REFERENCES

Ahn, H.J., Kim, K.M., Choi, J., and Kim, C. 1997. Effects of Cyclodextrin Derivatives on Bioavailability of Ketoprofen. **Drug. Dev. Ind. Pharm.** 23 (4): 397-401.

Althal, K.S., Udupa, N., and Sreenivasan, K.K. 1995. Physicochemical Properties of Drug-Cyclodextrin Complexes. **Indian Drugs.** 32 (7): 293-305.

Antoniadou-Vyza, E., Buckton, G., Michaleas, S.G., Loukas, Y.L., and Efentakis, M. 1997. The formation of an inclusion complex of methocarbamol with hydroxypropyl-β-cyclodextrin: the effect on chemical stability, solubility and dissolution rate. **Int. J. Pharm.** 158: 233-239.

Arias, M.J., Moyano, J.R., and Gines, J.M. 1997. Investigation of the triamterene-β-cyclodextrin system prepared by co-grinding. **Int. J. Pharm.** 153: 181-189.

Bellringer, M.E., Smith, T.G., Read, R., Gopinath, C., and Olivier, Ph. 1995. β-Cyclodextrin: 52-Week Toxicity Studies in the Rat and Dog. **Fd. Chem. Toxic.** 33 (5): 367-376.

Brewster, M.E. et al. 1997. Interaction and oral Pharmacokinetic Evaluation of a 2-Hydroxypropyl-β-cyclodextrin-Based Formulation of Carbamazepine in the Dog: Comparison with Commercially Available Tablets and Suspensions. **J. Pharm. Sci.** 86 (3): 335-339.

Brewster, M.E., Estes, K.S., and Bodor, N. 1990. An intravenous toxicity study of 2-hydroxypropyl-β-cyclodextrin, a useful drug solubilizer, in rats and monkeys. **Int. J. Pharm.** 59: 234-243.

Brewster, M.E., Loftson, T., Estes, K., Lin, J., Fridriksdottir, H., and Bodor, N. 1992. Effect of various cyclodextrins on solution stability and dissolution rate of doxorubicin hydrochloride. **Int. J. Pharm.** 79: 289-299.

Brewster, M.E., Simpkins, J.W., Hora, M.S., Stern, W.C., and Bodor, N. 1989. The Potential Use of Cyclodextrins in Parenteral Formulations. **J. Parenter. Sci. Technol.** 43 (5): 231-240.

Brittain, H. 1997. Spectral Methods for the Characterization of Polymorphs and Solvates. **J. Pharm. Sci.** 86 (4): 405-412.

Budavari, S., O'Neil, M.J., Smith, A., Heckelman, P.E., and Kinneary, J.F., eds. 1996. **The Merck Index: An encyclopedia of chemicals, drugs, and biologicals**. 12th ed. pp. 383,667,1143,1395,1424. Rhaway, NJ: Merck & Co., Inc.

Carpenter, T.O. et al. 1987. Severe hypervitaminosis A in Siblings: Evidence of variable tolerance to retinol intake. **J. Pediatr.** 111: 507-512.

Carpenter, T.O., Gerloczy, a., and Pitha, J. 1995. Safety of Parenteral Hydroxypropyl-β-Cyclodextrin. **J. Pharm. Sci.** 84: 222-225.

Carstensen, J.T. 1995. **Drug Stability: principles and practices**. 2nd ed., rev. and expanded. pp. 1-121, 196-303. New York: Marcel Dekker, Inc.

Carstensen, J.T. and Franchini, M.K. 1995. Isoenergetic Polymorphs. **Drug. Dev. Ind. Pharm.** 21 (5): 523-536.

Chen, C., Chen, F., Wu, A., Hsu, H., Kang, J., Cheng, H. 1996. Effect of hydroxypropyl-β-cyclodextrin on the solubility, photostability and in-vitro permeability of alkannin/shikonin enantiomers. **Int. J. Pharm.** 141: 171-178.

Cholerton, T.J., Hunt, J.H., Klinkert, G., and Martin-Smith, M. 1984. Spectronic studies on ranitidine -its structure and the influence of temperature and pH. J. **Chem. Soc. Perkin. Tran. 2**: 1761-1766.

Connors, K. 1997. The Stability of Cyclodextrin Complexes in Solution. **Chem. Rev.** 97: 1325-1357.

Connors, K. and Rosanske, T.W. 1980. Tran-Cinnamic Acid-α-Cyclodextrin System as Studied by Solubility, Spectral, and Potentiometric Techniques. J. **Pharm. Sci.** 69 (2): 173-179.

Demarco, P.V. and Thakkar, L. 1970. Cyclohepta-amylose Inclusion Complexes: A Proton Magnetic Resonance Study. **Chem. Commun.** : 2-4.

Dhanaraju, M.D., Kumaran, K.S., Baskaran, T., and Moorthy, M.S.R. 1998. Enhancement of Bioavailability of Griseofulvin by Its complexation with β-cyclodextrin. **Drug. Dev. Ind. Pharm.** 24 (6): 583-587.

Duchêne, D. 1988. New Trends in Pharmaceutical Applications of Cyclodextrin Inclusion Compounds. In Huber, O. and Szejtli, J. eds. **Proceedings of the Fourth International Symposium on Cyclodextrins**. pp. 265-275. Dordrecht: Kluwer Academic Publishers.

Duchêne, D. and Wouessidjewe, D. 1990. Physicochemical Characteristics and Pharmaceutical Uses of Cyclodextrin derivatives. **Drug Dev. Ind. Pharm.** 16 (17): 2487-2499.

Duchêne, D. and Wouessidjewe, D. 1990. Physicochemical Characteristics and Pharmaceutical Uses of Cyclodextrin Derivatives, Part I. **Pharm. Technol.** 14 (6): 26, 28, 32, 34.

Duchêne, D. and Wouessidjewe, D. 1996. Pharmaceutical and Medical Applications of Cyclodextrins. In Dumitriu, S. ed. **Polysaccharides in Medicinal Applications**. New York: Marcel Dekker, Inc.: 575-602.

Duchêne, D., Vaution, C., and Glomot, F. 1986. Cyclodextrins, Their Value in Pharmaceutical Technology. **Drug. Dev. Ind. Pharm**. 12 (11-13): 2193-2215.

Dumanovic, D., Juranic, I., Dzeletovic, D., Vasic, V.M., and Jovanoic, J. 1997. Protolytic constants of nizatidine, ranitidine and N, N'- dimethyl-2-nitro-1,1-ethenediamine; spectrophotometric and theoretical investigation. J. **Pharm. Biomed. Anal.** 15: 1667-1678.

Fini, A. et al. 1997. Fractal Analysis of β-Cyclodextrin-Indomethacin Particles Compacted by Ultrasound. **J. Pharm. Sci.** 86 (11): 1303-1309.

Frank, D.W., Gray, J.E., and Weaver, R.N., 1976. Cyclodextrin Nephrosis in the Rat. **Am. J. Pathol.** 83 (2): 367-374.

Frank, S.G. 1975. Inclusion compounds. **J. Pharm. Sci.** 64 (10): 1585-1604.

Fujioka, K., Kurosaki, Y., Sato, S., Noguchi, T., Noguchi, T., and Yamahira, Y. 1983. Biophamaceutical Study of Inclusion Complexes. I. Pharmaceutical Advantages of Cyclodextrin Complexes of Bencyclane Fumarate. **Chem. Pharm. Bull.** 31 (7): 2416-2423.

Gupta, V.D. 1988. Quantitation of ranitidine hydrochloride in tablets and injections using high-performance liquid chromatography. **Drug. Dev. Ind. Pharm.** 14: 1647-1655.

