Acta Scientific Pharmaceutical Sciences (ISSN: 2581-5423)

Volume 10 Issue 1 January 2026

Review Article

Analytical Techniques for the Assay of Risperidone: A Review

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DOI: 10.31080/ASPS.2025.10.1249

Received: November 28, 2025

Published: December 31, 2025

Abstract

Risperidone is an anti-psychotic drug to reduce this overactivity through inhibition of dopaminergic D2 receptors and serotonergic 5-HT2A receptors in the brain. In the present study the authors have summarised the analytical methods so far published for the estimation of Resperidone in the literature

Keywords: Risperidone; Liquid Chromatographic Method

Introduction

Risperidone (Figure 1) is a second-generation antipsychotic medication used in the treatment of a number of mood and mental health conditions including schizophrenia and bipolar disorder [1,2]. Chemically it is 3-[2-[4-(6-fluoro-1,2-benzoxazol-3-yl) piperidin-1-yl] ethyl]-2-methyl-6,7,8,9-tetrahydropyrido[1,2-a] pyrimidin-4-one with molecular formula $C_{23}H_{27}FN_4O_2$ and molecular weight 410.5 grams/mole. It is practically insoluble in water (pKa 8.76). It is more soluble in acidic solutions and organic solvents like ethanol and dichloromethane.

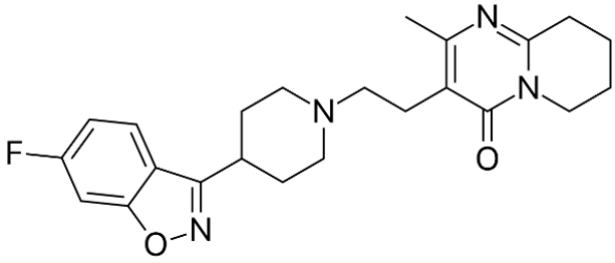

Figure 1: Structure of Risperidone ($C_{23}H_{27}FN_4O_2$).

Risperidone (CAS no. 106266-06-2) binds with a very high affinity to 5-HT2A receptors, approximately 10-20 fold greater than the drug's binding affinity to D2 receptors, and carries lesser activity at several off-targets which may responsible for some of its undesirable effects. Risperidone is indicated for the treatment of schizophrenia and irritability associated with autistic disorder.

Literature survey reveals that Resperidone was studied by different analytical methods such as spectrophotometry [3-20] (Table 1), Liquid chromatographic methods [22-41] (Table 2) etc for the estimation of Risperidone and. The earlier reported methods were summarized in Table 1.

Table 1: Review of spectrophotometric methods.

Reagent	Linearity (μg/ml)	λ_{max} (nm)	Reference
Potassium permanganate in alkaline medium	5-40	415	[3]
Methanol	2-6	280	[4]
Bromo Cresol Green	10-250	440	[5]
MBTH reagent	4-14	666	[6]
0.1N HCl	2.5-20	202	[7]
0.1N HCl: Methanol (40:60)	2-6	280	[8]
0.1N HCl: Methanol (30:70)	3-27	238 & 276	[9]
0.1N HCl	2-6	238	[10]
3% H_2O_2 and Methanol	5-35	274.2	[11]
Britton Robinson Buffer (BR Buffer)	0.11 - 4.93 1.15 -16.82	277 & 238	[12]
Tetrahydrofuran	0.5-5	285	[13]
Water: Acetonitrile (65:35)	21-36	237	[14]
0.1 N HCl 0.1N NaOH	2-12	239 277	[15]
0.1 N HCl	5-30	238	[16]
Chloramine T(CAT) & Xylene cyanol (XCFF) or Malachite Green (MG)	2-26 2-18	612 619	[17]
7,7,8, 8 Tetra-cyano quinoid methane (TCNQ) 2,3-dichloro-5,6-dicyano-1,4-benzo-quinone (DDQ) tetracyanoethylene (TCNE) Chloranilic acid (CA)	10-110 8-150 5-70 25-250	842 457 414 520	[18]
Methanol	10-80	595.8	[19]
Aq. Urea (30%)	4-24	265-287.4	[20]
Phosphate buffer (pH 7.0) Acetate buffer (pH 4.0) Phosphate buffer (pH 7.5)	1-50	280	[21]

Table 1: Review of liquid chromatographic methods.

Mobile Phase (v/v)	Column	Wavelength (nm)	Flow rate (ml/min)	Linearity (μg/ml)	Reference
Methanol: 0.1M Ammonium Acetate (pH 5.50) (60:40) Chlordiazepoxide hydrochloride(Internal standard)	Supelcosil LC_8 DB	274	1.0	4.0-275	[22]
Methanol: Acetonitrile (80:20)	Symmetry C18	280	1.0	10-60	[23]
Acetonitrile: 0.2M Potassium Dihydrogen Phosphate (80:20)	Thermo C18	254	0.7	2-10	[24]
0.5% Ammonium Acetate: Acetonitrile: Methanol (50:20:30)	RP-C_{18} Phenominex Gemini	260	1.5	20-100	[25]
Methanol: 0.2% aq. OPA (80:20)	Chemisil® ODS C18	235	0.6	0.5-10	[26]
Water: Glacial acetic acid 0.5%: Triethylamine 0.8 %: Acetonitrile (65: 0.32: 0.52: 34.16) Paroxetine (Internal standard)	Purosphere STAR RP-18e	294	-	25-250	[27]
Acetonitrile: 0.05M Potassium dihydrogen phosphate (45:55) (pH 6.5)	C_{18}	237	1.0	1-100	[28]
Methanol: 0.1% Formic acid (40:60)	Inertsil ODS C-18	260	1.0	4-12	[29]
0.1% Ammonium Formate: Methanol (30:70)	C8	240	1.0	50-3.12	[30]
Methanol: Acetonitrile: 0.02M Phosphate buffer (65:20:15) (pH 3.0)	Hypersil ODS C-18	238	1.0	-	[31]
Methanol: 0.05 M Acetate buffer (pH 4.6): Triethylamine (60:40:0.02)	RP-C18	280	1.0	0.25-10	[32]
Methanol: Acetonitrile: 50 mM Potassium Dihydrogen Ortho phosphate (80:10:10)	Phenomenex Gemini C-18	234	1.3	0.5-0.99	[33]
Water: Acetonitrile (75:25)	Hypersil BODS C-18	280	0.8	40-80	[34]
10 mM potassium dihydrogen phosphate, pH 3.5 ± 0.05): acetonitrile: methanol (65:20:15)	Waters Xterra RP8	276	1.0	4.973-44.757	[35]
Methanol: Acetonitrile: Potassium dihydrogen ortho-phosphate (60:30:10)	C18	234	1.0	20-100	[36]
Water: Methanol (35:65) (pH 5.5)	Phenomenex C18	276	0.9	10-100	[37]
Acetonitrile: Methanol (20:80)	Capcell Pak C18	239	1.2	20-100	[38]
Ammonium acetate buffer (pH 6.8): Acetonitrile	RP-18	260	0.5	0.5-3	[39]
Methanol: Acetonitrile (75:25)	Chromosil C18	238	1.0	20-100	[40]
Methanol: Ammonium Formate (pH 3.0 with OPA) (90:10)	C18	254	1.0	20-100	[41]

Conclusion

This review article explains different analytical methods developed for the estimation of Risperidone in pharmaceutical dosage forms as well as biological fluids.

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