Experimental Study

Apparatus

A laboratory made absorptiometer is shown in Fig.I. In its operations, it is essential that voltage is kept constant. Fig.2, 3 and 4 show the relationship between voltage, current, resistance and power characteristics of the instrument.

In Fig. 5, 6 and 7 are the calibration curves relating Turbidity to electric current.

A voltage is first selected and the ampere reading of the instrument when there is only distilled water in the jar read. The selection depends on the range of turbidity to be measured.

As this instrument is in the trying period, a Jackson Turbidimeter is also employed to check the instrument readings and to study its behaviour. This precaution is taken because the photo-cell employed is not sensitive enough. A better photo-cell could not be obtained due to financial reason. This instrument, however, is suitable for relative turbidity study and forms a first attempt to a more refine instrument.

2. Jackson candle turbidimeter can measure turbidity from 25 to 5000 ppm, although a turbidity below 100 ppm. is measured more accurately by using turbidity standards, as will be discussed later.

Jackson turbidimeter · consists of a graduated glass tube supported and enclosed in a slightly large brass tube that rests above a so-called standard candle. The flame of this candle is viewed by looking down ward through the tube into which the water sample is poured until the flame of the candle disappears. Only a standard candle or a small electric light bulb of equal light intensity may be used in this equipment.

Turbidity Standards.

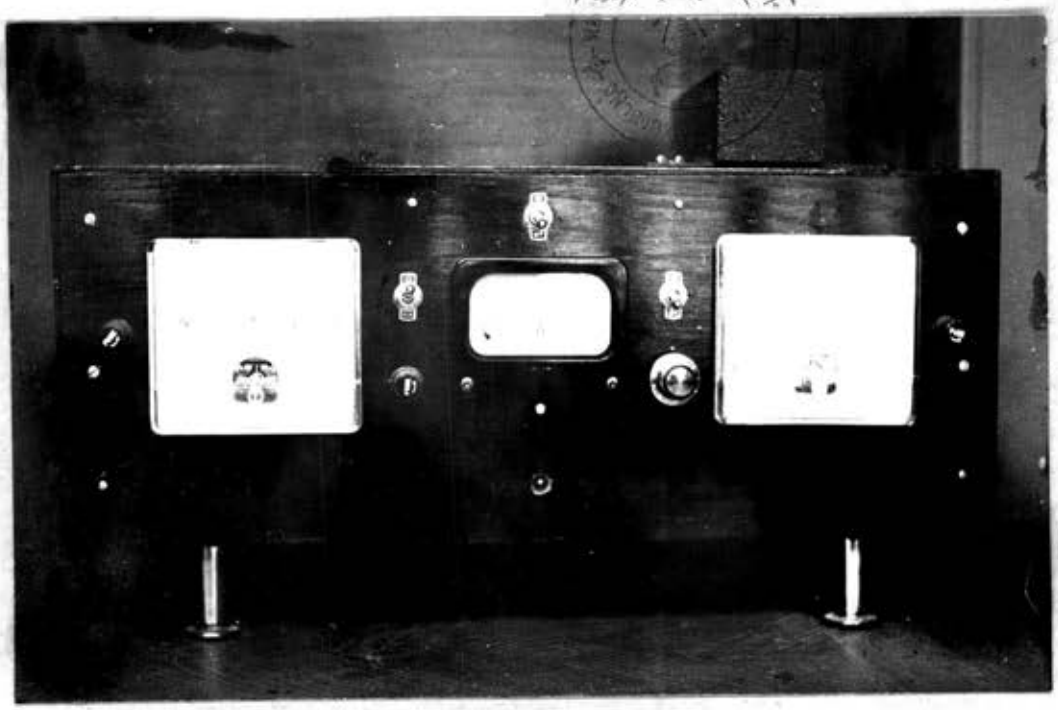
Turbidities between 5-100 ppm. should be determined by comparing the cloudiness of the water sample with that of standard solutions placed in bottles of the same size as that containing the sample. Preparation of standards is adding 4 to 6 grams of Fuller's earth to about 2 liters of distilled water. The mixture was shaken several times during a peroid of one hour, and then left standing for about 24 hours. The turbidity of solution was then determined with Jackson candle. More Fuller's earth is added until the sample water shows a turbidity of about 200 ppm.