Haywood, P.A., Martin-Smith, M., Cholerton, T.J., and Evan, M.B. 1987. Isolation and Identification of the Hydrolytic Degradation Products of Ranitidine Hydrochloride. J. **Chem. Soc. Perkin Trans.** 1.: 951-954.

Hedges, A. 1998. Industrial Applications of Cyclodextrins. **Chem. Rev.** 98: 2035-2044.

Helm, H., Muller, B.W., and Waaler, T. 1995. Complexation of dihydroergotamine mesylate with cyclodextrin derivatives: Solubility and stability in aqueous solution. **Eur. J. Pharm. Sci.** 3:195-201.

Hirayama, F. Kurihara, M., Utsuki, T., and Uekama, K. 1993. Inhibitory Effect of Guest Molecules on Acid-catalysed Ring-opening of β-Cyclodextrin. J. **Chem. Soc., Chem. Commun.** : 1578-1580.

Hirayama, F., Hirashima, N., Abe, K., Uekama, K., Ijitsu, T., and Ueno, m. 1988. Utilization of Diethyl-β-cyclodextrin as a Sustained-Release Carrier for Isosorbide Dinitrate. **J. Pharm. Sci.** 77 (3): 233-236.

Hohnjec, M., Kuftinec, J., Malnar, M. Skredlin, M., Kajfez, F., Nagl, A., and Blazevic, N. 1986. Ranitidine. In Florey, K. ed. **Analytical Profiles of Drug substances**. Vol. 15. pp. 535-561. Orando: Academic Press, Inc. :535.

Horikawa, T., hirayama, F., and Uekama, K. 1995. In-vivo and In-vitro Correlation for Delayed-release Behavior of a Molsidomine / O-carboxymethyl-O-ethyl-β-cyclodextrin Complex in Gastric Acidity-controlled Dogs. **J. Pharm. Pharmacol.** 47: 124-127.

Horiuchi, Y., Hirayama, F., and Uekama, K. 1990. Slow-Release Characteristics of Diltiazem from Ethylated β-Cyclodextrin Complexes. **J. Pharm. Sci.** 79 (2): 128-132.

Horsky, J. and Pitha, J. 1996. Hydroxypropyl Cyclodextrins: Potential synergism with Carcinogens. **J. Pharm. Sci.** 85 (1): 96-100.

Irie, T. and Uekama, K. 1997. Pharmaceutical Applications of Cyclodextrins. III. Toxicological Issues and Safety Evaluation. **J. Pharm. Sci.** 86 (2): 147-162.

Islam, M.s., and Narurkar, M.M. 1991. The effect of 2-Hydroxypropyl -β-Cyclodextrin on the Solubility, Stability and Dissolution Rate of Famotidine. **Drug Dev. Ind. Pharm.** 17 (9): 1229-1239.

Jarho, P., Urtti, A., and Jarvinen, T. 1995. Hydroxypropyl-β-Cyclodextrin Increases the Aqueous Solubility and Stability of Pilocarpine Prodrugs. **Pharm. Res.** 12 (9): 1371-1375.

Jarvinen, T., Jarvinen, K., Schwarting, N., and Stella, V. 1995. β-Cyclodextrin Derivatives, SBE4-β-CD and HP-β-CD, Increase the Oral Bioavailability of Cinnarizine in Beagle Dogs. **J. Pharm. Sci.** 84 (3): 295-299.

Kanokwan Thiengthawat 1994. **Chemical stability of ranitidine** HCl. Master's Thesis, Chulalongkorn University.

Kontny, M.J. and Zografi, G. 1995. Sorption of Water by Solids. In Brittain, H.G. ed. **Physical Characterization of Pharmaceutical Solids**. pp. 387-418. New York: Marcel Dekker, Inc.

Lach, J.L. and Chin, T. 1964. Schardinger Dextran Interaction IV: Inhibition of Hydrolysis by Means of Molecular Complex Formation. **J. Pharm. Sci.** 53: 924-927.

Li, S. and Purdy, W.C. 1992. Cyclodextrins and Their Applications in Analytical Chemistry. **Chem. Rev.** 92: 1457-1470.

Loftsson, T., and Brewster, M. 1996. Pharmaceutical Applications of Cyclodextrins. 1. Drug Solubilization and Stabilization. **J. Pharm. Sci.** 85 (10): 1017-1025.

Loftsson, T., Bjornsdottir, S., Palsdottir, G., and Bodor, N. 1989. The effects of 2-hydroxypropyl-β-cyclodextrin on the solubility and stability of chlorambucil and melphalan in aqueous solution. **Int. J. Pharm.** 57: 63-72.

Marques, H.M.C., Hadgraft, J., Kellaway, I.W., and Pugh, W.J. 1990. Studies of cyclodextrin inclusion inclusion complexes. II. Molecular modeling and ^{1}H-NMR evidence for the salbutamol-β-cyclodextrin complex. **Int. J. Pharm.** 63: 267-274.

Martin, A. 1993. **Physical Pharmacy: physical chemical principles in the pharmaceutical sciences.** 4th ed. pp. 147, 284-323. Philadelphia: Lea & Febiger.

McCandless, R. and Yalkowsky, S.M. 1998. Effect of Hydroxypropyl-β-Cyclodextrin and pH on the Solubility of Levemopamil HCl. **J. Pharm. Sci.** 87 (12): 1639-1642.

McEvoy, G. 1995. **AHFS Drug information.** pp. 2057-2062. New York: The American Society of Hospital Pharmacist.

Miyazawa, I., Ueda, H., Nagase, H., Endo, T., Kobayashi, S., and Nagai, T. 1995. Physicochemical properties and inclusion complex formation of δ-cyclodextrin. **Eur. J. Pharm. Sci.** 3:153-162.

Montassier, P., Duchêne, D., and Poelman, M. 1997. Inclusion complexes of tretinoin with cyclodextrins. **Int. J. Pharm.** 153: 199-209.

Mura, P., Bettinetti, G.P., Manderioli, A, Fancci, M.T., Bramanti, G., and Sorrenti, M. 1998. Interactions of ketoprofen and ibuprofen with β-cyclodextrins in solution and in the solid state. **Int. J. Pharm.** 166: 189-203.

Palmieri, G.F., Galli-Angeli, D., Giovannucci, G., and Martelli, S. 1997. Inclusion of Methoxybutropate in β- and Hydroxypropyl-β-Cyclodextrins: Comparison of Preparation Methods. **Drug Dev. Ind. Pharm.** 23 (1): 27-37.

Patima Phunagchan 1997. **Oxidative degradation kinetics of ranitidine HCl solutions.** Master's Thesis, Chulalongkorn University.

Pitha, J. and Pitha, J. 1985. Amorphous water-soluble derivatives of cyclodextrins: nontoxic dissolution enhancing excipients. **J. Pharm. Sci.** 74 (9): 987-990.

Pitha, j. Milecki, J., Fales, H., Pannell, L., and Uekama, K. 1986. Hydroxypropyl-β-cyclodextrin: preparation and characterization; effects on solubility of drugs. **Int. J. Pharm.** 29: 73-82.

Pitha, J., Irie, T., Sklar, P.B., and Nye, J.S. 1988. Drug Solubilizers to Aid Pharmacologist: Amorphous Cyclodextrin Derivatives. **Life Sci.** 43: 493-502.

Rajewski, R. and Stella, V.J. 1996. Pharmaceutical Applications of Cyclodextrins. 2. *In vivo* Drug Delivery. **J. Pharm. Sci.** 85 (11): 1142-1169.

Rockville, M.D. 1995. **The United States Pharmacopoeia**. 23rd ed. revision. The National Formulary. 18th ed. pp. 1774-1777, 1982-1984. The United States Pharmacopoeia convention, Inc.

Schneider, H., Hacket, F., and Rudiger, V. 1998. NMR Studies of Cyclodextrins and Cyclodextrin Complexes. **Chem. Rev.** 98: 1755-1785.

