# 7
# Referências Bibliográficas

[1] WILLIAMS, ROBERT J. P. A química inorgânica da vida. In: HALL, Nina. **Neoquímica: A Química Moderna e Suas Aplicações**. 1ª edição. Porto Alegre: Bookman, 2004.

[2] TOMA, Henrique E. **Química Bioinorgânica**. Washington DC, 1984.

[3] DEMICHELI, C. P.; MAIA, E. C. P. Química de Coordenação em Sistemas Biológicos. In: Farias, R. F. (Organizador). **Química de Coordenação**. São Paulo: Editora Átomo, 2003.

[4] KISS, T. **Biocoordination Chemistry**. Kalman Burger (Ed.). Nova York: Ellis Horwood, 1990.

[5] CHISHOLM, Malcolm. A vestimenta dos íons metálicos: a química de coordenação na virada do milênio. In: HALL, Nina. *Neoquímica:* **A Química Moderna e Suas Aplicações.** 1ª edição. Porto Alegre: Bookman, 2004.

[6] LEHNINGER, A. L **Princípios de Bioquímica**. Sarvier, São Paulo, 2005.

[7] MOINARD, C., CYNOBER, L., BANDT, J. **Polyamines: Metabolism and Implications in Human Diseases**. Clinical Nutrition (2005) 24, 184-197.

[8] WALLACE, H. M., FRASER, A. V, HUGHES, A. **A Perspective of Polyamine Metabolism**. Biochem. J. (2003) 376, 1-14.

[9] MORGAN, D. M. L. **Polyamines**. Molecular Biotechnology. 1999/11:3/229-250.

[10] GROPPA, M. D.; BENAVIDES, M. P. **Polyamines and Abiotic Stress: Recent Advances**. Amino Acids (2008) 34:35-45.

[11] KUSANO, T. et al. **Polyamines: Essential Factors for Growth and Survival**. Planta (2008) 228:367-381.

[12] IGARASHI, K., KASHIWAGI, K. **Polyamines: Mysterious Modulators of Cellular Functions**. Biochem. and Biophys. Res. Com. 271, 559-564 (2000).

[13] MATTHEWS, H. R. **Polyamines, Chromatin Structure and Transcription**. BioEssays 15, 561-567 (1993).

[14] TABOR, C. W; TABOR, H. **Polyamines.** Annu. Rev. Biochem. 53, 749-790.

[15] ZHAO, J.; SHI, G.; YUAN, Q. **Polyamines Contend and Physiological and Biochemical Response to Ladder Concentration of Nickel Stress in *Hidrocharis dubia* (Bl.) Backer Leaves**. Biometals (2008) 21:665-674.

[16] SUMAN, B.; JAMES, R. **Putrescine aminopropyltransferase is Responsible for Biosynthesis of Spermidine, Spermine and Multiple Uncommon Polyamines in Osmotic Stress-tolerant alfalfa**. Plant Physiol. 114:445-454.

[17] BONCHER, T., et al. **Polyamine-Based Analogues as Biochemical Probes and Potential Therapeutics**. Biochemical Society Transactions (2007) Volume 35, part 2, 356-363.

[18] BABBAR, N.; MURRAY-STEWART, T.; CASERO, R.A. **Inflammation and Polyamine Catabolism: The Good, The Bad and The Ugly**. Biochemical Society Transactions (2007) Volume 35, part 2, 300-304.

[19] GARCIA-ESPAÑA, E. et al. **Anion Coordination Chemistry in Aqueous Solution of Polyamnonium Receptors.** Coordination Chemistry Reviews, 341:2953–2956, 2006.

[20] MARQUES, M. P. M.; CARVALHO, L. A. E. **Vibrational Spectroscopy Studies on Linear Poliamines**. Biochemical Society Transactions (2007) Volume 35, part 2, 374-380.

[21] LLINHARES, J.; POWELL, D.; BOWMAN-JAMES, K. **Amnonium Based Anion Receptors.** Coordination Chemistry Reviews, 240:57–75, 2003.

[22] PEGG, A. E.; FEITH, D. J. **Polyamines and Neoplastic Growth**. Biochemical Society Transactions (2007) Volume 35, part 2, 295-299.

[23] SAUNDERS, F. R.; WALLACE, H. M. **Polyamine Metabolism and Cancer Prevention**. Biochemical Society Transactions (2007) Volume 35, part 2, 364-368.

[24] LAGISHETTY, C. V.; NAIK, S. R. **Polyamines: Potential Anti-Inflammatory Agents and Their Possible Mechanism of Action**. Indian J. Pharmacol. Jun 2008, vol 40, Issue 3, 121-125.

[25] LOMOZICK, L.; GASOWSKA, A.; BOLEWSKI, L. **Copper (II) Ions as a Factor Interfering in the Interaction Between Bioligands in Systems with Adenosine and Polyamines.** Journal of Inorganic Biochemistry, 63:191-206, 1996.

[26] CASERO, R. A.; WOSTER, P. M. **Terminally Alkylated Polyamine Analogues as Chemotherapeutic Agents.** Journal of Medicinal Chemistry, 2001, Vol. 44, Nº 1.

[27] RASPAUD, E.; et al. **Precipitation of DNA by Polyamines: A Polyeletrolyte Behavior**. Biophysical Journal. Volume 74, January 1998, 381-393.

[28] THOMAS, T., THOMAS, T. J. **Polyamine Metabolism and Cancer**. J.Cell.Mol.Med. Vol 7, No 2, 2003 pp. 113-126.

[29] CRISS, W. E. **A Review of Polyamines and Cancer**. Turk. J. Med. Sci. 33, (2003) 195-205.

[30] LEE, J. D. **Química Inorgânica não tão Concisa.** São Paulo: Edgard Blücher, 1999.

[31] SHRIVER, D.F.; ATKINS, P.W. **Química Inorgânica.** Porto Alegre: Bookman, 2003.

[32] COTTON, F. A.; WILKINSON, G.; GAUS, P. **Basic Inorganic Chemistry**. 2ª Edição. New York: John Wiley & Sons, 1987.

[33] COTTON, F. A. et. al. **Advanced Inorganic Chemistry.** 6ª Ed. New York: John Wiley & Sons, I999.

[34] GASOWSKA, A.; LOMOZIK, L. **Spectroscopic and Potentiometric Investigation of the Solution Structure and Stability of Ni(II) and Co(II) Complexes with adenosine-5-monofosfate and 1,12-diamino-4,9-**

**diazadodecane(spermine) or 1,11-diamino- 4,8-diazaundecane.** Polyhedron, 21:745–751, 2002.

[35] MAFRA, D., COZZOLINO, S. M. F. **Importância do Zinco na Nutrição Humana.** Rev. Nutr., Campinas, 17(1):79-87, jan./mar., 2004.

[36] SZCKUREK, E. I., BJORNSSON, C. S., TAYLOR, C. G. **Dietary Zinc Deficiency and Repletion Modulate Metallothionein Immunolocalization and Concentration in Small Intestine and Liver of Rats**. J Nutr 2001; 131: 2132-8.

[37] FRAÚSTO DA SILVA, J. J. R., WILLIAMS, P. J. P. **The Biological Chemistry of the Elements – The Inorganic Chemistry of Life**. 2ª ed. New York: Oxford University Press, 2001.

[38] SANDSTEAD, H. H. **Understanding Zinc: Recent Observations and Interpretations**. J Lab Clin Med 1994; 124(3):322-7.

[39] McCALL, K. A., HUANG C., FIERKE, C. A. **Function and Mechanism of Zinc Metalloenzymes**. J Nutr 2000; 130 Suppl:1437-46.

[40] VALLEE, B. L., FALCHUK, K.H. **The Biochemical Basis of Zinc Physiology**. Physiol Rev 1993; 73(1).

[41] VALLET, M.; et al. **Introducción a La Química Bioinorgánica**. Madrid: Editorial Sintesis, 2003.

[42] CHANG, C. J.; LIPPARD, S. J. **Zinc Metaloneurochemistry: Physiology, Pathology and Probes**. Met. Ions Life Sci. 1, 281-320 (2006).

[43] BRAY, T.M., BETTER, W. J. **The Physiological Role of Zinc as an Antioxidant**. Free Radical Biol Med 1990.

[44] POWELL, S. R. **The Antioxidant Properties of Zinc**. J. Nutr. 2000; 130 Suppl: 1447-54.

[45] MOCCHEGIANI, E.; MUZZIOLI, M. **Therapeutic Application of Zinc in Human Immunodeficiency Virus Against Opportunistic Infections**. J Nutr 2000; 130 Suppl:1424-31.

[46] BAUM, M. K.; POSNER-SHOR, G., CAMPA, A. **Zinc Status in Human Immunodeficiency Virus Infection**. J Nutr 2000; 130 Suppl:1421-3.

[47] BHATNAGAR, S., TANEJA, S. **Zinc and Cognitive Development**. Br J Nutr 2001; 85:139-45.

[48] FAIRWEATHER-TAIT, S. J. **Zinc in Human Nutrition**. Nutr Res Rev 1988; 1:23-37.

[49] PRASAD, A. S. **Zinc Deficiency in Women, Infants and Children**. J Am Coll Nutr 1996; 15(2):113-20.

[50] SALGUEIRO, M. J.; et al. **Zinc as an Essencial Micronutrient: A Review**. Nutr Res. 2000; 20(5): 737-55.

[51] SENA, K. C. M., PEDROSA, L. F. C. **Efeitos da Suplementação com Zinco sobre o Crescimento, Sistema Imunológico e Diabetes**. Rev. Nutr., Campinas, 18(2):251-259, mar./abr., 2005.

[52] ALLEN, L. H. **Zinc and Micronutrient Supplements for Children**. Am J Clin Nutr. 1998; 68(2):485S.

[53] ANDRADE, M. L. A., et al. **Níquel - Novos Parâmetros de Desenvolvimento**. Disponível em: http://www.bndes.gov.br. Acessado em 09 de março de 2009.

[54] SILVA, C. S. **Anuário Mineral Brasileiro 2005**. Brasília: DNPM, 2005. Disponível em: www.dnpm.gov.br. Acessado em 09 de março de 2009.

[55] KRISTIANSSON, O., et al. **A Structural Study of the Hydrated and the Dimethylsulfoxide, N,N'-Dimethylpropyleneurea, Acetonitrile, Pyridine and N,N-Dimethylthioformamide Solvated Nickel (II) Ion in Solution And Solid State**. Inorganica Chimica Acta 344 (2003) 15-27.

[56] FUKUDA, Y., SONE, K. **Inorganic Thermochromism.** Springer, Heidelberg, 1987.

[57] BUKLESKI, M.; PETRUŠEVSKI, V. M. **Preparation and Properties of a Spectacular Thermochromic Solid.** Journal of Chemical Education. Vol. 86, Nº 1, January 2009.

[58] RYLEY, M. J. et al. **Thermochromism and Structure of Piperazinium Tetrachrorocuprate (II) Complexes**. Inorganic Chemistry. 1998, 37, 3635-3639.

[59] PARIYA, C. Et al. **Syntheses, Crystal Structures and Solid State Thermochromism of Copper(II) Complexes of *trans*-1,2-diaminocyclohexane.** Polyhedron. Volume 17, Issue 4, January 1998, Pages 547-554.

[60] KONER, S. et al. **Thermochromism in Nickel (II) Complexes: Thermal, IR Spectroscopic, Solid-state $^{1}$H NMR and Single Crystal X-ray Analysis of diaqua-bis(2,2-dimethyl-1,3-propanediamine) Nickel (II) Nitrate**. Journal of Molecular Structure. Volume 345, February 1995, Pages 265-272.

[61] LANDEE, C. P.; WESTRUM, E. F. **Heat Capacities of his-tetraethylammonium tetrachloronickelate and tetrachlorozincate I. Structural Transitions and Tthermophysical Results**. Journal Chem. Thermodynamics 1979, 11, 247-260.

[62] DAY, J. H. **Thermochromism of Inorganic Compounds**. Chemical Reviews**.** Volume 68, Nº 6, November 1968.

[63] KULESZA, P. J. et al. **Electrolyte-cation-dependent Coloring, Electrochromism and Thermochromism of Cobalt(II) Hexacyanoferrate(III, II) Films**. Journal of electroanalytical Chemistry. Volume 397, Issues 1-2, November 1995, Pages 287-292

[64] HALCROW, M. A., CHRISTOU, G. **Biomimetic Chemistry of Nickel**. Chem. Rev., 1994, 94 (8), 2421-2481.

[65] GLENNON, J. D.; SARKAR, B. **Nickel (II) Transport in Human Bood Serum**. Biohemistry Journal. (1982) 203, 15-23.

[66] DENKHAUS, E., SALNIKOW, K. **Nickel Essentiality, Toxicity, and Carcinogenicity**. Critical Reviews in Oncology / Hematology 42 (2002) 35-56.

[67] COSTA, M.; HECK, D. Perspectives on the Mechanism of Nickel Carcinogenesis. In: EICHHORN, G. L.; MARZILLI, L. G. **Advance in Inorganic Biochemistry**. New York: Elsevier, 1984.

[68] BARCELOUX, D. G. **Nickel**. Clin. Toxicol. 1999; 37:239–58.

[69] NIELSON, F. H., et al. **Nickel Deficiency in Rats**. J. Nutr. 1975; 105:1620-30.

[70] NIELSON, F. H., et al. **Nickel Influences Iron Metabolism Through Physiologic, Pharmacologic, and Toxicologic Mechanisms in the Rat**. J. Nutr. 1984; 114:1280-8.

[71] STANGL, G. I., KIRCHGESSNER, M. **Nickel Deficiency Alters Liver Lipid Metabolism in Rats**. J. Nutr. 1996; 126:2466-73.

[72] RAGSDALE, S. W. **Nickel Biochemistry**. Curr. Opin. Chem. Biol. 1998; 2:208–15.

[73] SEGAL, E. D., SHON, J., TOMPKINS, L. S. **Characterization of *Helicobacter pylori* Urease Mutants**. Infect Immunol. 1992; 60:1883-9.

[74] VOLBEDA, A., FONTECILLA-CAMPST, J. C., FREY, M. **Novel Metal Sites in Protein Structures**. Current Opinion in Structural Biology 1996, 6:804-812.

[75] HAUSINGER, R. P. **Metallocenter Assembly in Nickel-Containing Enzymes**. Journal Biological Inorganic Chemistry (1997) 2: 279-286.

[76] MARONEY, M. J. **Structure *I* Function Relationships in Nickel Metallobiochemistry**. Current Opinion in Chemical Biology 1999, 3:188-199.

[77] TEIXEIRA, R. R.; BARBOSA, L. C. A.; PILÓ-VELOSO, D. **Reações de Acoplamento Cruzado de Organossilanos Catalisadas por Paládio: Aspectos, Históricos, Sintéticos e Mecanísticos.** *Quim. Nova,* Vol. 30, No. 7, 1704-1720, 2007.

[78] TAIRA, A. L. et al. **Factors Impacting all-cause Mortality in Prostate Cancer Brachytherapy Patients With or Without Androgen Deprivation Therapy**. Brachytherapy, 9, (2010) 42-49.

[79] ABU-SURRAH, A. S.,; AL-SA'DONI, H. H., ABDALLA, M. Y. **Palladium-Based Chemotherapeutic Agents: Routes Toward Complexes With Good Antitumor Activity**. Cancer Therapy. 2008, Vol 6, 1-10.

[80] RAU, T.; ALSFASSER, R.; ZAHL, A.; VAN, E. R. **Structural and Kinetic Studies on the Formation of Platinum(II) and Palladium(II) Complexes with L-Cysteine-Derived Ligands.** Inorganic Chemistry. 1998, 37, 4223-4230.

[81] ZHAO, G. et al. **Dinuclear Palladium(II) Complexes Containing Two Monofunctional [Pd(en)(pyridine)Cl]$^{+}$ Units Bridged by Se or S. Synthesis, Characterization, Cytotoxicity and Kinetic Studies of DNA-binding**. Journal of Inorganic Biochemistry. 1998, 70(3-4): 219-26.

[82] ZHAO, G. et al. **Palladium(II) complexes with N,N'-dialkyl-1,10-phenanthroline-2,9-dimathanamine: synthesis, characterization and cytotoxic activity**. Journal of Inorganic Biochemistry. 1998, 72(3-4): 173-7.

[83] BUTOUR, J. L. et al. **Palladium(II) Compounds With Potential Antitumour Properties and Their Platinum Analogues: A Comparative Study of the Reaction of Some Orotic Acid Derivatives With DNA in Vitro**. Chemical Biological Interactions. 1997, 104(2-3): 165-78.

[84] NAVARRO-RANNINGER, C. et al. **Palladium(II) Compounds of Putrescine and Spermine. Synthesis, Characterization, and DNA-binding and Antitumor Properties.** Journal of Inorganic Biochemistry. 1992, 52(1): 37-49.

[85] BASOLO, F.; JOHNSON, R. **Química de los Compuestos de Coordinación**. Barcelona: Editorial Reverté, 1967.

[86] JONES, C. J. **A Química dos Elementos dos Blocos d e f**. São Paulo: Bookman, 2001.

[87] BENVENUTTI, E. V. **Química Inorgânica: Átomos, Moléculas, Líquidos e Sólidos**. 2ª Edição. Porto Alegre: Editora da UFRGS, 2006.

[88] BARROS, H. L. C. **Química Inorgânica: Uma Introdução**. Belo Horizonte: UFMG, 1992.

[89] OLIVEIRA, O. A. Fundamentos da Química de Coordenação. In: Farias, R. F. (Organizador). **Química de Coordenação**. São Paulo: Editora Átomo, 2003.

[90] ZENEBON, O.; PASCUET, N. S.; TIGLEA, P. **Métodos Físico-Químicos para Análise de Alimentos**. São Paulo: Instituto Adolfo Lutz, 2008, p. 1020, 1ª Edição Digital (4ª edição – 2005).

[91] VELHO, R. G. **Medidas de condutividade na caracterização de complexos inorgânicos: um levantamento bibliográfico**. 170 p. Dissertação (Mestrado) – Universidade Federal de São Carlos. São Carlos: UFSCar, 2006.

[92] VOGEL, H. J. **Análise Química Quantitativa.** 5ª Edição. Rio de Janeiro: LTC, 1992.

[93] FARIAS, R. F. Termoquímica dos Compostos de Coordenação. In: Farias, R. F. (Organizador). **Química de Coordenação**. São Paulo: Editora Átomo, 2003.

[94] ALMEIDA, B. L. **Síntese e Caracterização de Compostos com Poliaminas, Adenosina 5'trifosfato, Fosfocreatina e Alguns Metais de Interesse Biológico**. 215p. Tese (Doutorado) – Pontifícia Universidade Católica do Rio de Janeiro. Rio de Janeiro: PUC-Rio, 2008.

[95] HARRISON, W. T. A. **Ethylenediaminium Tetrachlorozincate**. Acta Cryst. (2005). E 61, 1951–1952.

[96] BRINGLEY, J. F.; RAJESWARAN, M. ***p*-Phenylenediammonium tetrachlorozincate(II)**. Acta Cryst. (2006). E 62, 1304–1305.

[97] ALBRECHT, A. S.; LANDEE, C. P.; TURNBULL, M. M. **Structure of bis(2-amino 5-methylpyridinium) tetrachlorozincate at 298 and 150 K**. Journal of Chemical Crystallography, Vol. 33, No. 4, April 2003

[98] BELLAMY, L. **The Infrared Spectra of Complex Molecules**. Methuen and Co. LTD, London, 1996.

[99] SILVERSTEIN, R. M.; WEBSTER, F. X.; KIEMLE, D. J. **Identificação Espectrofotométrica de Compostos Orgânicos**. 7ª edição. Rio de Janeiro: LTC, 2007.

[100] NAKAMOTO, K. **Infrared and Raman Spectra of Inorganic and Coordination Compounds**. Wiley, 5ª Edição, 1997.

[101] GONÇALVES, N. S. Espectroscopia Vibracional dos Compostos de Coordenação. In: Farias, R. F. (Organizador). **Química de Coordenação**. São Paulo: Editora Átomo, 2003.

[102] CHEN, X. K. et al. **Zone-Folding Raman Modes of Tetramethylammonium Tetrachlorozincate in Structurally Modulated Phases**. Physicals Review B. Volume 42, nº 13, November 1990, 8465-8470.

[103] LIN-VLEN, D.; et al. **The Handbook of Infrared and Raman Characteristic Frequencies of Organic Molecules**. New York: Academy Press, 1991.

[104] SALLES, M. R. Espectroscopia Eletrônica dos Compostos de Coordenação. In: Farias, R. F. (Organizador). **Química de Coordenação**. São Paulo: Editora Átomo, 2003.

[105] ALLINGER, N. L. et al. **Química Orgânica**. 2ª edição. Rio de Janeiro: Guanabara, 1978.

[106] LOPES, C. C. ; SILVA, J. A. ; FELCMAN, J. ; ROSANGELA, S. C. L. ; VILLAR, J. D. **Study of the protonation/deprotonation sequence of two polyamines: bis - [(2S)-2-pyrrolidinylmethyl]ethylenediamine and spermedine by $^{1}H$ and $^{13}C$ nuclear magnetic resonance.** Spectroscopy Letters, Estados Unidos, v. 35, n. 5, p. 643-661, 2002.

[107] DONG, Y.; LINDOY, L. F. **A Three-ring, Linked Cyclam Derivative and Its Interaction With Selected Transition and Post-transition Metal Ions**. Coordination Chemistry Reviews, 245:11–16, 2003.

[108] GUANTIERI, V. et al**. Potentiometric and NMR Studies on $Cd^{2+}$ Coordination With the Histidine-containing Ac184–188$NH_2$ Prion Protein Fragment**. Inorganica Chimica Acta, In Press, 2007.

[109] KOESTER, V. J.; DUNN, M. **Electronic Spectrum of the Tetrachloronickelate(I1) Complex at 2.2'K**. Inorganic Chemistry, Vol. 14, No. 8, I975.

[110] KALLEL, A. et al. **1,3-Propanediammonium Tetrachlorozincate (II)**. Acta Crystallogr.,Sect.B:Struct.Crystallogr.Cryst.Chem. 1980, 36, 2788.

[111] SILVA, J. A. **Estudo de Complexos de Cu (II) e Pd (II) com Algumas Poliaminas e o Adenosina 5' Trifosfato (ATP)**. 216p. Tese (Doutorado) – Pontifícia Universidade Católica do Rio de Janeiro. Rio de Janeiro: PUC-Rio, 2001.