The suspension of very fine material in distilled water, obtained in this manner, becomes the stock solution in the preparation of the standards. Therefore, it is necessary, for the readings made with Jackson Candle turbidity to be very accurate. This is facilitated by using a value of about 200 ppm. turbidity.

Dilute a measured amount of the stock solution with distilled water to obtain standards of 5,10,15,20, 25 ppm. etc. up to 100 ppm. turbidity

Place the sample between the turbidity standards having values nearest to the sample in cloudiness or turbidity. Compare the cloudiness of the sample with that of the standards looking through the bottles at the cardboard before described, which is placed in back of the bottles. It may be that the sample has a cloudiness of turbidity between that of two standards 5 and 10 ppm. In such case it is necessary to estimate the in-between value. The reading may be put down as 8 ppm, if it is slightly nearer the 10 ppm. standard then the 5 ppm. standard.

3. A standard jar test machine useing 1-liter sample.
4. pH meter having an accuracy of 0.1 pH unit



FLOCCULATION MEASURING APPARATUS

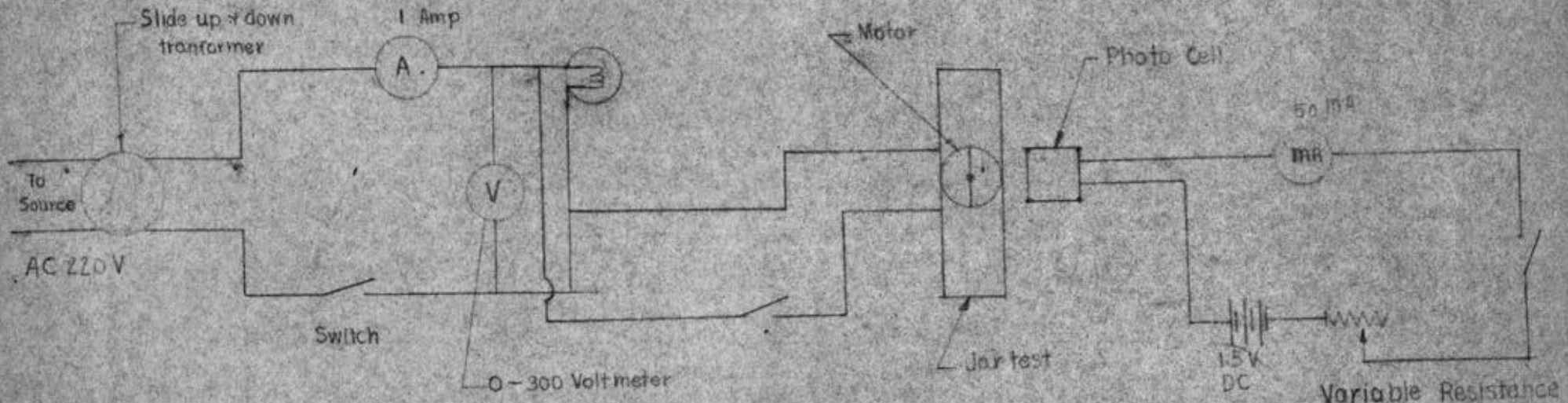


Fig 1 DIAGRAM FOR CONSTRUCTION THE APPARATUS.