Sharma, U.S., Balasubramanian, S.V., and Straubinger, R.M. 1995. Pharmaceutical and Physical Properties of Paclitaxel (Taxol) Complexes with Cyclodextrins. **J. Pharm. Sci.** 84 (10): 1223-1230.

Shiotani, K., Irie, T., Uekama, K. and Ishimaru, Y. 1995. Cyclodextrin sulfates in parenteral use: protection against gentamycin nephrotoxicity in the rat. **Eur. J.Pharm. Sci.** 3: 139-151.

Steiner, T. and Koellner, G. 1994. Crystalline β-Cyclodextrin Hydrate at Various Humidities: Fast, Continuous, and Reversible Dehydration Studied by X-ray Diffraction. **J. Am. Chem. Soc.** 116: 5122-5128.

Suryanarayanan, R. 1995. X-ray Powder Diffractometry. In Brittain, H.G. ed. **Physical Characterization of Pharmaceutical Solids**. pp. 187-221. New York: Marcel Dekker, Inc.

Szejtli, J. 1988. **Cyclodextrin Technology**. pp. 1-306. Dordrecht: Kluwer Academic Publishers.

Szejtli, J. 1998. Introduction and General Overview of Cyclodextrin Chemistry. **Chem. Rev**. 98: 1743-1753.

Teraoka, R., Otsuka, M., and Matsuda, Y. 1993. Effects of Temperature and Relative Humidity on the Solid-State Chemical Stability of Ranitidine Hydrochloride. J. **Pharm. Sci**. 82: 601-604.

Tros de Ilarduya, M.C., Martin, C., Goni, N.M., and Martinez-Oharriz, M.C. 1998. Solubilization and Interaction of Sulindac with β-Cyclodextrin in the Solid State and in Aqueous Solution. **Drug Dev. Ind. Pharm**. 24 (3): 301-306.

Uekama, K. and Hirayama, F. 1996. Improvement of Drug Properties by Cyclodextrins. In Wermuth, C.G. ed. London: Academic Press limited. : 793-825.

Uekama, K. Horikawa, T., yamanaka, M., and Hirayama, F. 1994. Peracylated β-cyclodextrins as Novel Sustained-release Carriers for a Water-soluble Drug, Molsidomine. **J. Pharm. Pharmacol**. 46: 714-717.

Wade, A. and Welly, P.J. 1994. **Handbook of pharmaceutical excipients**. pp. 145-148, 628. Washington: The American Pharmaceutical Association.

Yoshida, A., Arima, H., Uekama, K., and Pitha J. 1988. Pharmaceutical evaluation of hydroxyalkyl ethers of β-cyclodextrins. Int. J. **Pharm**. 46: 217-222.

Yoshida, A., Yamamoto, M., Hirayama, F., and Uekama, K. 1988. Improvement of Chemical Instability of Digitoxin in Aqueous Solution by Complexation with β-Cyclodextrin Derivatives. **Chem. Pharm**. Bull. 36 (10): 4075-4080.

Yoshida, A., Yamamoto, M., Irie, T., Hirayama, F., and Uekama, K. 1989. The Pharmaceutical Properties of 3-Hydroxypropyl- and 2, 3- Dihydroxypropyl-β-Cyclodextrins and their Solubilizing and Stabilizing Abilities. **Chem. Pharm. Bull.** 37 (4): 1059-1063.

APPENDIX I

Calibration Curve Data of Ranitidine HCl

Calibration curve data A

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0629	0.0686	0.0656
4.00	0.1256	0.1307	0.1284
8.00	0.2572	0.2682	0.2602
12.00	0.3928	0.4013	0.3876
16.00	0.5108	0.5301	0.5237
20.00	0.6398	0.6662	0.6554
24.00	0.7658	0.7910	0.7856

PAR = 0.0003 + 0.0326 Conc. ; r^2 = 0.9999

Calibration curve data B

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0658	0.0769	0.0763
4.00	0.1346	0.1384	0.1399
8.00	0.2577	0.2661	0.2766
12.00	0.3844	0.3986	0.3962
16.00	0.5212	0.5348	0.5375
20.00	0.6630	0.6900	0.6733
24.00	0.7828	0.8071	0.8129

PAR = 0.0025 + 0.0333 Conc. ; r^2 = 0.9996

Calibration curve data C

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0736	0.0740	0.0689
4.00	0.1431	0.1377	0.1354
8.00	0.2678	0.2637	0.2599
12.00	0.3925	0.3929	0.3896
16.00	0.5176	0.5227	0.5223
20.00	0.6632	0.6645	0.6553
24.00	0.8089	0.7939	0.7884

$PAR = 0.0023 + 0.0330\ Conc.\ ;\ r^2 = 0.9997$

Calibration curve data D

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0652	0.0653	0.0663
4.00	0.1335	0.1316	0.1276
8.00	0.2593	0.2580	0.2619
12.00	0.3886	0.3903	0.3884
16.00	0.5180	0.5199	0.5210
20.00	0.6540	0.6510	0.6598
24.00	0.7781	0.7784	0.7794

$PAR = 0.0003 + 0.0325\ Conc.\ ;\ r^2 = 0.9999$

Calibration curve data E

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0653	0.0649	0.0693
4.00	0.1264	0.1285	0.1307
8.00	0.2465	0.2474	0.2516
12.00	0.3709	0.3767	0.3787
16.00	0.4869	0.5034	0.5103
20.00	0.6263	0.6460	0.6296
24.00	0.7495	0.7670	0.7589

$PAR = 0.0003 + 0.0315\ Conc.\ ;\ r^2 = 0.9998$

Calibration curve data F

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0644	0.0644	0.0653
4.00	0.1271	0.1302	0.1322
8.00	0.2479	0.2554	0.2591
12.00	0.3734	0.3790	0.3809
16.00	0.4990	0.5109	0.5100
20.00	0.6291	0.6413	0.6469
24.00	0.7636	0.7647	0.7598

$PAR = 0.0006 + 0.0317\ Conc.\ ;\ r^2 = 0.9999$

Calibration curve data G

Ranitidine HCl concentrations (µg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0628	0.0645	0.0661
4.00	0.1298	0.1281	0.1334
8.00	0.2596	0.2543	0.2586
12.00	0.3803	0.3811	0.3819
16.00	0.5173	0.5100	0.5140
20.00	0.6557	0.6479	0.6420
24.00	0.7714	0.7795	0.7721

PAR = -0.0009 + 0.0323 Conc. ; r^2 = 0.9999

Calibration curve data H

Ranitidine HCl concentrations (µg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0628	0.0618	0.0630
4.00	0.1280	0.1311	0.1282
8.00	0.2506	0.2503	0.2473
12.00	0.3721	0.3819	0.3754
16.00	0.5269	0.5007	0.5003
20.00	0.6152	0.6367	0.6278
24.00	0.7454	0.7573	0.7482

PAR = 0.0018 + 0.0313 Conc. ; r^2 = 0.9998

Calibration curve data I

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0653	0.0643	0.0649
4.00	0.1310	0.1314	0.1305
8.00	0.2554	0.2568	0.2606
12.00	0.3854	0.3816	0.3862
16.00	0.5148	0.5169	0.5224
20.00	0.6509	0.6454	0.6570
24.00	0.7729	0.7700	0.7780

$PAR = -2.06x10^{-6} + 0.0323\ Conc.\ ;\ r^2 = 0.9999$

Calibration curve data J

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0639	0.0630	0.0622
4.00	0.1286	0.1317	0.1298
8.00	0.2495	0.2565	0.2505
12.00	0.3748	0.3794	0.3830
16.00	0.5041	0.5084	0.5124
20.00	0.6426	0.6474	0.6477
24.00	0.7633	0.7629	0.7673