# 8
# Anexos

## 8.1
## Anexo A - Poliaminas

### 8.1.1
### Análise Termogravimétrica



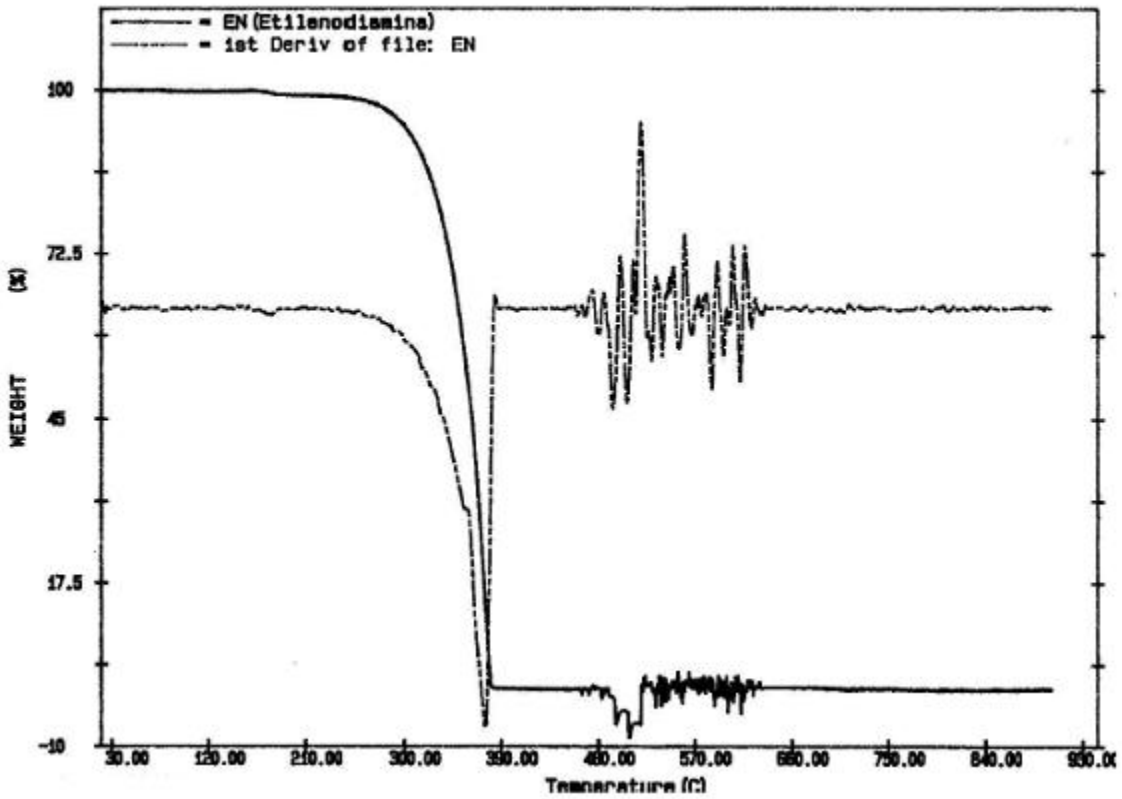


Figura A.1: TGA e DTG da Etilenodiamina

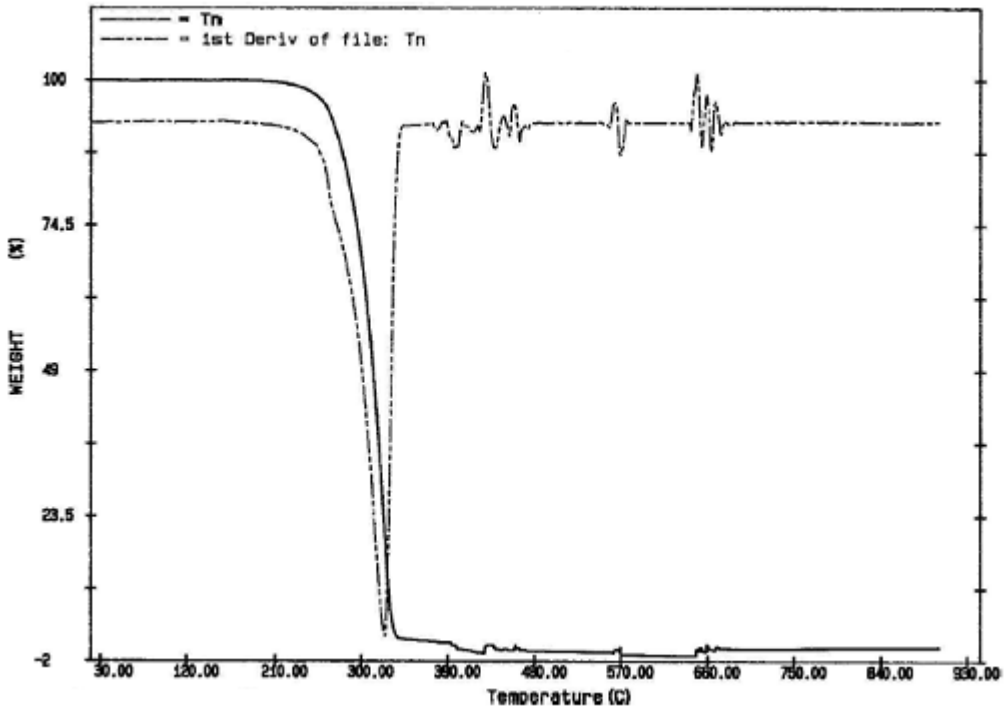


Figura A.2: TGA e DTG do Diaminopropano

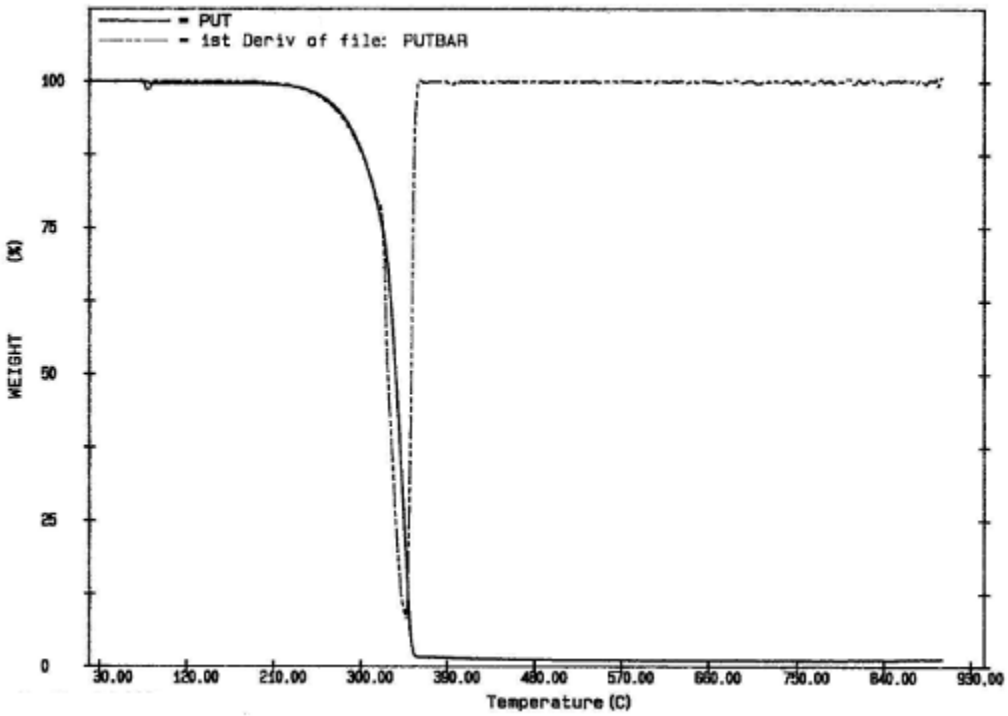


Figura A.3: TGA e DTG do Diaminobutano

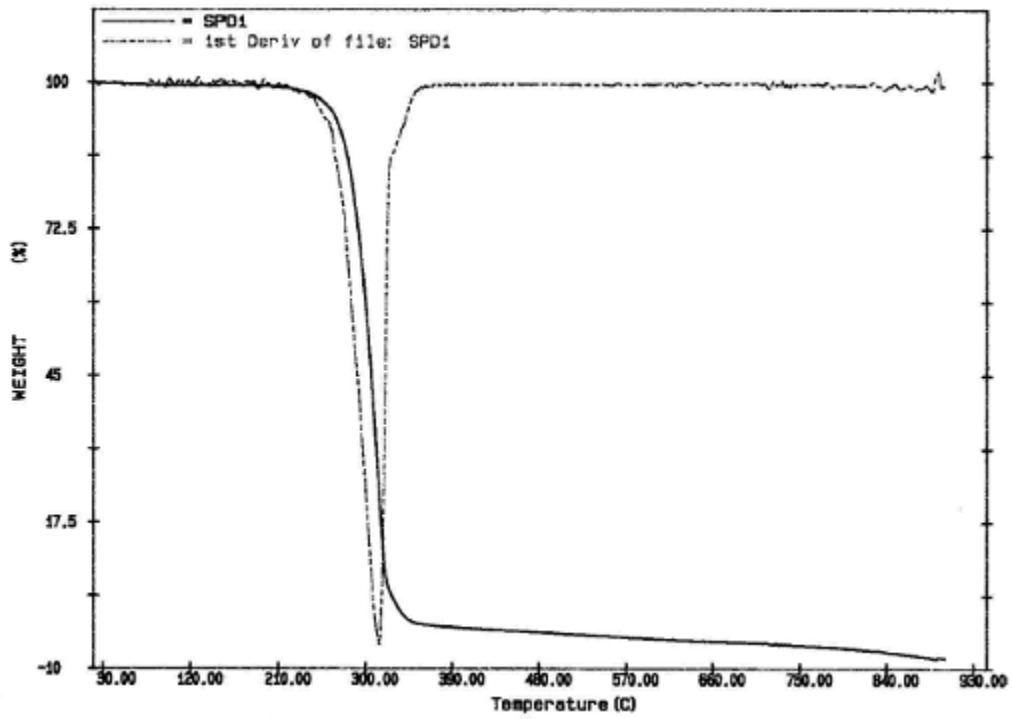


Figura A.4: TGA e DTG da Espermidina

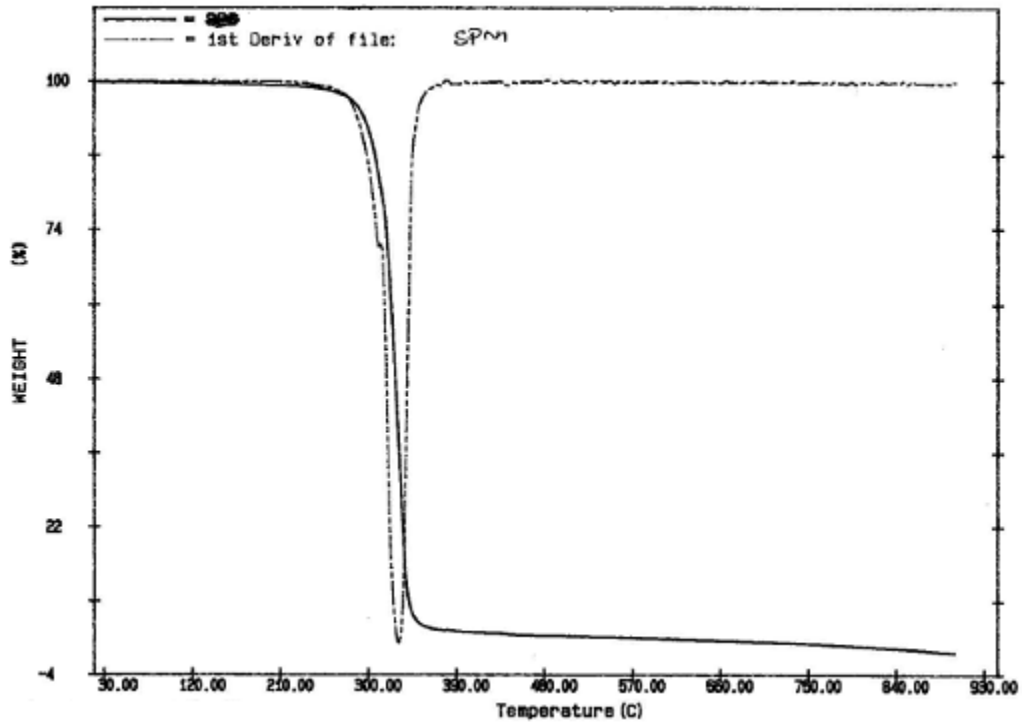


Figura A.5: TGA e DTG da Espermina

## 8.1.2
## Espectroscopia de Infravermelho

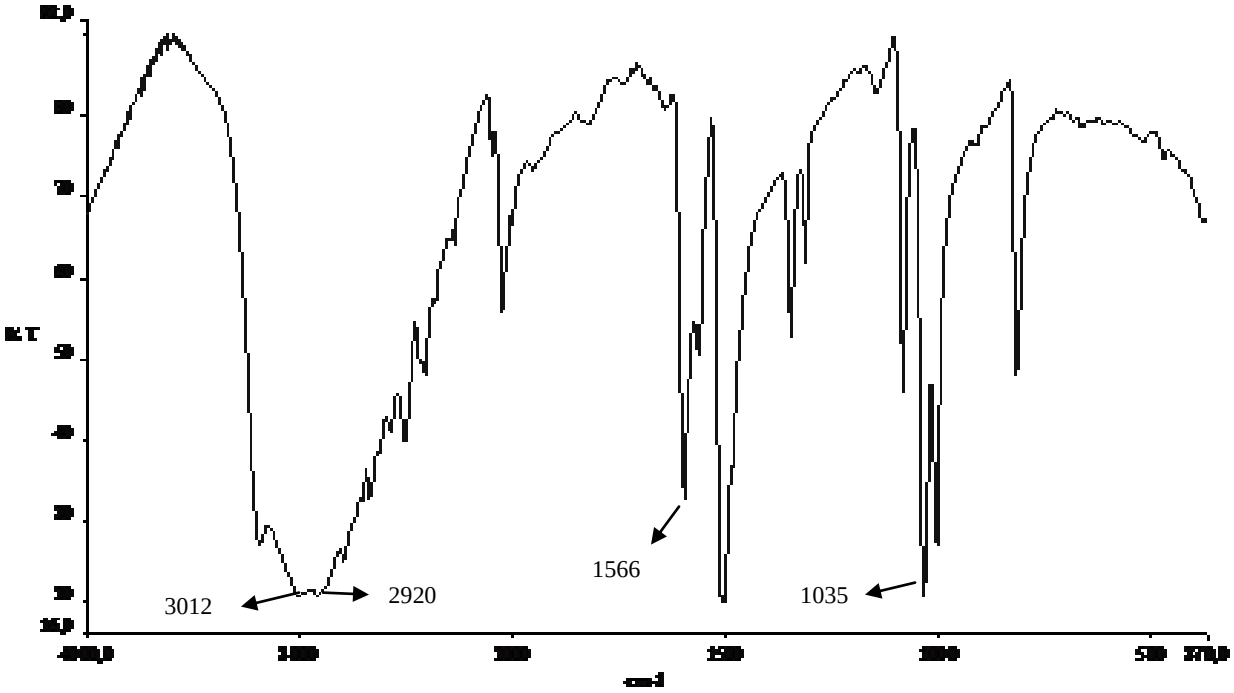


Figura A.06: Espectro de IV na região de média freqüência da Etilenodiamina

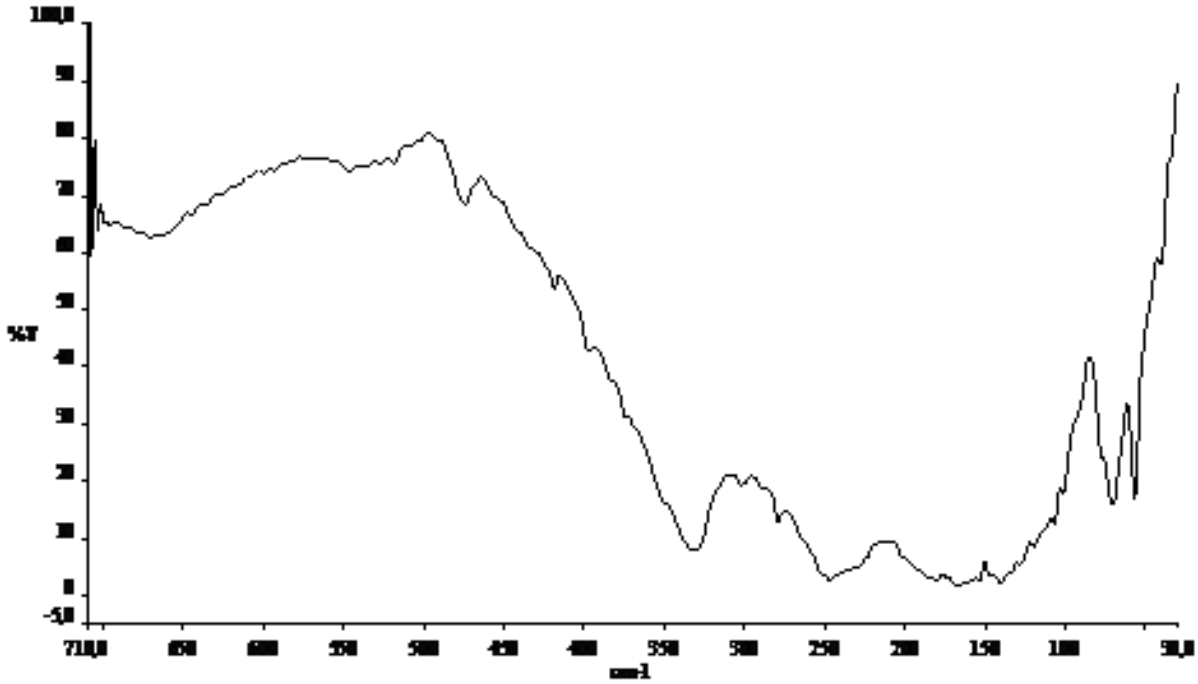

Figura A.07: Espectro de IV na região de baixa freqüência da Etilenodiamina

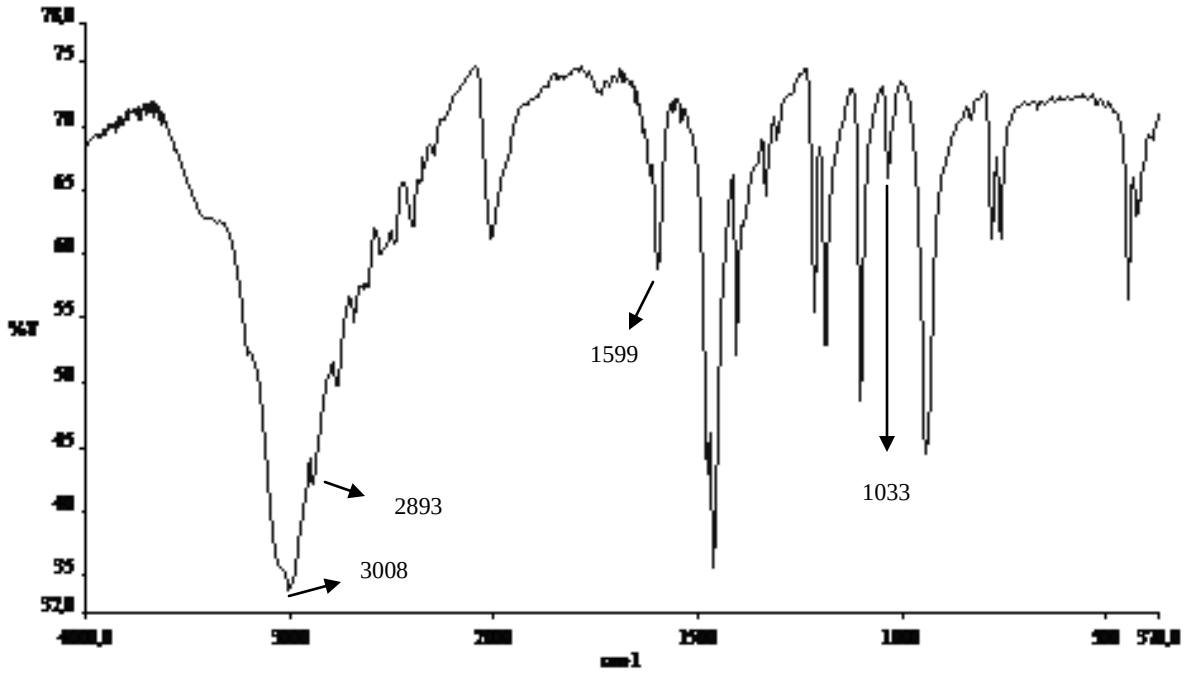


Figura A.08: Espectro de IV na região de média freqüência do Diaminopropano

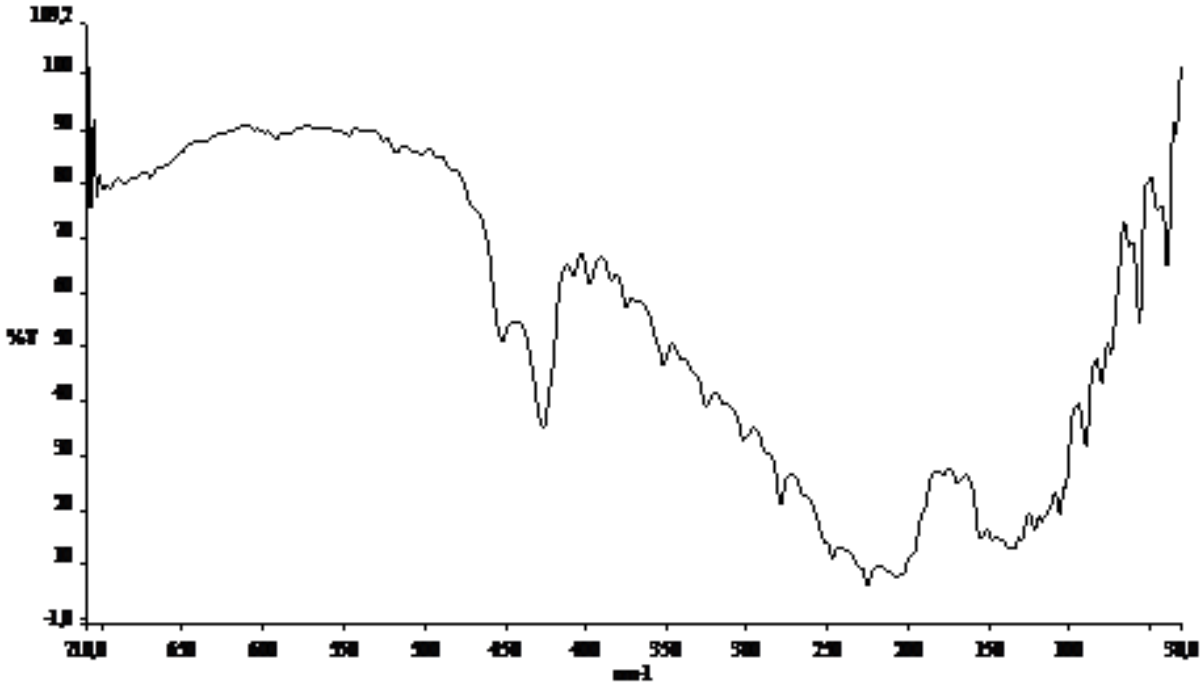

Figura A.09: Espectro de IV na região de baixa freqüência do Diaminopropano

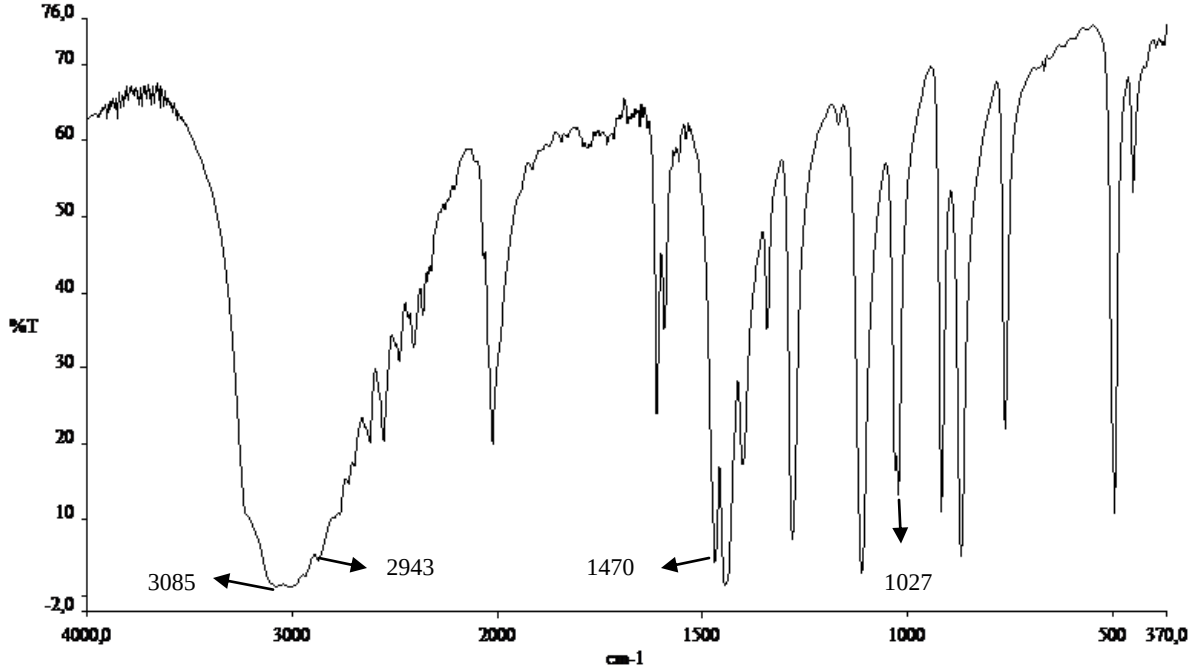


Figura A.10: Espectro de IV na região de média freqüência do Diaminobutano

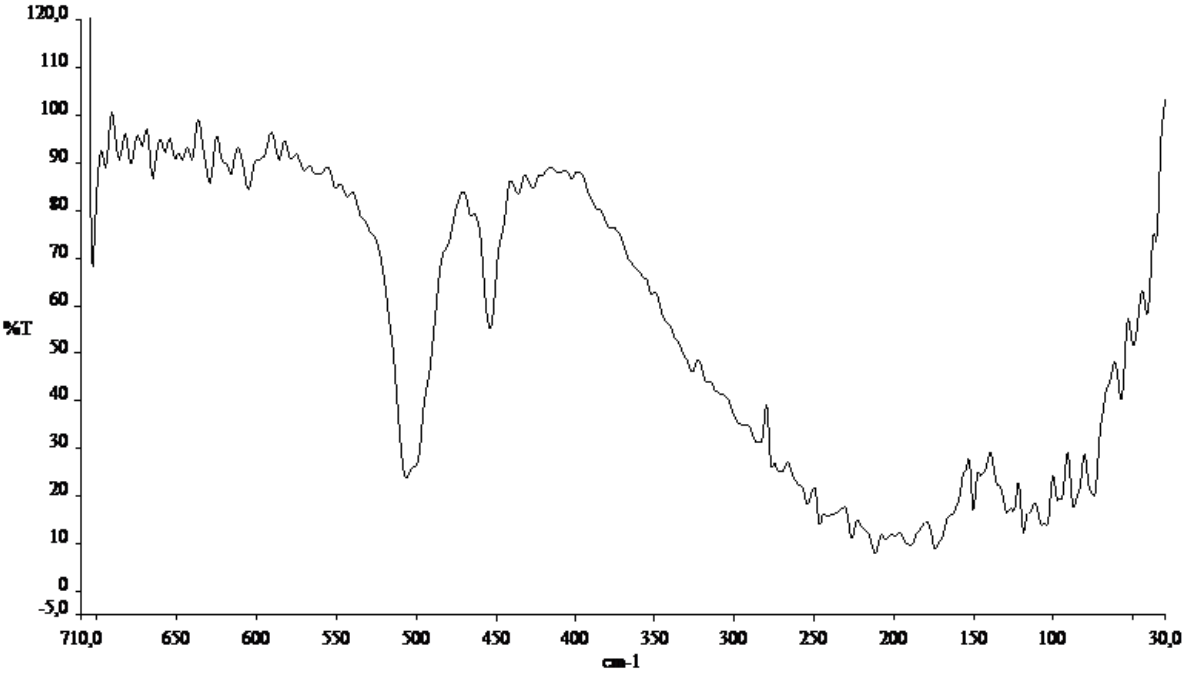


Figura A.11: Espectro de IV na região de média freqüência do Diaminobutano

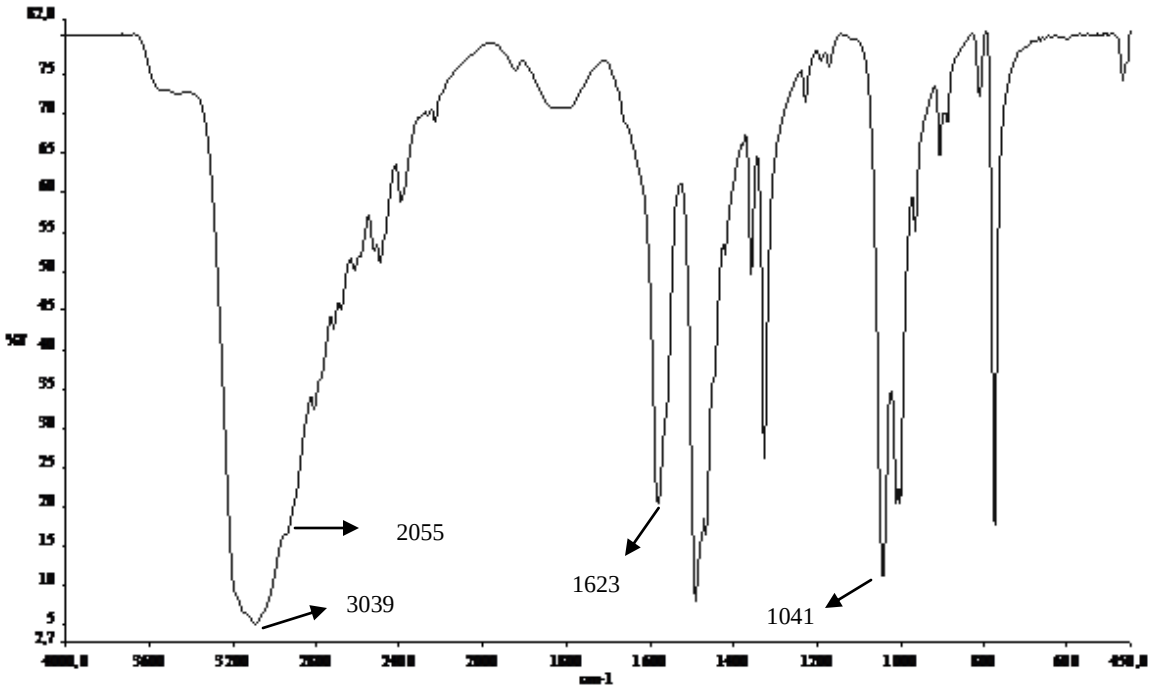


Figura A.12: Espectro de IV na região de média freqüência da Espermidina

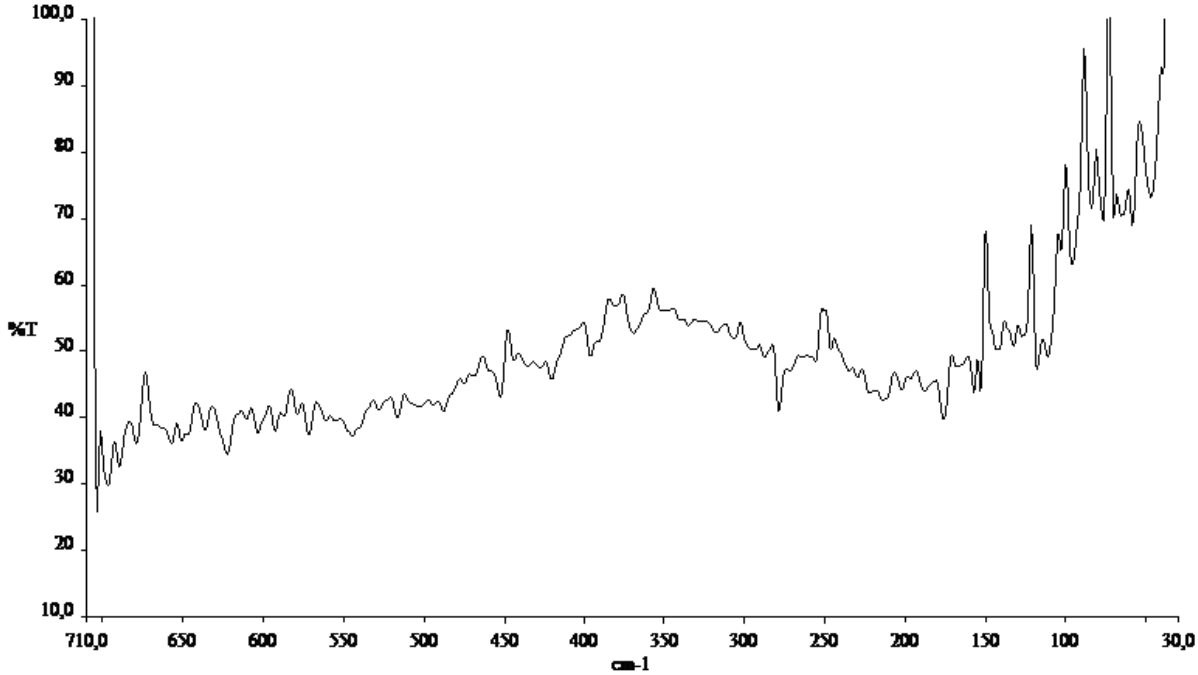


Figura A.13: Espectro de IV na região de baixa freqüência da Espermidina

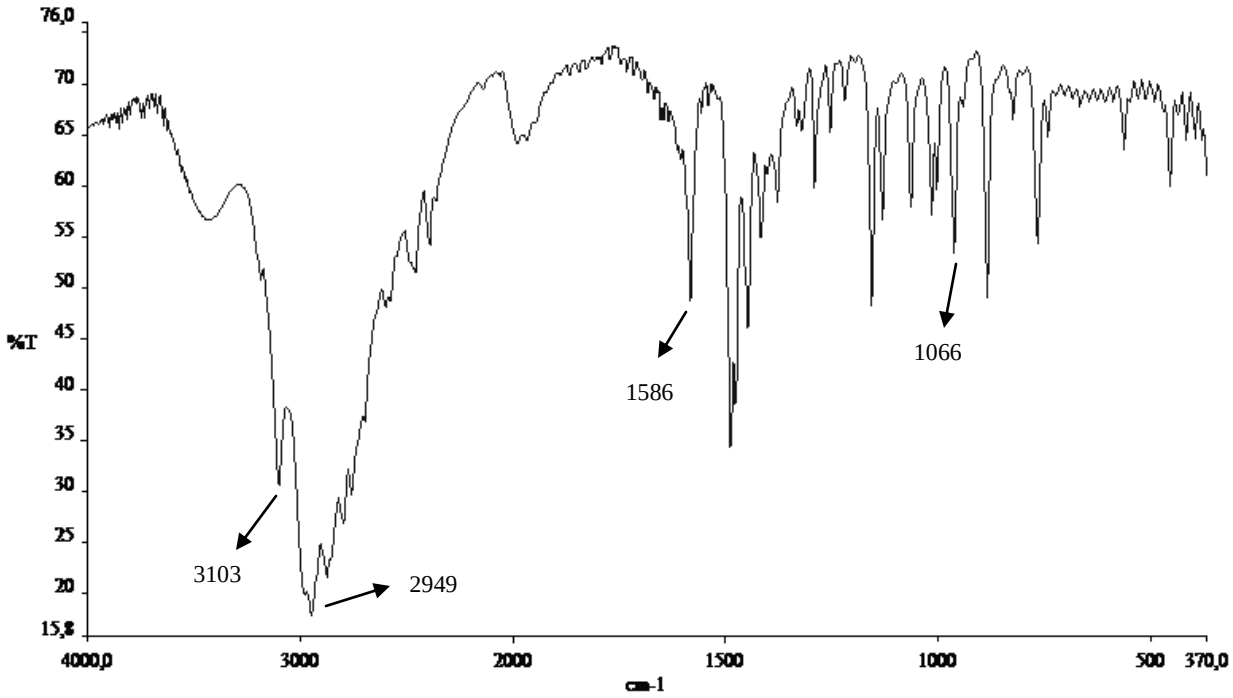


Figura A.14: Espectro de IV na região de média freqüência da Espermina

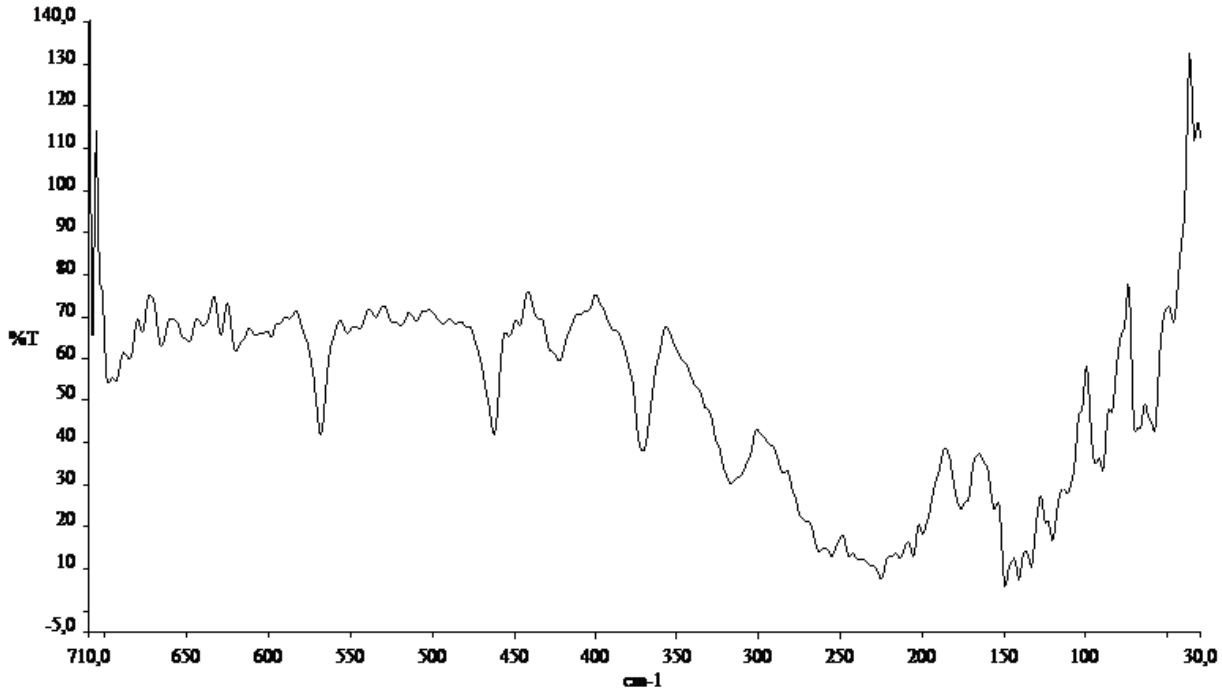


Figura A.15: Espectro de IV na região de baixa freqüência da Espermina

