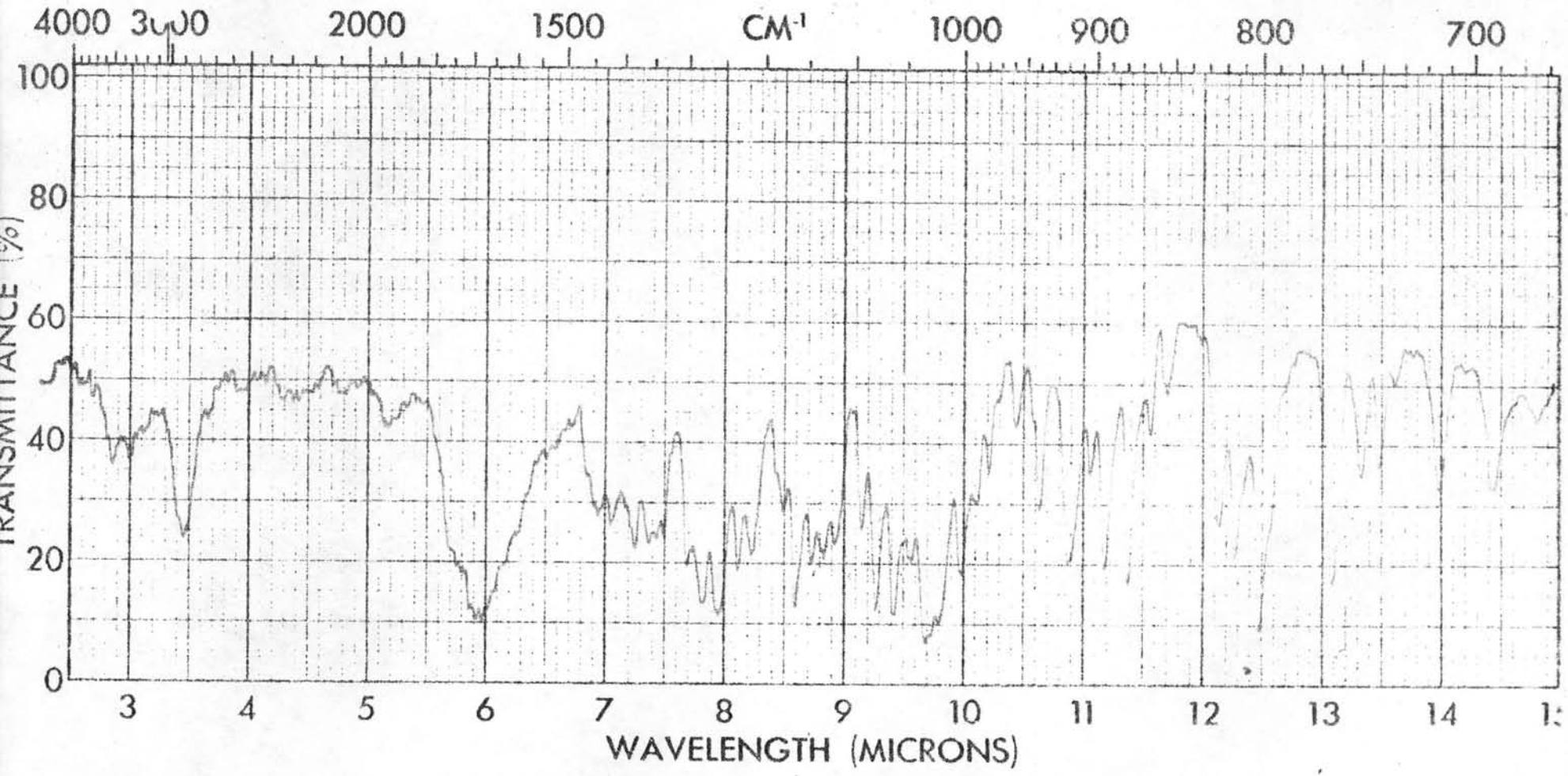
Appendix I

Spectrum of Limonin



Appendix II

Standard Curve of Limonin Content

Limonin content g	% Absorbance					average
	I	II	III	IV	V	
1.446	2.93	2.75	2.75	2.90	2.86	2.838
2.169	4.00	3.00	3.40	3.63	3.80	3.566
2.892	4.46	3.60	4.35	3.51	4.40	4.064
3.615	5.73	4.95	4.55	5.46	5.46	5.230
4.338	6.16	6.70	5.60	7.03	6.08	6.314
5.061	7.00	6.00	7.50	6.93	6.96	6.878
5.784	8.33	7.20	7.60	7.90	7.66	7.738
6.507	8.80	8.25	9.25	9.05	8.83	8.836
7.231	11.16	10.60	9.60	10.20	9.23	10.158
10.846	16.66	13.65	15.10	12.90	15.40	14.742
14.462	20.77	17.50	18.55	18.18	18.26	18.652
18.077	26.66	22.10	23.45	24.83	25.60	24.528
21.693	32.33	29.40	29.75	27.96	29.66	29.820

From equation (Mendenhall, 1970)

$$y = bx + a$$

$$b = \frac{n\sum_{i=1}^{n} x_i y_i - \left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)}{n\sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2}$$

$$a = \bar{y} - b\bar{x}$$

$$y = 1.327\ x + 0.400$$

assume 0.4 could be omitted due to the experimental error.