$PAR = -0.0013 + 0.0320\ Conc.\ ;\ r^2 = 0.9998$

Calibration curve data K

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0633	0.0660	0.0644
4.00	0.1318	0.1333	0.1307
8.00	0.2579	0.2585	0.2584
12.00	0.3838	0.3893	0.3839
16.00	0.5172	0.5186	0.5146
20.00	0.6489	0.6528	0.6469
24.00	0.7858	0.7821	0.7753

PAR = -0.0008 + 0.0325 Conc. ; r^2 = 0.9999

Calibration curve data L

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0700	0.0635	0.0658
4.00	0.1288	0.1300	0.1311
8.00	0.2523	0.2527	0.2544
12.00	0.3786	0.3767	0.3816
16.00	0.5013	0.5046	0.5049
20.00	0.6375	0.6424	0.6369
24.00	0.7569	0.7662	0.7598

PAR = 0.0017 + 0.0316 Conc. ; r^2 = 0.9999

Calibration curve data M

Ranitidine HCl concentrations (µg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.06469	0.0632	0.0675
4.00	0.1294	0.1297	0.1337
8.00	0.2549	0.2539	0.2594
12.00	0.3813	0.3992	0.3868
16.00	0.5134	0.5136	0.5187
20.00	0.6465	0.6467	0.6557
24.00	0.7893	0.7812	0.7755

$PAR = -0.0013 + 0.0325\ Conc.\ ;\ r^2 = 0.9999$

Calibration curve data N

Ranitidine HCl concentrations (µg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0630	0.0637	0.0664
4.00	0.1294	0.1308	0.1336
8.00	0.2513	0.2564	0.2596
12.00	0.3780	0.3870	0.3903
16.00	0.5061	0.5123	0.5112
20.00	0.6388	0.6482	0.6567
24.00	0.7653	0.7798	0.7705

$PAR = -5.20 \times 10^{-5} + 0.0322\ Conc.\ ;\ r^2 = 0.9999$

Calibration curve data O

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0658	0.0651	0.0650
4.00	0.1306	0.1300	0.1309
8.00	0.2574	0.2624	0.2574
12.00	0.3859	0.3858	0.3907
16.00	0.5080	0.5140	0.5144
20.00	0.6463	0.6474	0.6463
24.00	0.7849	0.7820	0.7818

PAR = -0.0009 + 0.0324 Conc. ; r^2 = 0.9998

Calibration curve data P

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0610	0.0630	0.0641
4.00	0.1304	0.1309	0.1314
8.00	0.2523	0.2550	0.2540
12.00	0.3843	0.3885	0.3847
16.00	0.5176	0.5179	0.5143
20.00	0.6481	0.6499	0.6491
24.00	0.7701	0.7802	0.7694

PAR = -0.0016 + 0.0324 Conc. ; r^2 = 0.9999

Calibration curve data Q

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0624	0.0674	0.0646
4.00	0.1294	0.1316	0.1294
8.00	0.2513	0.2568	0.2552
12.00	0.3827	0.3847	0.3835
16.00	0.5089	0.5151	0.5158
20.00	0.6469	0.6427	0.6442
24.00	0.7683	0.7641	0.7679

PAR = 0.0006 + 0.0320 Conc. ; r^2 = 0.9999

Calibration curve data R

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0632	0.0633	0.0628
4.00	0.1270	0.1262	0.1292
8.00	0.2512	0.2576	0.2530
12.00	0.3840	0.3845	0.3875
16.00	0.5097	0.5091	0.5217
20.00	0.6389	0.6591	0.6431
24.00	0.7635	0.7625	0.7717

PAR = -0.0011 + 0.0321 Conc. ; r^2 = 0.9999

Calibration curve data S

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0652	0.0649	0.0658
4.00	0.1309	0.1342	0.1341
8.00	0.2544	0.2619	0.2608
12.00	0.3862	0.3865	0.3947
16.00	0.5167	0.5260	0.5302
20.00	0.6510	0.6624	0.6739
24.00	0.7877	0.8028	0.7819

PAR = -0.0024 + 0.0330 Conc. ; r^2 = 0.9998

Calibration curve data T

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0605	0.0625	0.0643
4.00	0.1245	0.1304	0.1347
8.00	0.2590	0.2564	0.2565
12.00	0.3773	0.3821	0.3901
16.00	0.5034	0.5131	0.5139
20.00	0.6359	0.6539	0.6626
24.00	0.7591	0.7655	0.7640

PAR = 0.0003 + 0.0320 Conc. ; r^2 = 0.9996

Calibration curve data U

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0632	0.0631	0.0625
4.00	0.1289	0.1290	0.1288
8.00	0.2495	0.2476	0.2563
12.00	0.3758	0.3779	0.3811
16.00	0.4986	0.5047	0.5081
20.00	0.6400	0.6431	0.6486
24.00	0.7523	0.7695	0.7613

$$PAR = -0.0014 + 0.0319\ Conc.\ ;\ r^2 = 0.9997$$

Calibration curve data V

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0604	0.0621	0.0622
4.00	0.1285	0.1270	0.1271
8.00	0.2535	0.2592	0.2524
12.00	0.3914	0.3852	0.3762
16.00	0.4968	0.5069	0.5150
20.00	0.6328	0.6311	0.6329
24.00	0.7583	0.7538	0.7526

$$PAR = 0.0018 + 0.0315\ Conc.\ ;\ r^2 = 0.9999$$

Calibration curve data W

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0620	0.0597	0.0593
4.00	0.1282	0.1266	0.1262
8.00	0.2516	0.2527	0.2458
12.00	0.3748	0.3739	0.3714
16.00	0.5032	0.5008	0.5015
20.00	0.6519	0.6261	0.6294
24.00	0.7722	0.7518	0.7679

PAR = -0.0044 + 0.0319 Conc. ; r^2 = 0.9998

Calibration curve data X

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0601	0.0613	0.0599
4.00	0.1250	0.1249	0.1277
8.00	0.2505	0.2468	0.2449
12.00	0.3793	0.3690	0.3698
16.00	0.5036	0.5006	0.5008
20.00	0.6406	0.6250	0.6241
24.00	0.7593	0.7593	0.7404

PAR = -0.0027 + 0.0315 Conc. ; r^2 = 0.9999

Calibration curve data Y

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0610	0.0617	0.0635
4.00	0.1277	0.1258	0.1242
8.00	0.2522	0.2553	0.2519
12.00	0.3810	0.3780	0.3807
16.00	0.5105	0.5180	0.5074
20.00	0.6415	0.6420	0.6326
24.00	0.7665	0.7627	0.7653

PAR = -0.0023 + 0.0320 Conc. ; r^2 = 0.9999

Calibration curve data Z

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.00	0.0580	0.0584	0.0595
4.00	0.1244	0.1265	0.1270
8.00	0.2534	0.2474	0.2552
12.00	0.3757	0.3799	0.3733
16.00	0.5076	0.4974	0.5015
20.00	0.6304	0.6397	0.6374
24.00	0.7516	0.7638	0.7605

PAR = -0.0034 + 0.0318 Conc. ; r^2 = 0.9999

Calibration curve data AA

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.03	0.0620	0.0635	0.0624
4.06	0.1292	0.1331	0.1291
8.12	0.2512	0.2574	0.2568
12.18	0.3814	0.3851	0.3926
16.24	0.5120	0.5164	0.5179
20.30	0.6383	0.6444	0.6452
24.36	0.7666	0.7803	0.7840

PAR = -0.0016 + 0.0319 Conc. ; r^2 = 0.9999

Calibration curve data AB

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.03	0.0612	0.0611	0.0623
4.06	0.1283	0.1294	0.1269
8.12	0.2579	0.2570	0.2566
12.18	0.3868	0.3891	0.3790
16.24	0.5137	0.5094	0.5162
20.30	0.6498	0.6530	0.6443
24.36	0.7830	0.7630	0.7705