## 8.1.3
## Espectroscopia Raman

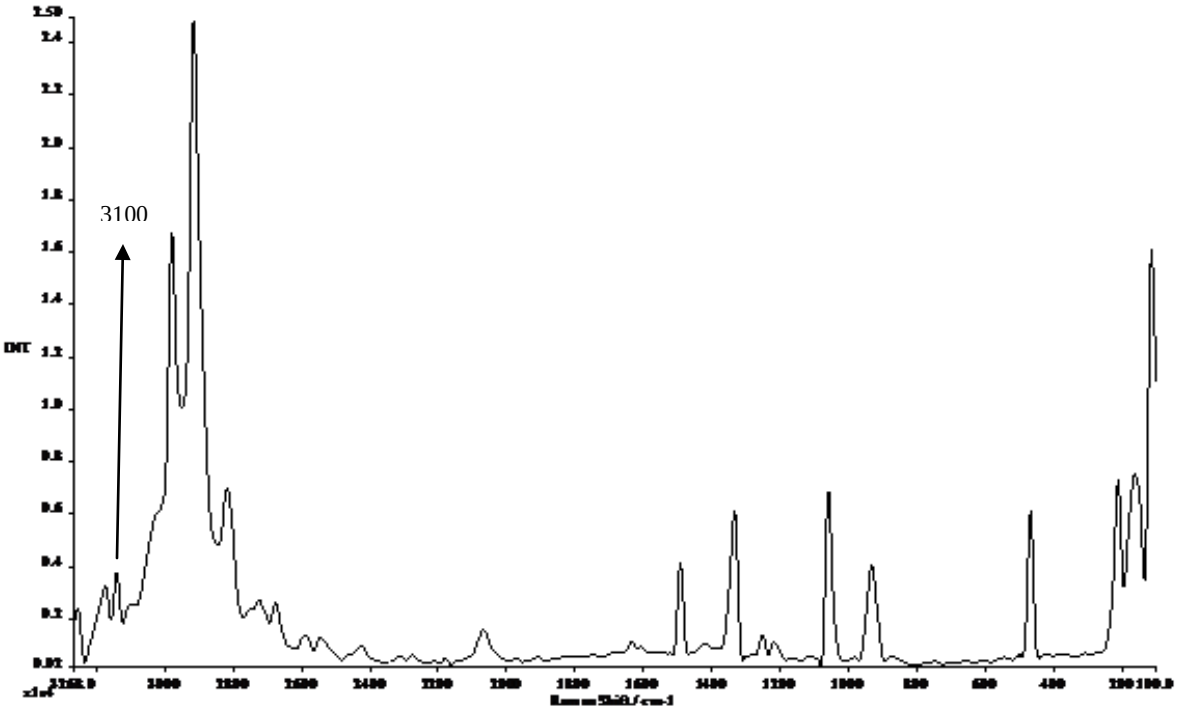


Figura A.16: Espectro de Raman da Etilenodiamina

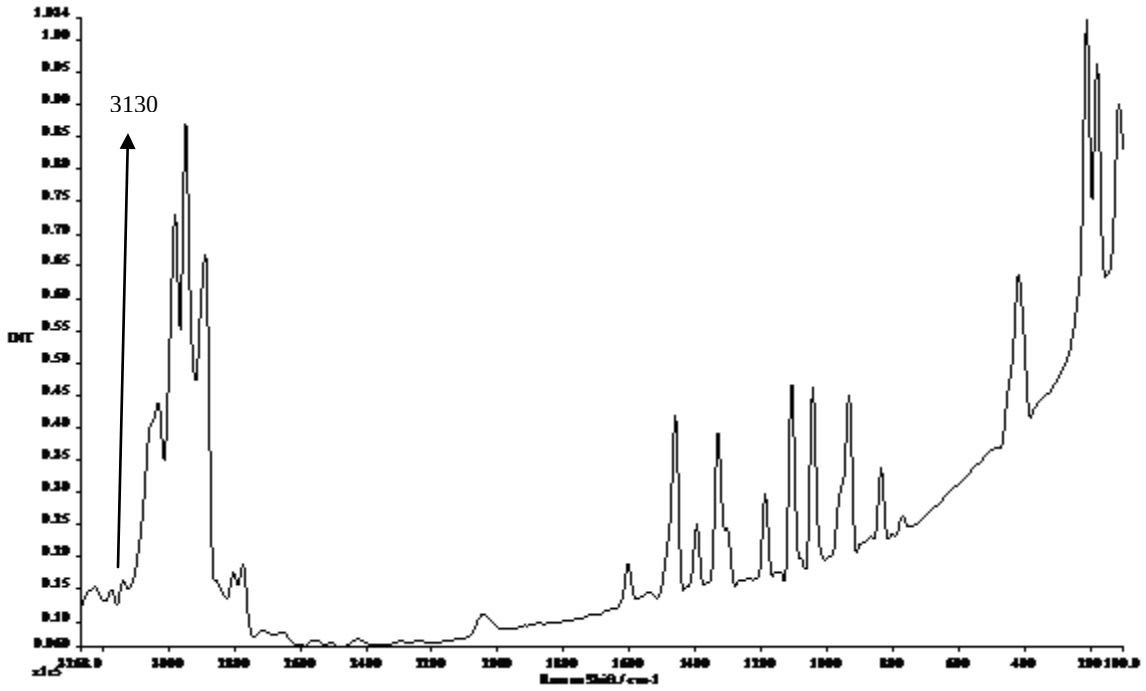


Figura A.17: Espectro de Raman do Diaminopropano

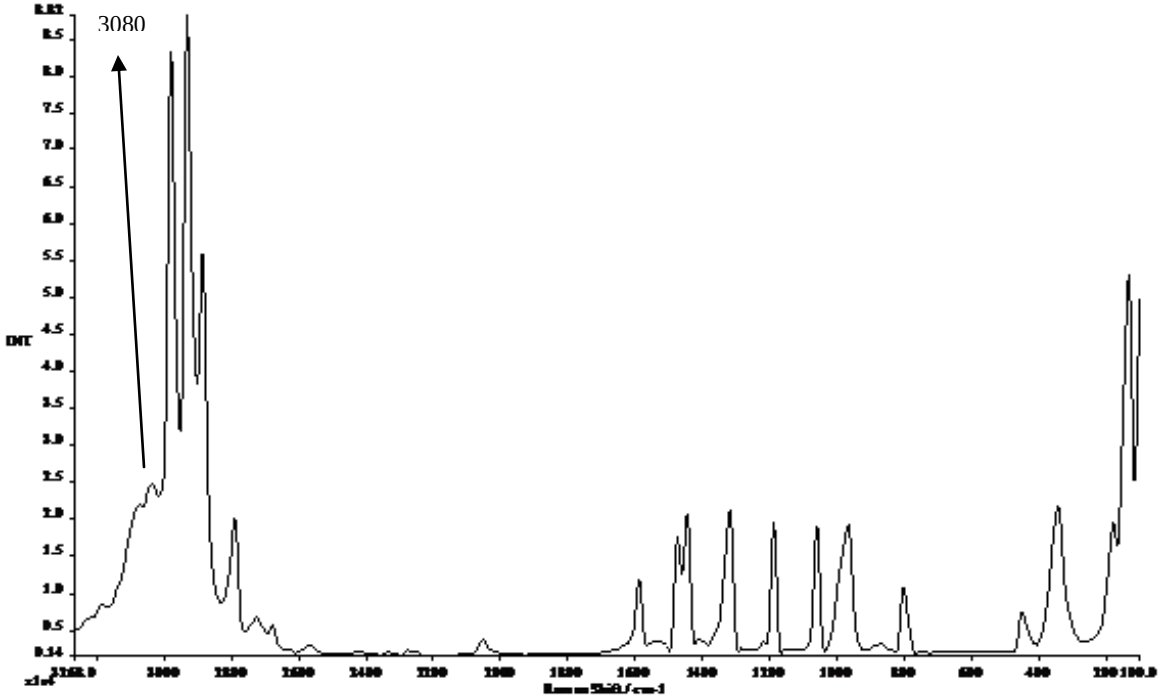


Figura A.18: Espectro de Raman do Diaminobutano

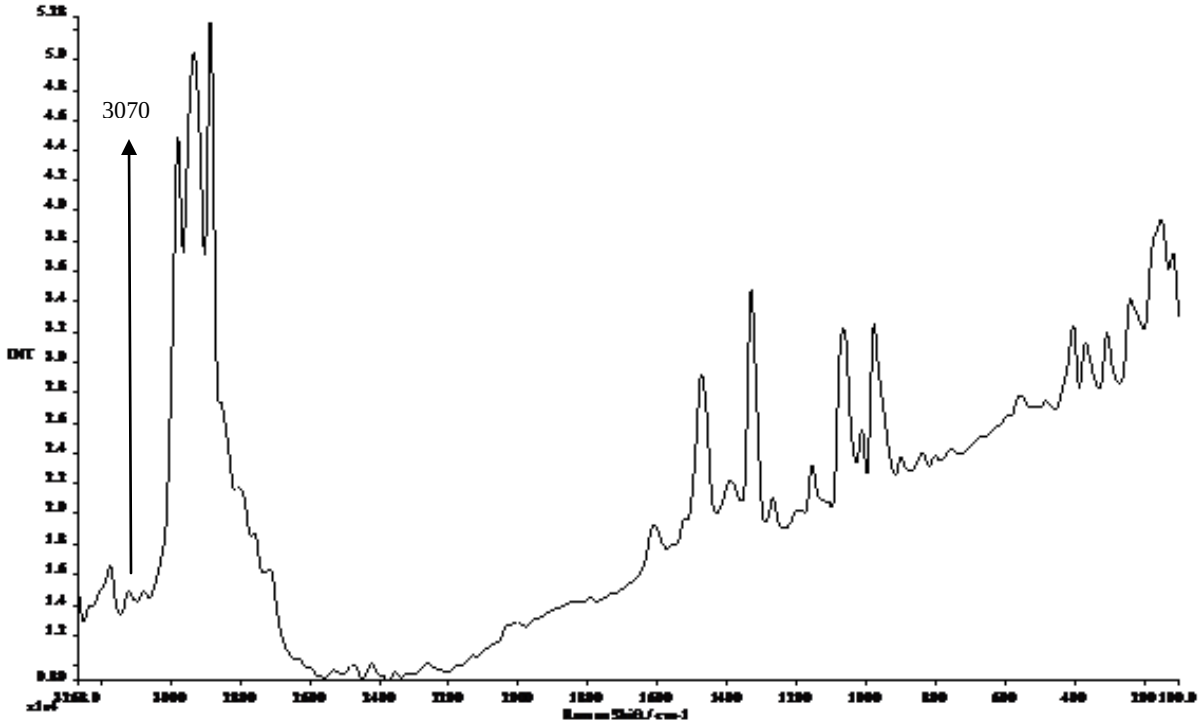


Figura A.19: Espectro de Raman da Espermidina

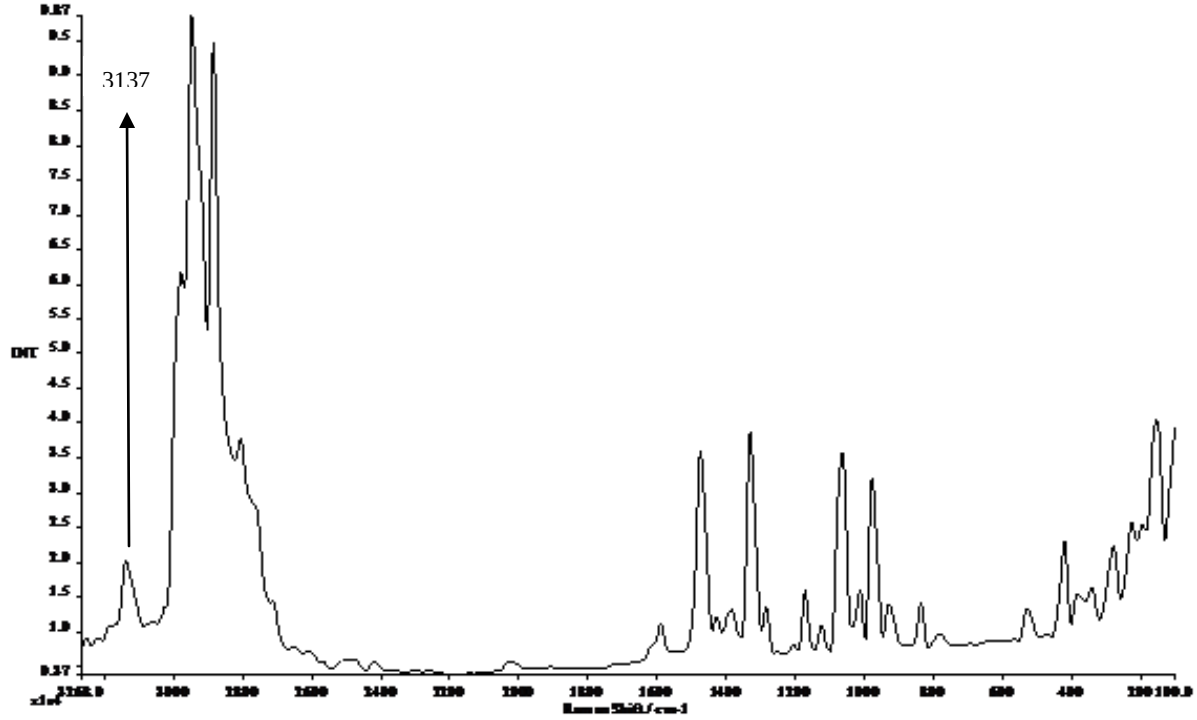


Figura A.20: Espectro de Raman da Espermina

### 8.1.4
### Espectroscopia no Ultravioleta-Visível

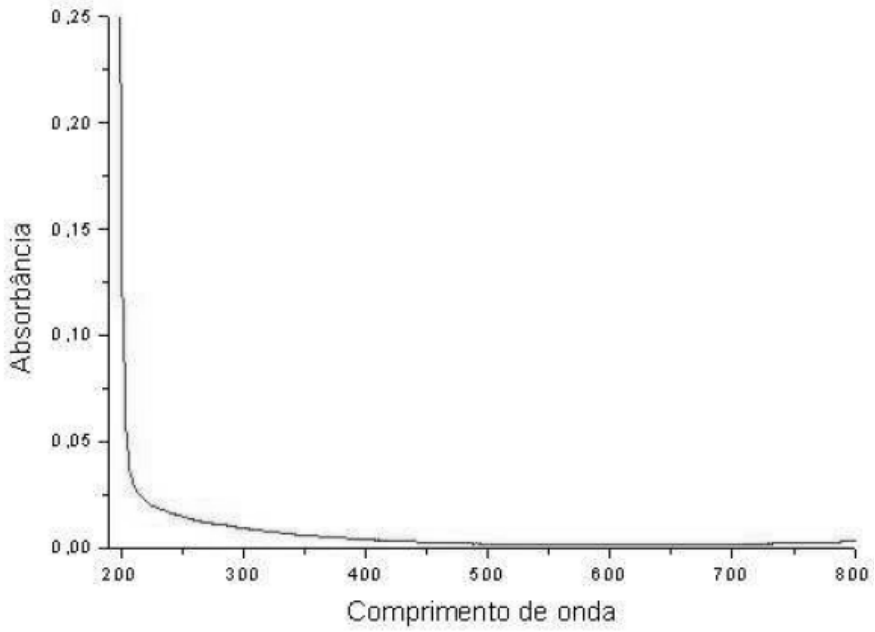


Figura A.21: Espectrocopia UV-Vis da Etilenodiamina

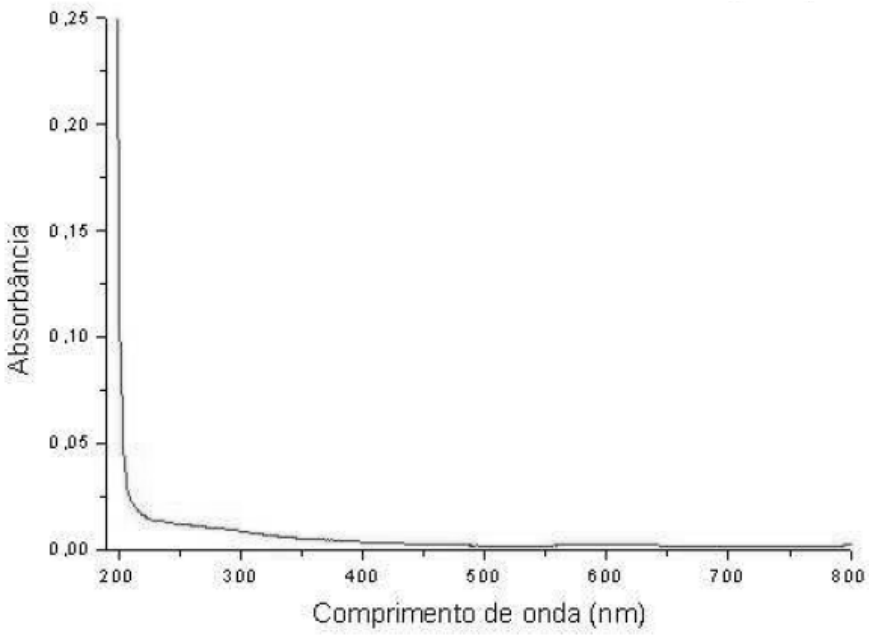


Figura A.22: Espectrocopia UV-Vis do Diaminopropano

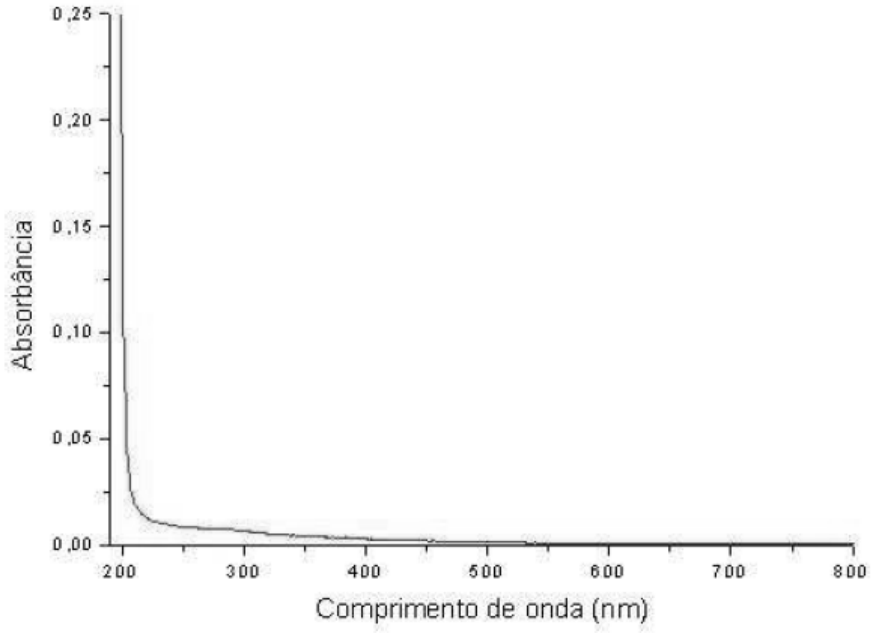


Figura A.23: Espectrocopia UV-Vis do Diaminobutano

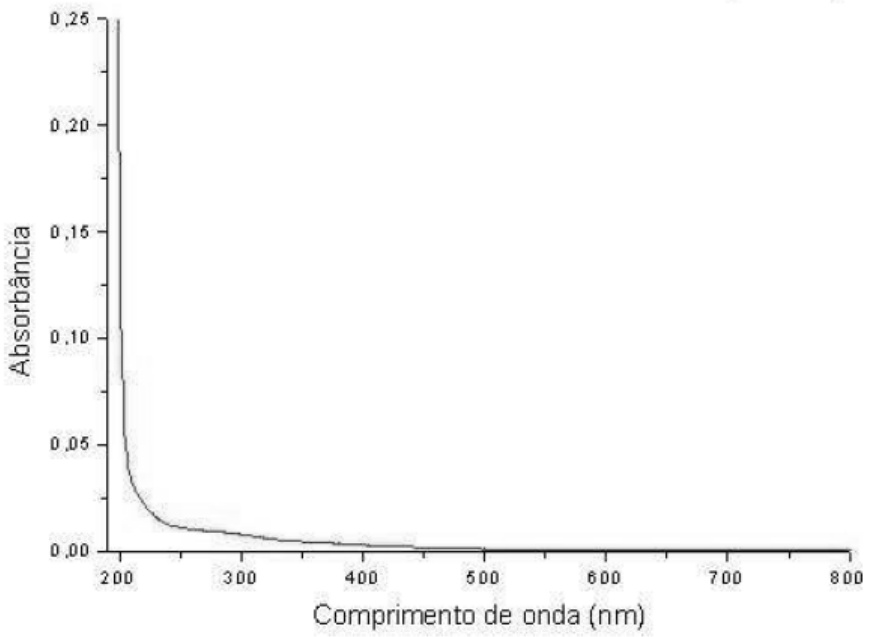


Figura A.24: Espectrocopia UV-Vis da Espermidina

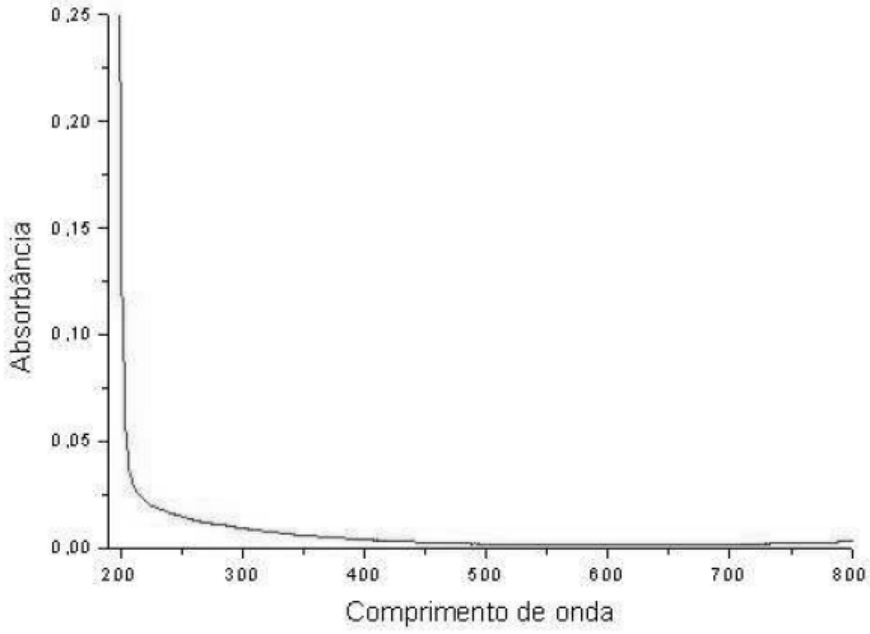


Figura A.25: Espectrocopia UV-Vis da Espermina

## 8.1.5
## Espectroscopia de Ressonância Magnética Nuclear de Hidrogênio

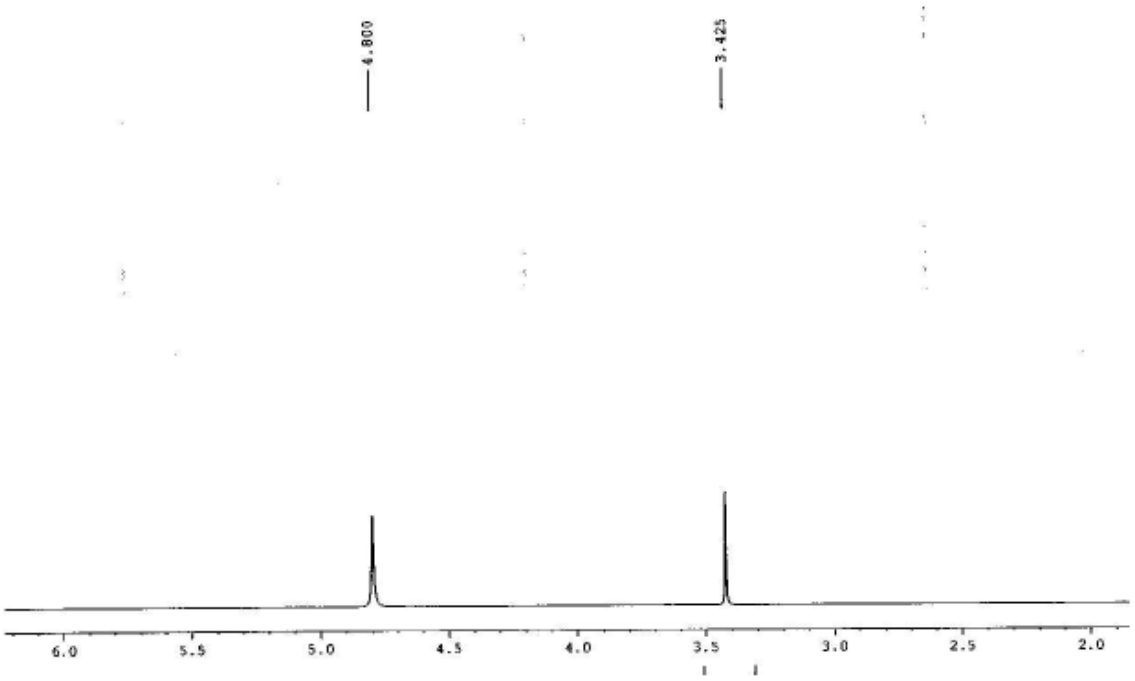


Figura A.26: RMN $^{1}H$ da Etilenodiamina

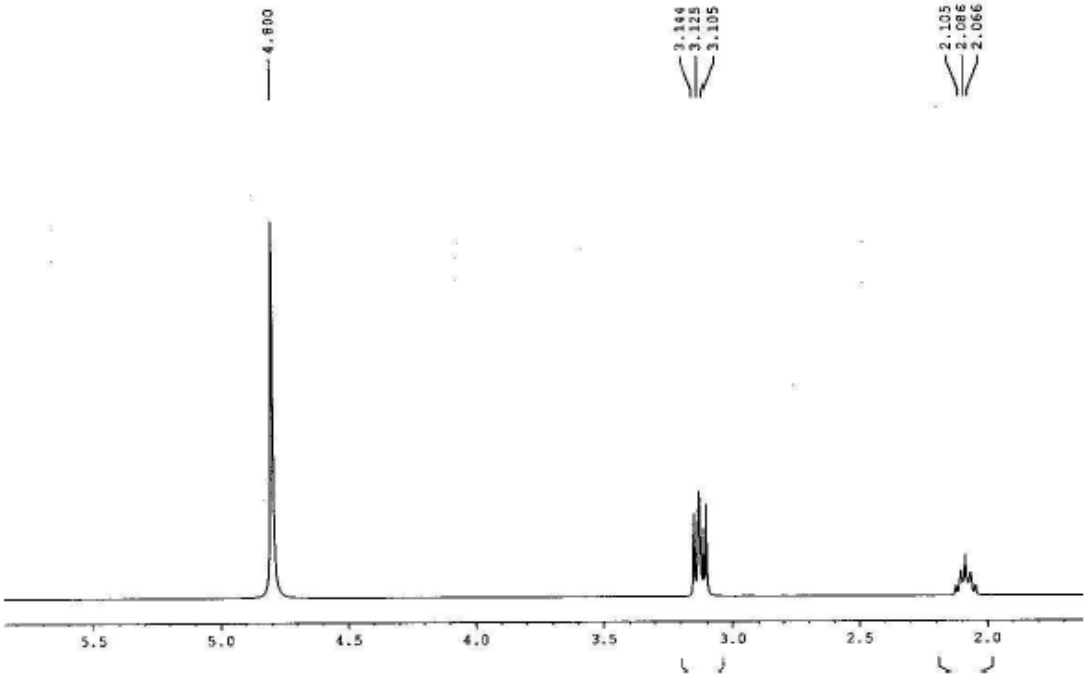


Figura A.27: RMN $^{1}H$ do Diaminopropano

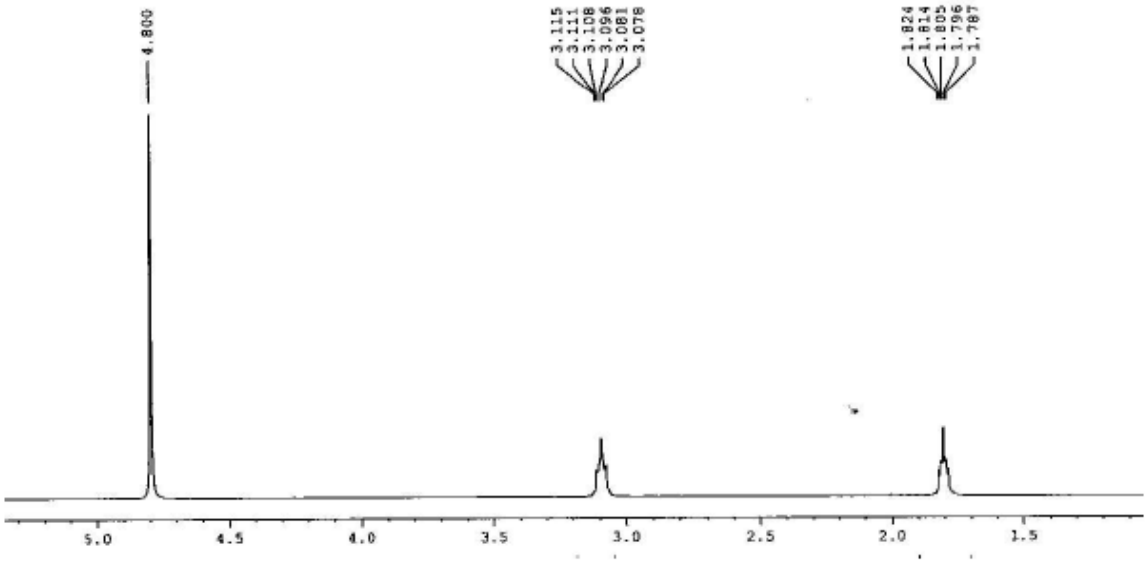


Figura A 28: RMN $^{1}H$ do Diaminobutano

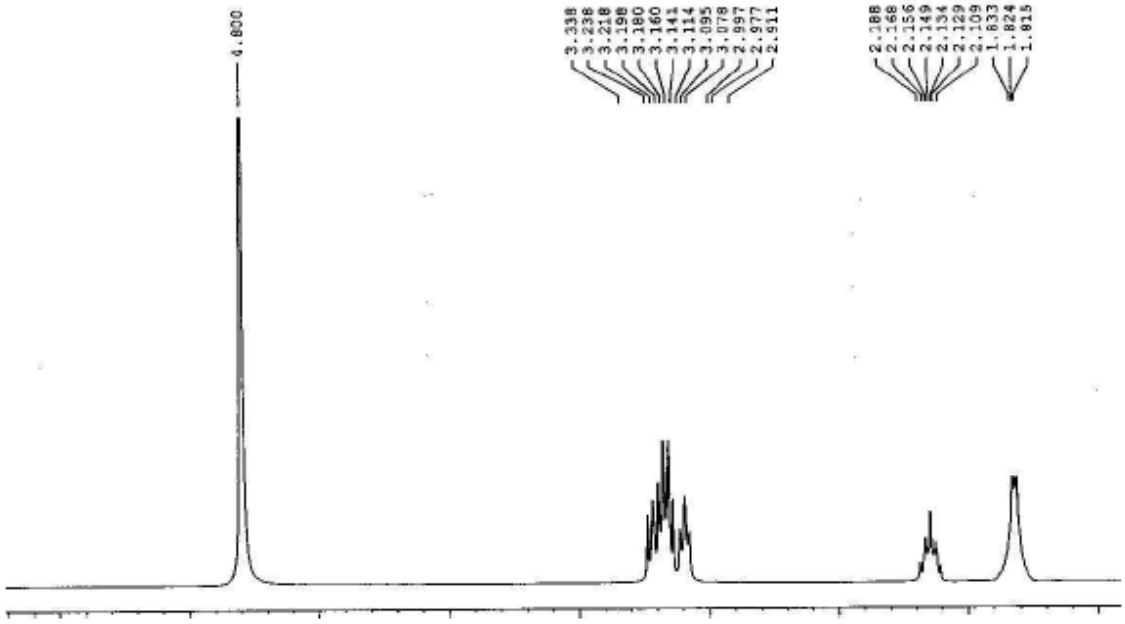


Figura A.29: RMN $^{1}$H da Espermidina

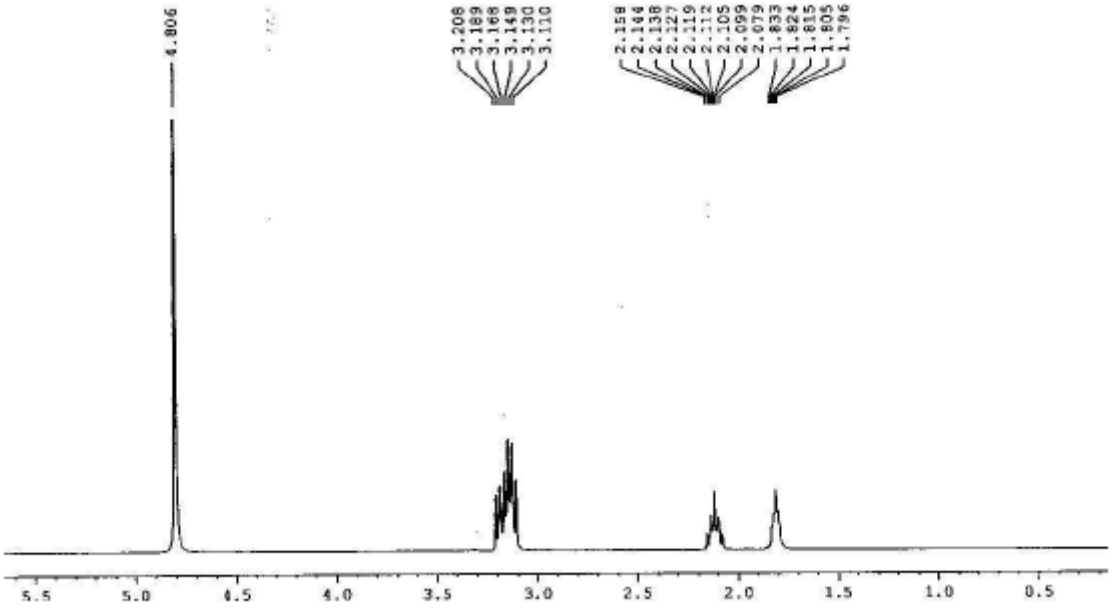


Figura A.30: RMN $^{1}$H da Espermina

## 8.1.6
## Espectroscopia de Ressonância Magnética Nuclear de Carbono 13

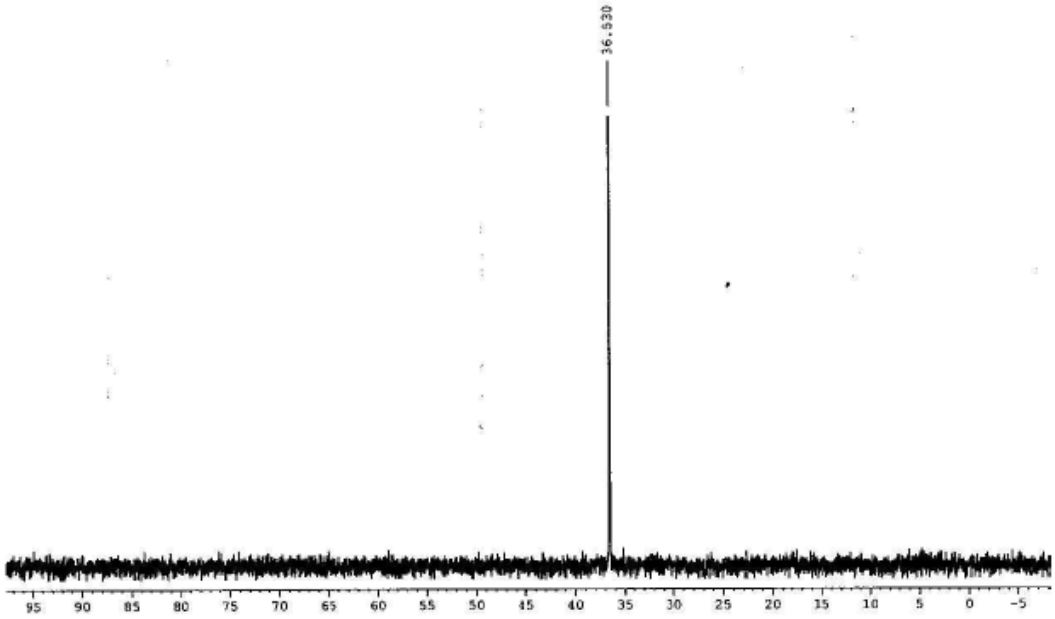


Figura A.31: RMN $^{13}C$ da Etilenodiamina

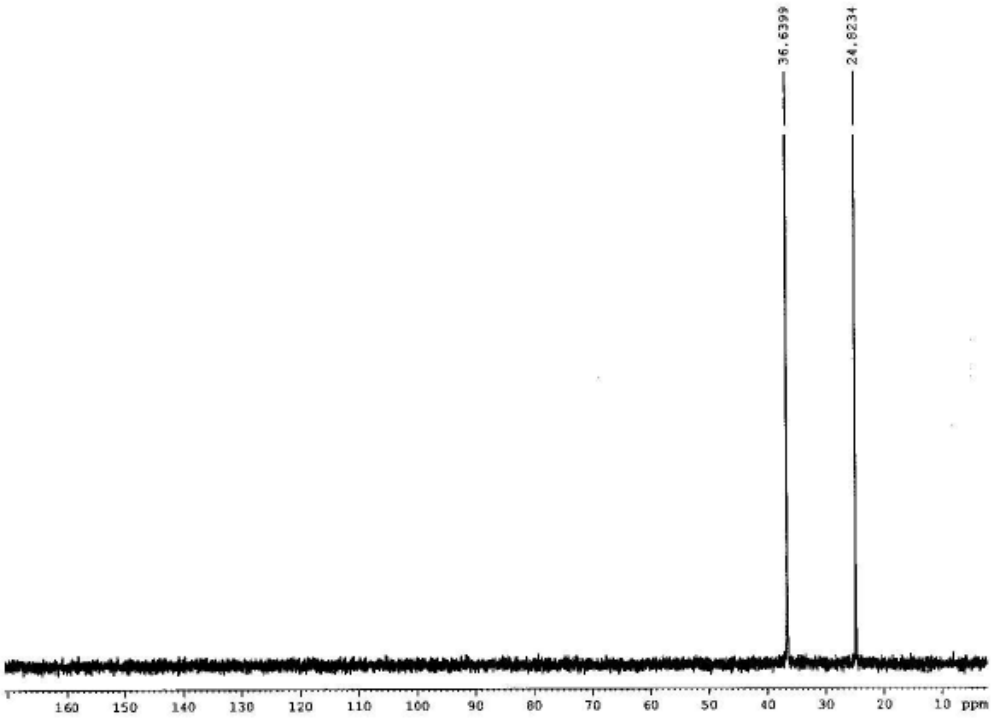


Figura A.32: RMN $^{13}C$ do Diaminopropano