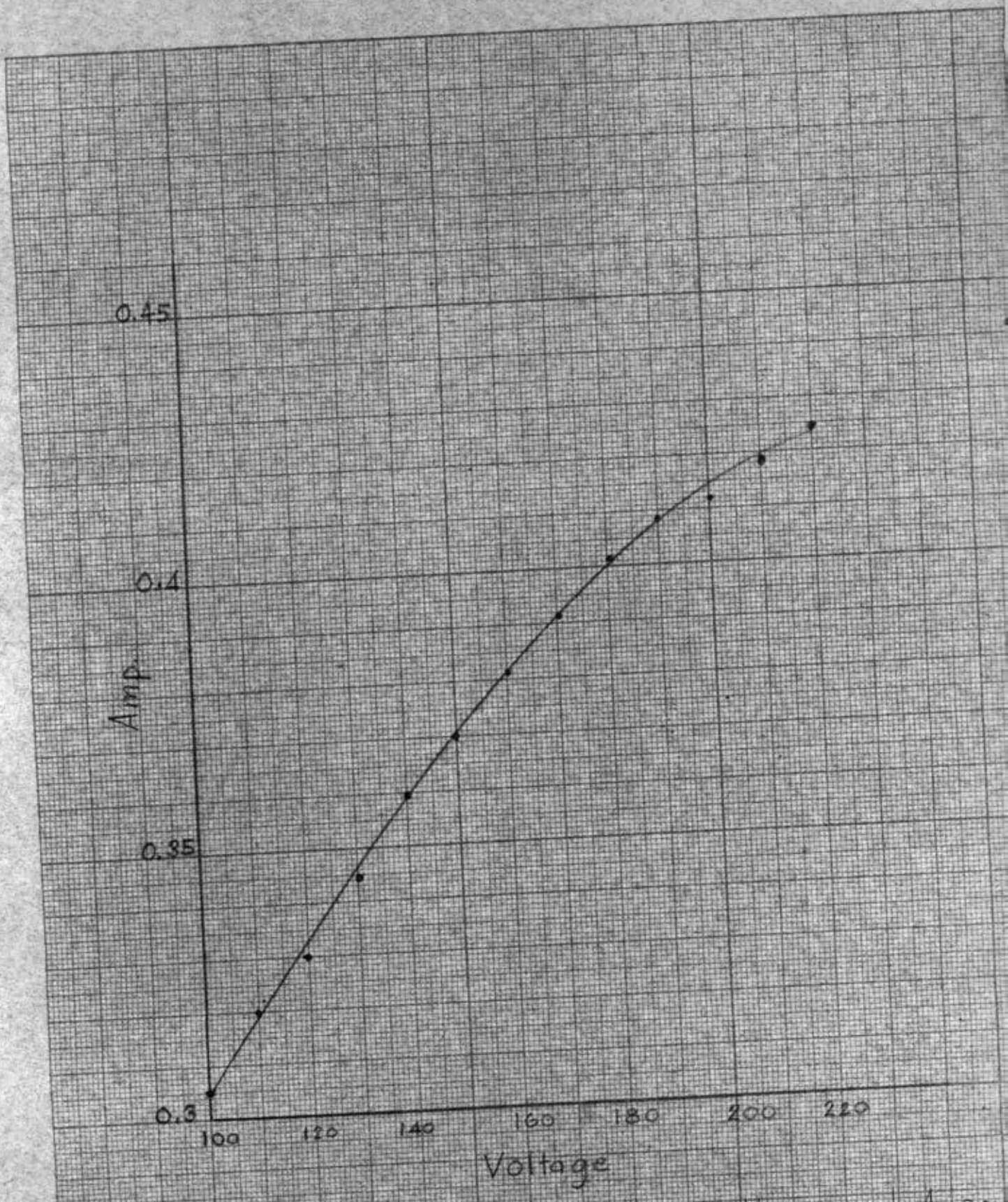


Fig 2. Relation between Voltage and Amper

Voltage	I Amp.	R ohms
220	0.425	$R = \frac{E}{I} = \frac{220}{0.425} = 520.2$
210	0.419	500
200	0.412	486
190	0.409	465
180	0.402	448
170	0.392	434
160	0.382	420
150	0.370	405
140	0.360	390
130	0.345	378
120	0.330	364
110	0.320	344
100	0.305	328