PAR = -0.0023 + 0.0319 Conc. ; r^2 = 0.9999

Calibration curve data AC

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
2.01	0.0610	0.0605	0.0604
4.02	0.1257	0.1280	0.1277
8.04	0.2574	0.2545	0.2557
12.06	0.3880	0.3851	0.3884
16.08	0.5083	0.5060	0.5114
20.10	0.6530	0.6291	0.6348
24.12	0.7695	0.7604	0.7640

PAR = -0.0007 + 0.0318 Conc. ; r^2 = 0.9999

Calibration curve data AD

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
1.98	0.0595	0.0613	0.0598
3.96	0.1307	0.1281	0.1248
7.92	0.2553	0.2491	0.2460
11.88	0.3813	0.3725	0.3714
15.84	0.5159	0.4959	0.4960
19.8	0.6423	0.6209	0.6331
23.76	0.7626	0.7471	0.7435

PAR = -0.0007 + 0.0318 Conc. ; r^2 = 0.9999

Calibration curve data AE

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
1.99	0.0601	0.0589	0.0601
3.98	0.1260	0.1279	0.1311
7.96	0.2524	0.2547	0.2496
11.94	0.3858	0.3817	0.3768
15.92	0.5129	0.5090	0.5050
19.90	0.6459	0.64437	0.6338
23.88	0.7721	0.7639	0.7585

PAR = -0.0028 + 0.0322 Conc. ; r^2 = 0.9999

Calibration curve data AF

Ranitidine HCl concentrations (μg/mL)	Peak area ratio (PAR)		
	Set No. 1	Set No. 2	Set No. 3
1.99	0.0552	0.0552	0.0546
3.98	0.1244	0.1201	0.1213
7.96	0.2426	0.2410	0.2373
11.94	0.3699	0.3654	0.3548
15.92	0.4883	0.4845	0.4730
19.90	0.6175	0.6150	0.5958
23.88	0.7419	0.7259	0.7093

PAR = -0.0029 + 0.0306 Conc. ; r^2 = 0.9999

APPENDIX II

Stability Data of Ranitidine HCl Solutions

Stability Data of Ranitidine HCl Solution

(pH 1 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	C	8.90	9.33	9.27	9.33	9.21 ± 0.20
4.00	C	9.44	9.61	10.23	9.68	9.74 ± 0.34
8.00	C	9.19	9.31	9.16	9.28	9.23 ± 0.07
11.00	C	8.35	8.23	8.30	8.22	8.28 ± 0.06
13.00	C	7.61	7.82	7.70	7.95	7.77 ± 0.15
16.00	C	6.17	5.94	5.91	6.04	6.02 ± 0.12
18.00	C	5.26	5.12	4.66	4.71	4.94 ± 0.30
20.00	C	4.03	3.55	3.31	3.03	3.48 ± 0.42
22.00	C	1.21	1.38	1.00	1.54	1.28 ± 0.23

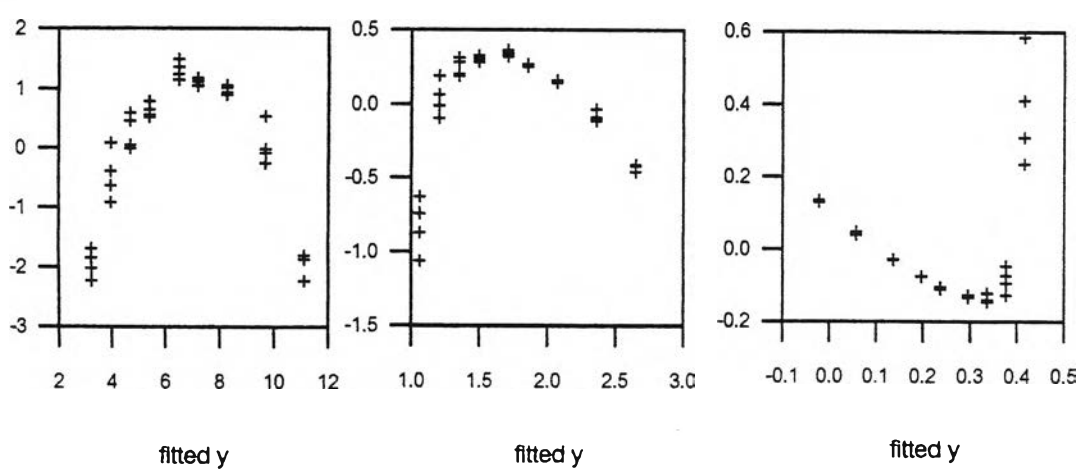
* calibration curve used.

Zero-order : conc = 11.1308 - 0.3592 time r = 0.9057

First- order : ln conc = 2.6476 - 0.0721 time r = 0.8021

Second-order : 1/conc = -0.0220 + 0.0199 time r = 0.6443

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

(pH 1 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	C	10.34	9.98	10.21	9.98	10.13 ± 0.18
4.00	C	9.92	9.67	9.66	9.92	9.79 ± 0.15
6.50	C	8.44	8.69	8.55	8.78	8.61 ± 0.15
8.00	C	7.46	7.95	7.68	7.69	7.70 ± 0.20
10.00	C	5.91	5.80	5.81	5.92	5.86 ± 0.06
11.00	C	4.68	4.57	4.79	4.54	4.64 ± 0.12
12.00	C	3.25	3.44	3.69	3.47	3.46 ± 0.18
13.00	C	1.71	1.90	1.77	1.97	1.84 ± 0.12

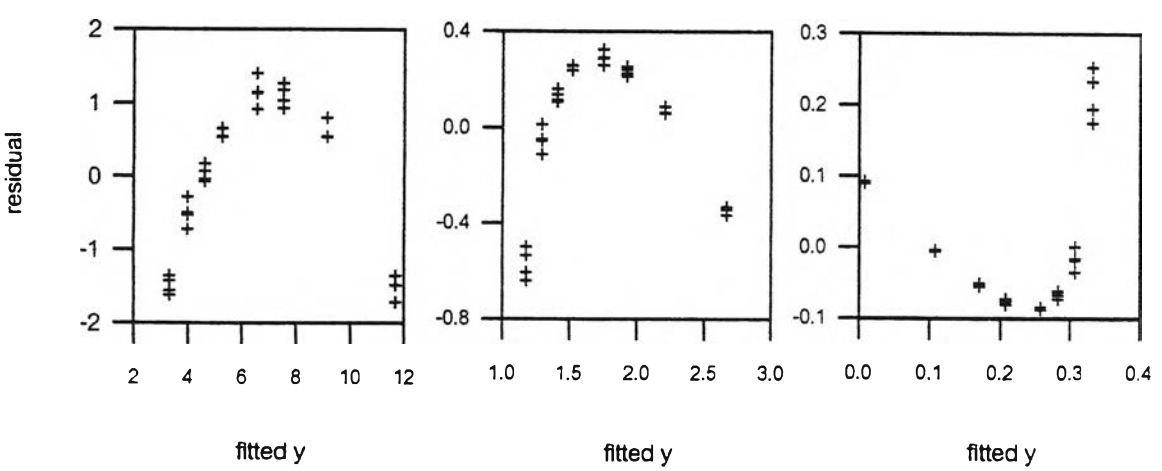
* calibration curve used.

