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Article

Spectrophotometric Determination of Trifluoperazine Hydrochloride By Oxidative Coupling Using Schiff Bases As A Reagent

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Abstract: A new spectrophotometric method was developed for the determination of trifluoperazine in aqueous media using the oxidative reaction with the Schiff base reagent (1,3,5-triazin-2,4,6-tril)tris(azanilidene)tris(methanedilidene). This reaction was generated by a 3–5-hour condensation between the aldehyde and an aromatic amine in the presence of glacial acetic acid, resulting in a light yellow precipitate with a molecular weight of 435 g/mol and a chemical formula of C24H21N9. Conjugation occurred at pH 1.28 in the presence of the oxidizing agent potassium iodate, producing a water-soluble product with a maximum absorbance at 548 nm. The product exhibited a stability period of over 70 minutes, sufficient for several measurements, and the Beer's law limits were between 70 and 10 μg/ml of trifluoperazine. The molar absorptivity was 3651.2 L/mol/cm, and the Sandell significance level was 0.131 μg/cm. The method was effective and convenient for testing, with a specificity of 100.49%, a relative error of 1.26%, and a detection limit of 0.208 mg/L. The method was effective in the determination of trifluoperazine in tablet form in pharmaceutical preparations.

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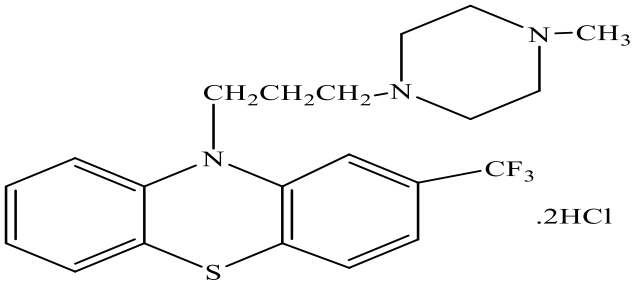
1. Introduction

Hydrochloride of trifluoperazine TFPH is the symbol. Propyl 3-(4-methylepiprazin-1-yl) Dihydrochloride of 2-trifluoromethyl-phenothiazine: The following is its structural formula:



(Formula 1)

Its molecular formula 1 is C21H24F3N3S.2HCl, and its molecular weight is 480.4 g mol-1. Pharmaceutical structures of TFPH include the following : Stelazine, Amylosin (with Amloprameton), Stelladex (with Dexamfetamine Sulfate), Stellade (with

Isopropamide Iodide), Parstelin (with Tranylcypromine Sulfate), Eralzine (SDI), Sulabid (SDI) [1].

The white powder known as trifluoperazine hydrochloride has a bitter taste, a melting point of 240°C, no smell, and a pale to yellowish hue. It decomposes in water at 20°C, readily dissociates in alcohol, but is only partially soluble in ether and does not dissociate in basic solutions. It is sensitive to sunlight and should be stored in tightly sealed containers away from sunlight [2]. Trifluoperazine hydrochloride is used as a mental health supplement and local anesthetic, as well as for the relief of anxiety and other mental disorders, such as schizophrenia. It is also used as a sleep aid and as a means of calming anxiety. It is used to treat nausea and vomiting, and to treat hysteria. Pregnant women and breastfeeding women are not recommended to take the drug without first consulting a doctor. Due to its unstable nature, it is recommended to discuss the reasons for taking the drug with a doctor, and the maternal dose should not exceed 400 mg per day. In addition, it has harmful effects on the newborn later in life. Trifluoperazine hydrochloride has side effects that include drowsiness, excessive sleepiness, weight gain, rash, excessive sweating, difficulty urinating, stomach pain, yellowing of the eyes, and heart palpitations. Therefore, it should be used with caution in patients with a history of heart attack, seizures, fatigue, shortness of breath, and Parkinson's disease [3]. There are medications that interact with phenothiazines, including alcohol, which has the potential to relieve pain , as well as blood pressure lowering medications, hypnotics, anti-anxiety medications, and blood pressure regulating medications. Use of trifluoperazine hydrochloride as an organic reagent in the optical measurement of metronidazole. Indirect fluorescence spectrophotometry of trifluoperazine hydrochloride. Determination of trifluoperazine hydrochloride using a dedicated spectrometer, using a 12-type oxidation reaction. Electrochemical detection of trifluoperazine at a graphite electrode modified with a PTH/MWNTs membrane [4].