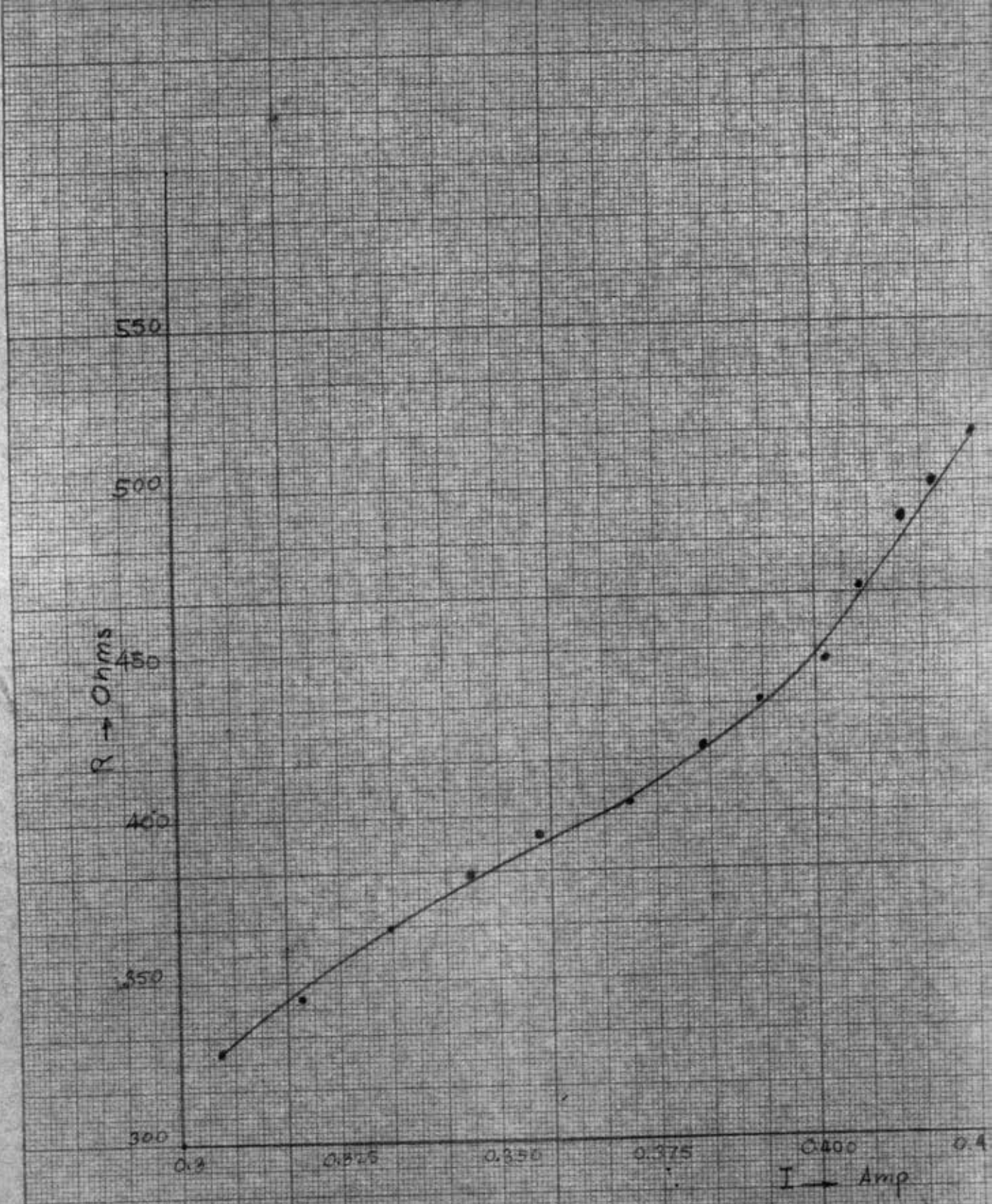


Fig 3. Relation between Ampere and Resistance

Control current

A.C Volts

Lamp tube 100 W

$P = EI = 220 \times .425 = 94.5$ Watt

Voltage	Amp
220 V.	0.425
210 V.	0.419
200 V	0.412
190 V.	0.409
180 V.	0.402
170 V.	0.392
160 V	0.382
150 V.	0.370
140 V	0.360
130 V.	0.345
120 V.	0.330
110 V	0.320
100 V.	0.305

When Voltage 220 V.

$E = IR$

$R = \frac{E}{I}$

$= \frac{220}{.425}$

$= 520\ \Omega$

Voltage	I Amp.	P watt
220	0.425	P = EI = 220 x .425 = 94.5
210	0.419	88
200	0.412	82.4
190	0.409	77.8
180	0.402	72.5
170	0.392	66.5
160	0.382	61.2
150	0.370	55.5
140	0.360	50.5
130	0.345	45
120	0.330	39.6
110	0.320	35.2
100	0.305	30.5