$$y = 1.327x$$

Conversion Limonin to Limonin 2,4-dinitrophenylhydraz ne

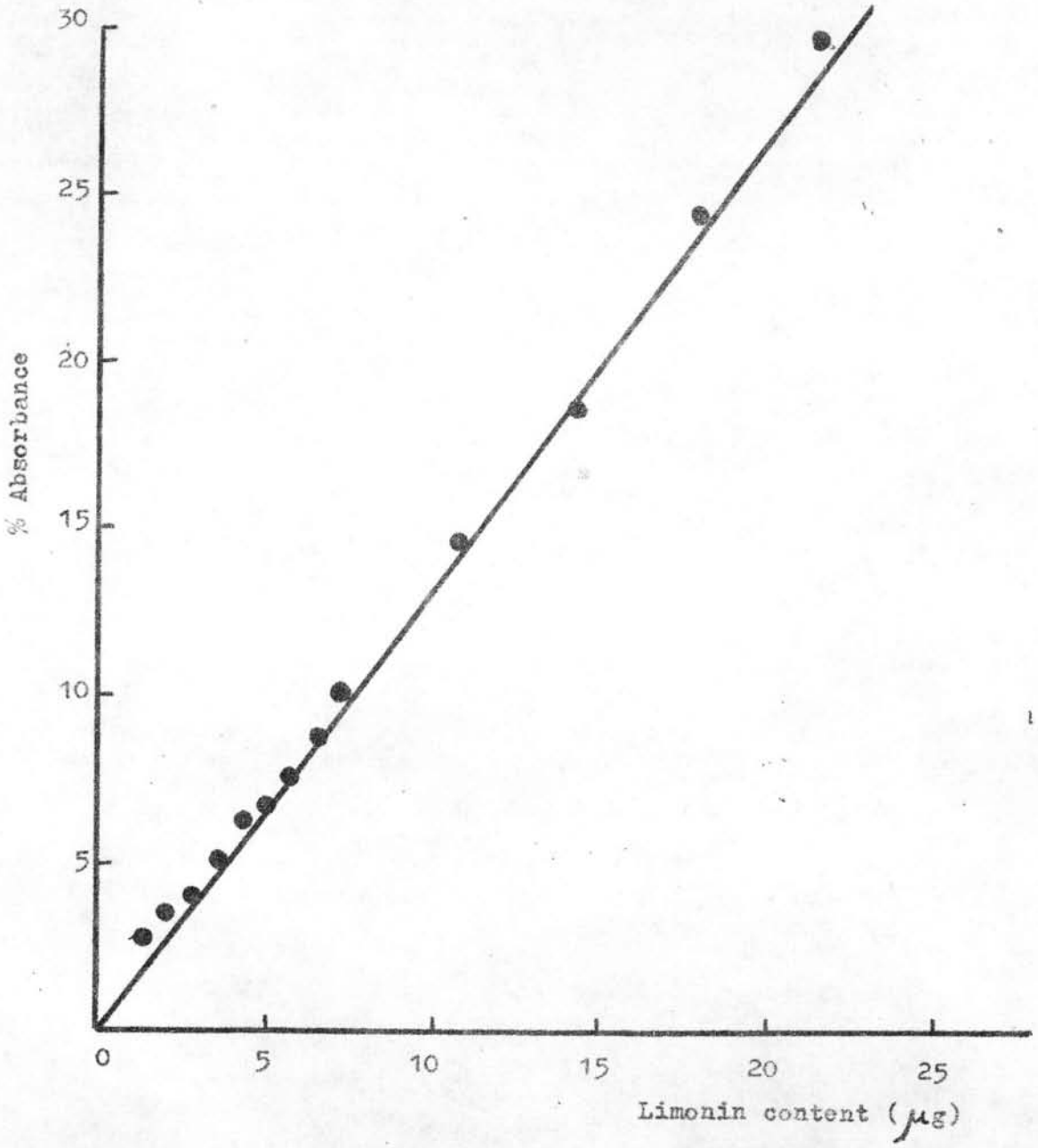
Limonin $C_{26}H_{30}O_8$ (Arigoni et al., 1960)

Limonin 2,4-dinitrophylhydrazone $C_{32}H_{34}O_{11}N_4$ (Chandler & Kefford, 1966)

2,4-dinitrophenylhydrazine $C_6H_6N_4O_4$

1 mole Limonin 2,4-dinitrophenylhydrazone is converted from 1 mole Limonin

1g of Limonin 2,4-dinitrophenylhydragone converted to 0.723g Limonin



Standard curve of limonin content.

Appendix III

Recovery of Limonin Added to Lime Juice

Limonin Added (ppm)	Limonin Found (ppm)	Recovery %
0	22.60	
0	23.00	
0	21.00	
20	41.80	98.00
20	43.00	104.00
20	42.80	103.00
40	62.44	101.00
40	62.00	99.50
40	61.20	97.50

Appendix IV

Limonin Content of Citrus Product

Sample	Method	Limonin content (ppm)	reference
Gropefruit juice	Kruger and Colter 1972	3.5	Kruger and Colter, 1972
Navel Orange Juice	Wilson and Crutchfield 1968	1-2	Wilson & Crutchfield 1968
Heated Navel Orange Juice (70°C 2 hr)	" --- "	9-18	" ------ "
Grapefruit Juice	Maies and Dreyger 1965	9.5	Maier and Dreyer 1965
Grapefruit juice	Fisher 1973	3.8-4.3	Fisher 1973
Lemon juice (single strength)	Maier & Grant 1970	3.7 ± 3.0	Maier & Grant 1970
Grapefruit juice (521 concentration)	" ---- "	76.8 ± 2.8	" ------ "
Navel Orange Juice (6:1)concentration)	" ---- "	68.7 ± 1.1	" ------ "
Navel Orange Juice (boiled)	" ----- "	12.4	Maier et al., 1973
Lemon Juice	" ----- "	6.0	" ------ "
Navel Orange Juice (boiled)	" ----- "	12.8	Brewster et al., 1976
Fresh Valencia Orange	Chandler 1971	2-3	Tariq, 1974
Pasteurized " "	"----- "	11-13	" ------ "

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