2. Materials and Methods

2.1 **Chemicals used:** The materials used in this research are intended for pure use by FLUKA, Avonchem UK, SDI, and Samrra. Ethanol and distilled water were used as solvents for the solutions.

2.2 **The devices used** were a Shimadzu UV-160 UV-Vis spectrophotometer, 1 cm quartz cells, an ultrasonic bath (ISO 9001), a Jenway 3310 pH meter, and a sensitive balance (Sartorius).

2.3 Trifluoperazine hydrochloride solution 1000 μg/ml (2.08 x 10-3 M):

Trifluoperazine hydrochloride (0.1000 g) is dissolved in distilled water to create it, and the same solvent is then used to make up the remaining volume in a 100 ml container.

2.4 Trifluoperazine hydrochloride solution 300 μg/ml:

This solution was prepared by reducing the volume of the 1000 μg/ml standard solution by 100 ml, then adding distilled water to make up the remaining space.

2.5 Reagent solution (1*x 10-3 M) :

This solution was made by dissolving 0.435 g of the reagent in a predetermined volume of distilled water. The remaining distilled water was then put into a 100 ml bottle.

2.6 (1 x 10-2 M) Potassium iodate solution:

It is made by dissolving 0.2140 grams of powdered iodine in a specific volume of distilled water and then filling it to the intended mark in a 100 ml volume of distilled water.

2.7 Hydrochloric acid solution (1M) with a concentration of approximately:

It was prepared by filling a 100 ml volumetric flask with pure water and 8.28 ml of hydrochloric acid solution (12.77 M). Distilled water was used to adjust the volume to a sufficient degree.

2.8 M sulfuric acid solution with an approximate concentration.

To prepare, fill a flask with 100 mL of distilled water, add 5.42 mL of hydrochloric acid solution (18.44 M), and then add more distilled water.

2.9 1M sodium hydroxide solution.

4.0 g of sodium hydroxide was added to 100 mL of a 100 mL flask. This resulted in a solution.

2.10 Additional solutions (starch, glucose, lactose) with a concentration of 1000 μg/mL.

0.1 g of these solutions was added to a 100 mL volumetric flask [5].

2.11 Pharmaceutical solution 300 μg/ml

Pharmaceutical composition of Salabid 1 mg.

A 300 microgram/ml solution of Salabid was prepared by grinding 30 tablets to a weight of 30 mg, dissolving them in a certain amount of water, and filtering the solution. The sediment was then transferred to a 100 ml graduated bottle and filled with distilled water to the required depth.

3. Results and Discussion

3.1 General principle

When the oxidizing agent, potassium iodate, is added to trifluoperazine hydrochloride, it produces an orange byproduct. When the chemical solution is added, it turns purple due to its combination with the chemical.

3.2 Preliminary study

An orange-colored product was formed when 1 ml of potassium iodate solution was added to 3 ml of 300 μg/ml trifluoperazine hydrochloride solution, along with 1.5 ml of hydrochloric acid solution. Adding 2 mL of 0.01 M reagent solution resulted in the formation of a violet-colored product. When the dye's absorption spectrum and the sample solution's absorption spectrum were evaluated in a 25 ml flask following dilution with water, the dye's greatest absorption was observed at 548 nm. The sample solution, on the other hand, exhibited its maximum absorption at a wavelength of 220 nm and no absorption in this area [6].

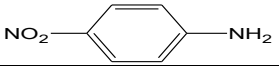
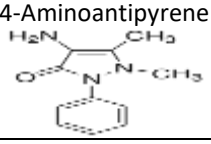
3.3 Study of the optimal conditions for product formation

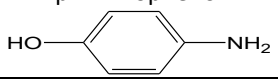
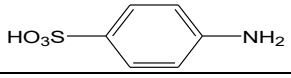
Subsequent experiments used 3 ml of a 300 μg/ml solution of trifluoperazine hydrochloride in a final volume of 25 ml, and the solutions were measured at 548 nm compared to the sample solution using 1 cm cells.

3.3.1 Choosing the best coupling detector:

3 ml of each of the 1 × 10-2 M reagent solutions and 1 ml of the solution used to oxidize the iodine were collected as shown in Table 1.