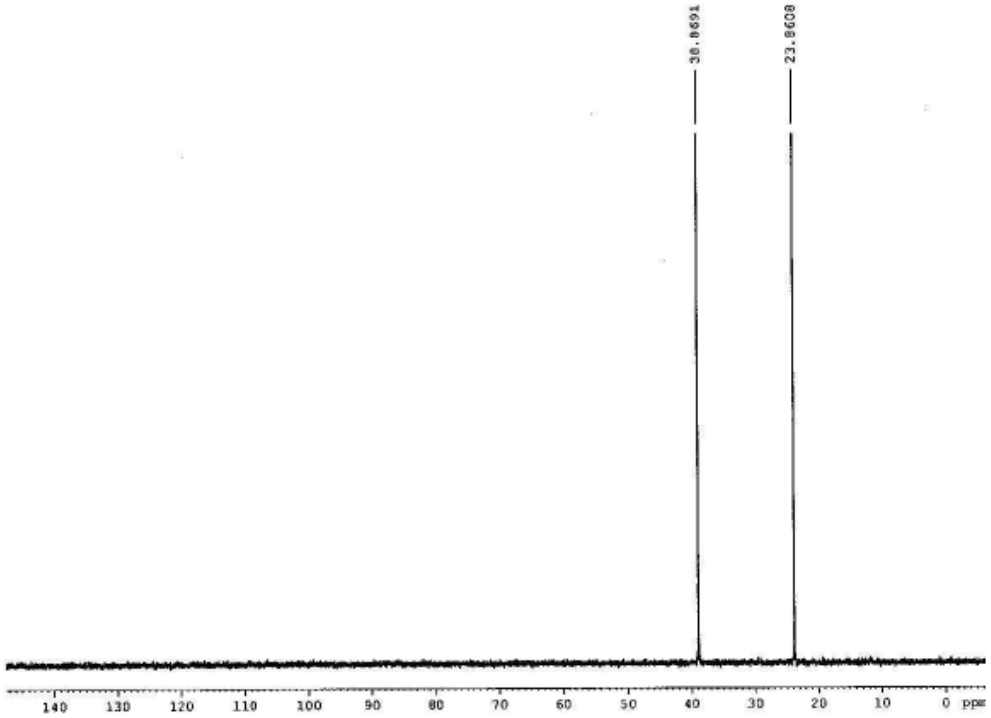


Figura A 33: RMN $^{13}C$ do Diaminobutano

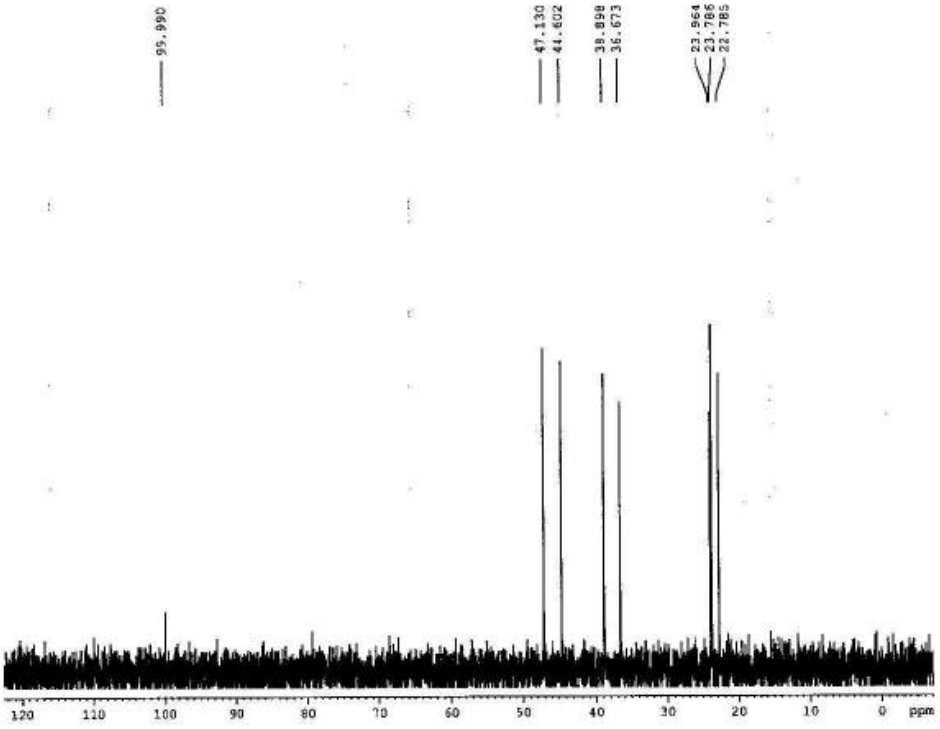


Figura A.34: RMN $^{13}C$ da Espermidina

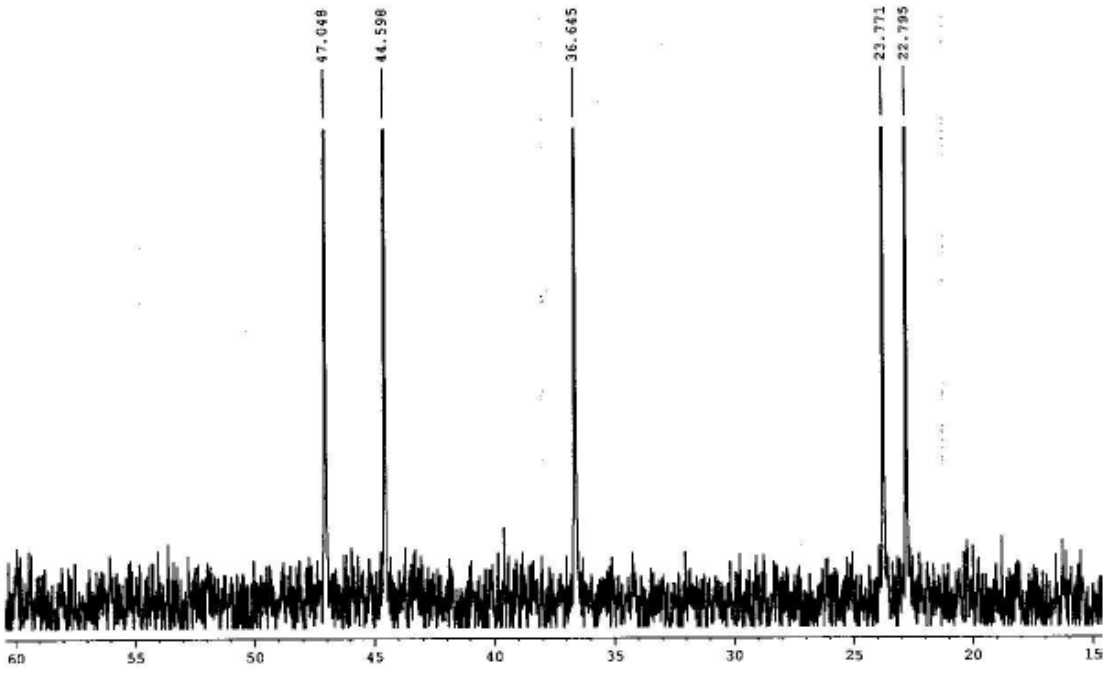


Figura A.35: RMN $^{13}C$ da Espermina

## 8.2
## Anexo B – Complexos do tipo PA[$ZnCl_4$]

### 8.2.1
### Análise Termogravimétrica

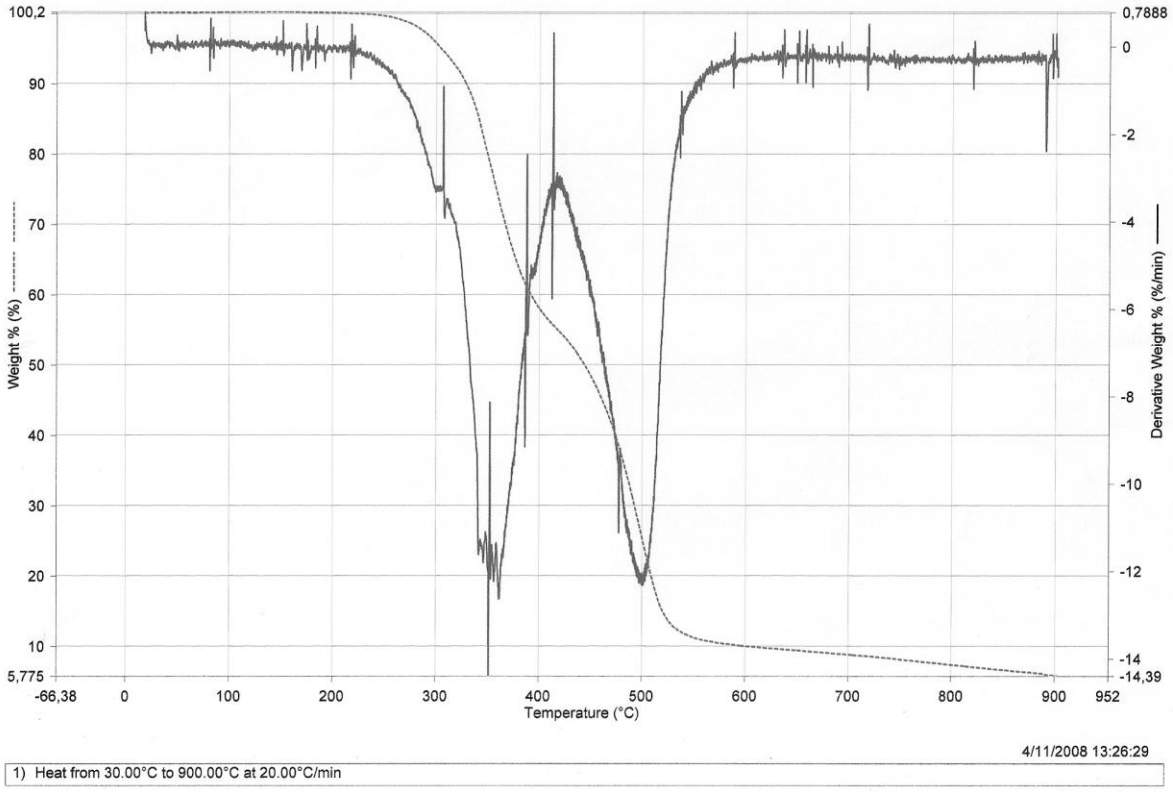


Figura B.36: TGA e DTG do Etilenodiamina[$ZnCl_4$]

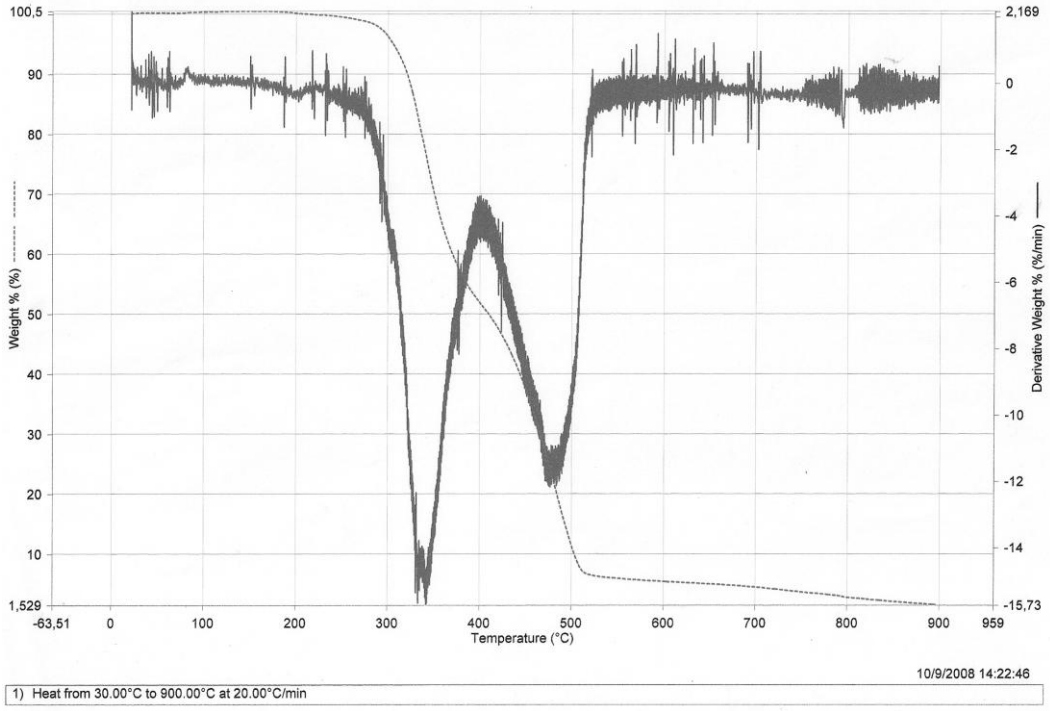


Figura B.37: TGA e DTG do Diaminopropano[$ZnCl_4$]

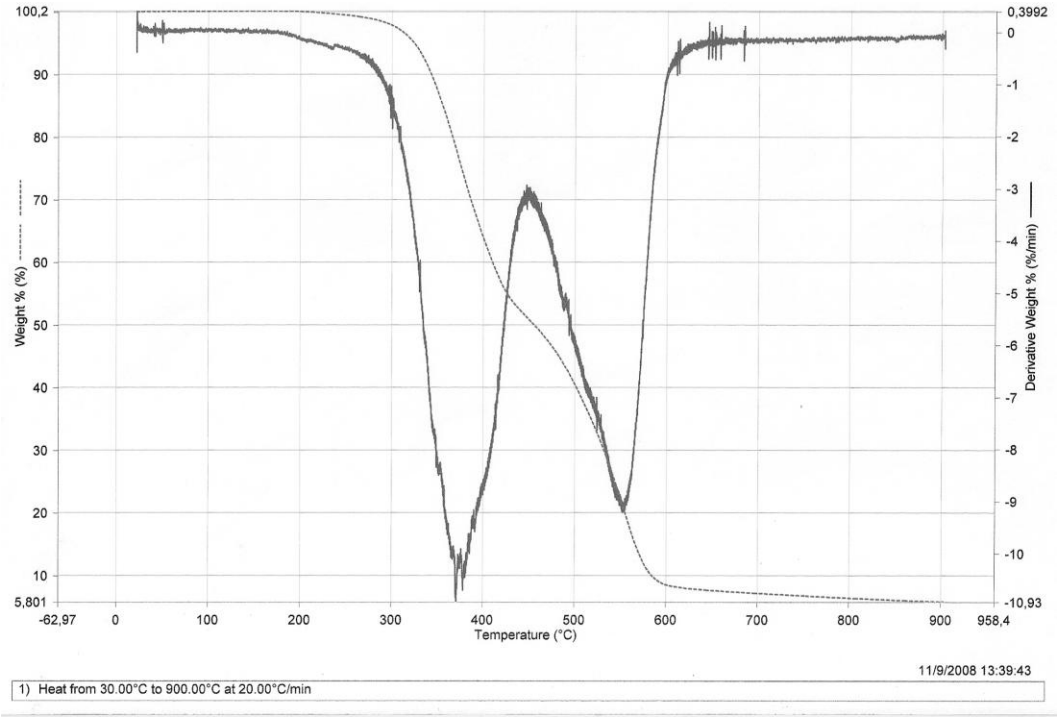


Figura B.38: TGA e DTG do Diaminobutano[$ZnCl_4$]

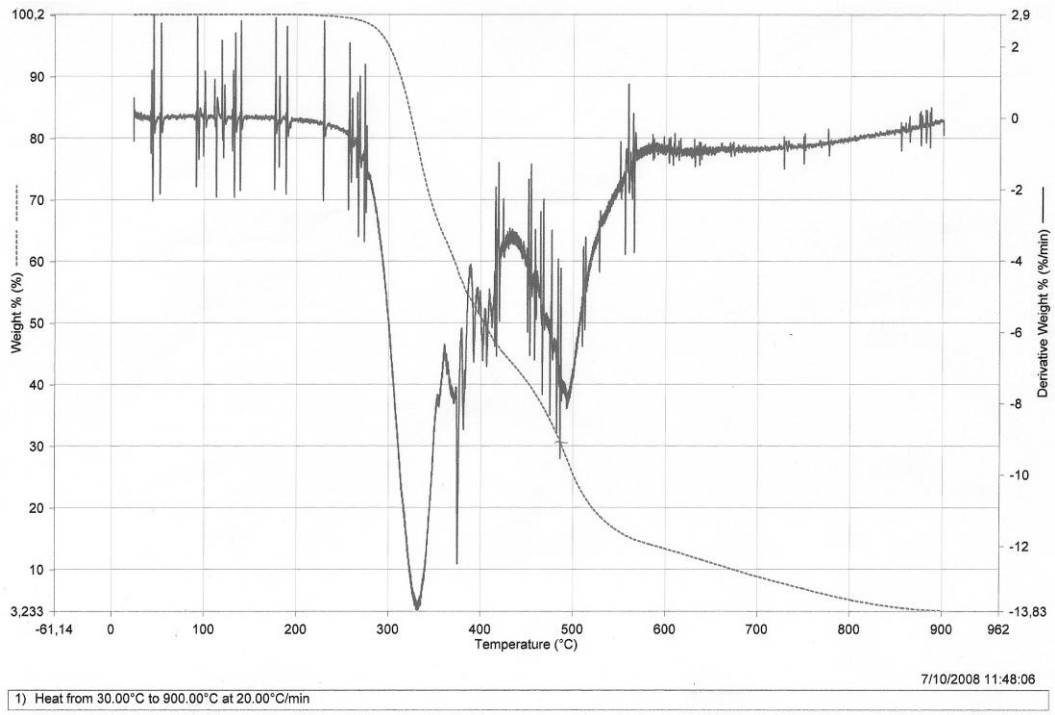


Figura B.39: TGA e DTG do Espermidina[$ZnCl_4$]

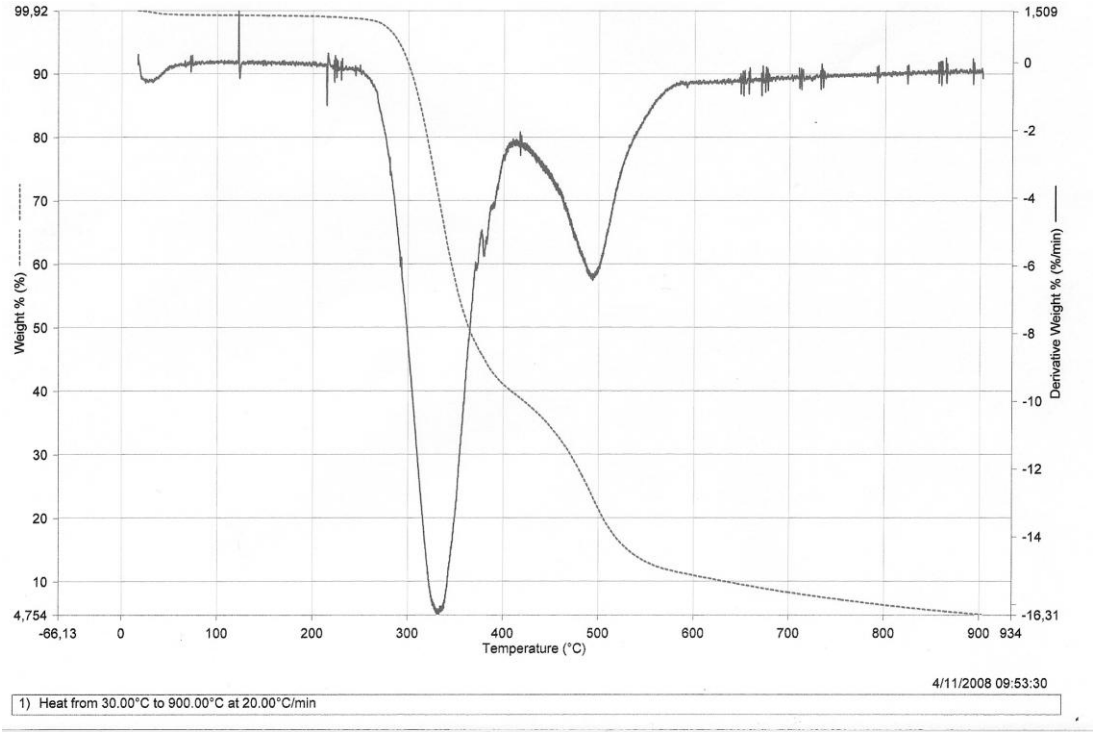


Figura B.40: TGA e DTG do Espermina[$ZnCl_4$]

## 8.2.2
## Espectroscopia de Infravermelho

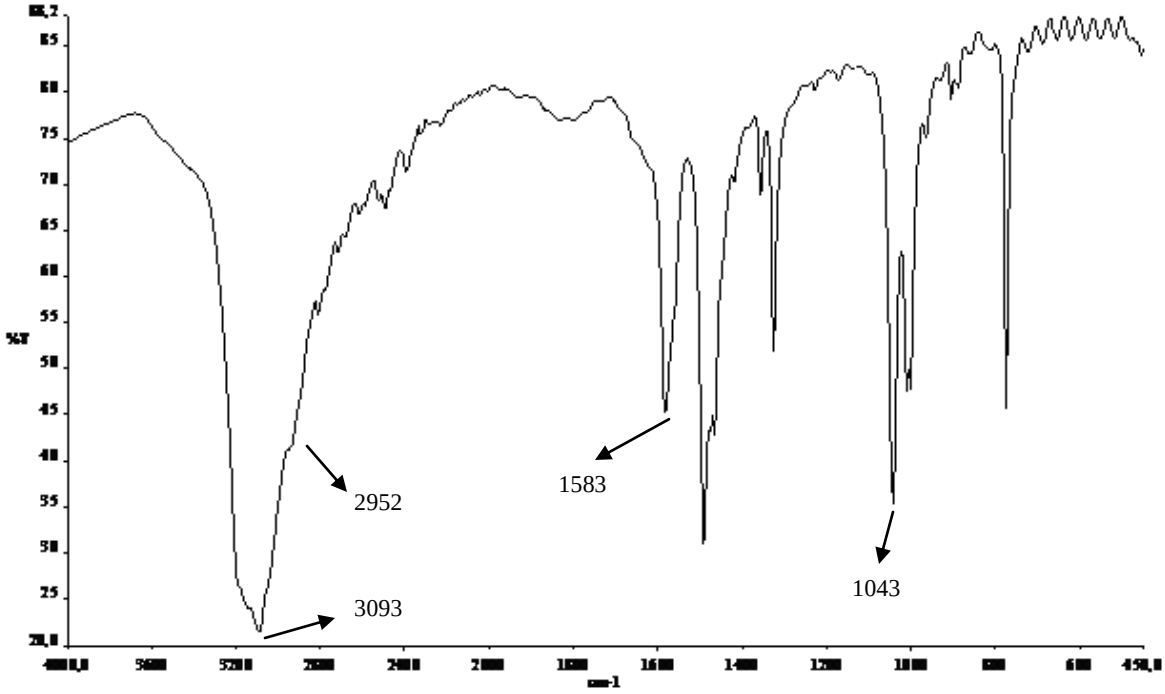


Figura B.41: Espectro de IV na região de média freqüência do Etilenodiamina[$ZnCl_4$]

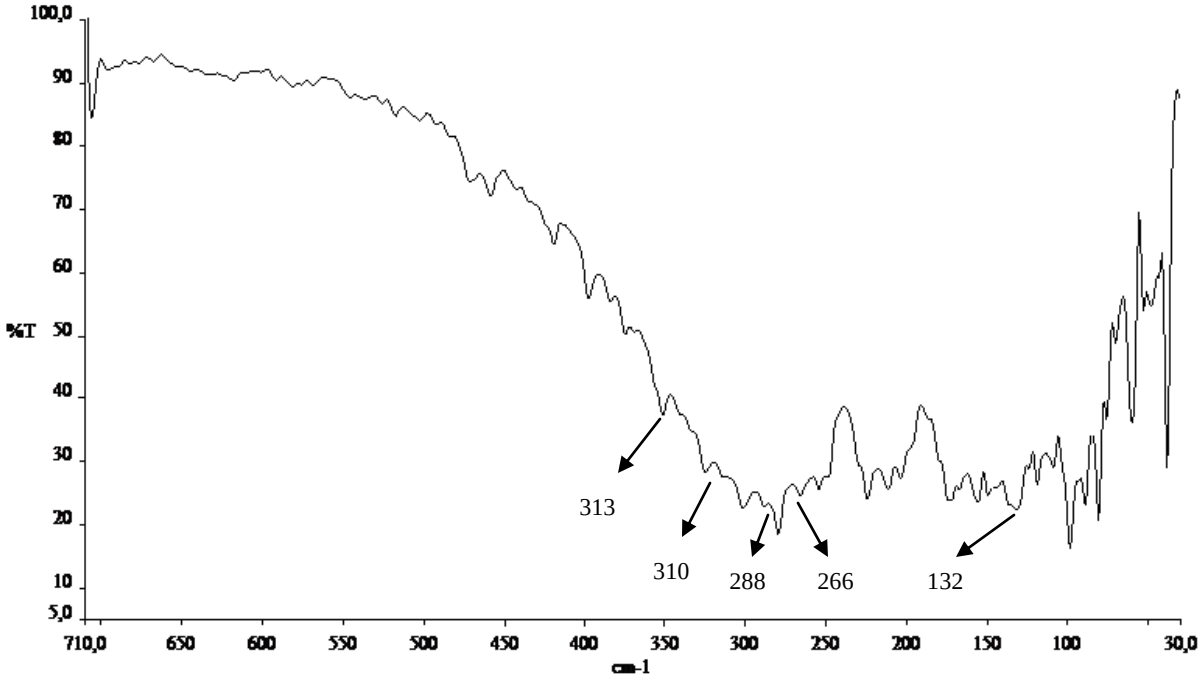


Figura B.42: Espectro de IV na região de baixa freqüência do Etilenodiamina[$ZnCl_4$]

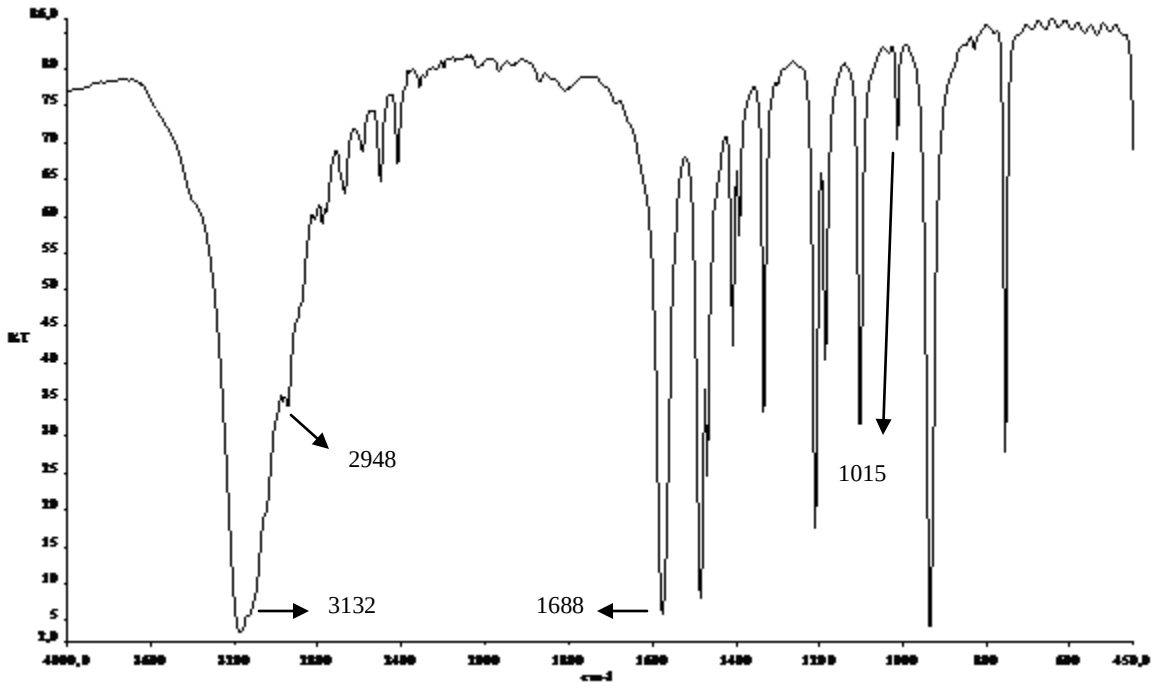


Figura B.43: Espectro de IV na região de média freqüência do Diaminopropano[$ZnCl_4$]

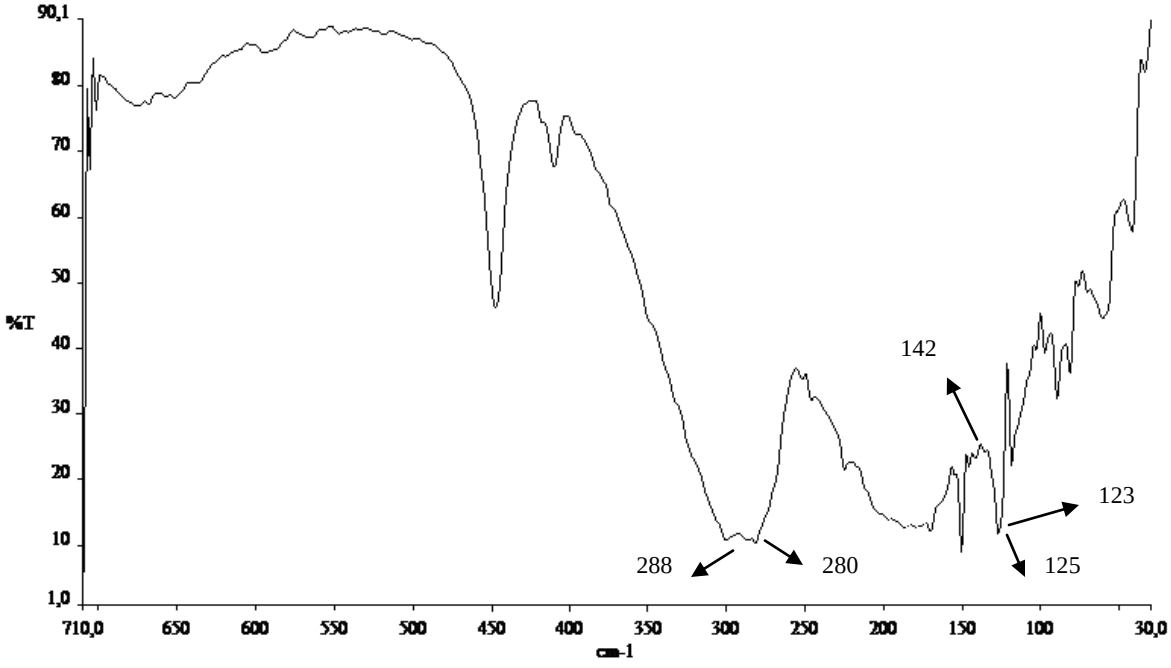


Figura B.44: Espectro de IV na região de baixa freqüência do Diaminopropano[$ZnCl_4$]

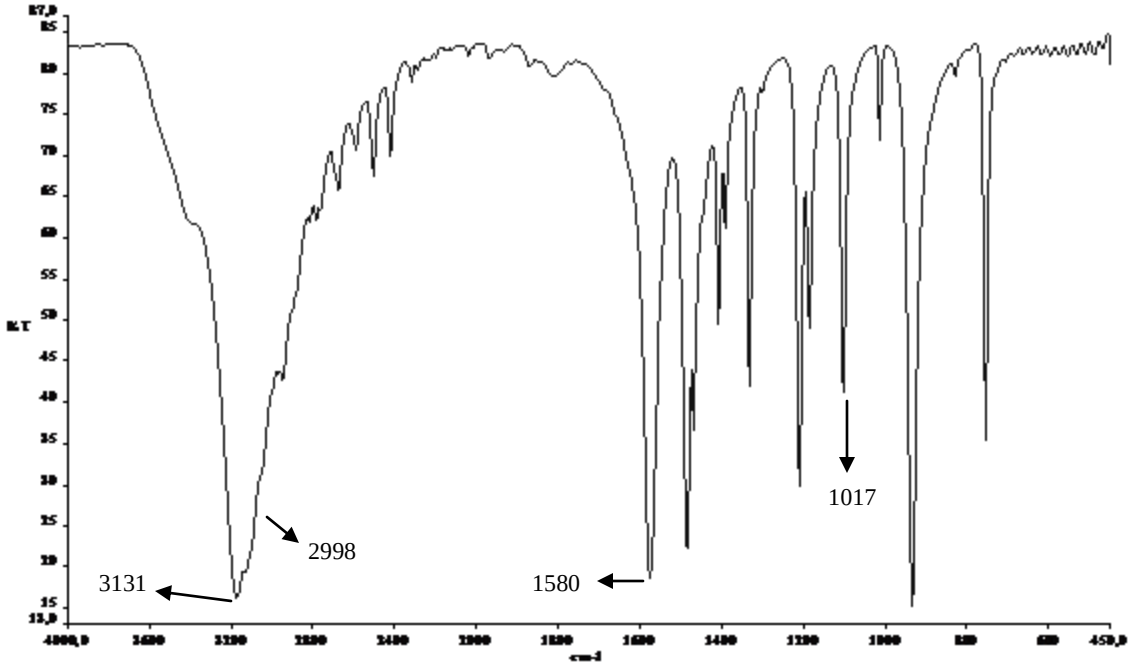


Figura B.45: Espectro de IV na região de média frequência do Diaminobutano[$ZnCl_4$]

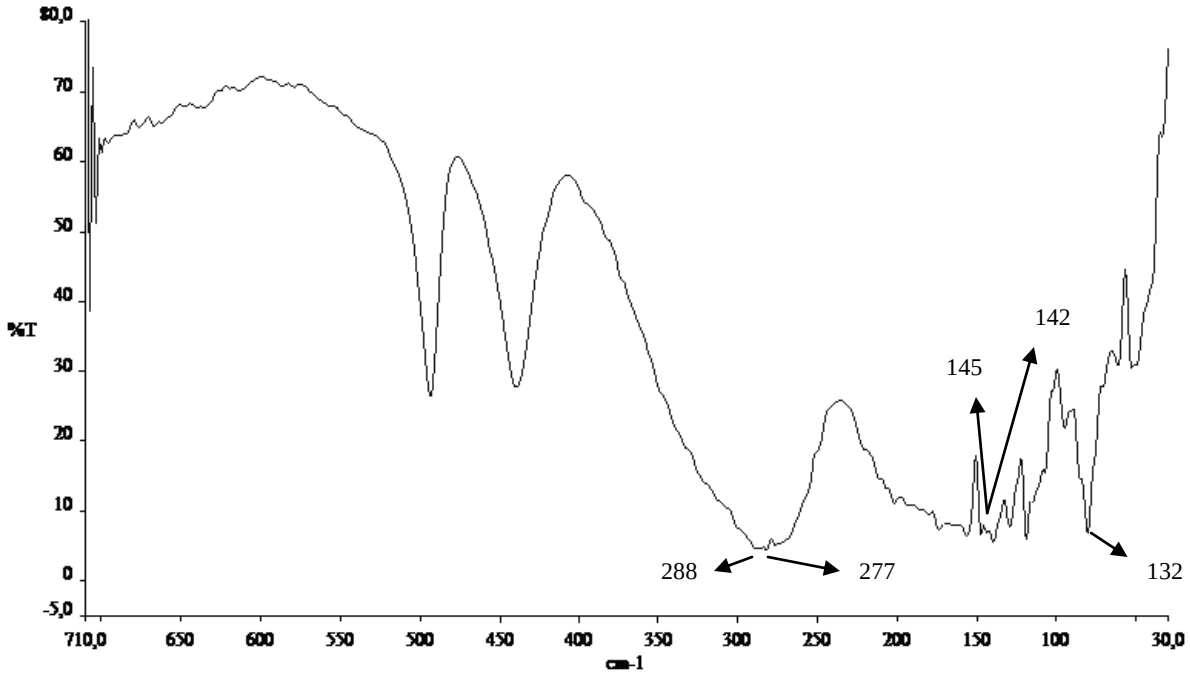


Figura B.46: Espectro de IV na região de baixa frequência do Diaminobutano[$ZnCl_4$]

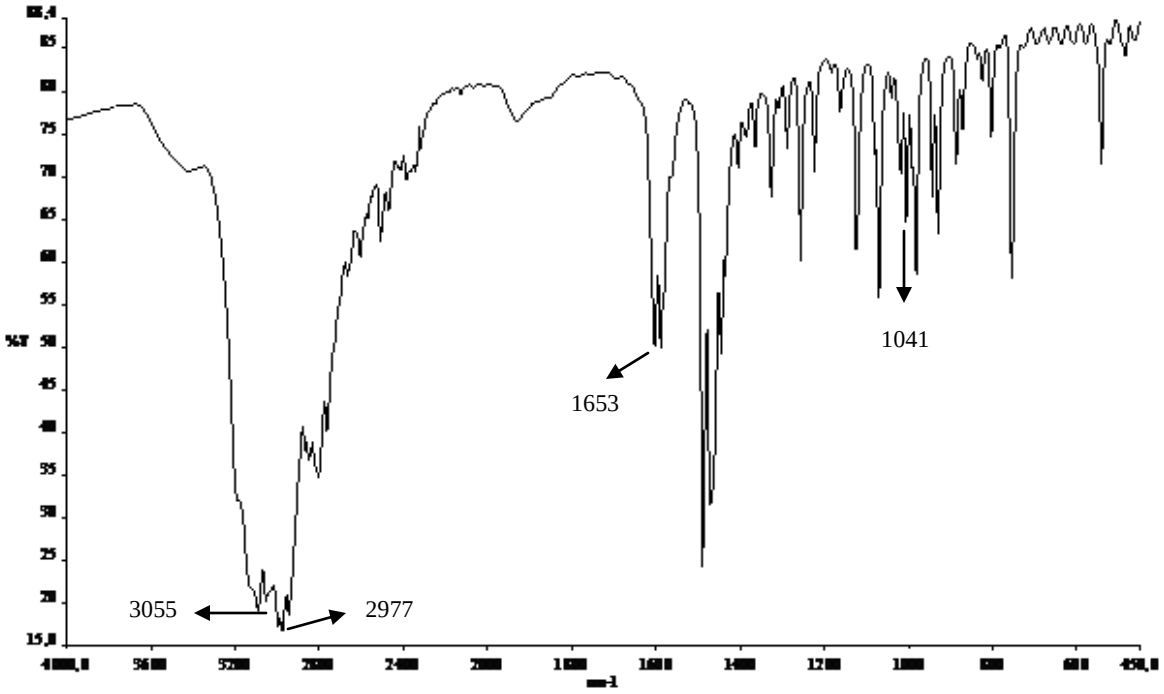


Figura B.47: Espectro de IV na região de média frequência do Espermidina[$ZnCl_4$]