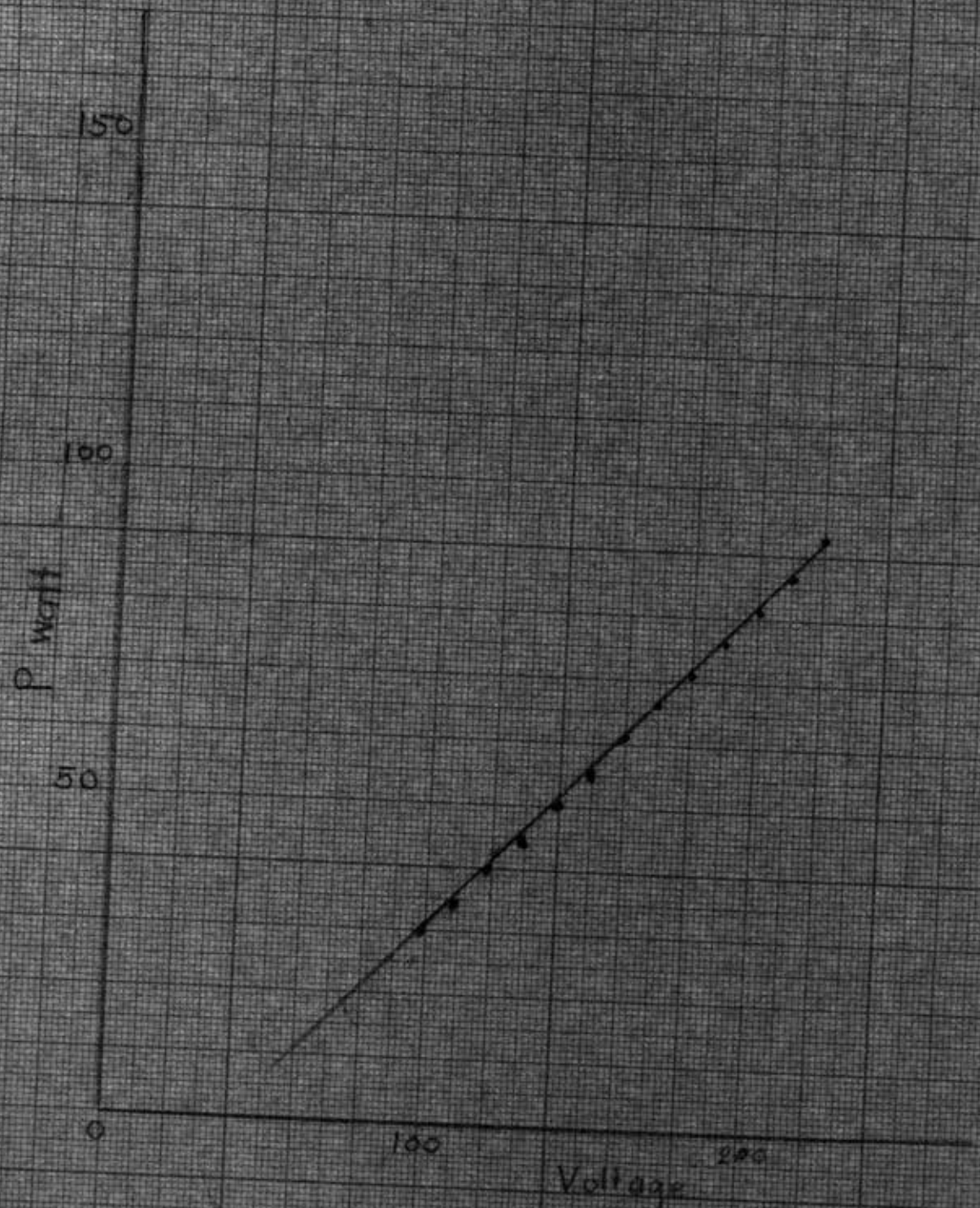


Fig 4 Relation between Voltage and Power

Calibration curve for flocculation measuring apparatus compare with Jackson candle turbidity

Set 220 V 0.425 A 25 mA

turbidity	mA
0	25.0
10	24.8
25	24.5
50	24.0
100	23.0
150	21.5
200	20
250	17.5
300	14
350	11.5
400	8
450	6
500	4