Table 1: Selecting the best coupling detector

Reagent 1×10^{-2}M	Variable	Colour	λ_{max} nm	Abs.
4-Nitroaniline 	SB	Orange	505	0.097
	BW	Yellow	390	1.912
4-Aminoantipyrene 	SB	Yellow	553	0.113
	BW	Colorless	279	0.051

p-Aminophenol 	SB	Yellow	341	0.196
	BW	Colorless	246	2.013
Sulphanilic Acid 	SB	Violet	554	0.436
	BW	Colorless	206	1.604
(1,3,5-triaine-2,4,6-triyl) tris(azaeylyidene) tris(methaneylyidene)trianiline	SB	Violet	533	0.126
	BW	Colorless	249	1.894

The SB variable represents the absorbance of the sample solution. BW represents the absorbance of the sample solution in distilled water.

The table above shows that the reagent mixture (1,3,5-triazin-2,4,6-tril)tris(azanilylidene)tris(methanelylidene)trianiline produced the largest amount of colored product compared to the sample solution at a specific wavelength of 548 nm. Consequently, this reagent was chosen for further experiments [7].

3.3.2 Choosing the best oxidizing agent

1 ml of each of the oxidizing agents used at a concentration of (1×10-2 M), along with 2 ml of a solution of (1,3,5-triazin-2,4,6-tril)tris(azanilidene)tris(methanelidine)trianiline, at a concentration of 1×10-2 M, were collected and recorded in Table 2.

Table 2: Selection of the best oxidizing agent

Oxidizing agent 10^{-2}M	**Absorbance**	**λ_{max} nm**
Ammonium Ferric Sulphate	0.0989	328
Potassium Periodate	0.0292	532
Potassium Iodate	0.417	548
Potassium Dichromate	0.086	349
Ferric Chloride	0.128	325

The table above noted that potassium iodate had the greatest absorption of the colorant at 548 nm compared to other chemicals used as oxidizing agents, so it was used as the most effective chemical in the following experiments.

3.3.3 Effect of acidity function

This study used different hydrochloric acid amounts ranging from 0.3 to 3 mL at a molar concentration. The acid's effect was determined, and the pH of the solution was recorded, as shown in Table 3.

Table 3: acid effect

HCl	**Absorbance**		**pH**	
1M	**SB**	**BW**	**S**	**B**
Without	0.084	0.053	3.33	3.28
0.3	0.382	0.058	2.17	2.13
0.5	0.386	0.058	1.73	1.72
0.7	0.389	0.057	1.60	1.58
1	0.395	0.052	1.54	1.52
1.5	0.401	0.050	1.28	1.26
2	0.390	0.052	1.17	1.16
2.5	0.381	0.058	1.10	1.09
3	0.377	0.051	1.02	1.09

where SB is the absorbance of the sample relative to the sample solution, and BW is the absorbance of the sample relative to distilled water at a wavelength of 548 nm.

From the table above, it was noted that when using a volume ranging from 1-2 ml, the pH ranged between 1.54 - 1.17, so the pH of 1.28 was chosen, which gave the highest absorption, and then a volume of 1.5 ml was used in the experiments [8].

3.3.4 Effect of Base

Any amount of basic solution will result in a precipitate, and this precipitate may be the drug itself. When 1.5 mL of 0.1000 M sodium hydroxide solution was added to a trifluoperazine hydrochloride solution, a precipitate occurred, indicating that the reaction did not occur in a basic environment.

3.3.5 Effect of the amount of coupling detector

The effect of the amount of reagent combined was studied by taking different concentrations of reagent solution (1,3,5-triazin-2,4,6-tril)tris(azanilidene)tris(methanelidine)trianiline at a concentration of 1×10-2 M) in different volumes (2-6 ml) of 300 μg/ml trifluoperazine hydrochloride solution in the presence of 1 ml of 1×10-2 M potassium iodate solution and 1.5 ml of 1 M hydrochloric acid solution in a final volume of 25 ml, and the results are recorded in Table 4.

Table 4: Effect of the amount of coupling detector

ml of Reagent 1×10^{-2}M	Absorbance/ ml of Trifluoperazine. 2HCl 300 μg/ml					R^2	Slope
	2	3	4	5	6		
0.6	0.200	0.398	0.500	0.514	0.698	0.9326	0.1251
1	0.211	0.403	0.507	0.520	0.703	0.9345	0.0211
1.5	0.216	0.408	0.509	0.528	0.719	0.9387	0.0317
2	0.222	0.417	0.516	0.536	0.727	0.9379	0.0173
2.5	0.228	0.421	0.520	0.539	0.733	0.9374	0.057
3	0.226	0.404	0.512	0.529	0.699	0.9441	0.1783
3.5	0.220	0.399	0.498	0.521	0.682	0.9457	0.1952
4	0.215	0.388	0.486	0.516	0.678	0.9537	0.1314

The results in the table above showed that the 3.5 ml volume of the reagent solution with a concentration of 1×10-2 M had the greatest slope value of 0.1952 (which is the highest sensitivity) and a high correlation coefficient value of 0.9457, so it was later used in the experiments.

