UNIVERSAL
EXERCISE BOOK

Temp. 30°C

$p = \frac{I_N - I_N}{I_N + I_H}$

1. Fluorescein.

Concentration - 4.10^{-5} gm/cm^3.

Wavelength.	2θ.	p.	Percentage
4358	114°	·45	45
3650	115°	·42	42
3131	82°	-·13	-13
2536	100°	·17	17

Temperature 30°C

2. Rhodamine B.

Concentration. 4.10^{-5} gm per c.c.

Wave lengths	2θ.	p.	Percentage
5461	110°	·34	34
4358	102°	·21	21
3650	90°	0	0
3131	84°	−·10	−10
2536	108°	·24	24.

Temperature 28°C - 30°C

3 Eosin.

Concentration - $\cdot 5.10^{-5}$ gm per c.c.

Wave length	2θ.	ρ.	Percentage
5461	114°	·41	41
4358	120	·50	50
3650	104	·24	24
3131	61	−·16	−16
2536	108°	·31	

Temp. 28°C - 30°C

4. Erythrosin

Concentration - 4.10^{-5} gm/c-m^3.

Wave length-	2θ.	Percentage
5461	122°	53
4358	120°	50
3650	106°	24
3131	85°	- 9
2536	110°	38.

25.11.32.

λ	2θ.
5461.	120°
4358	114°
3650	106°
3131	85°
2536	110°.

Temperature
30°C

5. Magdala Red.

Concentration – 2.10^{-5} gm per c.c

Wavelengths	2θ.	Percentage
5461	114°	41
4358	105°	26.
3650	96	10
3131	87	– 5 –
2537	–	–

26.11.32

λ.	2θ.
	115°
5461	105°
4358	96°
3650	87°
3131	~~105~~ 103°
2537	

Temp. 30°C

6. β-Aesculine.

Concentration - 1.10^{-5} gm/cm^3.

Wavelength	2θ	Percentage
4358	110°	34
3650	114°	40.
3131	106°	27
2537	108°	31.

Part III.

Is the polarization same throughout the F. Spectrum?

Fluorescent spectrum.

1. Fluorescein -

$$\frac{H}{V} = \frac{60}{84} \times \frac{10}{16} = .45$$

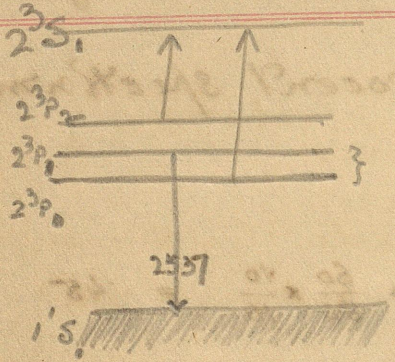
2. Eosin :- $\frac{H}{V} = \frac{60}{85} \cdot \frac{10}{16} = .44.$

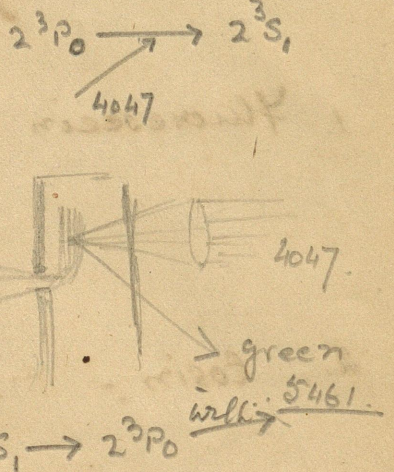
3. Magdala Red - $\frac{H}{V} = \frac{60}{40} \times \frac{10}{16} = .94.$

4. Aesculine. $\frac{H}{V} = \frac{60}{100} \times \frac{10}{16} = .37$

5. Rhodamine. $\frac{H}{V} = \frac{60}{42} \cdot \frac{10}{16} = .91.$

Rayleigh



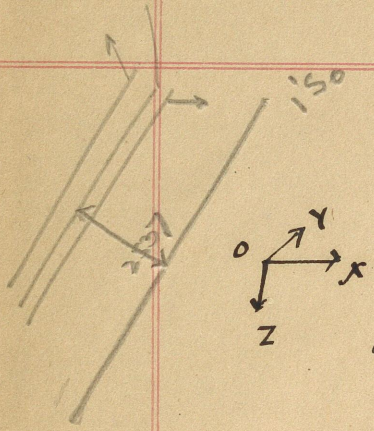


5461 Å is absorbed by 2^3P_2 Hg atoms and raises to 2^3S_1.