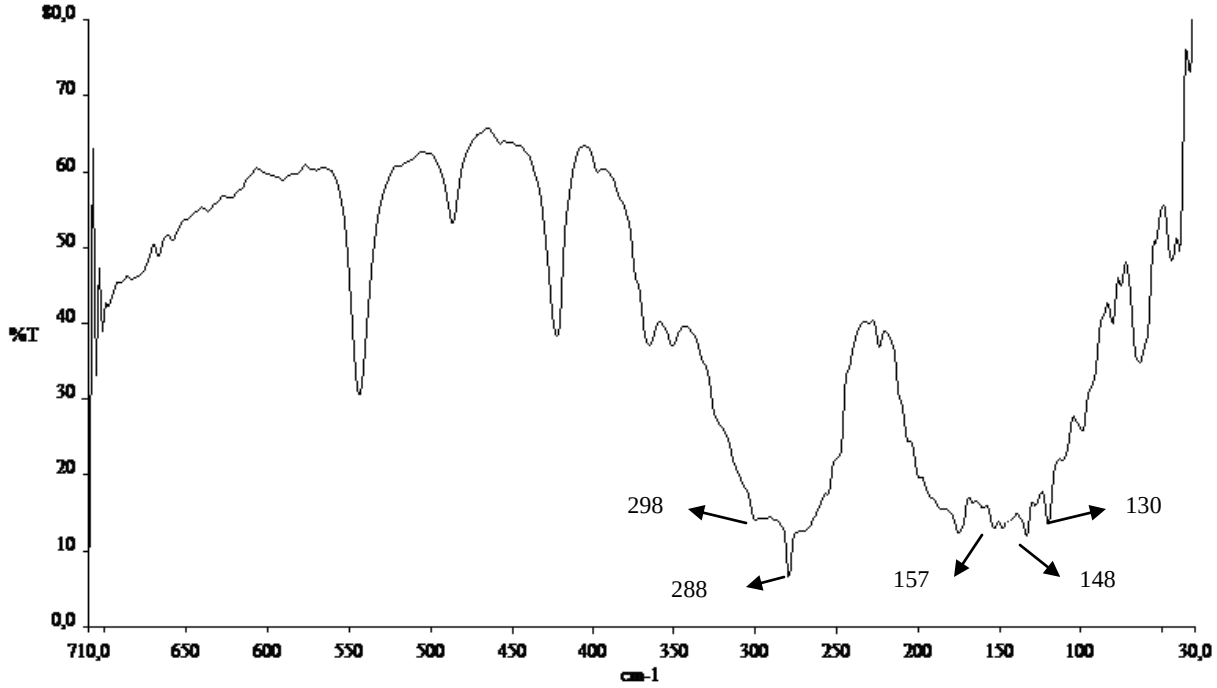


Figura B.48: Espectro de IV na região de média frequência do Espermidina[$ZnCl_4$]

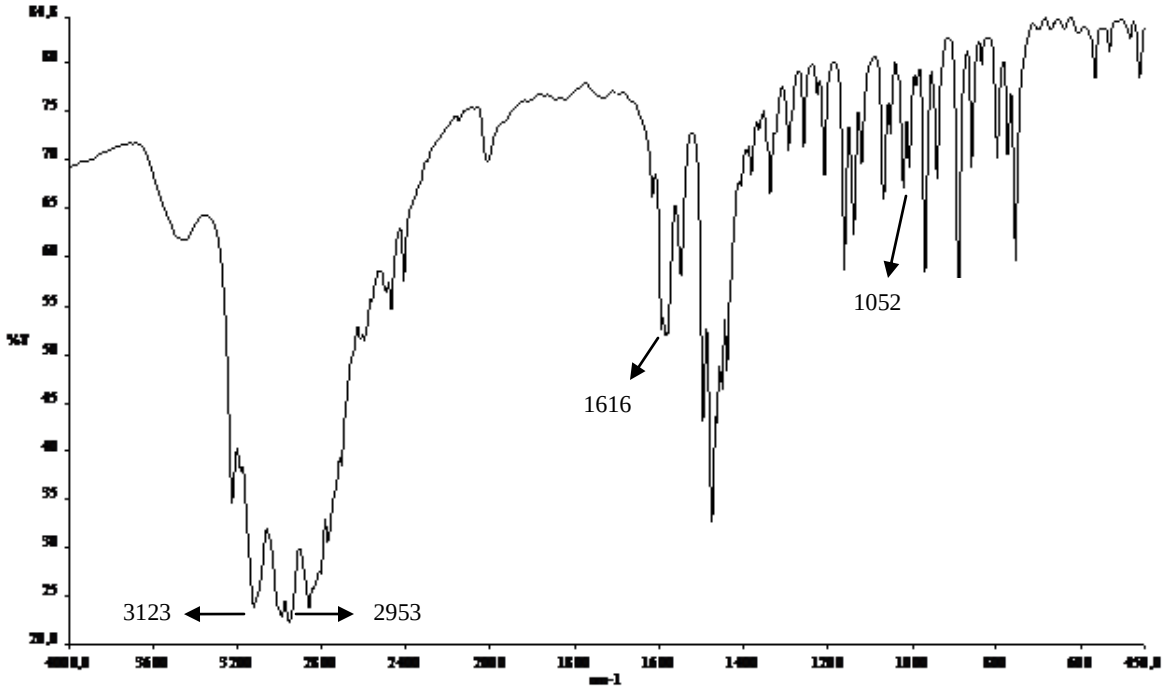


Figura A.49: Espectro de IV na região de média frequência do Espermina[$ZnCl_4$]

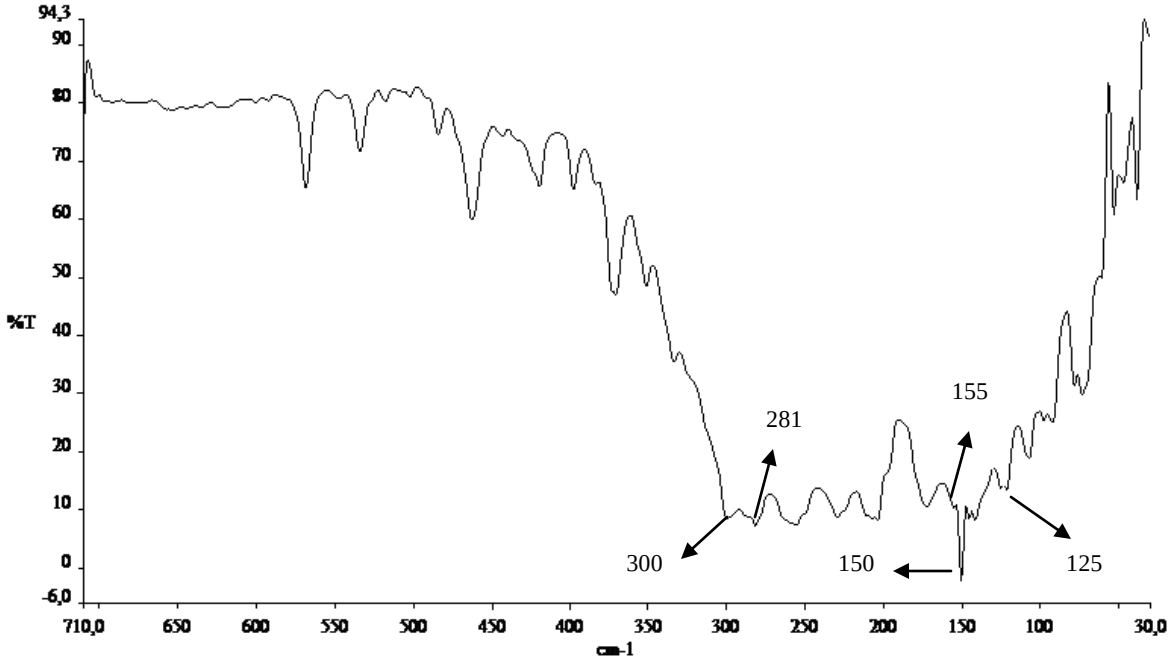


Figura B.50: Espectro de IV na região de baixa frequência do Espermina[$ZnCl_4$]

## 8.2.3
## Espectroscopia Raman

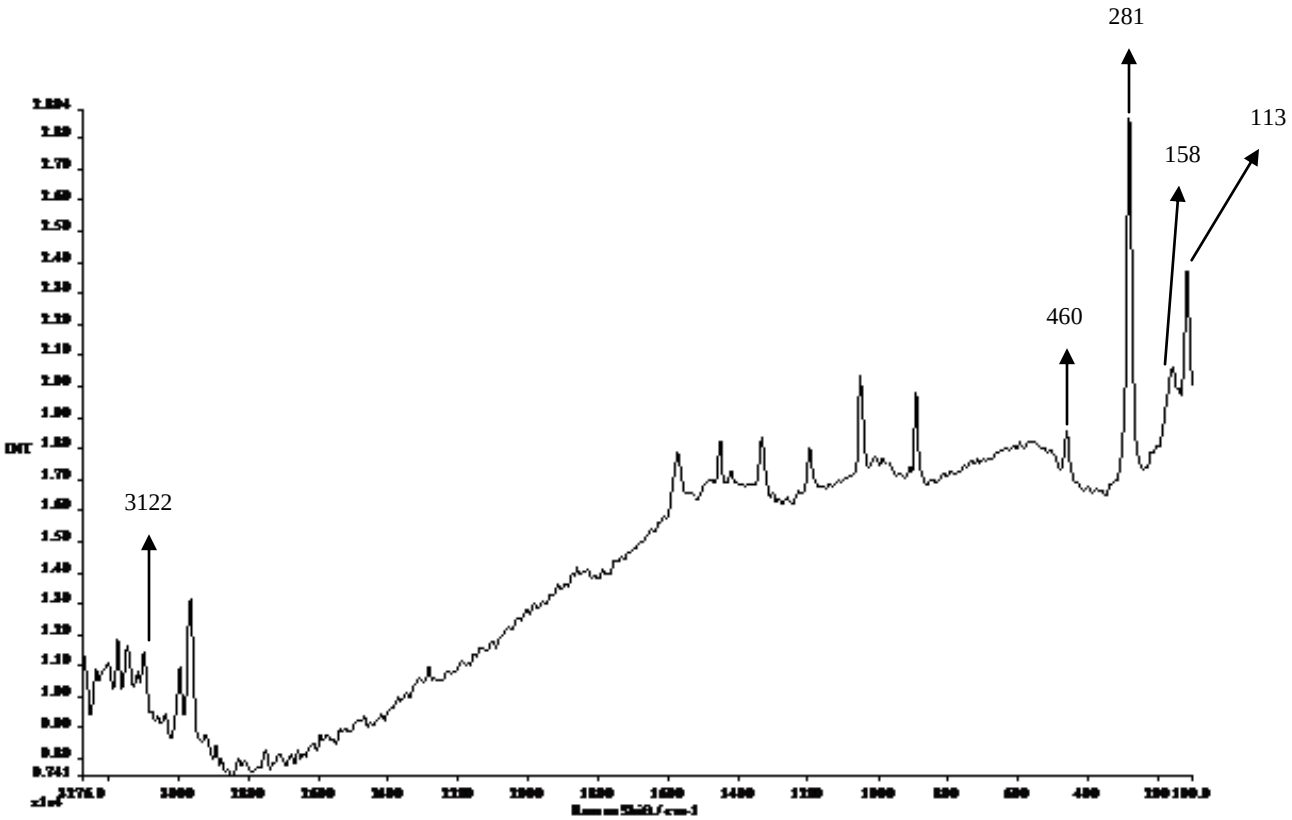


Figura B.51: Espectro de Raman do Etilenodiamina[$ZnCl_4$]

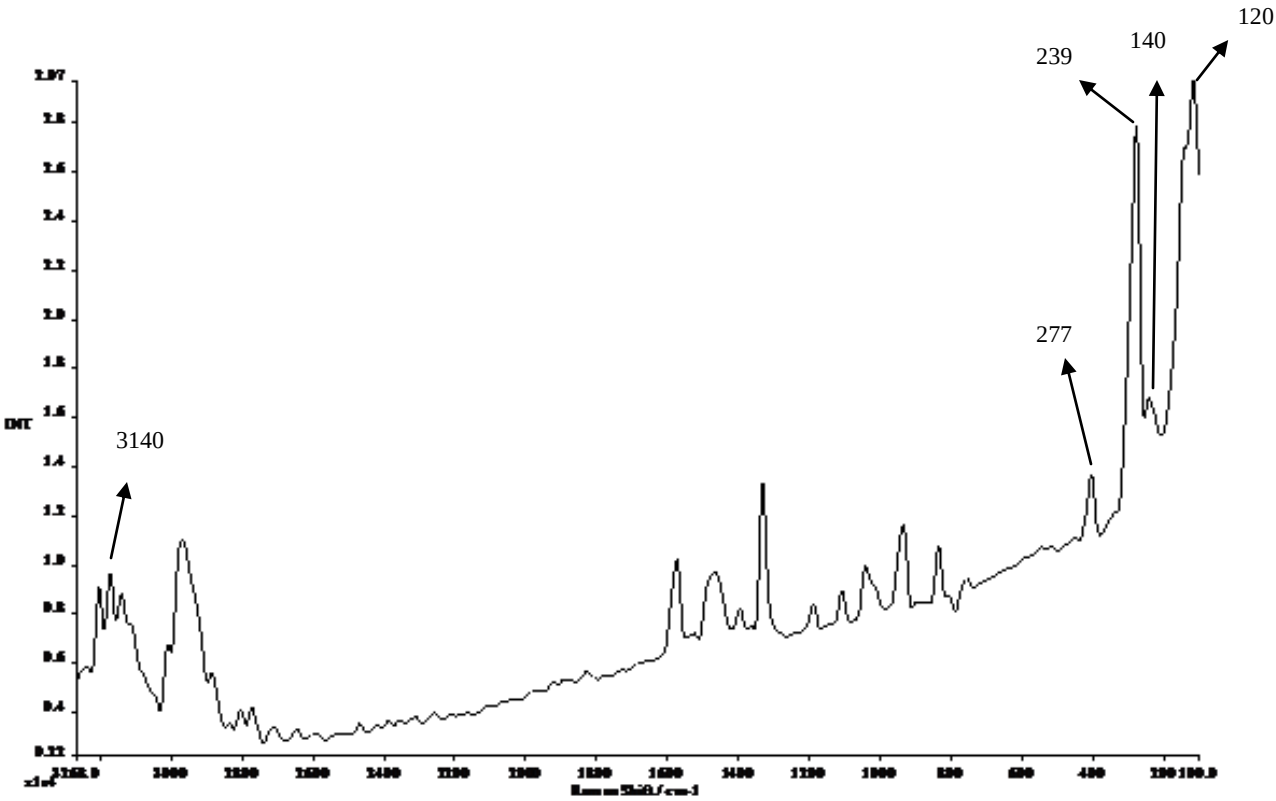


Figura B.52: Espectro de Raman do Diaminopropano[$ZnCl_4$]

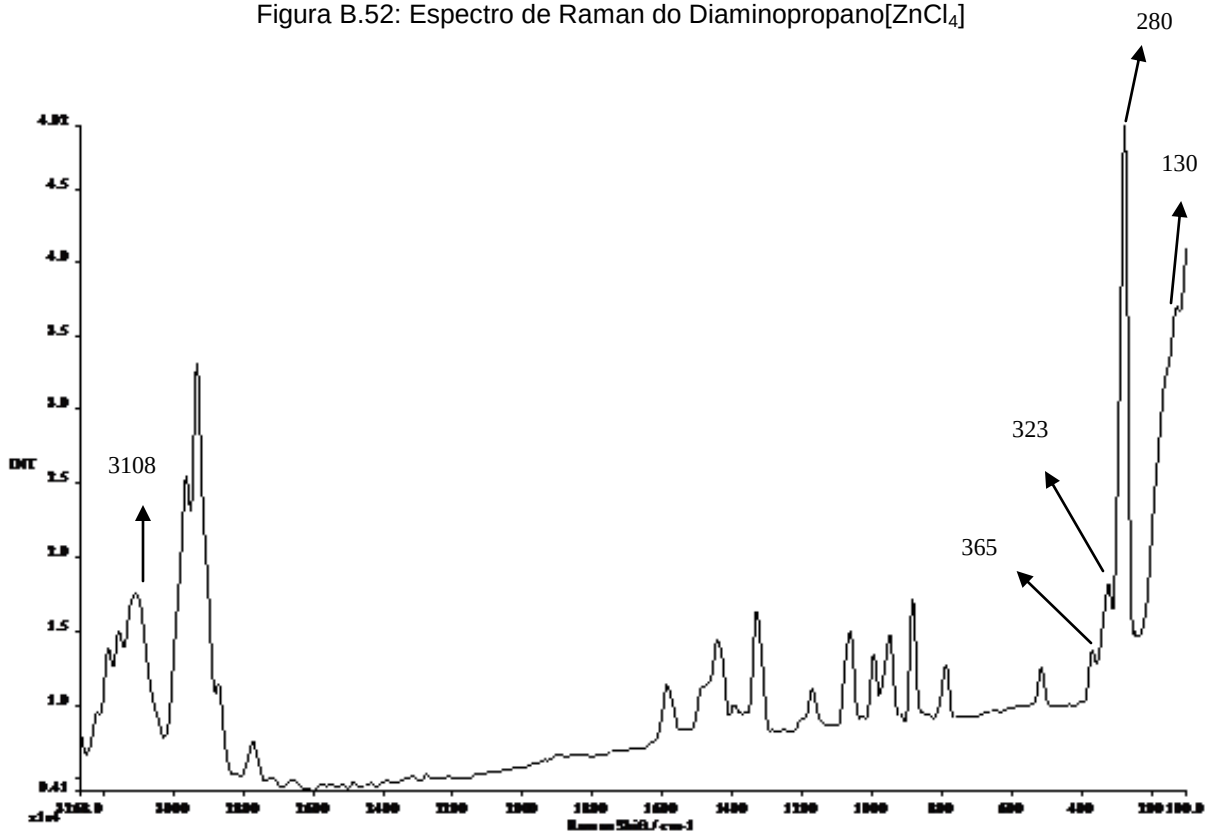


Figura B.53: Espectro de Raman do Diaminobutano[$ZnCl_4$]

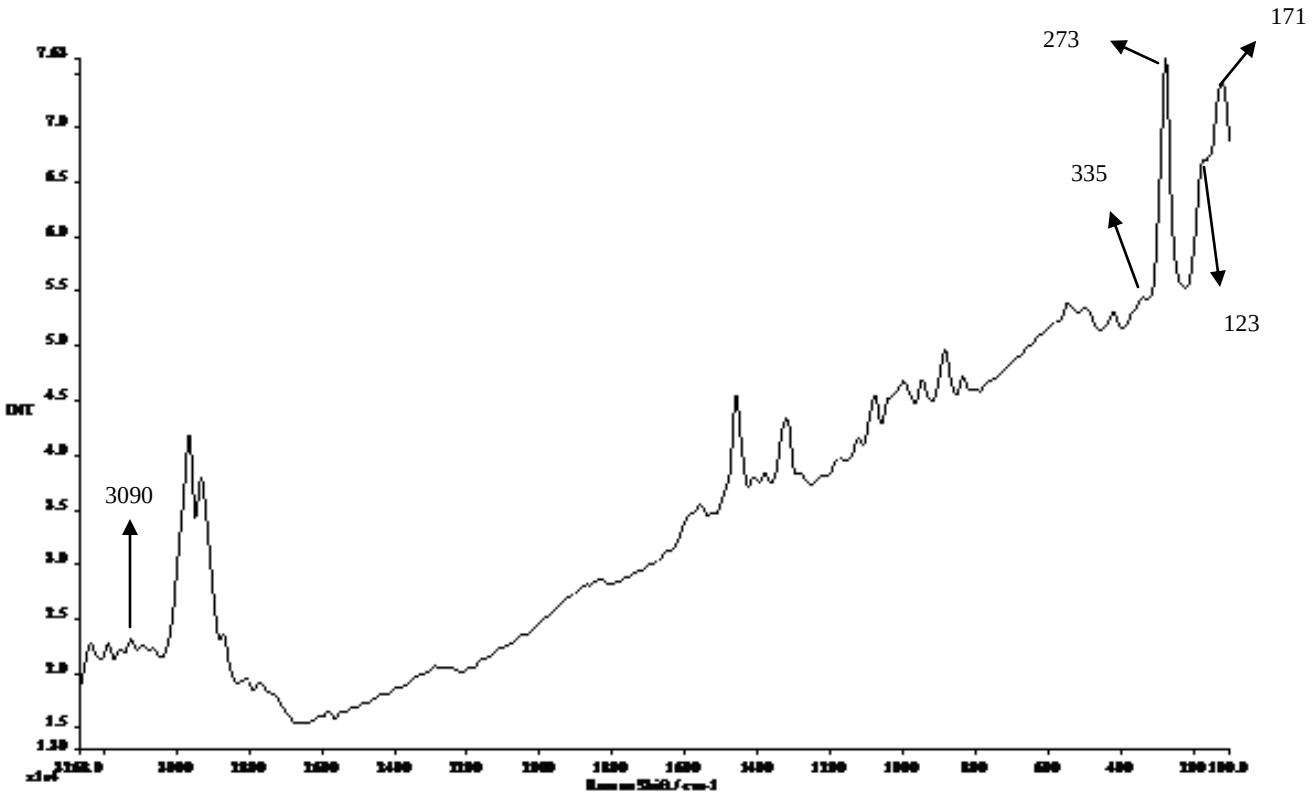


Figura B.54: Espectro de Raman do Espermidina[$ZnCl_4$]

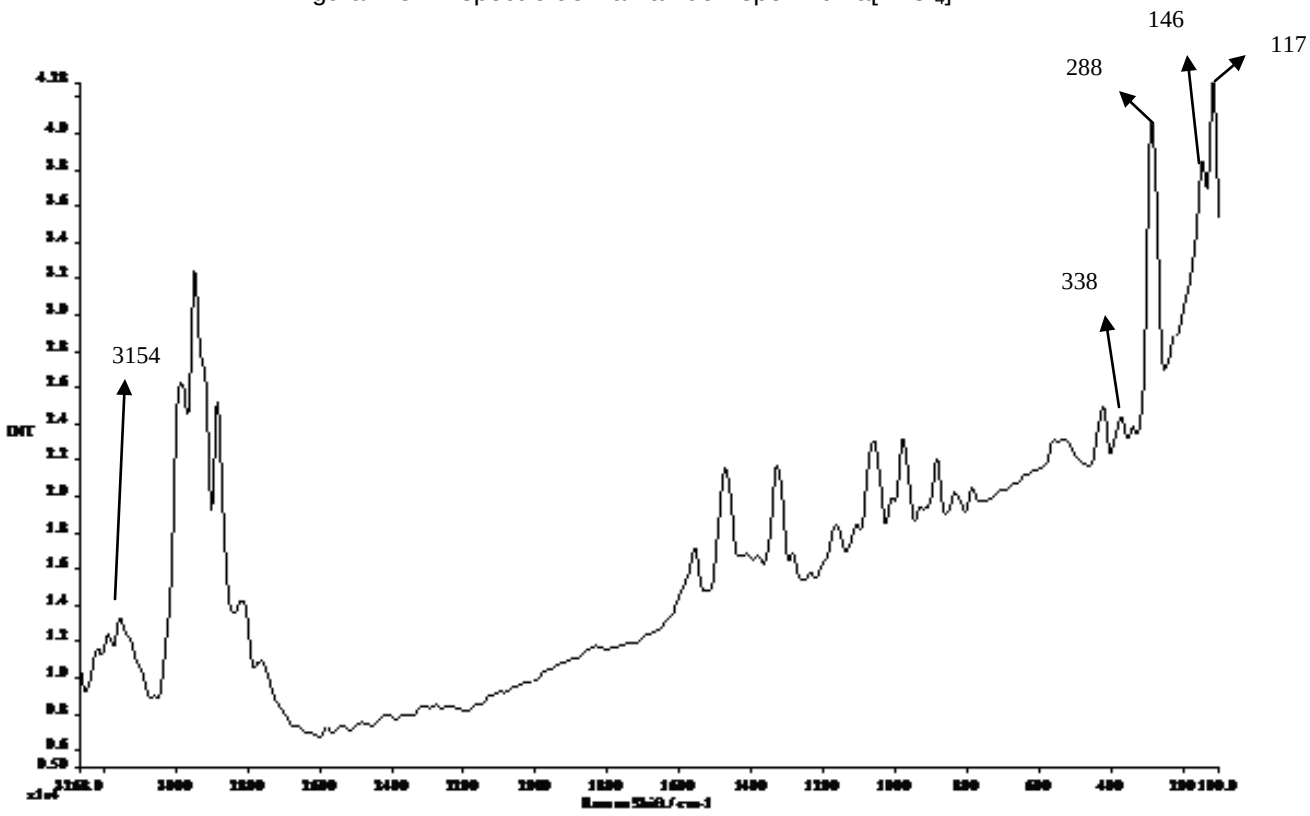


Figura B.55: Espectro de Raman do Espermina[$ZnCl_4$]

## 8.2.5
## Espectroscopia no Ultravioleta-Visível

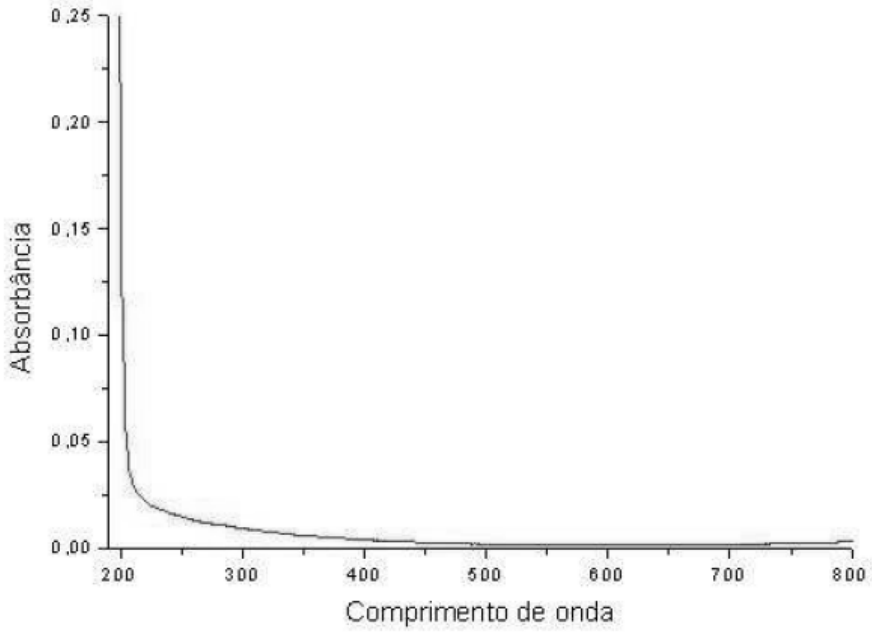


Figura B.56: Espectrocopia UV-Vis do Etilenodiamina[$ZnCl_4$]

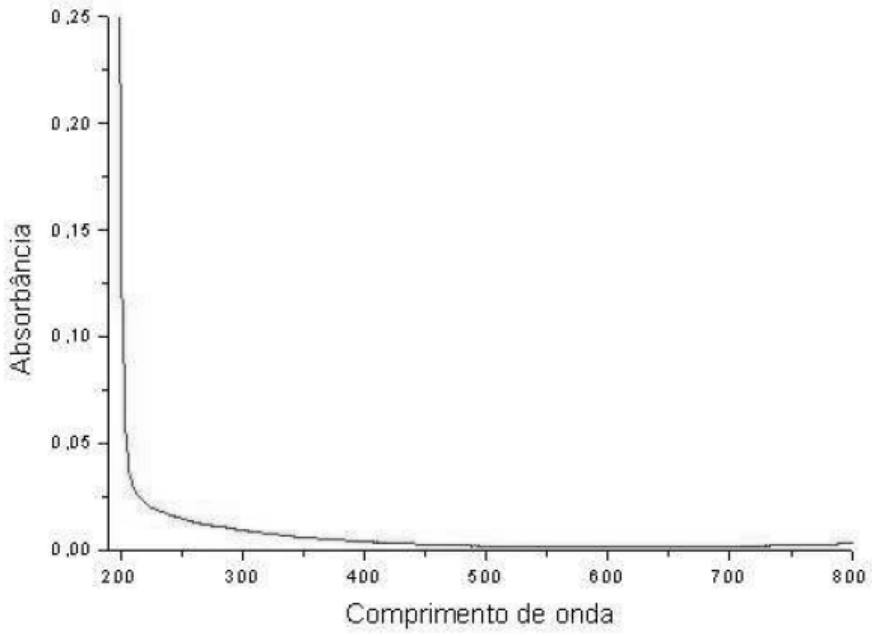


Figura B.57: Espectrocopia UV-Vis do Diaminopropano[$ZnCl_4$]

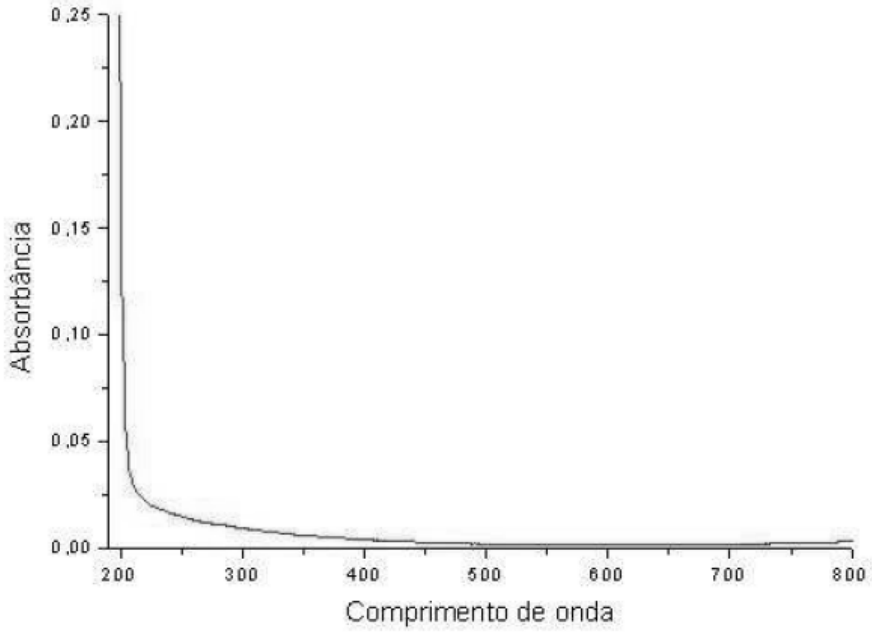


Figura B.58: Espectrocopia UV-Vis do Diaminobutano[$ZnCl_4$]

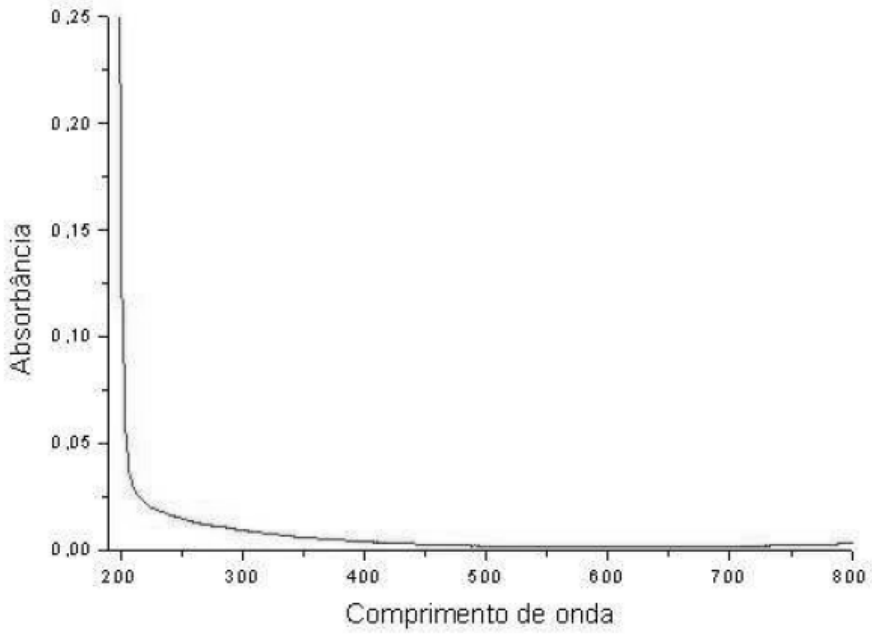


Figura B.59: Espectrocopia UV-Vis do Espermidina[$ZnCl_4$]

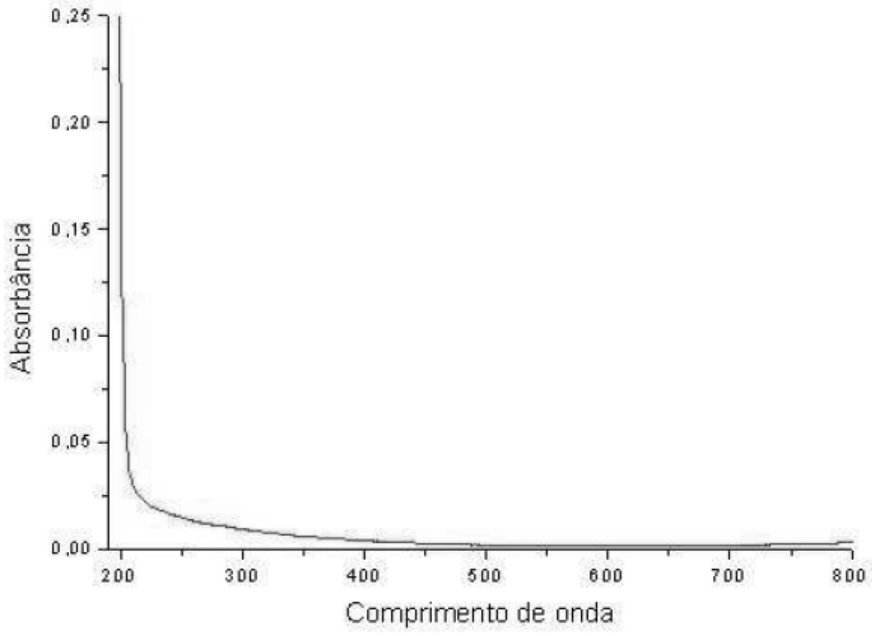


Figura B.60: Espectrocopia UV-Vis do Espermina[$ZnCl_4$]