3.3.6 Effect of the amount of oxidizing agent

Add 0.2–3 mL of potassium iodate to a 25 mL volumetric flask that contains 3 mL of 300 μg/mL trifluoperazine hydrochloride solution and 1×10-2 M reagent solution in order to examine the impact of the oxidizing agent, 1×10-2 M potassium iodate solution. After adding 1.5 mL of 1 M hydrochloric acid, top it off with distilled water to reach the desired level. Table 5 documents the outcomes.

Table 5: Impact of Oxidizing Agent Amount

ml of 10^{-2}M KIO_3	Absorbance	
	SB	BW
0.2	0.379	0.066
0.5	0.385	0.052
0.7	0.393	0.051
1	0.413	0.047
1.5	0.402	0.053
2	0.392	0.050
2.5	0.384	0.052
3	0.371	0.051

The biggest volume optimizing the absorption of the color-coded product was found to be between 0.7 and 1.5 ml, based on the results shown in the above table. 1 ml was selected for further testing.

3.3.7 Addition sequence

The effect of changing the order of addition of the reactants on the adsorption of the dye was evaluated through several experiments. Addition order (1) was found to have the greatest ability to adsorption the dye and was therefore used in the following experiments. The results are documented in Table 6.

Table 6: Sequence of additions

Order number	Order of addition	Absorbance	
		BW	SB
1	T + O + A+ R	0.051	0.413
2	T + R + A + O	0.085	0.347
3	T + A + O + R	0.071	0.367
4	T + O + R + A	0.047	0.336

Solutions (T) are composed of hydrochloride, solutions (R) are composed of 1,3,5-triazin-2,4,6-tril)tris (azanilidene)tris(methanilidine)trianiline, and solutions (O) are composed of potassium iodate. Solutions (A) are composed of hydrochloric acid.

3.3.8 Effect of temperature

Using temperatures ranging from 5 to 60 °C, the impact of temperature on the absorption and cohesiveness of the resultant colored product was assessed; the findings are shown in Table 7.

Table 7: Temperature Effect

Temp C°	5	10	15	20	25
Absorbanc	0.389	0.392	0.402	0.405	0.413
30	35	40	50	55	60
0.405	0.402	0.397	0.385	0.377	0.377

It was observed from the table that the optimum temperature is (15-25) °C, while at temperatures of 40, 50 and 60) °C the absorption decreases, so the temperature between (15-25) °C was chosen in the subsequent experiments.

3.3.9 The effect of time

A series of 25 ml bottles containing 3 ml of a 300 μg/ml trifluoperazine solution, 1 ml of 1×10-2 M potassium iodate solution, 1.5 ml of hydrochloric acid, and 3.5 ml of extra reagent were used to test the impact of time on the reaction yield. The solutions were left for different periods of time before being diluted with distilled water from a plant source, and then the volume was reduced to 25 ml. The absorbance characteristics of the solutions were measured at a wavelength of 548 nm using their samples, and the results are listed in Table 8.

Table 8: Effect of time

Time minutes	5	10	15	20	25	30	40	50	55	60
Absorbance	0.389	0.393	0.407	0.413	0.412	0.412	0.404	0.397	0.378	0.373

It is noted that 15-20 minutes are sufficient to complete the reaction, and 20 minutes was adopted in subsequent experiments.