Magnetic dipoles.
Electric dipoles.

Polarisation of Fluorescence

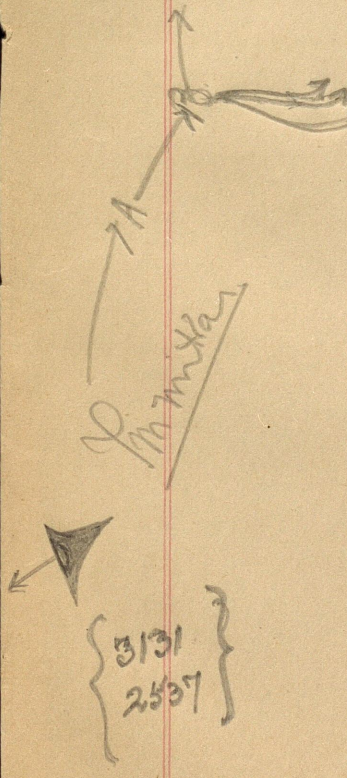
Polarisation of Fluorescence



Dye in gelatine.

Incident light vibrating along OY and the direction of obser. being OZ.

Dye	Percentage λ 3650.
Fluorescein	12
Eosin.	5-
Rhodamine	- 3
Aesculine	22
Magdala Red	30.?



Fluorescein
in gelation.
λ 3650.

Temperature	2θ.	Percentage
28°C	98°	14
40°C	97°	12
50°C	98°	14
60°C	97·5	13.

The percentage seems not to change with the rise of temperature (within the range)

Lachie Neilas.
14, Paxton St.

Ferrous sulphate in Sodium
pyrophosphate,

Nickel chloride. on Brass.

1.	Benzene	260 - 291 μμ.
2.	Anthracene	366 - 435 μμ.
3.	Naphthalene	366 - 490 μμ.
4.	Phenol	286 - 364 μμ.
5.	Aniline	300 - 410 μμ.
6.	Naphthylamine	370 - 530 μμ.

25th May 1932.

Effect of changing the viscosity by adding H_2O.

Concentration - 1.10^{-5} gm/cm^3

	Percentage of water	% age by wt. of gly.	η	2θ.	P.	$T \times 10^5$ Secs
	0	99 %	5.7	114°	45	9.0
10 c.c. gly + 1 cc. water	9	92.7	1.8	112°	34	9.0
10 " + 2 "	14	86.3	0.74	108°	31	6.5
10 " + 3 "	23	80.8	0.39	102°	21	7.7
10 " + 4 "	29	75.9	0.21	94°	12	9.5
10 " + 5 "	33	71.6		94°	7	
10 " + 6 "	38	67.8		93°	5	
10 " + 7 "	41	64.3		-	-	
10 " + 8 "	44	61.2		90°	0	
10 " + 9 "	47	58.3		90°	6	
10 " + 10 "	50	55.8		90°	0	

Pachin Mishra.

15th August 1932.

2. 12. 32.
6. 12. 32.

28°

Fluorescein.

Concentration.		Percentage. λ 435·8.	λ 3650.
·07. 10^{-5} gm per c.c.		50.	45-
·14. 10^{-5}	"	50	45-
·25. 10^{-5}	"	50	45-
·5. 10^{-5}	"	48	43
1. 10^{-5}	"	46	43
2. 10^{-5}	"	-	42
4. 10^{-5}	"	45-	42
8. 10^{-5}	"	39	41
12. 10^{-5}	"	37	39.
16. 10^{-5}	"	37	35-
20. 10^{-5}	"	37	33
24. 10^{-5}	"	37.	~~38~~ 33.

Maurain = 1905 -

$$4\pi r^2 \cdot p = 3$$

$$4 \cdot \frac{22}{7} r \cdot e = 3$$

$$rc = \frac{21}{4 \cdot 22} = \frac{21}{88}$$

Concentration. 8.10^{-7} gm/cm^3.