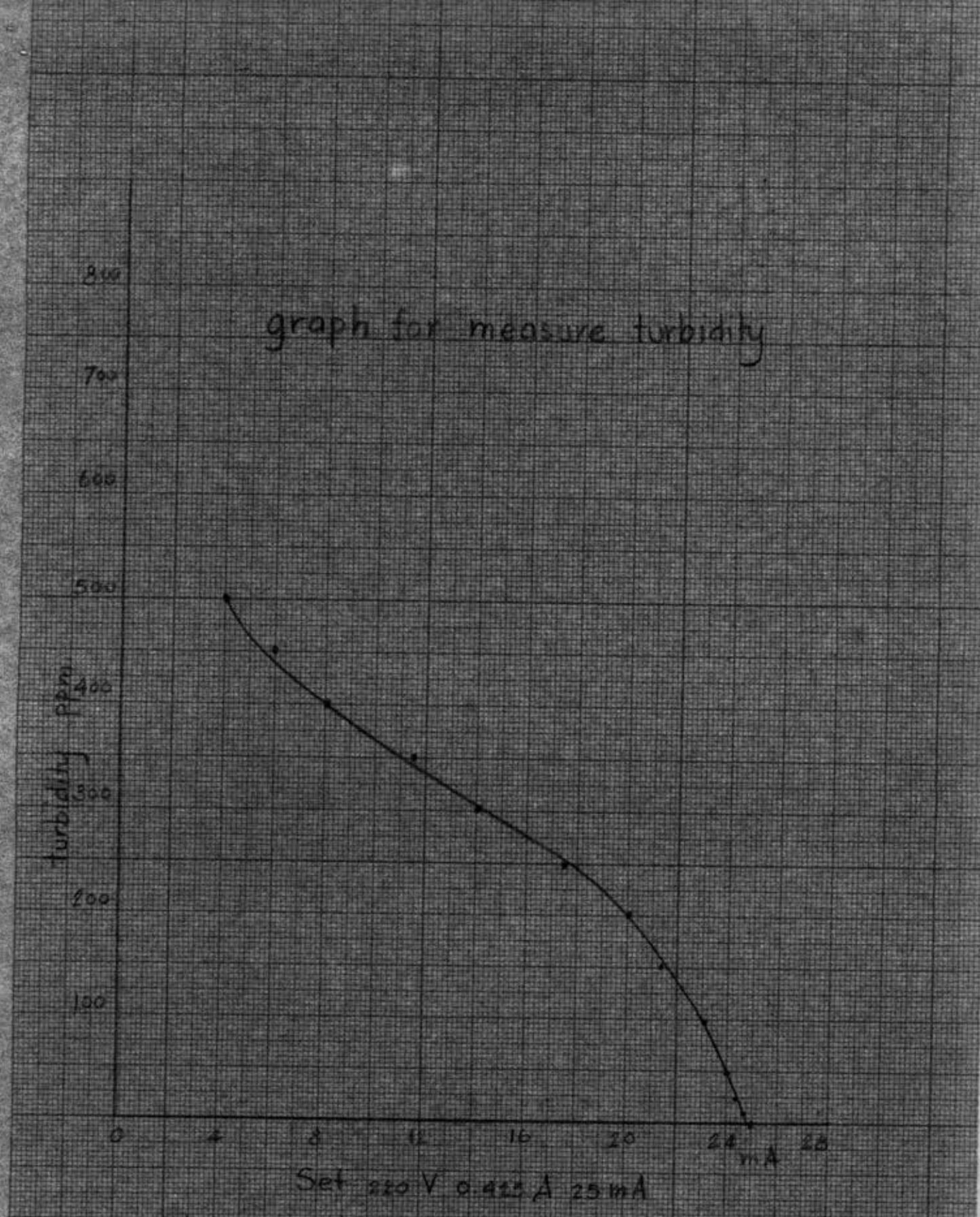