3.3.10 Stability of the reaction product

This study used three different volumes (2, 3, and 4 ml) of a 300 μg/ml hydrochloride solution for the trifluoperazine fraction, 3.5 ml of a 10-2 M solution for the reagent fraction (1,3,5-triazin-2,4,6-tril)tris(azanilidene)tris(methanelidine)trianiline), 1 ml of a 10-2 M solution for the

potassium iodate fraction, and 1.5 ml of 1 M hydrochloric acid at 25°C for 20 minutes. After diluting the sample with water in 25 ml volumetric flasks and adding water to reach the appropriate volume, the measurements were carried out. For sixty minutes, the absorbed color did not change, which is enough time to finish the majority of measurements. According to Table 9

Table 9: Stability of the reaction product

ml of TFPH	BW	Absorbance / min. standing time									
		5	10	15	20	25	30	35	40	50	60
2	0.057	0.257	0.261	0.271	0.271	0.265	0.262	0.258	0.254	0.254	0.250
3	0.081	0.391	0.397	0.401	0.411	0.404	0.402	0.394	0.386	0.382	0.382
4	0.083	0.492	0.495	0.501	0.505	0.505	0.503	0.493	0.488	0.487	0.484

3.3.11 Effect of solvent

The effect of some solvents on the coloration reaction product resulting from the combination of trifluoperazine hydrochloride and the reagent in a basic medium with potassium iodate was studied. In this study, 25 ml and 25 ml bottles were used. After adding the solvents under optimum conditions, the volume was increased to the desired destination using different organic solvents. The absorption spectrum of each solution was compared with the sample solution, and the results are listed in Table 10.

Table 10: Effect of solvent

Solvent	Absorbance	λ max
Ethanol	0.390	555
Acetone	0.241	552
2- Propanol	0.211	553
Water	0.411	544

In addition to being inexpensive and easily accessible, the results in the above table and Figure (1) demonstrate that water is an efficient medium for the reaction and exhibits the highest absorption at a wavelength of 548 nm [9].

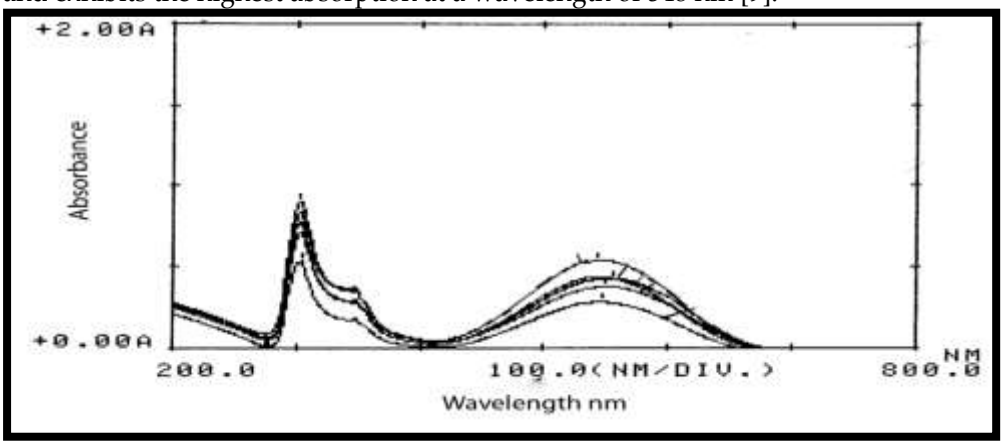


Figure 1: Absorption spectra using different solvents

3.4 Final absorption spectrum

After the conditions were optimized, the final absorption spectrum was recorded using 1.5 ml of 1 M hydrochloric acid, 3.5 mL of 10-2 M reagent, 1 mL of 10-2 M potassium iodate, and 3 mL of 300 mM trifluoperazine hydrochloride solution.All measurements were performed at 15–25 °C for 20 min. After adding the optimal

reaction components and bringing the volume to the desired mark in 25 mL of distilled water, the absorbance of the violet product was measured compared to the sample solution, which achieved the highest absorbance at 544 nm, while the sample solution recorded no absorbance in this region. As in Figure 2