Percentage of water	% age of R. by wt.	η	2θ	Percentage of Pola. P.	$T \times 10^3$ secs.
0	~~99~~	5.7	120°	50	
9	92.7	1.8	116°	44	3.5
17	86.3	0.74	112°	37	3.7
23	80.8	0.35	110°	34	2.6
29	75.9	0.21	108°	31	1.8
33	71.6	0.17	104°	24	2.6
38	67.8	0.13	102°	21	2.6
41	64.3	0.10	99°	18	3.0
44	61.2	0.086	94°	12	3.5
47	58.3	0.071	95°	9	4.6
50	55.8	0.060	94°	7	
10 cc. Rx + 11 cc. water	52	53.4	0.052	92°	3
10 cc. " + 12 " "	55	51.2		90°	0
10 cc " + 13 " "	57	49.2		90°	0

1) τ for diff Gly water Concentration.
for two Concentrations of dyestuffs.

Concentration of the dye. 1.10^{-5} gm/cm3.

Per Centage of water -

(a) Cent per cent Glycerine. $\tau = \cdot 91.10^{-8}$ Sec.

(b) 92% Glycerine Calculation not complete $\tau = 1.7.10^{-8}$ Sec.

(c) 85% " $\tau = \cdot 97.10^{-8}$ Sec.

(d) 81% " $\tau = \cdot 93.10^{-8}$ Sec.

(e) 46% " $\tau = 81.10^{-8}$ Sec.

Concentration – $\cdot 08 \cdot 10^{-5}$ gm/cm^3.

Cent/per Cent Glycerine – . $\tau = \cdot 17 \cdot 10^{-8}$ Sec.

(b) $\tau = \cdot 67, 10^{-8}$ Sec.

(c) $\tau = \cdot 63 \cdot 10^{-8}$ Sec.

(d) $\tau = \cdot 26 \cdot 10^{-8}$ Sec

(e) $\tau = \cdot 15 \cdot 10^{-8}$ Sec

3) τ for room temp in 100% Glyc.
for diff Concentra of dye Stuffs.

Concentration	τ
12.10^{-5} gm	$7.5.10^{-8}$ Sec.
8.10^{-5} gm	$2.9.10^{-8}$ Sec.
4.10^{-5} gm	$1.1.10^{-8}$ Sec.
1.10^{-5} gm	$.91.10^{-8}$ Sec.
$.08.10^{-5}$ gm	$.14.10^{-8}$ Sec.

(4)

Concentration — 8.10^{-5} gm

wave length	τ
4358	$2.9.10^{-8}$ sec.
3658	$2.9.10^{-8}$ sec.

Concentration — 4.10^{-5}

A	τ
4358.	$1.1.10^{-8}$ sec
3650	$1.8.10^{-8}$ sec

(2)

Concentration — $8 \cdot 10^{-5}$ gm.

Temperature	τ.
30°C	$2 \cdot 9 \cdot 10^{-8}$ sec
40°C	$2 \cdot 1 \cdot 10^{-8}$ sec
50°C	$2 \cdot 4 \cdot 10^{-8}$ sec
60°C	$2 \cdot 3 \cdot 10^{-8}$ sec
70°C	$2 \cdot 1 \cdot 10^{-8}$ sec.

Concentration 1.10^{-5}

Temperature	τ
30°	$.91 \cdot 10^{-8}$ sec
40°	$.89 \cdot 10^{-8}$ sec
50°	$.85 \cdot 10^{-8}$ sec
60°	$.83 \cdot 10^{-8}$ sec
70°	$.63 \cdot 10^{-8}$ sec.
80°	

Concentration – 4.10^{-5} gm.

Temp.	τ.
30	$1{\cdot}1.10^{-8}$ Sec.
40°	$1{\cdot}1.10^{-8}$ Sec.
58°C	$1{\cdot}7\ 10^{-8}$ Sec.
60°C	$1{\cdot}4.10^{-8}$ Sec.
70°C	$1{\cdot}0.\ 10^{-8}$ Sec.

$$\lambda \cdot 10^5 = \frac{(1-2\rho)\eta}{4.61 \cdot T \cdot \rho}$$

Concentration $4 \cdot 10^{-5}$ gm/cm^3.

4358 : λ $\quad$ $T = 1.1 \cdot 10^{-8}$ Sec.

$= \lambda\ 3650.$

$$\rho = \rho_0 \frac{}{1 + \left(1 - \frac{1}{3}\rho\right)\frac{RT}{\eta V} \cdot T}$$

$$= \frac{\cdot 45}{1 + \left(1 - \frac{\cdot 45}{3}\right)\frac{RT}{\eta V} T}$$

$3 - \cdot 45 = 2 \cdot 55$.