Zero-order : conc = 11.6935 - 0.6436 time r = 0.9328

First- order : ln conc = 2.6665 - 0.1146 time r = 0.8513

Second-order : 1/conc = 0.0075 + 0.0249 time r = 0.7253

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 1 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	C	9.71	9.78	9.31	9.61	9.60 ± 0.21
4.00	C	9.63	9.68	9.37	9.31	9.50 ± 0.19
7.00	C	8.86	8.73	9.00	8.90	8.87 ± 0.11
10.00	C	6.95	7.52	7.46	7.12	7.26 ± 0.28
12.00	C	6.39	6.24	6.36	5.96	6.24 ± 0.20
14.00	C	5.94	4.52	4.73	4.67	4.97 ± 0.65
16.00	C	3.15	2.58	2.62	2.53	2.72 ± 0.29

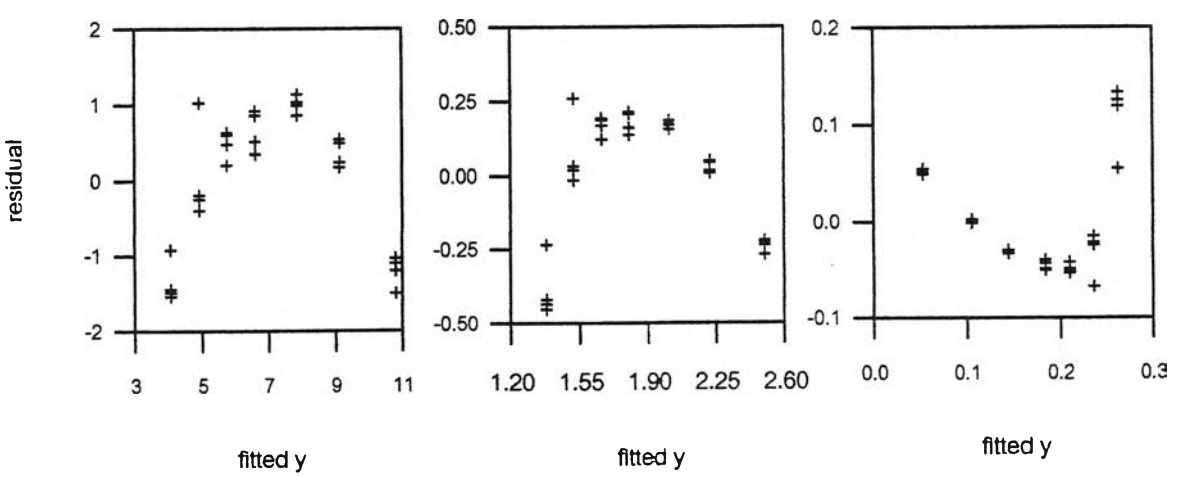
* calibration curve used.

Zero-order : conc = 10.8180 - 0.4217 time r = 0.9269

First- order : ln conc = 2.5000 - 0.0698 time r = 0.8629

Second-order : 1/conc = 0.0528 + 0.0131 time r = 0.7733

Zero-order plot First-order plot Second-order plot



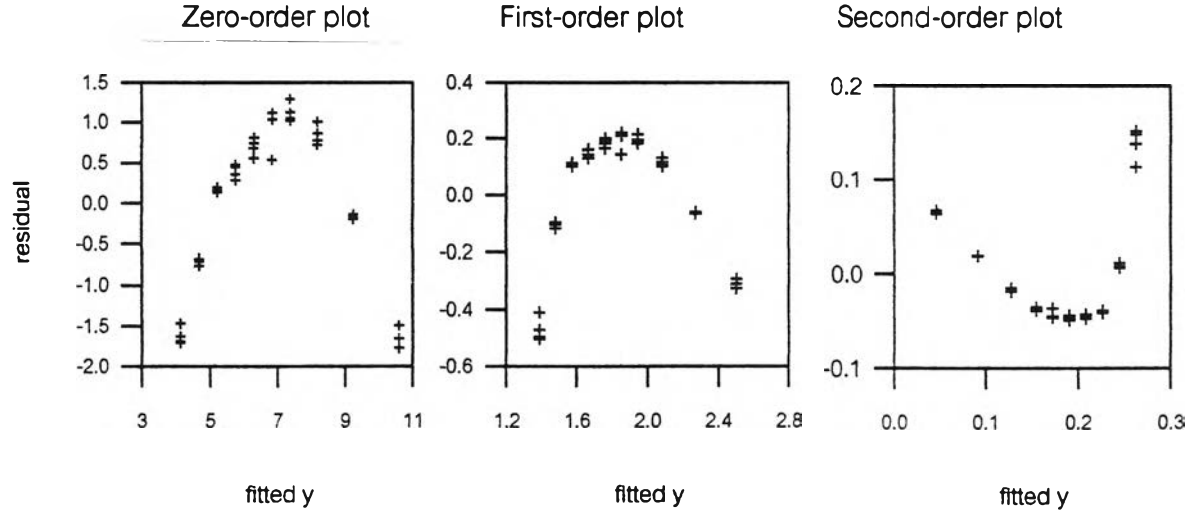
Stability Data of Ranitidine HCl Solution

(pH 1 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	D	9.10	8.82	8.94	8.94	8.95 ± 0.12
5.00	D	9.11	9.07	9.10	9.05	9.08 ± 0.03
9.00	D	9.17	8.89	9.03	8.94	9.01 ± 0.12
12.00	D	8.40	8.48	8.66	8.38	8.48 ± 0.13
14.00	D	7.93	7.85	7.36	7.93	7.77 ± 0.27
16.00	D	6.84	7.02	6.96	7.09	6.98 ± 0.11
18.00	D	6.22	6.03	6.20	6.10	6.14 ± 0.09
20.00	D	5.34	5.40	5.36	5.35	5.36 ± 0.03
22.00	D	3.96	3.91	3.99	3.96	3.96 ± 0.04
24.00	D	2.44	2.66	2.42	2.50	2.50 ± 0.11

* calibration curve used.

Zero-order :	conc = 10.5932 - 0.2693 time	r = 0.8948
First- order :	ln conc = 2.5009 - 0.0464 time	r = 0.8351
Second-order :	1/conc = 0.0466 + 0.0090 time	r = 0.7497



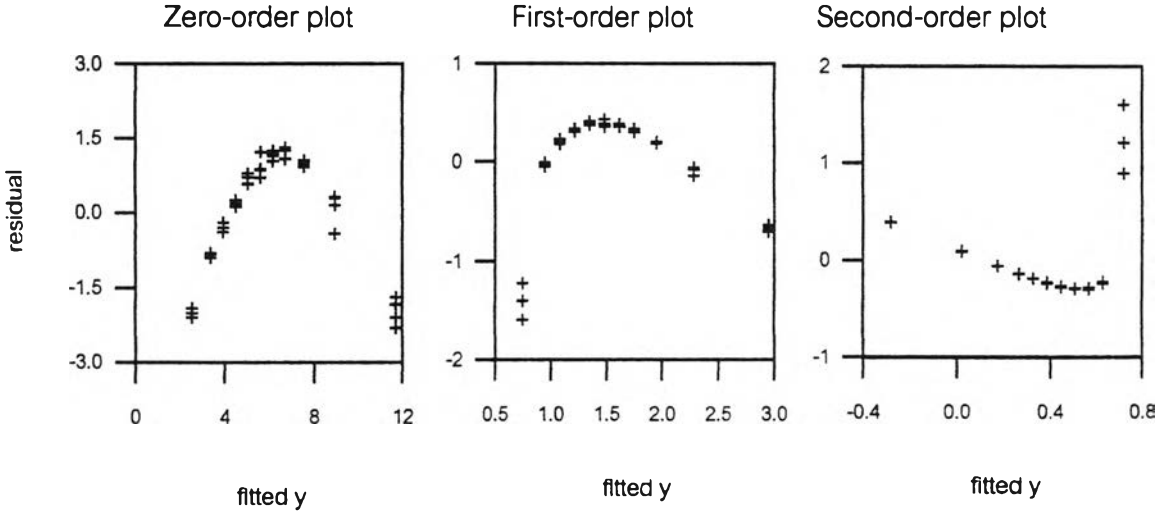
Stability Data of Ranitidine HCl : β–CD complex