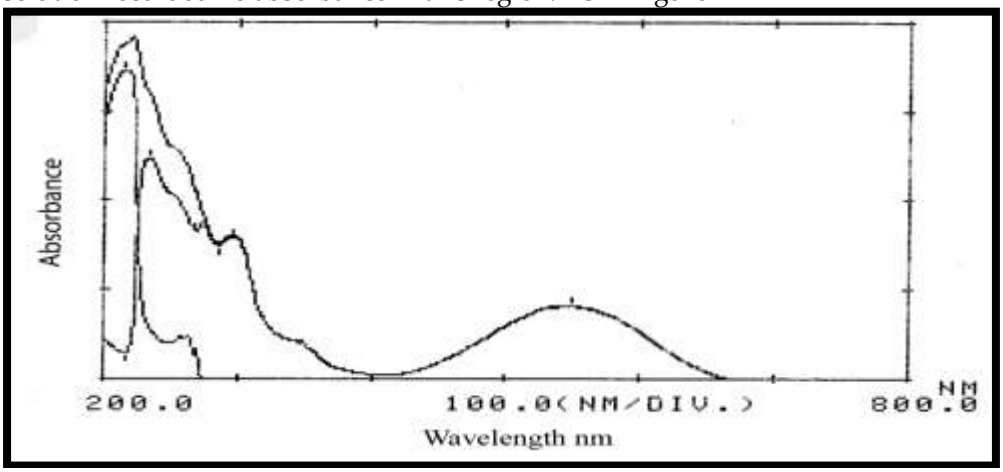


Figure 2: Trifluoperazine hydrochloride determination using the final absorption spectrum

SW is the trifluoperazine hydrochloride solution's absorption spectrum in relation to distilled water.

SB stands for the sample solution's absorbance, or the absorption spectrum of the trifluoperazine hydrochloride solution.

BW stands for the sample solution's absorption spectrum, which is the absorbance of pure water.

3.5 Approved working method and calibration curve

3.5 ml of a 10-2 M reagent solution, 1 ml of a 10-2 M iodine solution, and 1.5 ml of 1 M hydrochloric acid were introduced to a series of 25 ml volumetric flasks that contained escalating concentrations of 10-75 µg/ml of trifluoperazine hydrochloride (0.8-6.25 ml at 300 µg/ml).After diluting the solution with distilled water to the appropriate level, it was allowed to sit at 25°C for 20 minutes. At a wavelength of 548 nm, the spectrum was captured and the absorbance of the solutions was contrasted with that of the sample solution. Within the concentration range of 10-70 µg/ml of trifluoperazine hydrochloride solution, Figure 3 displays the titration curve that adheres to Beer's law. Beer's law is broken at concentrations greater than 70 µg/ml. At 0.9924, the correlation coefficient was noted. The Sandell equation's significance value was 0.131 µg/cm², and the anticipated molar absorption coefficient was 3651.2 L/mol/cm² [9].

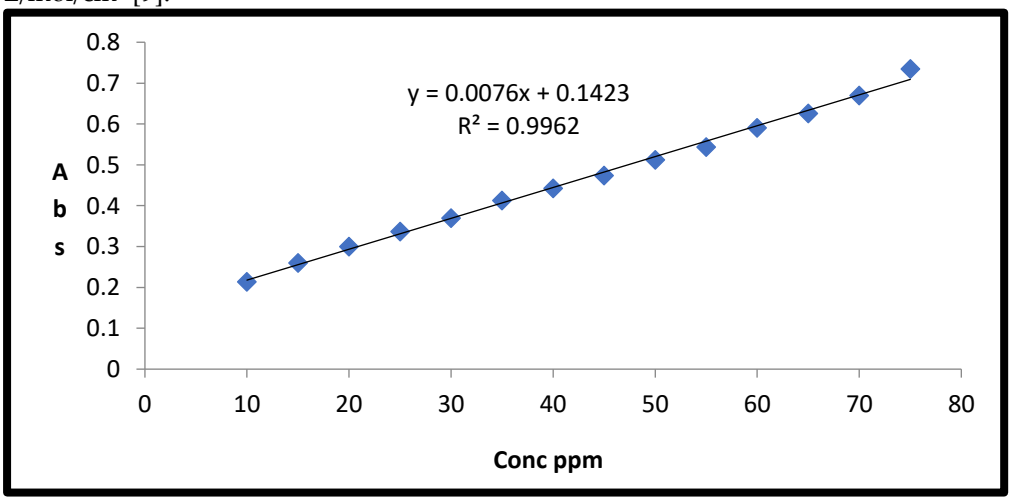


Figure 3: Calibration curve for the determination of trifluoperazine hydrochloride by oxidative coupling method with the reagent in the presence of the oxidizing agent potassium iodate.

3.6 Accuracy and compatibility

Optimized conditions were used in the procedure to evaluate the accuracy and consistency of the calibration chart. Five different concentrations of trifluoperazine hydrochloride were measured for three different quantities within the calibration range. Calculating the recovery rate and relative standard deviation (RSD), the method was found to have high precision (100.49%) and high consistency.as in Table 11.