## 8.2.6
## Espectroscopia de Ressonância Magnética Nuclear de Hidrogênio

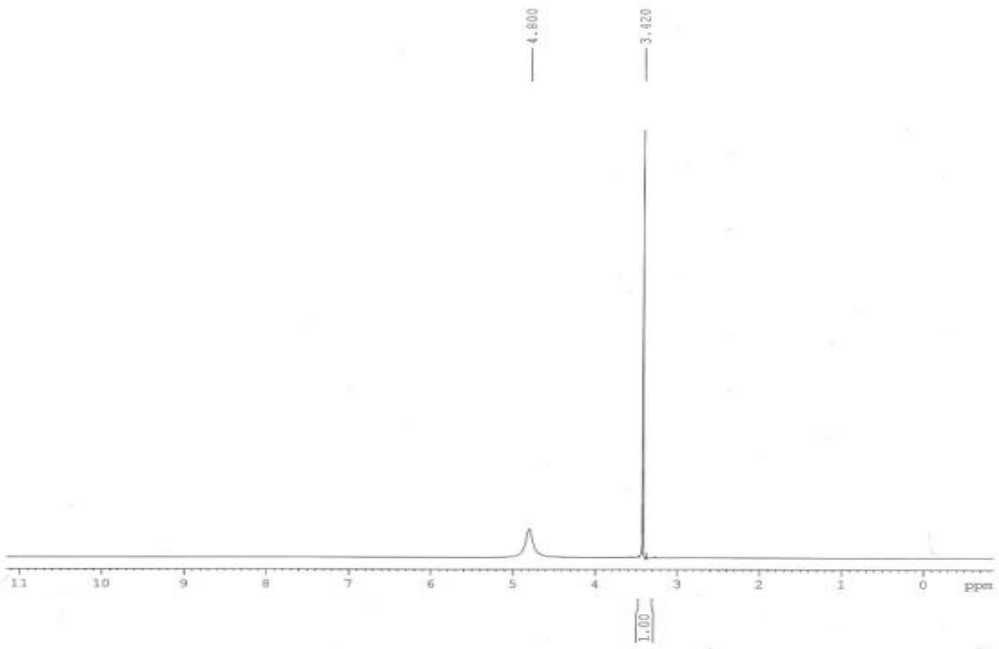


Figura B.61: RMN $^{1}H$ do Etilenodiamina[$ZnCl_4$]

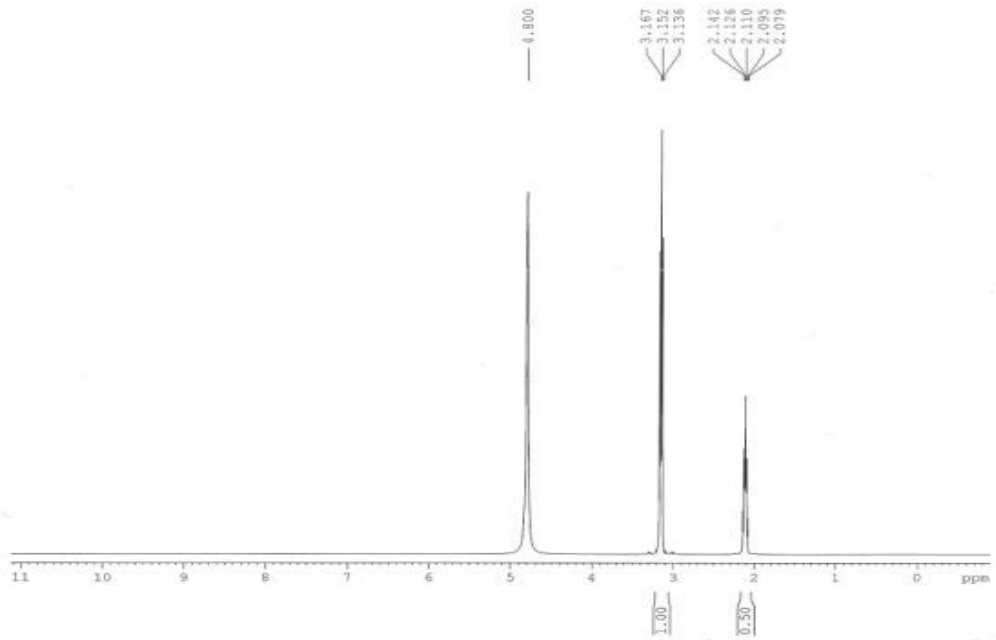


Figura B.61: RMN $^{1}H$ do Diaminopropano[$ZnCl_4$]

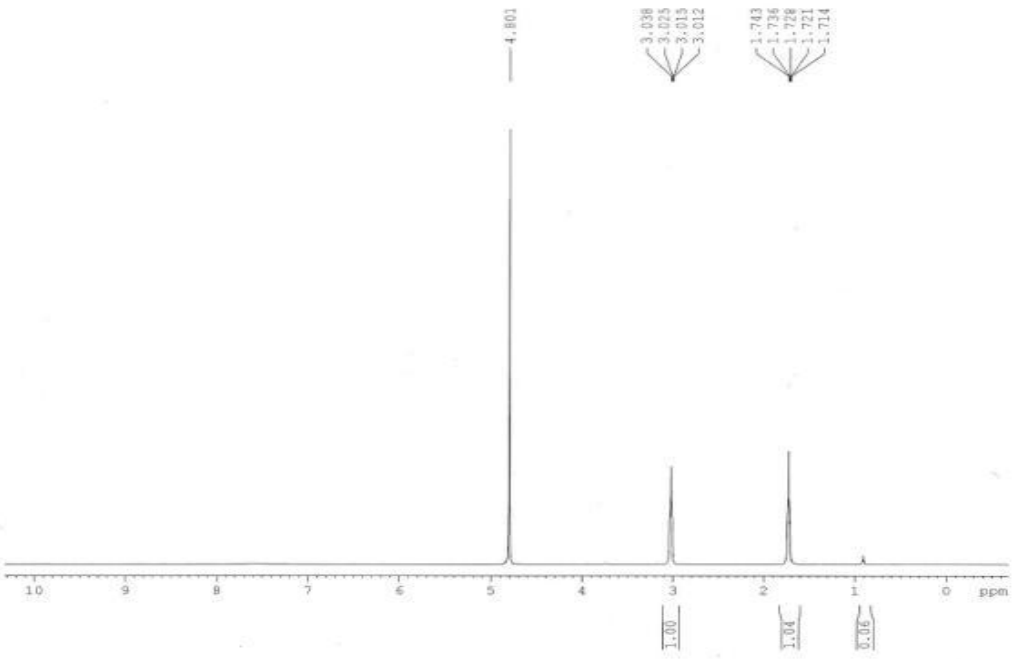


Figura B.62: RMN $^{1}H$ do Diaminobutano[$ZnCl_4$]

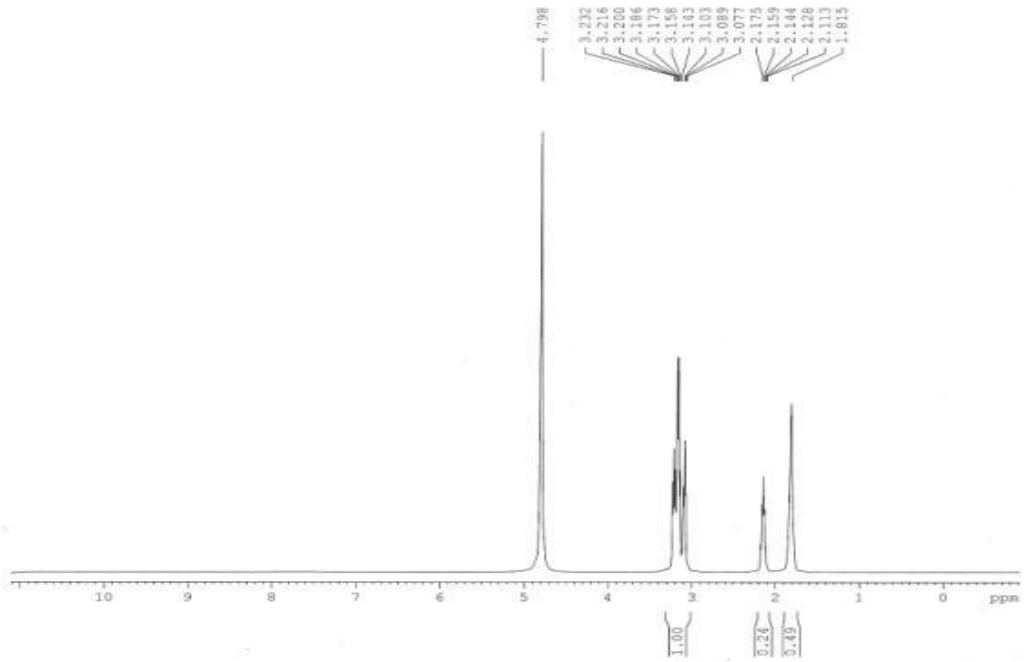


Figura B.63: RMN $^{1}H$ do Espermidina[$ZnCl_4$]

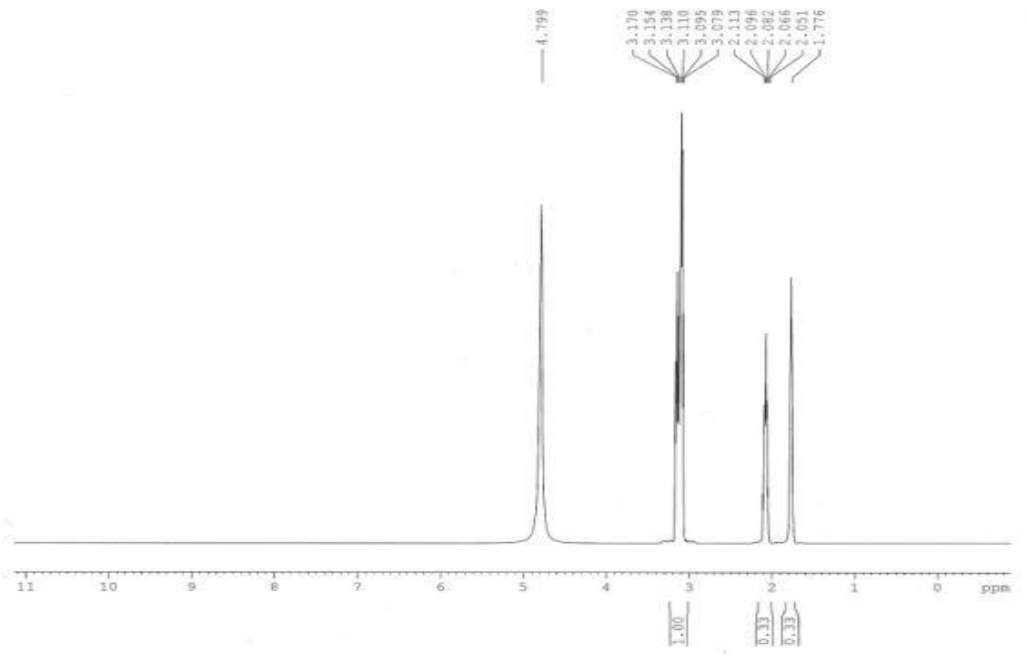


Figura B.65: RMN $^{1}H$ do Espermina[$ZnCl_4$]

## 8.2.7
## Espectroscopia de Ressonância Magnética Nuclear de Carbono 13

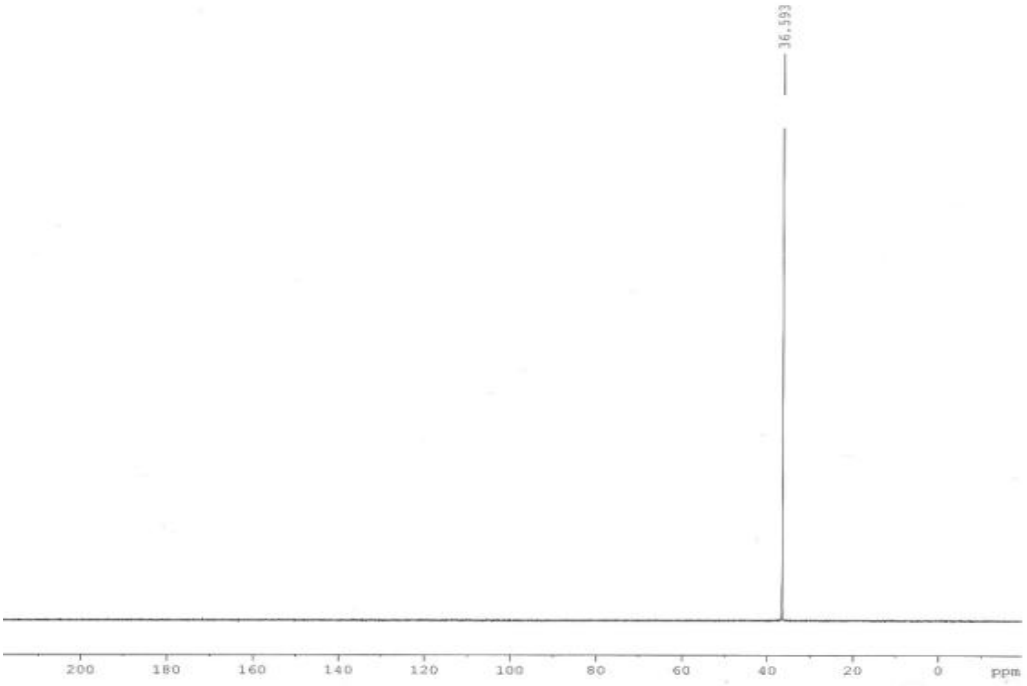


Figura B.66: RMN $^{13}C$ do Etilenodiamina[$ZnCl_4$]

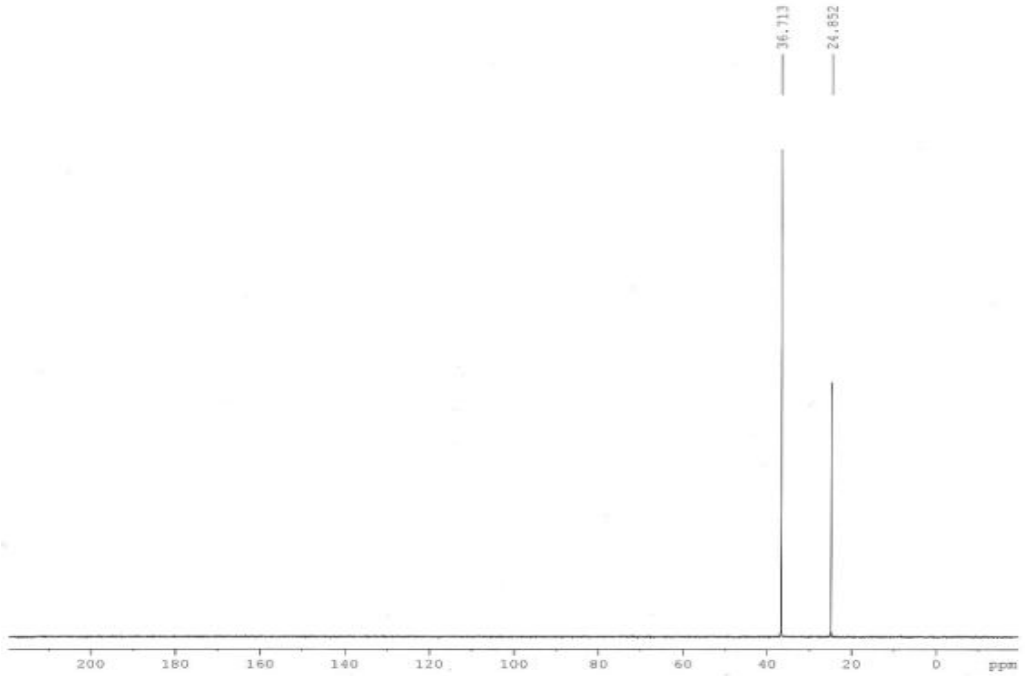


Figura B.67: RMN $^{13}C$ do Diaminopropano[$ZnCl_4$]

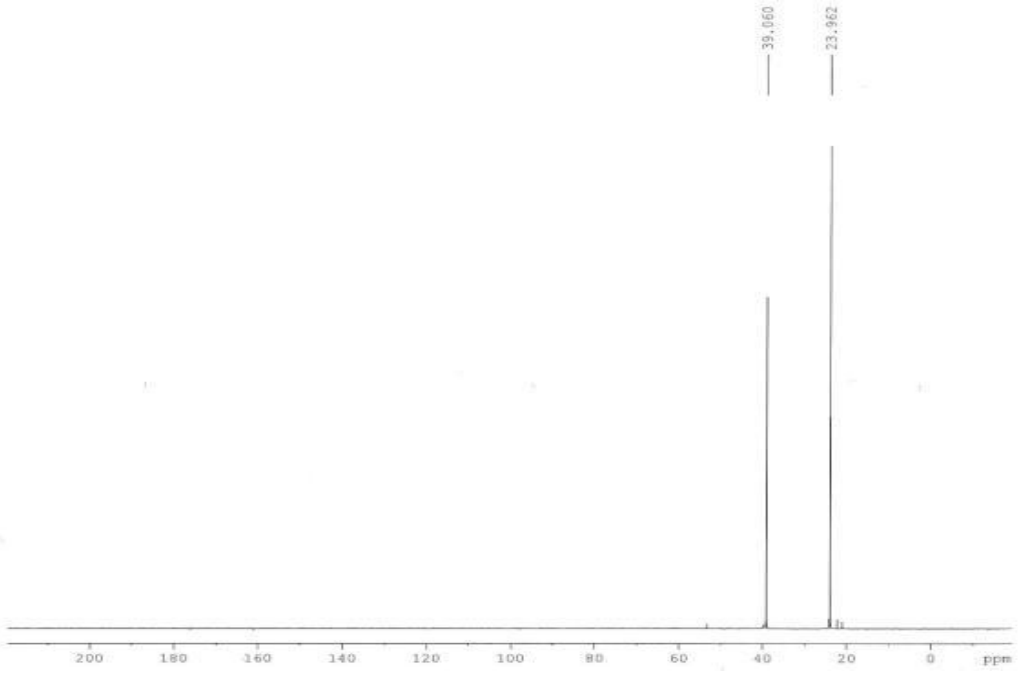


Figura B.68: RMN $^{13}C$ do Diaminobutano[$ZnCl_4$]

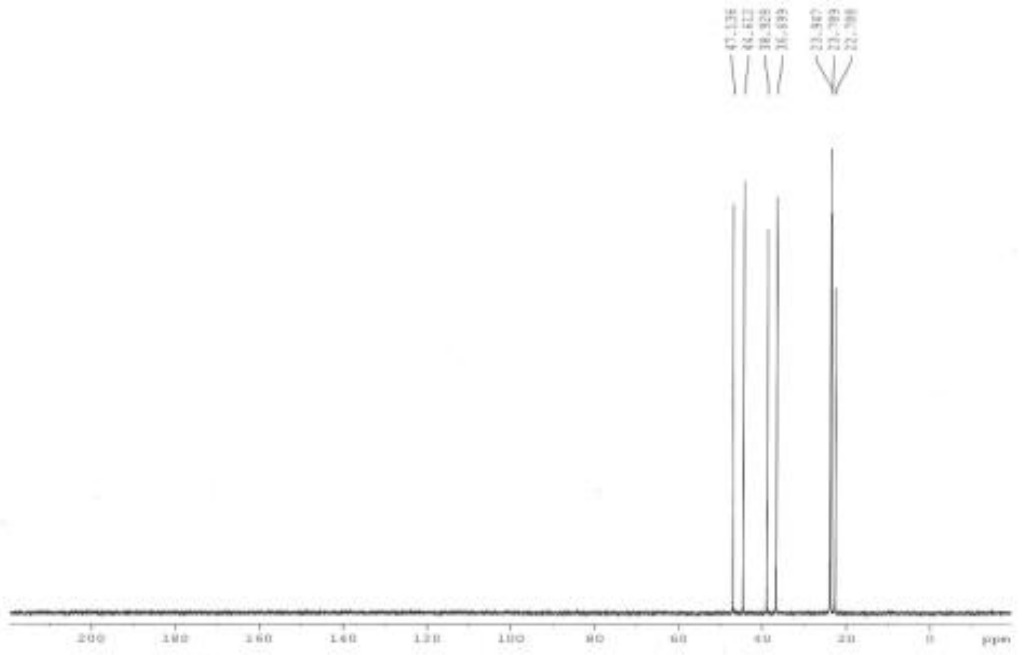


Figura B.69: RMN $^{3}C$ do Espermidina[$ZnCl_4$]

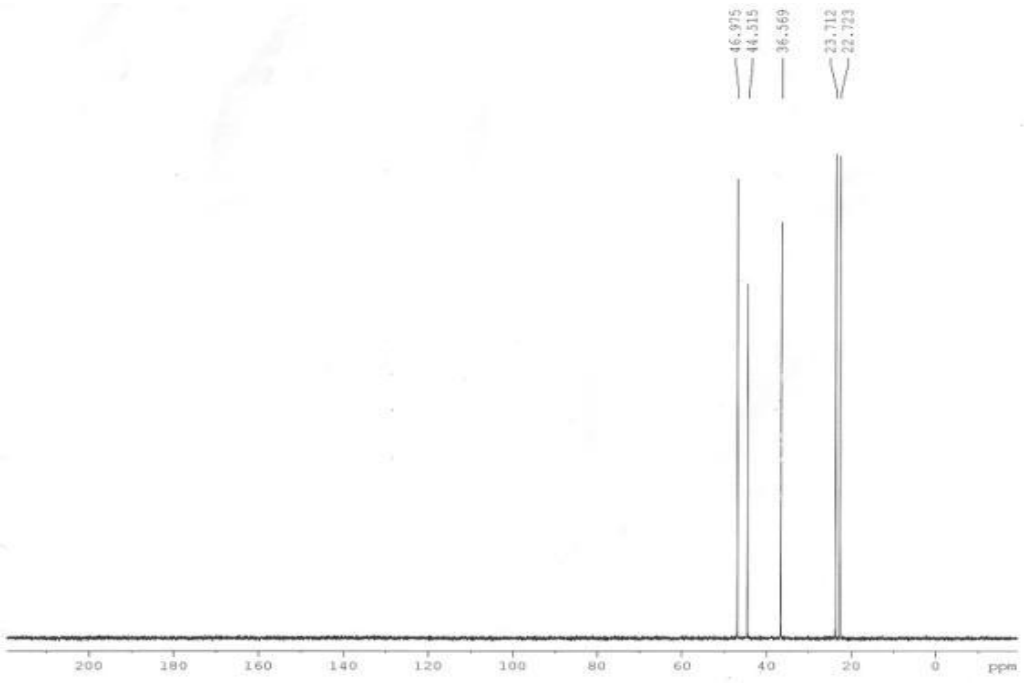


Figura B.70: RMN $^{13}C$ do Espermina[$ZnCl_4$]

## 8.3
## Anexo C – Complexos do tipo PA[$NiCl_4$]

### 8.3.1
### Análise Termogravimétrica

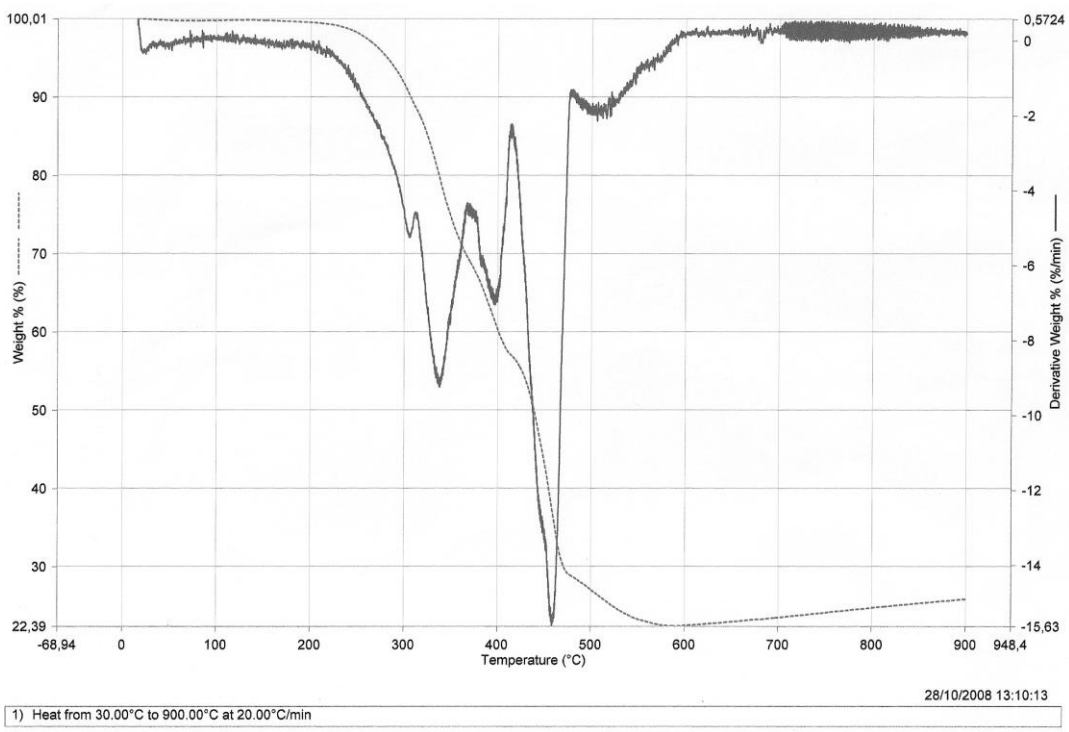


Figura C.01: TGA e DTG do Etilenodiamina[$NiCl_4$]

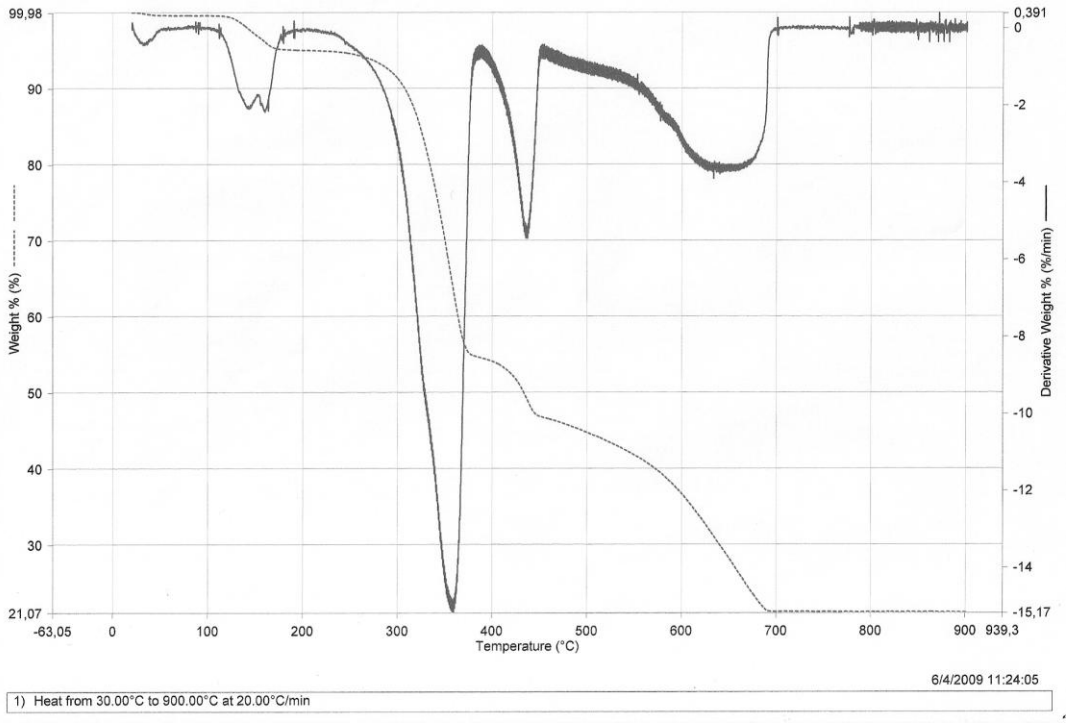


Figura C.02: TGA e DTG do Diaminopropano[$NiCl_4$]

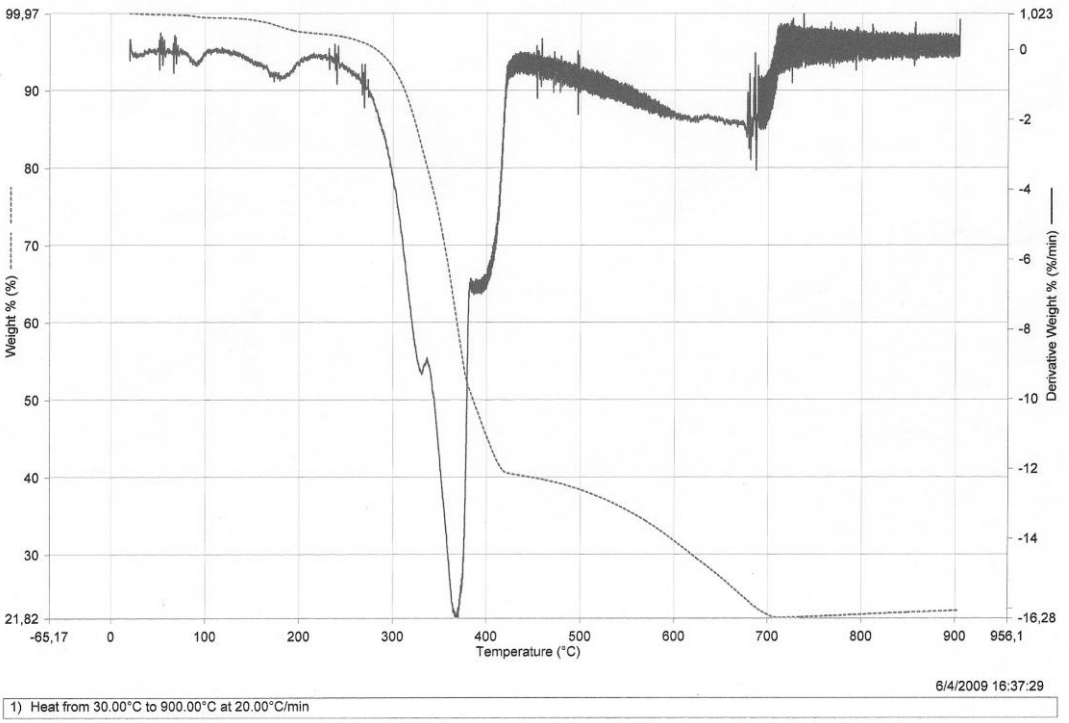


Figura C.03: TGA e DTG do Diaminobutano[$NiCl_4$]

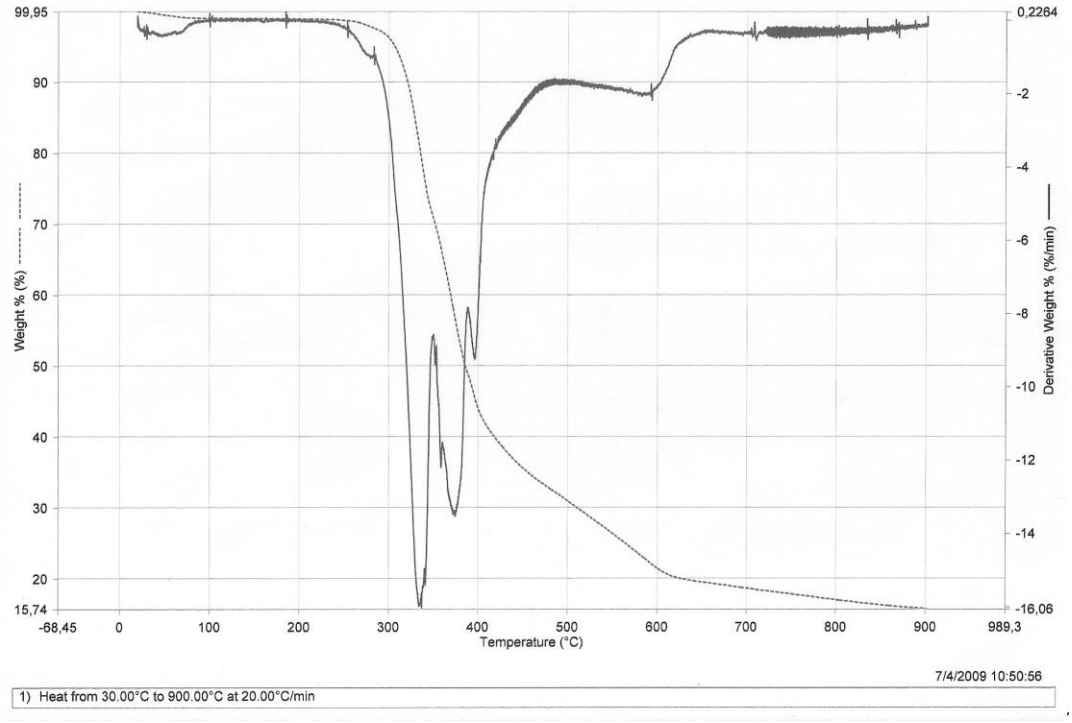


Figura C.04: TGA e DTG do Espermidina[$NiCl_4$]