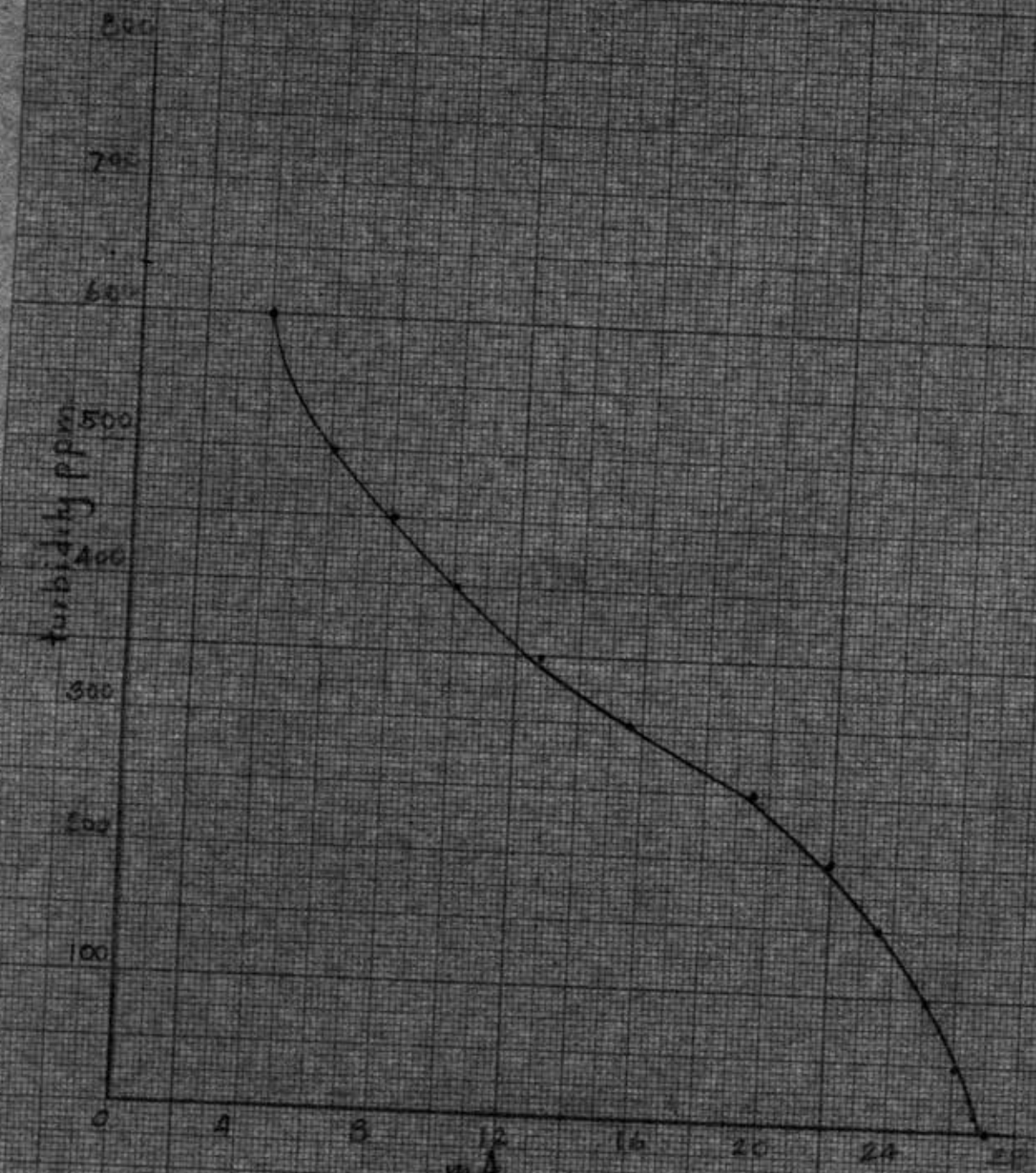