Table 11: Accuracy and compatibility

Conc. of TPFH µg /ml	Recovery,*%	Average of Recovery%	RSD*,%
15	103.23	100.49	3.245
30	99.86		0.131-
60	98.39		-1.601

*Average of five determinations

3.7 limit of detection

The detection limit, as shown in Table 12, was established by measuring the absorbance of 11 low volume concentrations (10 µg/ml) in the calibration plot under ideal conditions and within the bounds of Beer's Law.

Table 12: Detection limit

Concentration µg /ml	$\overline{X}$	S	D.L µg/ml
10	0.2136	0.00048	0.208

3.8 Nature of the Product Formed

The type of purple-colored product and the drug-to-reagent ratio were ascertained using the molar ratio method and the continuous-change method (Jobb's method). The trifluoperazine hydrochloride solution and the second solution had the same concentrations (3×10-4 M) in both techniques [10].

Jobb's procedure involved filling a succession of 25 mL and 9 mL bottles with varying concentrations of the drug solution, ranging from 1 to 9 mL. A 10 mL volume of the extra solution was then mixed with these amounts. The mark was then diluted with distilled water after 1 mL of a 1×10-2 M potassium iodate solution and 1.5 mL of a 1 M hydrochloric acid solution were added. A wavelength of 548 nm was then used to test the absorbance of these solutions. The ratio was equal to one, as seen in Figure 4.

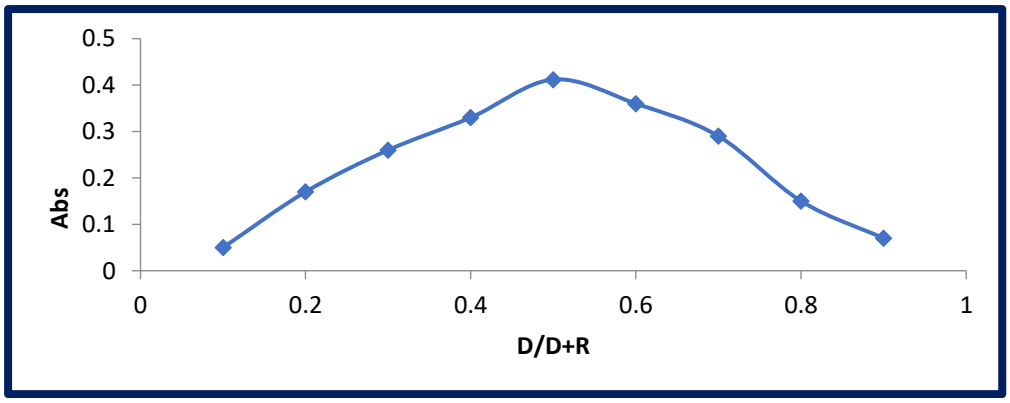


Figure 4: Job's method for the determination of trifluoperazine hydrochloride with the reagent in the presence of the oxidizing agent potassium iodate.

A series of 25 ml bottles containing 3 ml of the medication were used in the molar ratio approach. Each container was filled with 0.5–5 ml of the reagent, 1 ml of 1 × 10-2 M potassium iodate, and 1.5 ml of 1 M hydrochloric acid [11]. The volume was then adjusted with distilled water to reach the required level.The absorbance of these solutions at a wavelength of 548 nm was then recorded against the sample solution for each. The molar ratio was found to be consistent with the continuous variation method and was constant at 1:1. As As in Figure 5