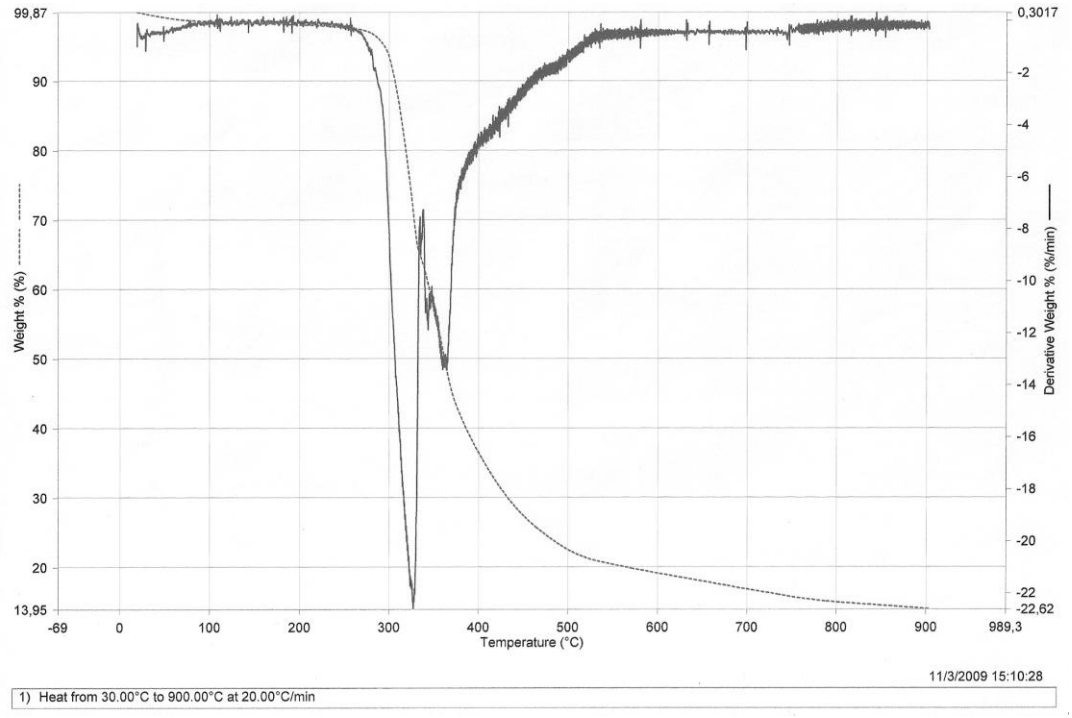


Figura C.05: TGA e DTG do Espermina[$NiCl_4$]

## 8.3.2
## Espectroscopia de Infravermelho

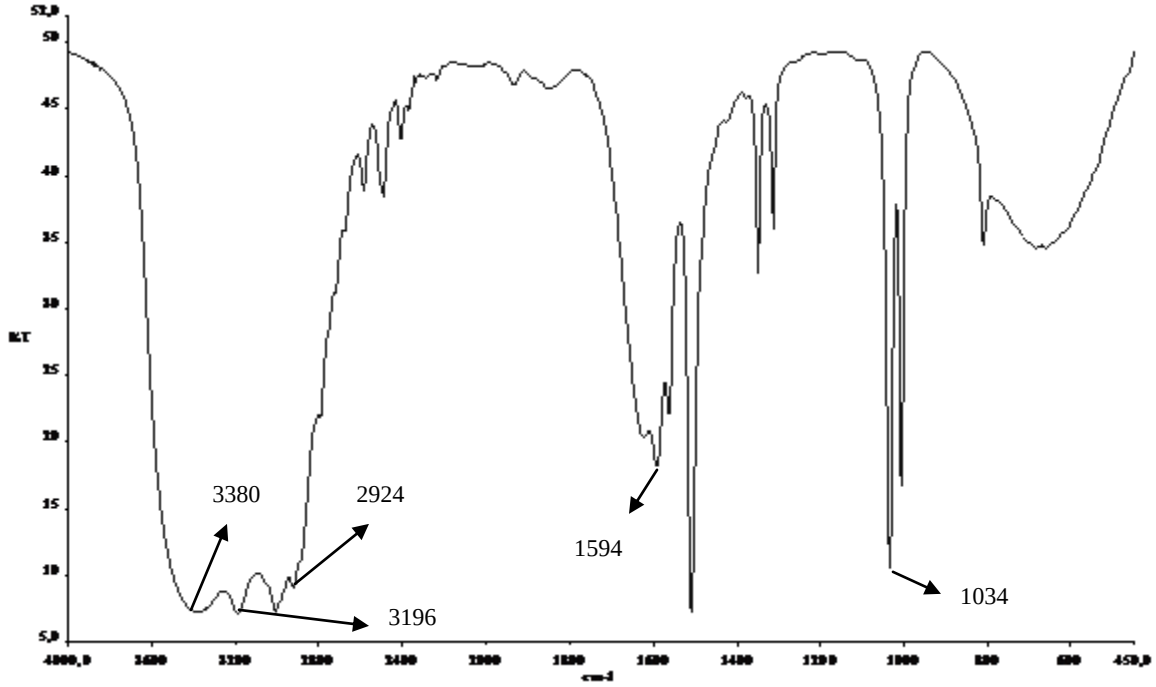


Figura C.06: Espectro de IV na região de média freqüência do Etilenodiamina[$NiCl_4$]

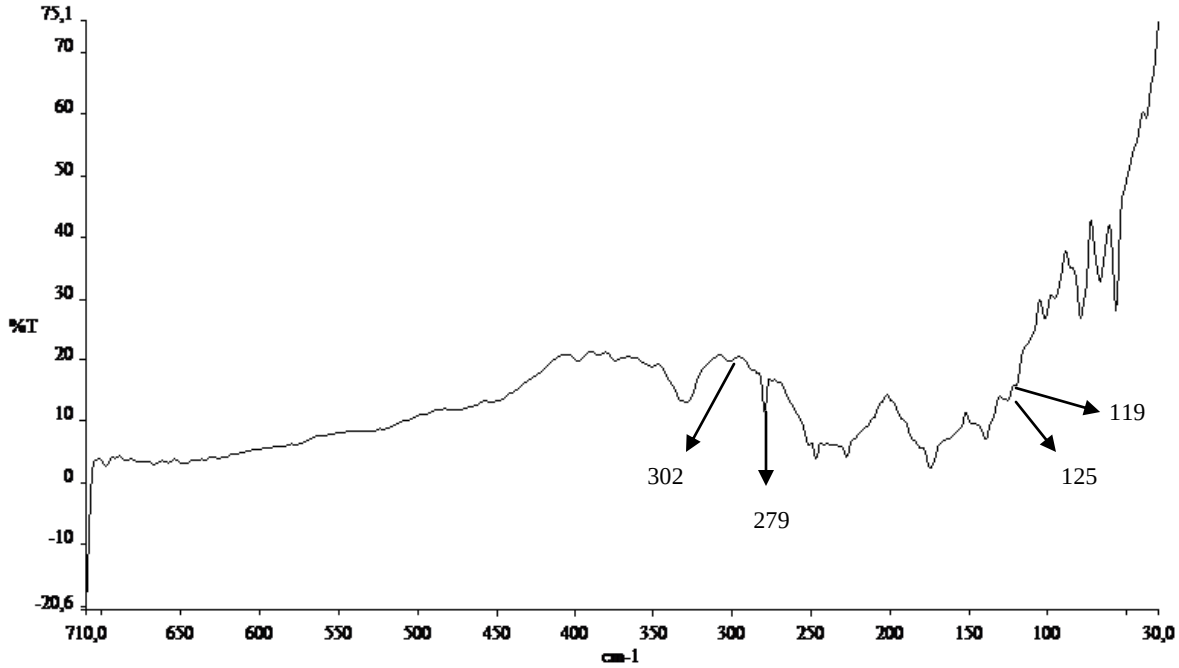


Figura C.07: Espectro de IV na região de baixa freqüência do Etilenodiamina[$NiCl_4$]

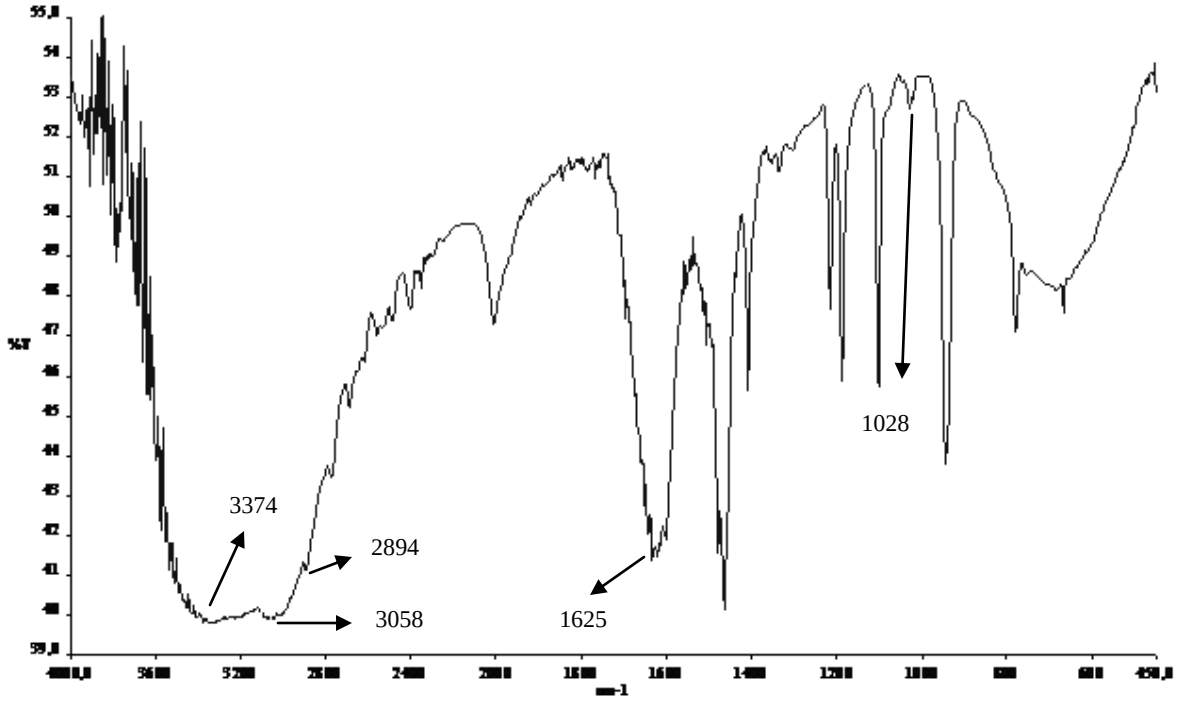


Figura C.08: Espectro de IV na região de média freqüência do Diaminopropano[$NiCl_4$]

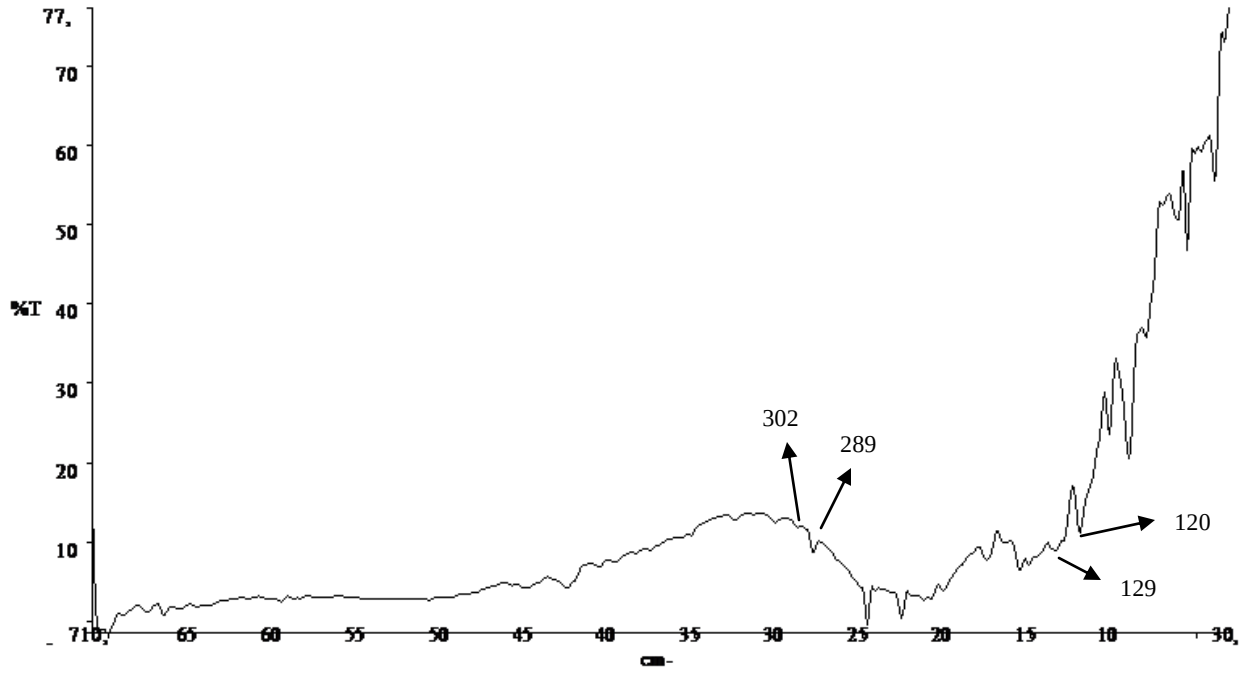


Figura C.09: Espectro de IV na região de média freqüência do Diaminopropano[$NiCl_4$]

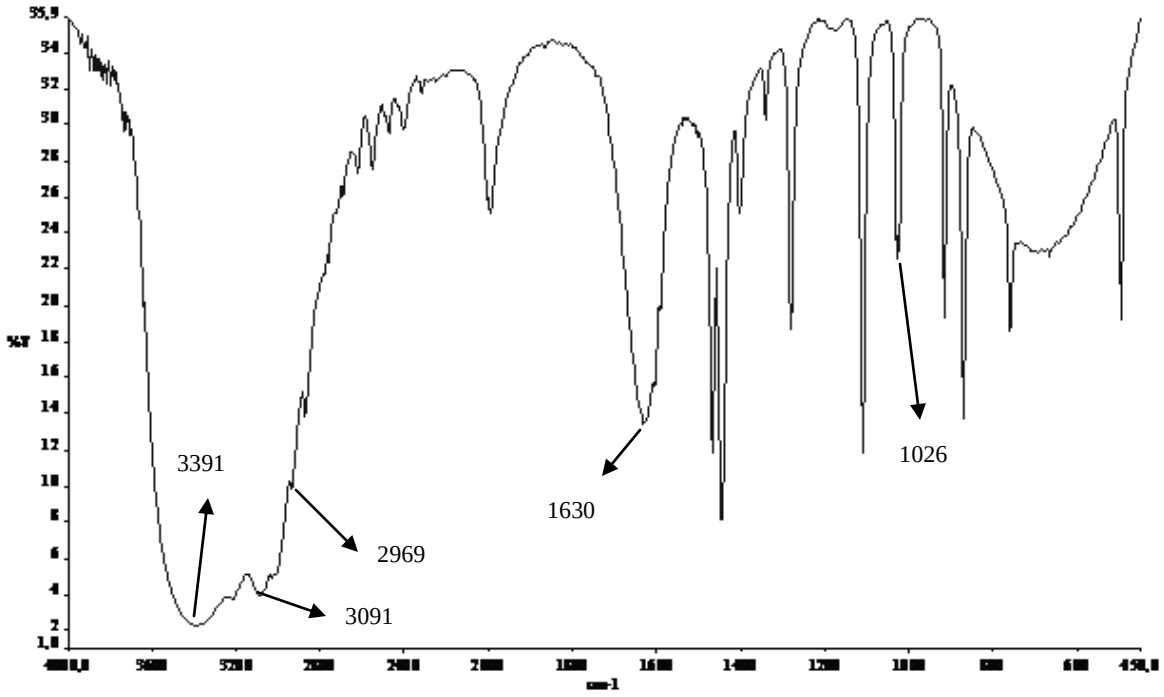


Figura C.10: Espectro de IV na região de média freqüência do Diaminobutano[$NiCl_4$]

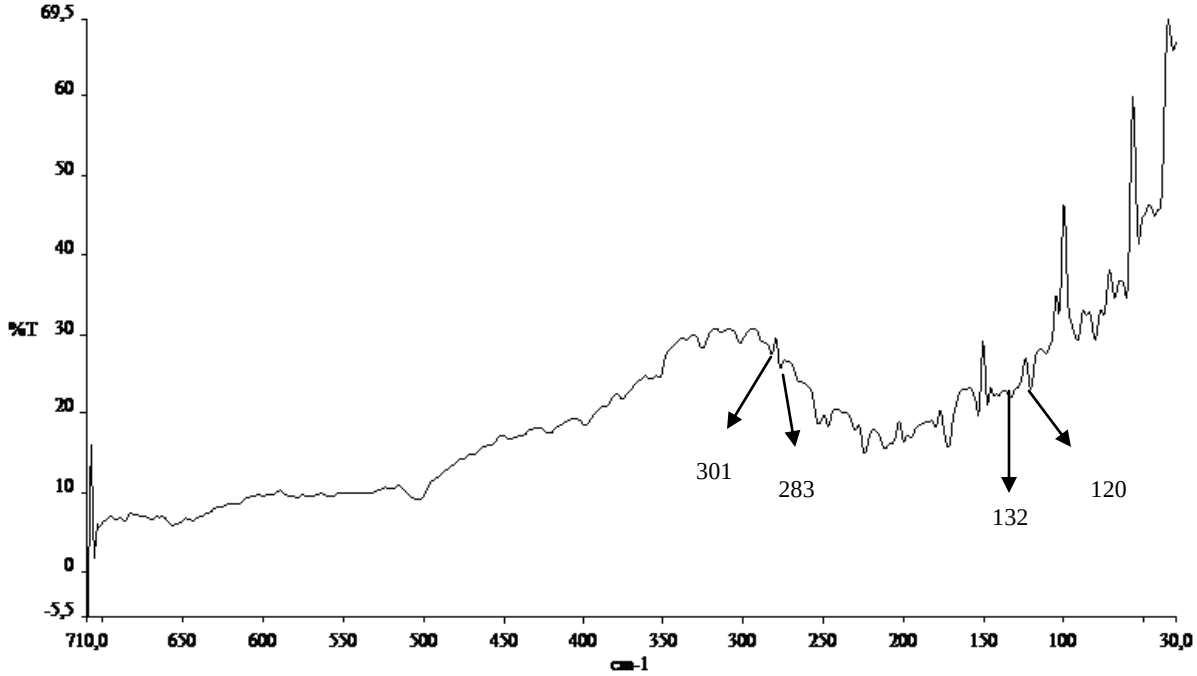


Figura C.11: Espectro de IV na região de baixa freqüência do Diaminobutano[$NiCl_4$]

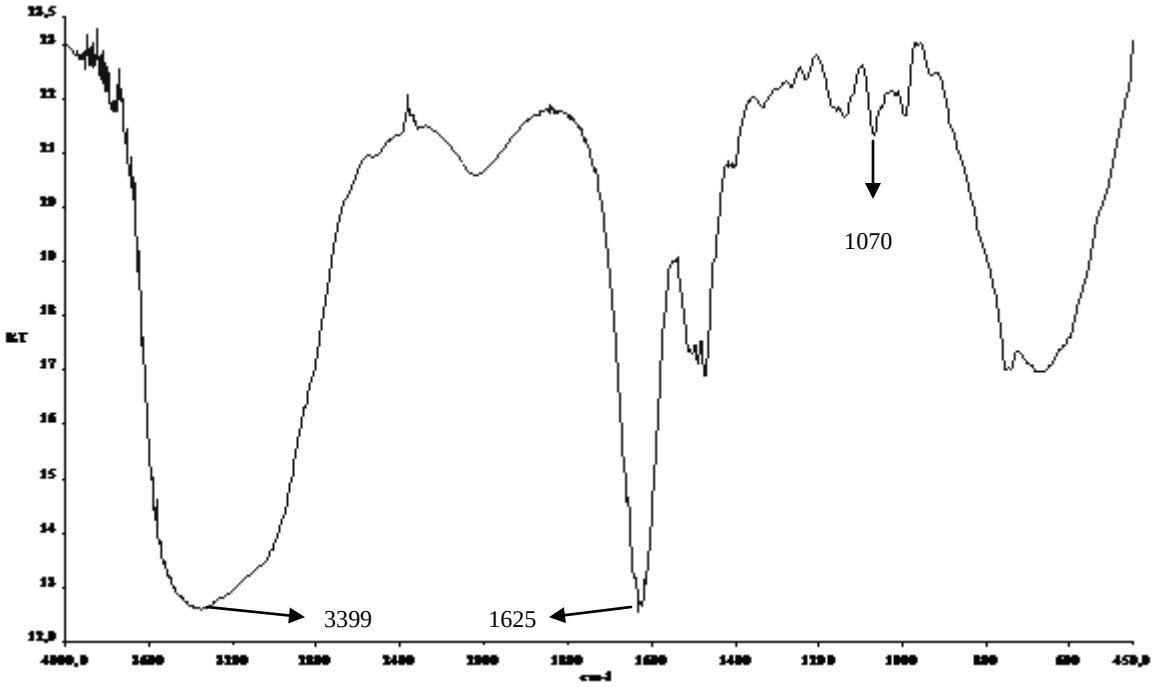


Figura C.12: Espectro de IV na região de média freqüência do Espermidina[$NiCl_4$]

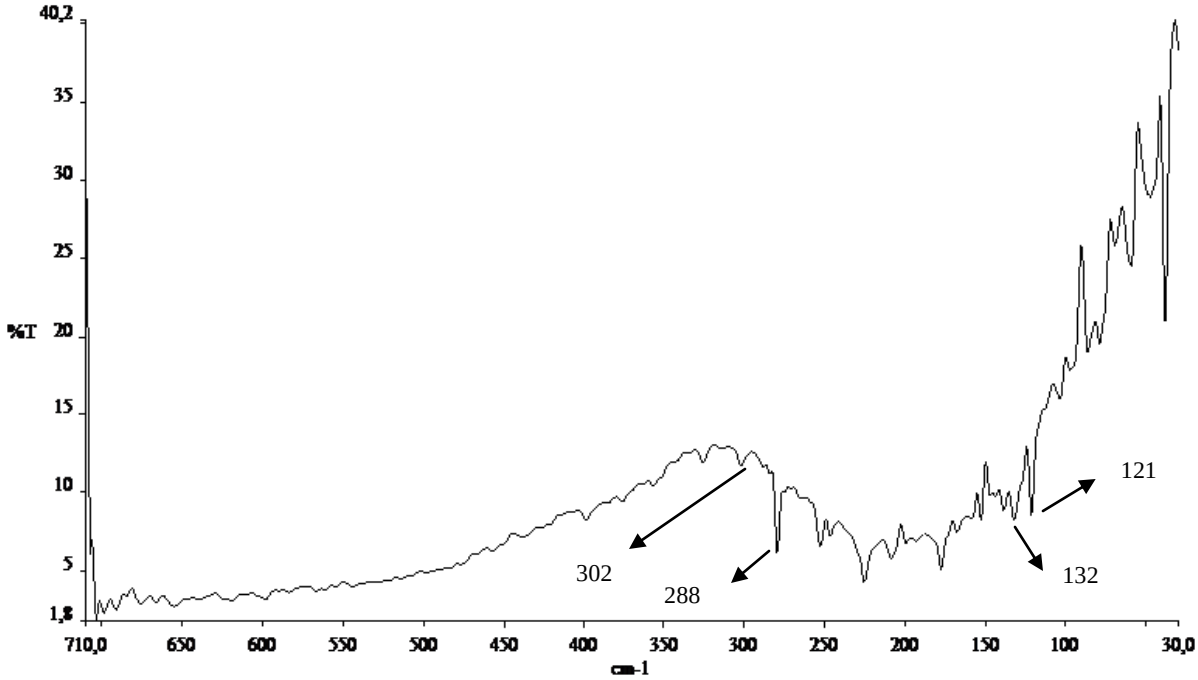


Figura C.13: Espectro de IV na região de baixa freqüência do Espermidina[$NiCl_4$]

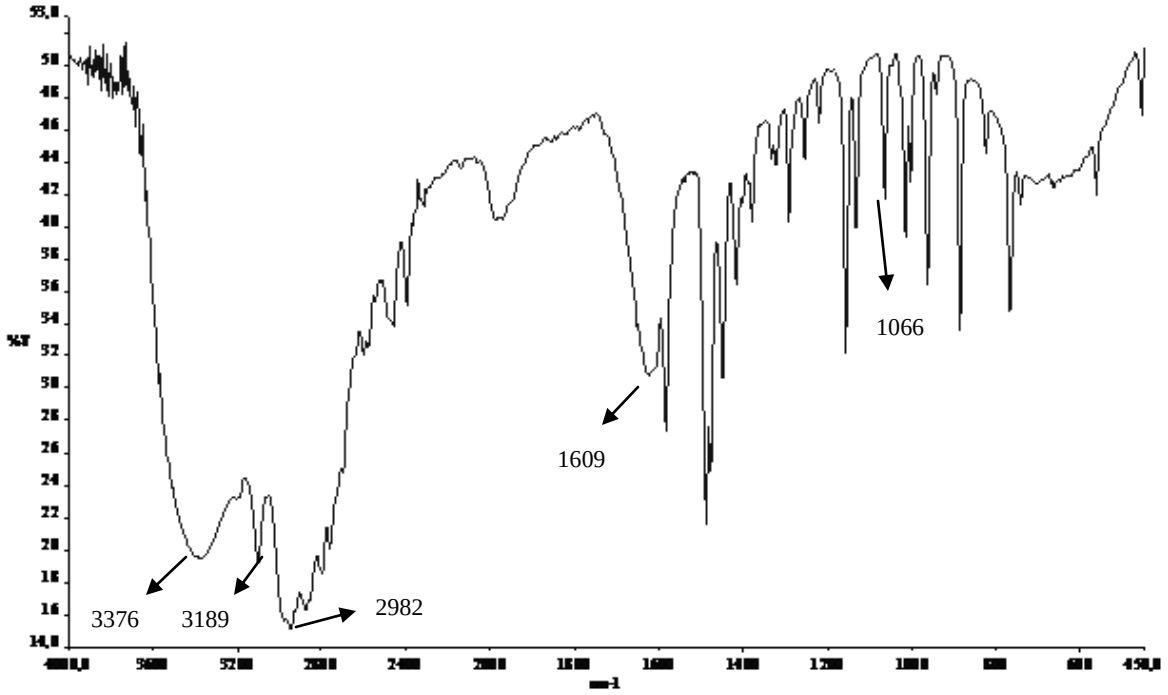


Figura C.14: Espectro de IV na região de média freqüência do Espermina[$NiCl_4$]

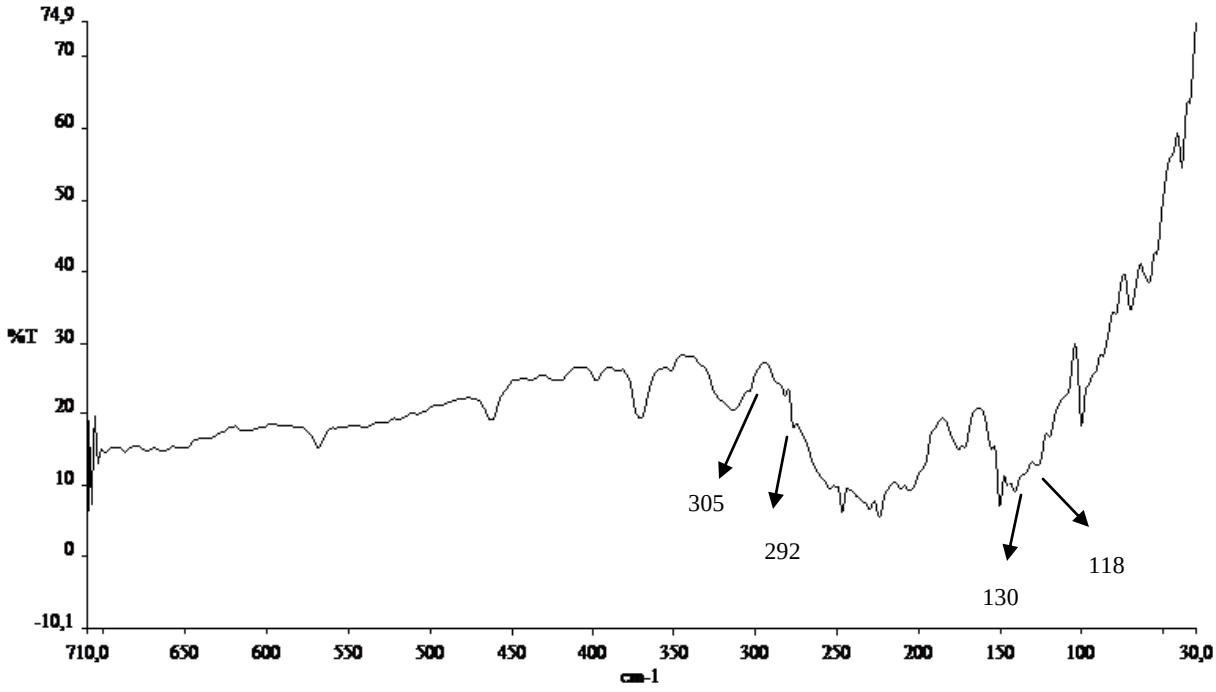


Figura C.15: Espectro de IV na região de média freqüência do Espermina[$NiCl_4$]

## 8.3.3
## Espectroscopia Raman

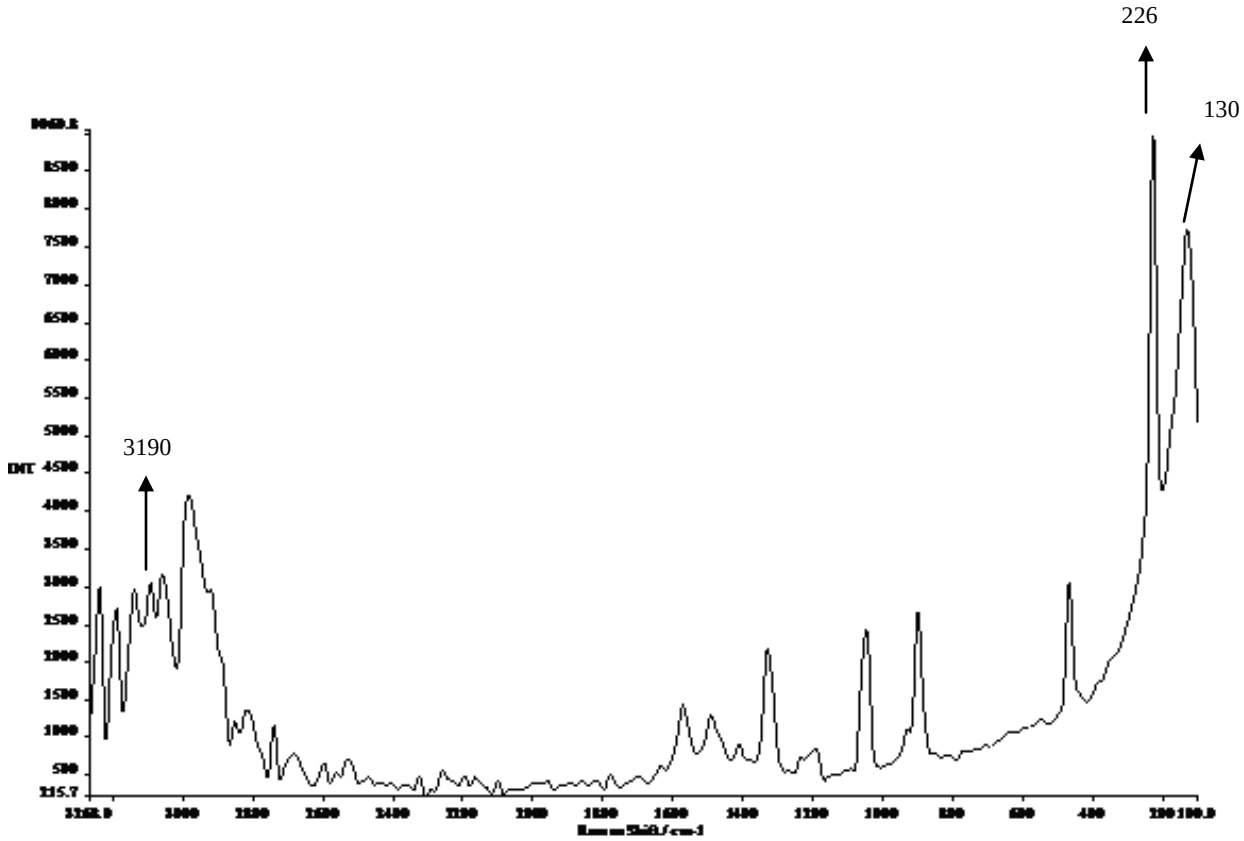


Figura C.16: Espectro de Raman do Etilenodiamina[$NiCl_4$]

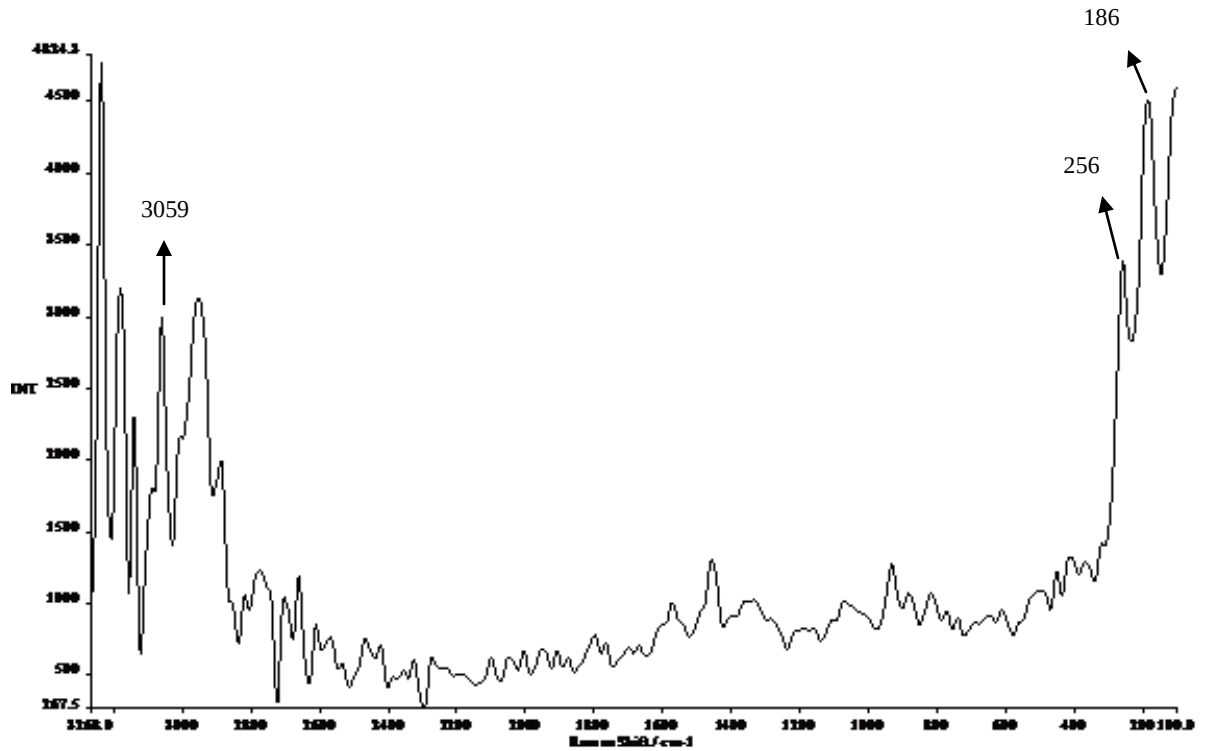


Figura C.17: Espectro de Raman do Diaminopropano[$NiCl_4$]