Fig 5. Calibration curve for Flocculation measuring apparatus compare with Jackson candle turbidimeter

Set 220 V 0.425 A 27 mA

turbidity	mA
0	27
10	26.7
25	26.5
50	26
100	25
150	23.5
200	22
250	19.5
300	15.6
350	12.8
400	10
450	8
500	6
600	4

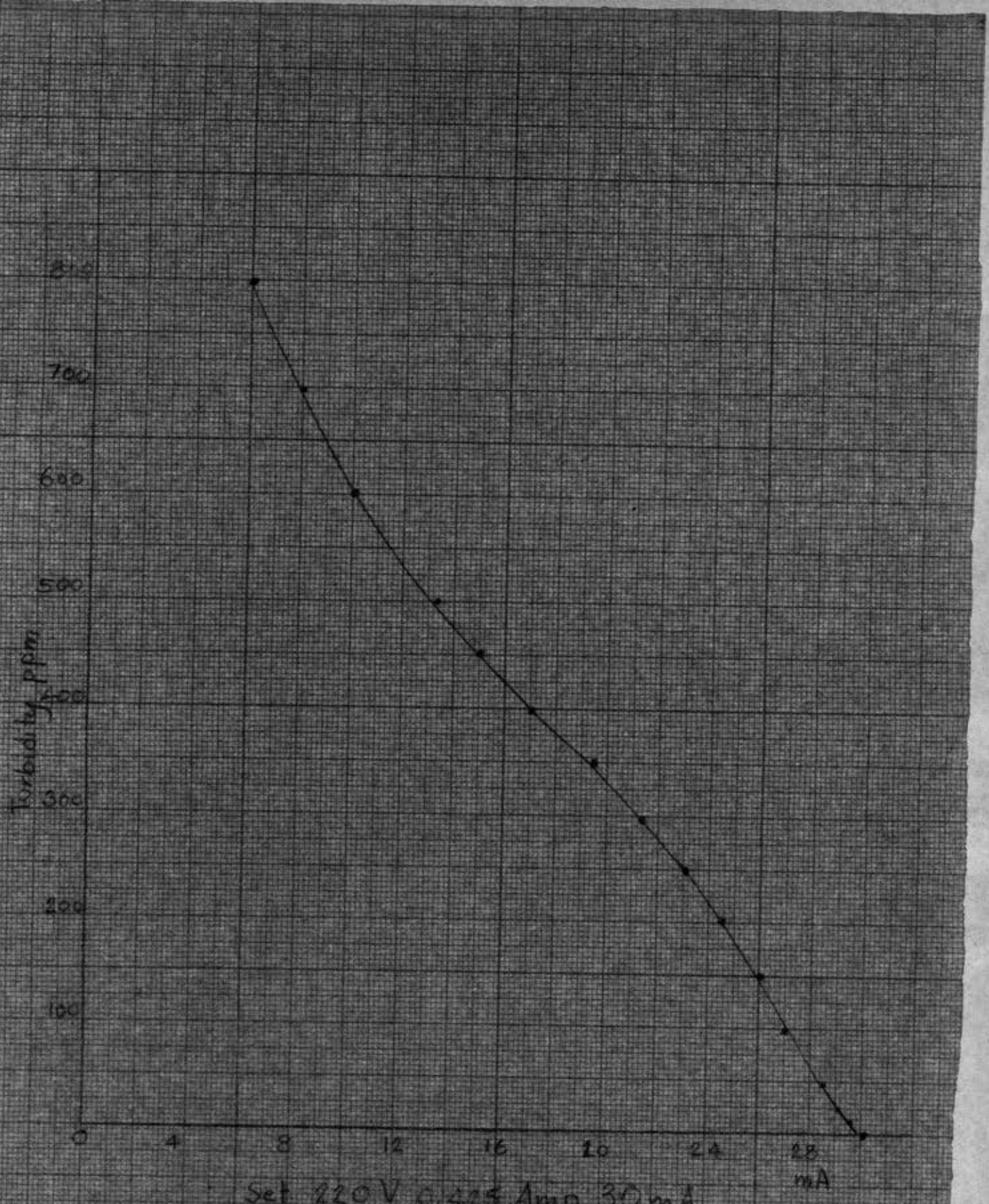


Set 220 V 0.425 Amp 27 mA

Fig 6 Calibration curve for Flocculation measuring apparatus compare with Jackson candle turbidimeter

set 220 V. 0.425 A 30 mA

turbidity	mA
0	30
10	29.6
25	29.0
50	28.5
100	27.0
150	26.0
200	24.5
250	23.0
300	21.0
350	19.5
400	17.0
450	15.0
500	13.4
600	10.0
700	8.0
800	6.0



Set 220 V 0.425 Amp 30 mA

Fig 7 Calibration curve for Flocculation measuring apparatus compare with Jackson candle turbidimeter

For this experimental study the flocculation measuring apparatus was set ranging between 30 mA-25 mA. The max. power of photo cell 33 mA.b but it is so difficult to set at this value-If we set below 25 mA, the range is very small. Using this range in setting, the results are obtained satisfactory.