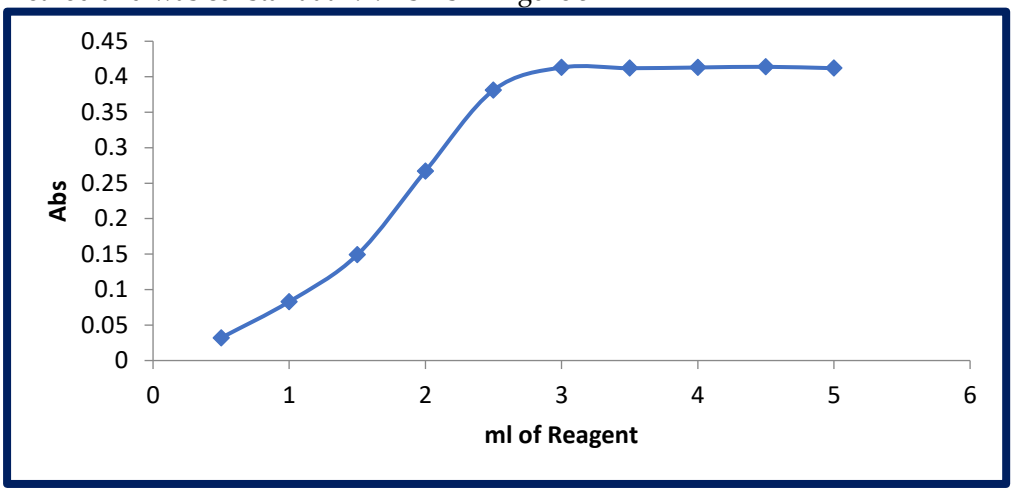


Figure 5: Molar ratio method for the determination of trifluoperazine hydrochloride with the reagent in the presence of potassium iodate

3.9 Effect of additives

The effect of increasing the amount of additives in 25 mg trifluoperazine hydrochloride tablet pharmaceutical formulations was evaluated. By combining two amounts of each additive, the results shown in Table 13 showed that these compounds did not interact with the reagent or trifluoperazine hydrochloride, confirming the feasibility of this approach in pharmaceutical products [12].

Table 13: Effect of additives

RE%	Added concentration (µg/ml)	RE%	Added concentration (µg/ml)	Additives
-3.91	120	0.42	60	Starch
-1.67	120	-1.12	60	Lactose
-3.24	120	-3.82	60	Glucose

3.10 Applications

The technique could be used using Salabid (1 mg), a medicinal preparation that contains trifluoperazine hydrochloride.

3.10.1 direct method

Three distinct concentrations of Salabid (1 mg) were used in the experiments: 12, 36, and 60 µg/ml. The calibration chart and the solutions were made in the same way [13]. The sample solution was used to assess their capacity to absorb light with a wavelength of 548 nm. The average of five different concentrations was determined for each spot, and the percentage recovery was determined. The results are documented in Table 14.

Table 14: Direct Method

Conc of TFPH , µg/ml	Recovery , %	Average recovery , %
15	98.85	99.8
35	100.63	

55	99.92	

*Average of five determinations

Given that the recovery rate in the Salabid preparation was 99.8%, the data in the following table show how well the suggested approach estimates trifluoperazine hydrochloride in the pharmaceutical formulation that contains it [14].

3.10.2 Comparison of the method with other methods

The findings of this study's comparison of the suggested method for measuring trifluoperazine hydrochloride with alternative spectrophotometric techniques are shown in Table 15 [15].

Table 15: Evaluation against alternative approaches

Analytical parameter	Literature[14] method	Literature[15] method	Present Method
Reagent	p- Bromo aniline	Pd(II) , Pt(IV)	(1,3,5-triaine-2,4,6-triyl) tris(azaeylyidene)tris (methaneylyidene)trianiline
Beers law range µg.ml^{-1}	2 – 32	1 – 120, 2 – 50	10 – 70
Molar absorptivity (l.mol^{-1}.cm^{-1})	19360.12	6005	3561.2
Sandells Senstivity µg /cm^{-2}	0.025	0.105 , 0.080	0.131
pH	1.8	1.9 , 1.6	1.28
Temperature °C	15 – 25	-----	15 – 25
λ_{max} (nm)	556	520 , 471	548
Recovery(%)	99.97 – 100.01	101± 0.83 ، 102.2± 0.5	100.49
RSD(%)	0.90 – 1.38	2.2 , 1.83	0.46 – 1.36
Solvent	Water	Benzylalcohol	Water
D.L	0.030	0.18 , 0.16	0.208
Colour of the dye	Violet	-----	Violet
Nature of the dye	1 : 1	1 : 1	1 : 1
Pharmaceutical preparation	Tablet	Tablet	Tablet

4. Conclusion

Trifluoperazine's oxidative reaction was used to determine epropiperazine hydrochloride using a sensitive and precise spectrophotometric technique. The drug is chemically changed into an acidic medium in this procedure, and then a second solution is added. After the additions were completed, the final reaction product immediately turned purple and remained stable for more than 70 minutes, a sufficient time for multiple measurements. It achieved its highest absorbance at 548 nm and followed Beer's law in the concentration range of 10–75 µg/mL. The molar absorption coefficient was 3651.2 L mol/cm², and the Sandell's significance was 0.131 µg/cm². The method was efficient and accurate, with a recovery rate of 100.49% and a standard

deviation of only 1.26%. The method was effective for the pharmaceutical preparation Sulapid, which contains trifluoperazine hydrochloride.

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