$\frac{45}{100}$ 20.

$$= \frac{\cdot 45}{1 + \frac{2 \cdot 55}{3} \cdot \frac{8 \cdot 315 \cdot 10^5}{300} \frac{\pi}{\eta} T}$$

$$\rho = \frac{\cdot 45}{1 + \left(\frac{2 \cdot 55 \times 8 \cdot 315 \cdot 10^{-5}}{3}\right)\frac{I}{\eta} T}$$

or $\cdot 45 = \rho + \frac{2 \cdot 55 \times 8 \cdot 315 \cdot 10^{-5}}{3} \frac{\pi}{\eta} T$

or $\frac{(\cdot 45 - \rho)\, 3\, \eta}{2 \cdot 55 \cdot 8 \cdot 315 \cdot 10^{-5}\, T} = I$.

$$\tau = \frac{(\cdot 45 - \beta)\, 3\eta}{2 \cdot 55 \cdot 8315 \cdot 10^{-5}\, T}$$

$$\tau \cdot 10^{+5} = \frac{(\cdot 45 - \cdot 41)\, 3 \times 5 \cdot 4}{2 \cdot 55 \times 8 \cdot 315 \times 303}$$

$\tau = \cdot 11 \cdot 10^{-8}$

0·4065
0·9199
2·4814
3·8078

T·0792
0·7559
T·8351
3·8078
4·0273

·000065
·00021

$$\tau = \frac{(\cdot 45 - \cdot 37)\, 3 \cdot 5 \cdot 4}{2 \cdot 55 \cdot 8 \cdot 315 \cdot 303}$$

T·3802
0·7559
0·1361
3·8078
4·3283

$\tau = \cdot 21 \cdot 10^{-8}$ Sec.

Concentration - $4 \cdot 10^{-5}$ gm/cm^3.

4358 → $1 \cdot 1 \cdot 10^{-8}$ Sec.
3650 → $\cdot 11 \cdot 10^{-8}$.

Concentration - $8 \cdot 10^{-5}$ gm/cm^3.

4358. → $2 \cdot 9 \cdot 10^{-8}$ Sec.
3650 → $\cdot 21 \cdot 10^{-8}$.

$\frac{A-B}{A+3B}$

41 (19) 32 (12) 21, (−3) −6, (17) 29

(26) (17) −29 0 (−9) 17 (21) −35

29 (17), (27) −43 (20) 33 (6) −11

(25) (13) 0 (−8) (20) −33

40 ↓26 15

$p_r = \frac{2p_n}{1+p_n}$

$= \frac{38}{20} =$

$= \frac{38}{15}$

112 | 240 / 224 | (21)
160
112
48

$\frac{38}{20} = 1.$

$\frac{1}{.19}$

.38 / .81

109 | 180 / 109 | 16
710
654
56

126 | 520 / 504 | 41
160

117 | 340 / 234 | 29
1060
1053

.06 / 103) 600 (.05
515
85

121 | 420 / 363 | 35
570

127 | 540 / 508 | 43
320

120 | 400 / 360 |
40

115 | 300 / 230 | .26
700

106 | 120 / 106 | 11
140

116 | 120 / 112 | .075
80

116 | 120 / 112 | .07
80

125 | 500 | 4

108 | 160 / 108 | 14
520
432
88

$$\frac{2/p_n}{1+2/p_n} = \frac{38}{1+\cdot 19} = \frac{38}{29} = \cdot 79$$

$$\frac{2 \times \cdot 19}{1+\cdot 19}$$

monday

$$= \frac{\cdot 38}{1\cdot 19}$$

384 (·32)
357
230

25
25
275 + 12/6
287/6/ 17/
127
112
15

228
228
2508
114 +
16/2622 / 164
16
102
96
62

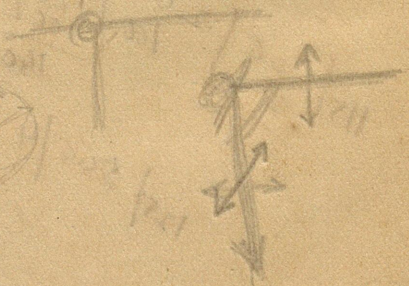
21
21
231 + 10/6
16/241/6 / 15
16
81
80

① Principle pl.
⊥ to the plane of
Polarisation of the

65

26 ×
33
33
363
32
22
42
32

6
10



Plane — ① Quenched by a nicol
{ Circ — ⟨π/2⟩ } Intensity independent of
{ Unpolarised } the orientation of the nicol.
{ Elliptically pol.
{ Partially polarised } Intensity fluctuates when observed through a rotating nicol

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