(pH 1 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	D	9.40	9.61	9.87	10.01	9.72 ± 0.27
5.00	D	9.22	9.08	8.50	9.24	9.01 ± 0.35
7.50	D	8.59	8.45	8.51	8.53	8.52 ± 0.06
9.00	D	8.01	7.95	7.79	7.77	7.88 ± 0.12
10.00	D	7.38	7.29	7.18	7.32	7.29 ± 0.08
11.00	D	6.81	6.46	6.44	6.29	6.50 ± 0.22
12.00	D	5.74	5.82	5.60	5.61	5.69 ± 0.11
13.00	D	4.59	4.66	4.60	4.72	4.64 ± 0.06
14.00	D	3.72	3.62	3.62	3.53	3.62 ± 0.08
15.00	D	2.47	2.46	2.53	2.56	2.50 ± 0.05
16.50	D	0.43	0.52	0.52	0.62	0.52 ± 0.08

* calibration curve used.

Zero-order :	conc = 11.7061 - 0.5563 time	r = 0.9137
First- order :	ln conc = 2.9466 - 0.1332 time	r = 0.7486
Second-order :	1/conc = -0.2811 + 0.0607 time	r = 0.5320



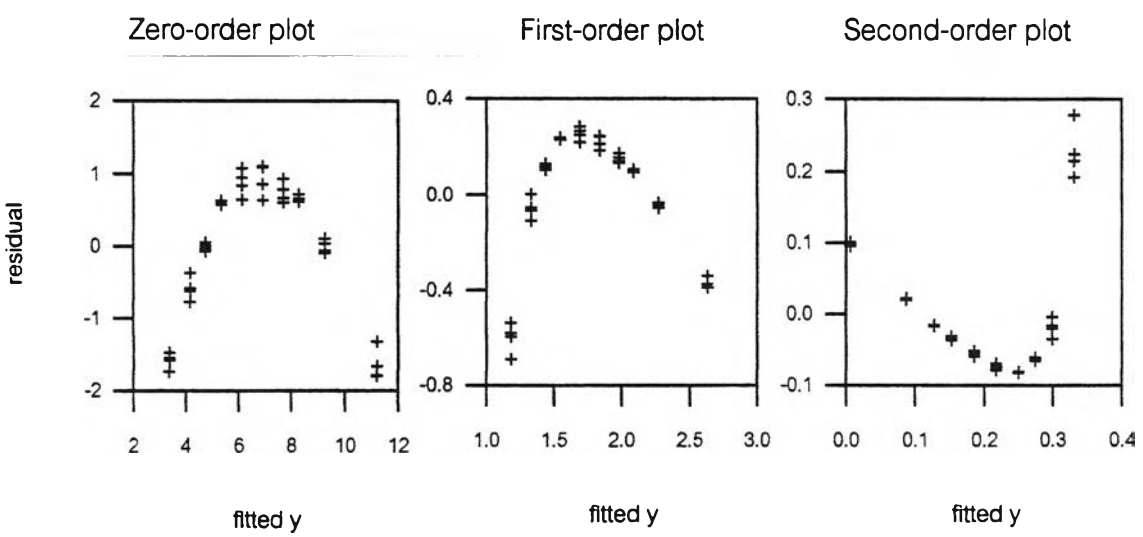
Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 1 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	D	9.41	9.42	9.55	9.89	9.57 ± 0.22
5.00	D	9.36	9.16	9.29	9.19	9.25 ± 0.09
7.50	D	8.93	8.99	8.99	8.89	8.95 ± 0.05
9.00	D	8.47	8.62	8.35	8.29	8.43 ± 0.15
11.00	D	7.76	8.00	7.54	8.01	7.83 ± 0.23
13.00	D	6.96	7.20	6.76	7.07	7.00 ± 0.19
15.00	D	5.91	5.95	5.95	5.96	5.94 ± 0.03
16.50	D	4.80	4.68	4.72	4.76	4.74 ± 0.05
18.00	D	3.39	3.79	3.58	3.54	3.58 ± 0.16
20.00	D	1.83	1.80	1.64	1.91	1.80 ± 0.11

* calibration curve used.

Zero-order :	conc = 11.2113 - 0.3916 time	r = 0.9277
First- order :	ln conc = 2.6320 - 0.0723 time	r = 0.8459
Second-order :	1/conc = 0.0059 + 0.0163 time	r = 0.7244



Stability Data of Ranitidine HCl Solution

(pH 1 0.30 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	S	9.41	9.30	9.47	10.41	9.65 ± 0.51
5.00	S	9.62	10.15	9.34	9.31	9.60 ± 0.39
9.00	S	8.92	8.79	9.22	8.96	8.97 ± 0.18
12.00	S	8.84	8.81	8.65	8.73	8.76 ± 0.08
17.00	S	7.44	7.16	7.23	7.38	7.30 ± 0.13
22.00	S	5.76	5.86	5.85	5.96	5.86 ± 0.08
27.00	S	3.96	3.85	3.68	3.74	3.81 ± 0.12
29.00	S	2.62	2.58	2.60	2.57	2.59 ± 0.02
31.00	S	1.36	1.38	1.48	1.38	1.40 ± 0.05

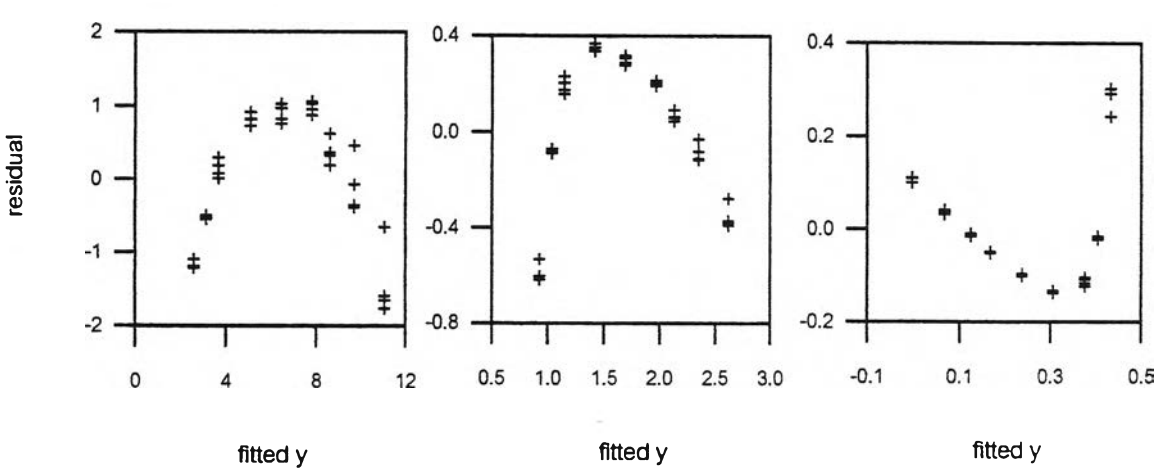
* calibration curve used.