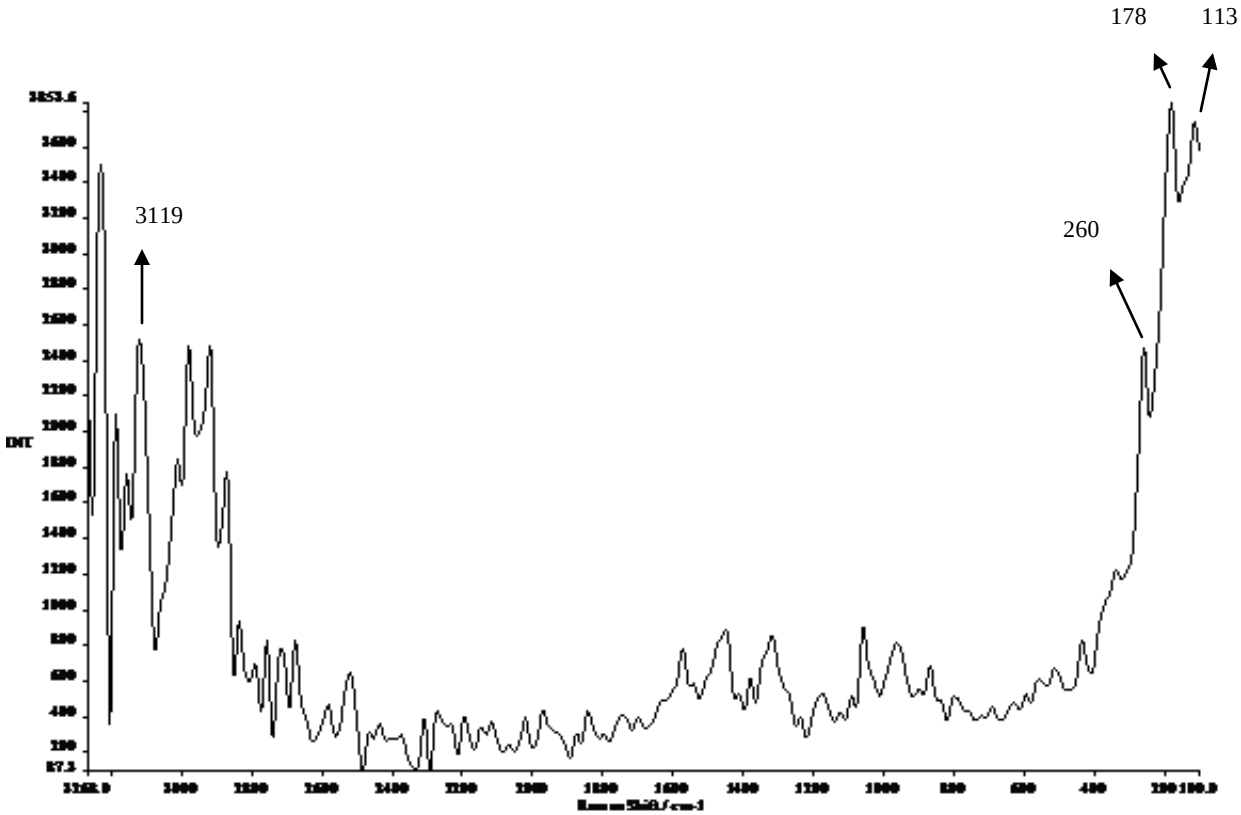


Figura C.18: Espectro de Raman do Diaminobutano[$NiCl_4$]

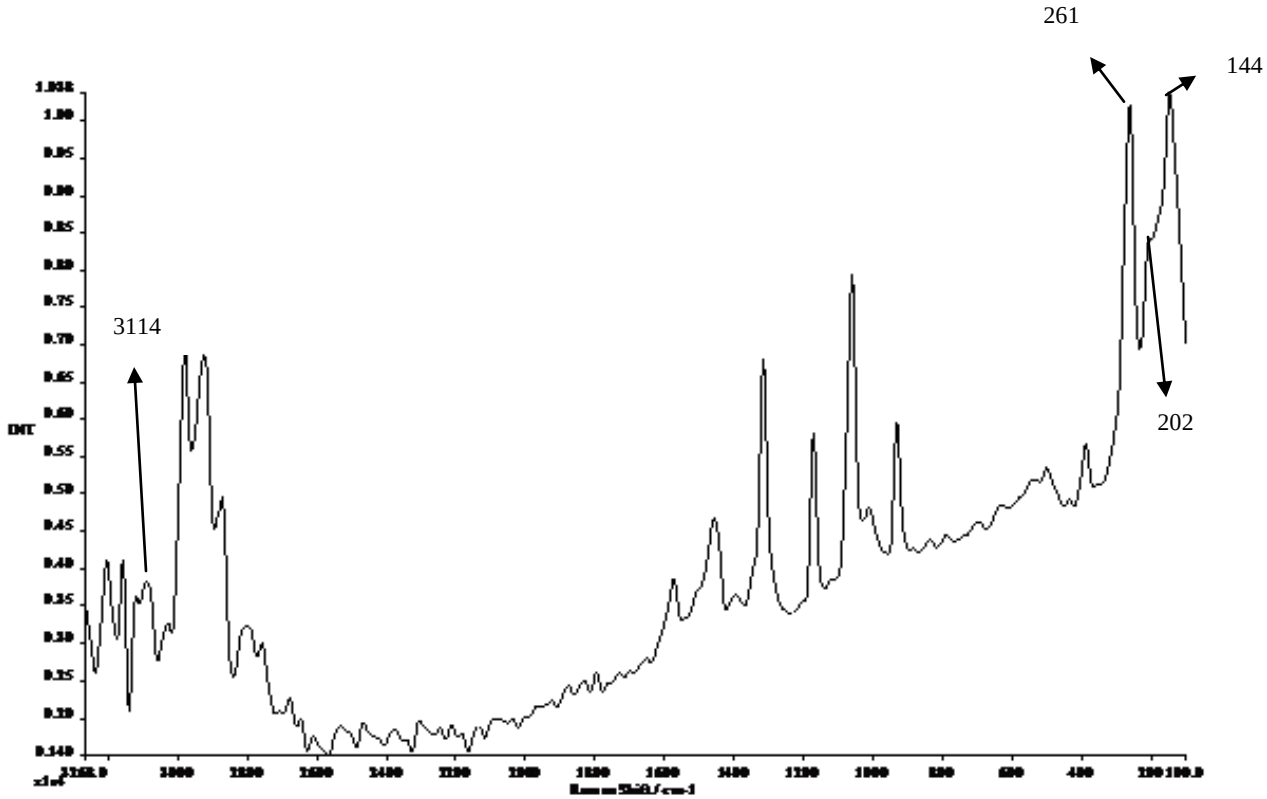


Figura C.19: Espectro de Raman do Espermidina[$NiCl_4$]

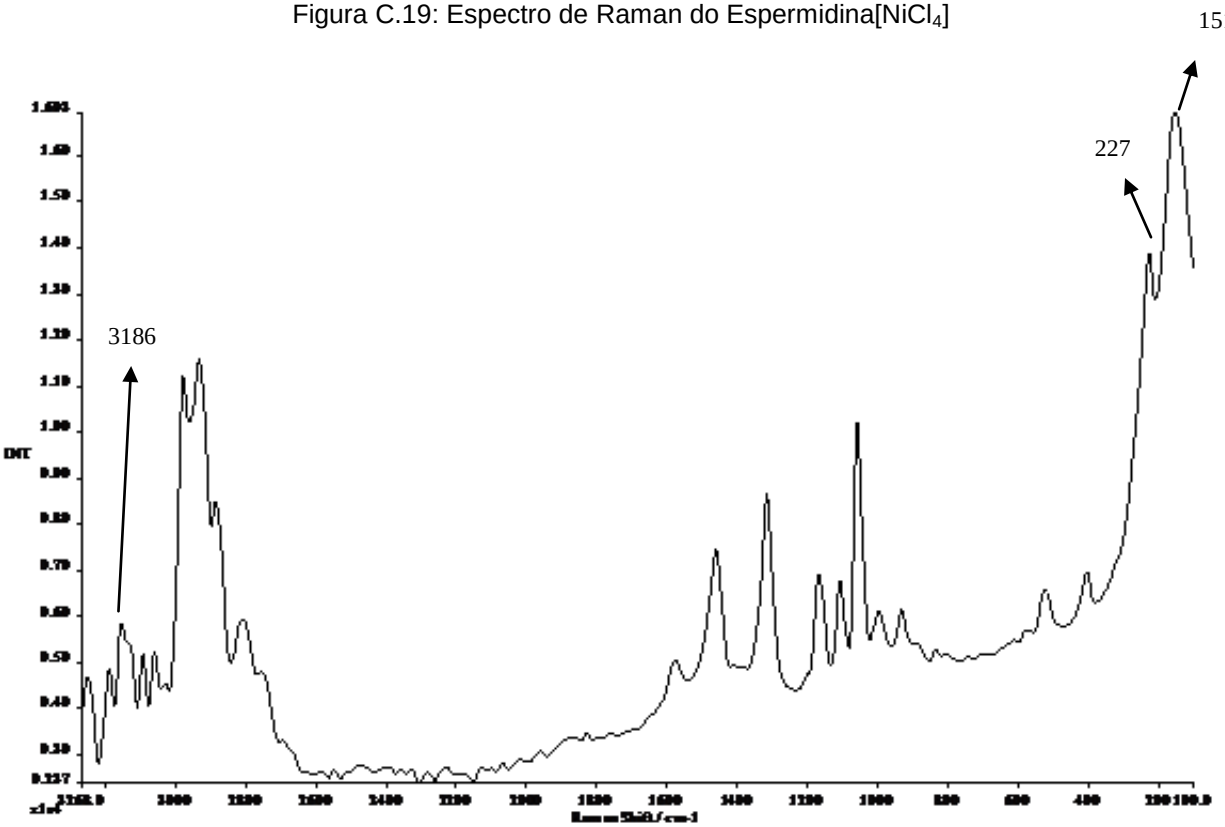


Figura C.20: Espectro de Raman do Espermina[$NiCl_4$]

## 8.4
## Anexo D – Complexos envolvendo o íon paládio (II) e as poliaminas

### 8.4.1
### Análise Termogravimétrica

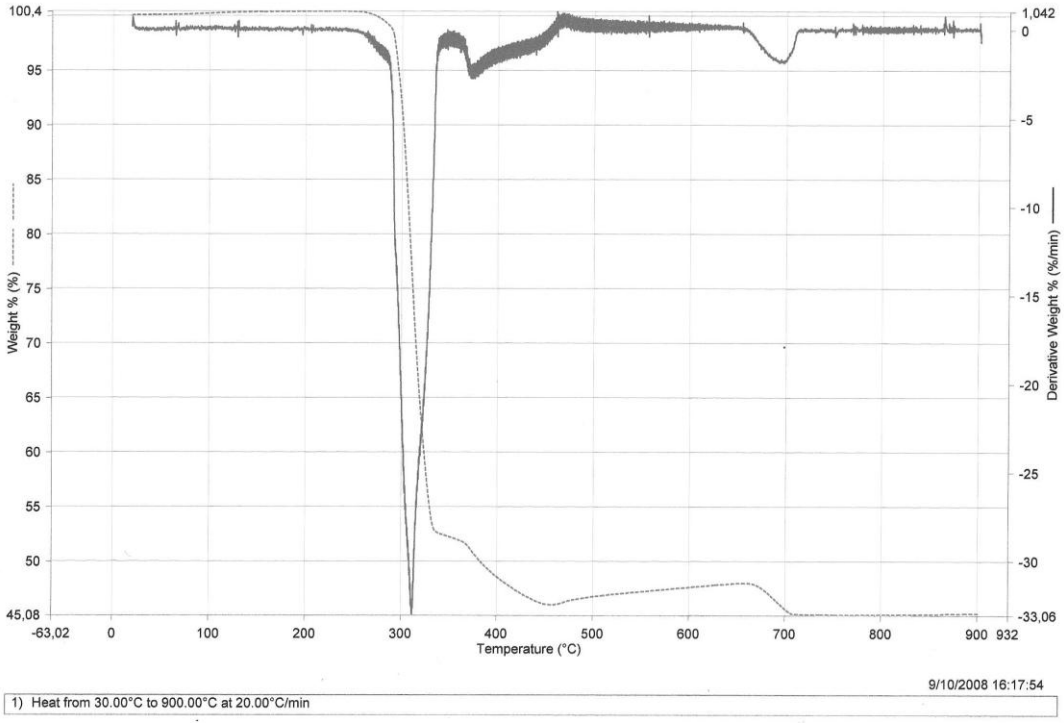


Figura D.01: TGA e DTG do $[Pd(Cl)_2(C_2H_8N_2)]$

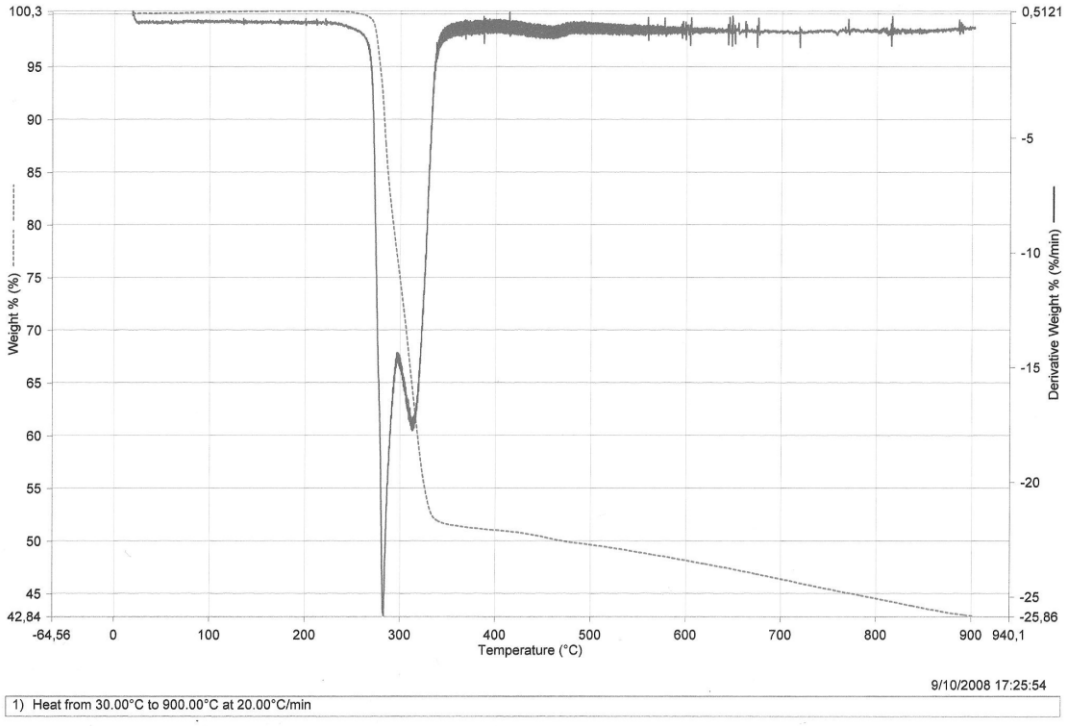


Figura D.02: TGA e DTG do $[Pd(Cl)_2(C_3H_{10}N_2)]$

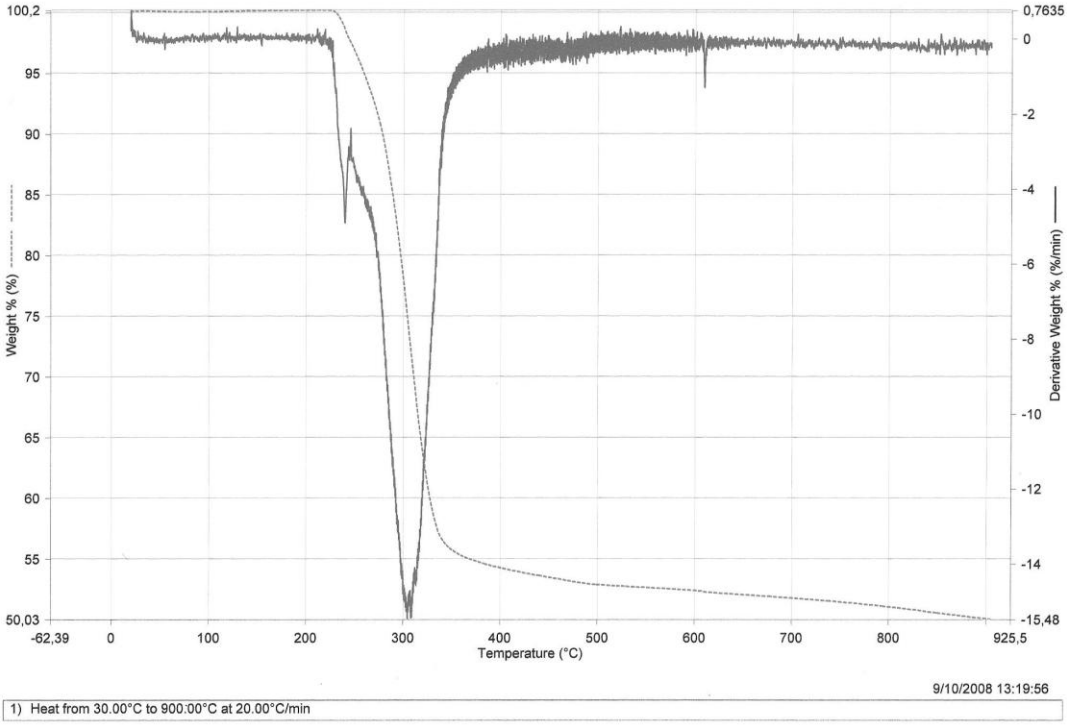


Figura D.03: TGA e DTG do $[Pd_2(Cl)_4(C_{10}H_{26}N_4)]$

## 8.4.2
## Espectroscopia de Infravermelho

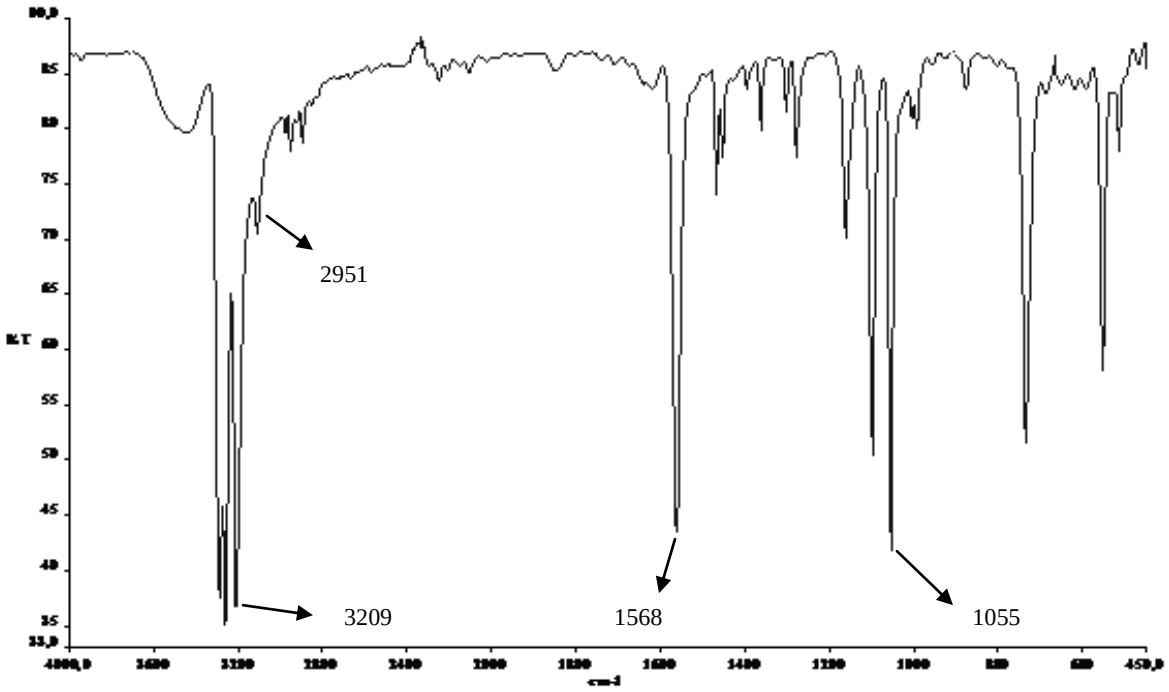


Figura D.04: Espectro de IV na região de média freqüência do $[Pd(Cl)_2(C_2H_8N_2)]$

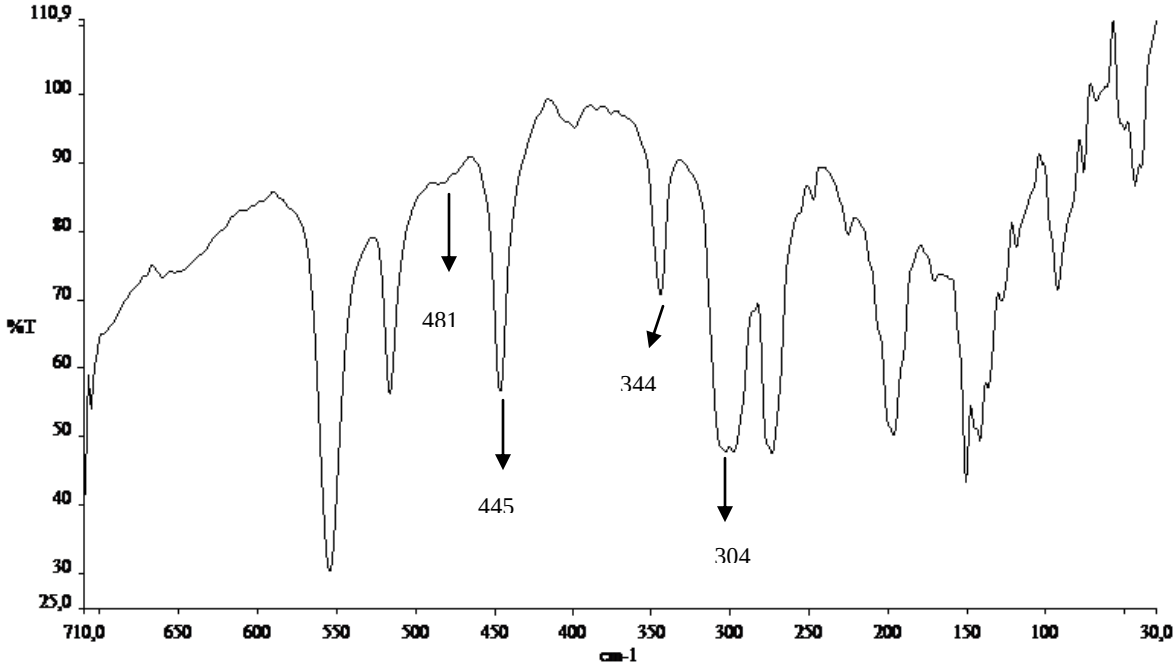


Figura D.05: Espectro de IV na região de baixa freqüência do $[Pd(Cl)_2(C_2H_8N_2)]$

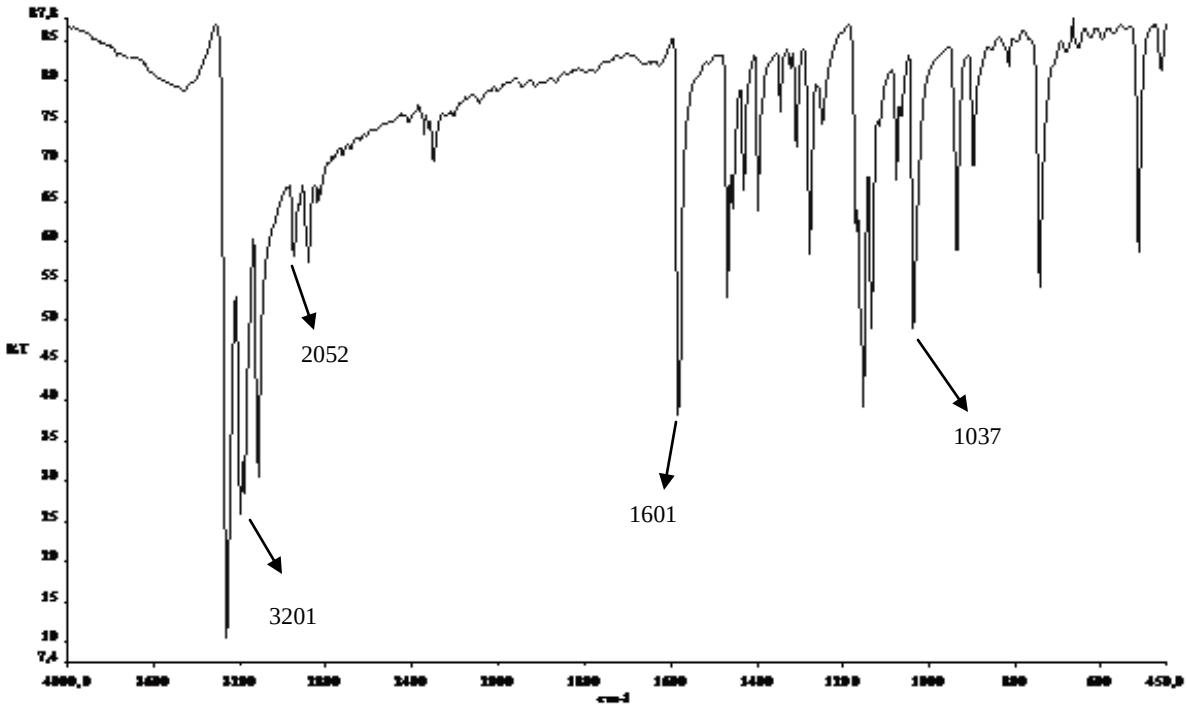


Figura D.06: Espectro de IV na região de média freqüência do $[Pd(Cl)_2(C_3H_{10}N_2)]$

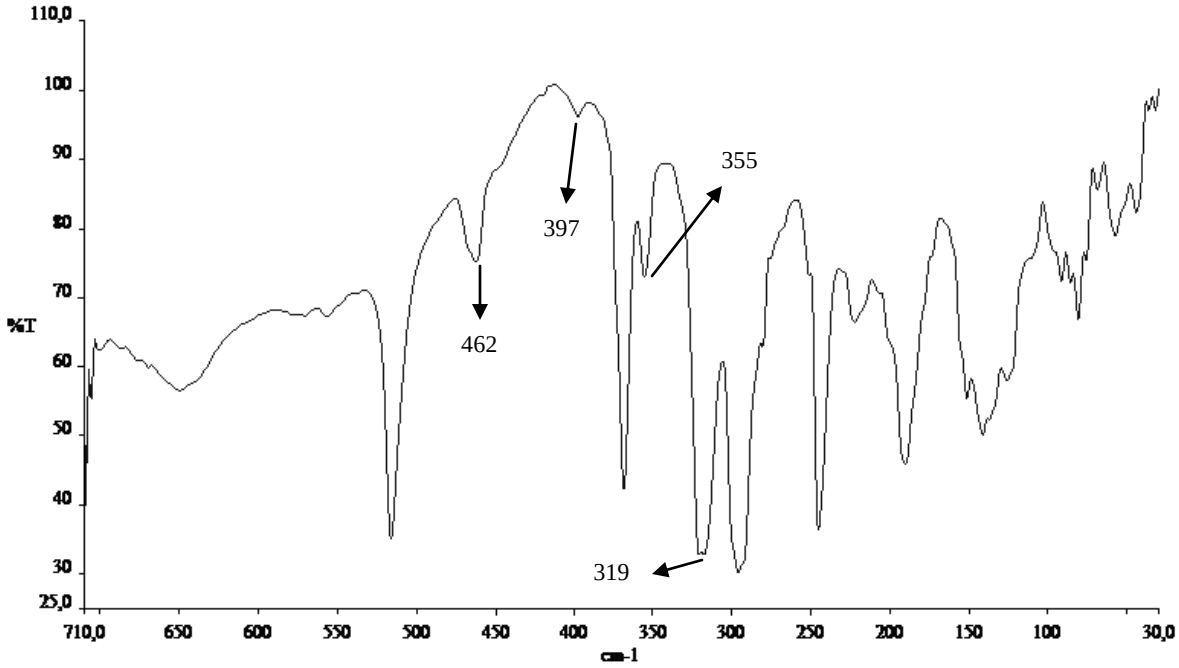


Figura D.07: Espectro de IV na região de baixa freqüência do $[Pd(Cl)_2(C_3H_{10}N_2)]$

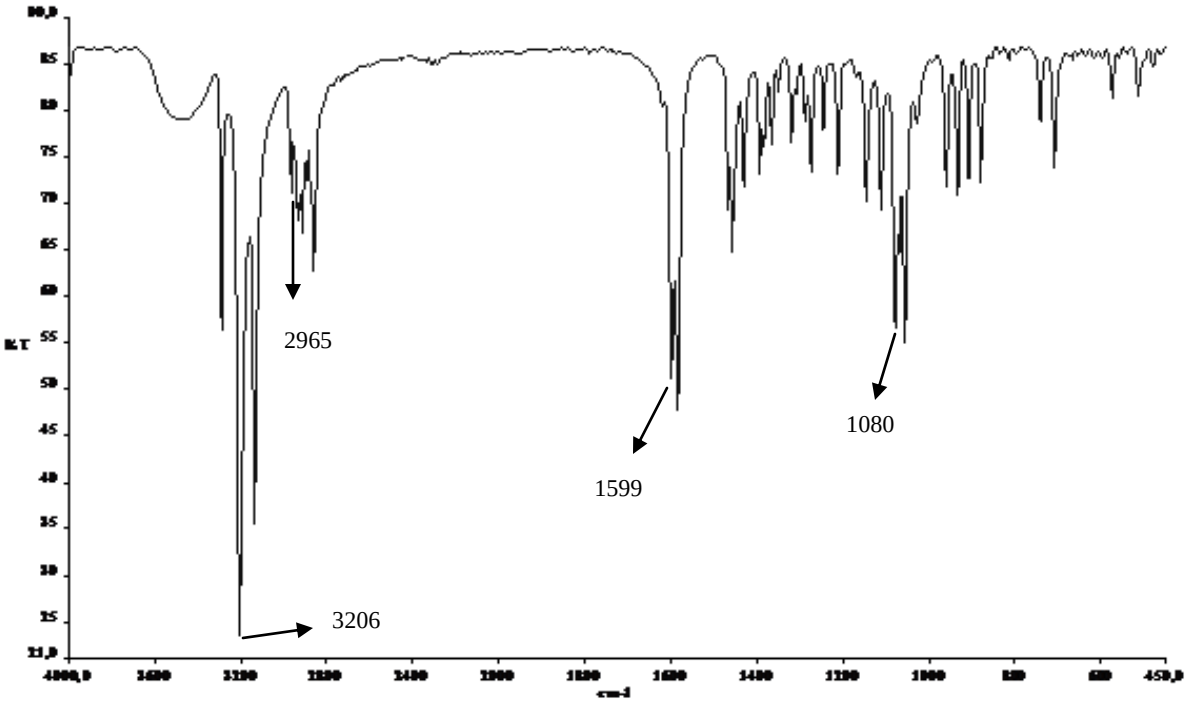


Figura D.08: Espectro de IV na região de média freqüência do $[Pd_2(Cl)_4(C_{10}H_{26}N_4)]$

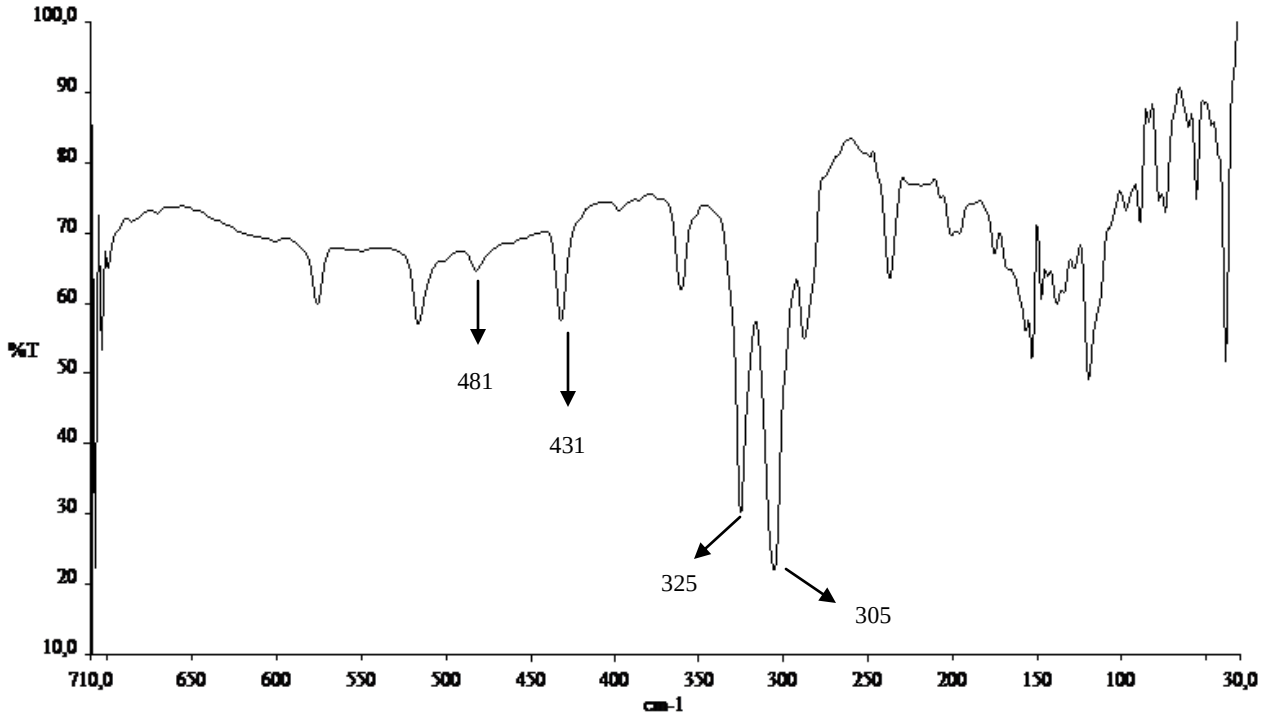


Figura D.09: Espectro de IV na região de baixa freqüência do $[Pd_2(Cl)_4(C_{10}H_{26}N_4)]$