Zero-order : conc = 11.0642 - 0.2739 time r = 0.9580

First- order : ln conc = 2.6214 - 0.0547 time r = 0.8886

Second-order : 1/conc = -0.0036 + 0.0141 time r = 0.7660

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

(pH 1 0.30 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	S	10.14	10.11	9.99	9.12	9.84 ± 0.48
4.00	S	9.57	9.23	10.05	9.47	9.58 ± 0.35
6.00	S	9.39	8.91	9.05	9.34	9.17 ± 0.23
8.00	S	8.37	8.64	8.54	8.57	8.53 ± 0.11
11.00	S	7.47	7.28	7.27	7.15	7.29 ± 0.13
13.00	S	6.03	5.65	5.77	5.98	5.86 ± 0.18
15.00	S	4.32	4.18	4.33	4.18	4.25 ± 0.09
17.00	S	2.80	2.60	2.68	2.61	2.67 ± 0.09
19.00	S	0.81	0.92	0.77	0.65	0.79 ± 0.11

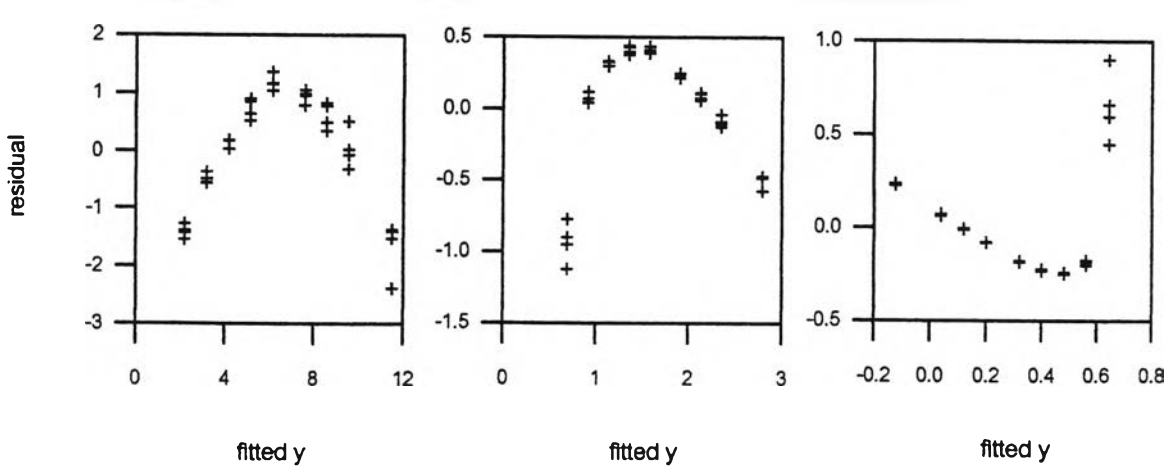
* calibration curve used.

Zero-order : conc = 11.5137 - 0.4907 time r = 0.9487

First- order : ln conc = 2.7897- 0.1104 time r = 0.8366

Second-order : 1/conc = -0.1219 + 0.0402 time r = 0.6545

Zero-order plot First-order plot Second-order plot



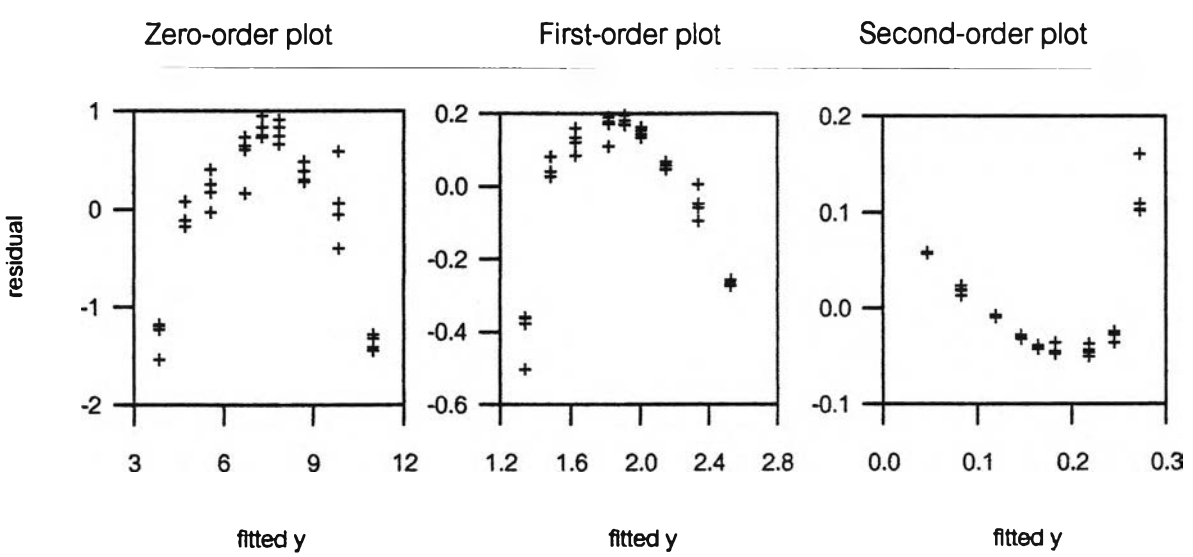
Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 1 0.30 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	S	9.69	9.56	9.65	9.53	9.61 ± 0.08
4.00	S	9.43	9.89	9.78	10.42	9.88 ± 0.41
8.00	S	8.99	9.17	9.08	8.97	9.05 ± 0.09
11.00	S	8.67	8.50	8.58	8.75	8.62 ± 0.11
13.00	S	8.10	8.22	8.00	8.02	8.09 ± 0.10
15.00	S	7.30	7.34	7.43	6.86	7.23 ± 0.26
19.00	S	5.73	5.96	5.81	5.53	5.76 ± 0.18
22.00	S	4.53	4.59	4.59	4.78	4.63 ± 0.11
25.00	S	2.31	2.67	2.66	2.62	2.56 ± 0.17

* calibration curve used.

Zero-order :	conc = 10.9723 - 0.2848 time	r = 0.9428
First- order :	ln conc = 2.5283 - 0.0475 time	r = 0.8843
Second-order :	1/conc = 0.0465 + 0.0090 time	r = 0.7955



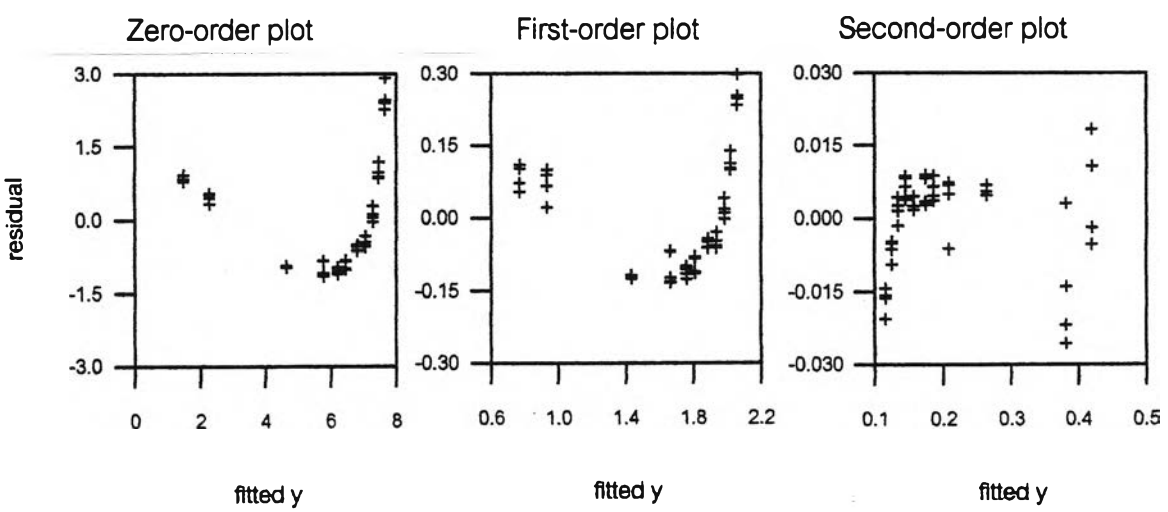
Stability Data of Ranitidine HCl Solution

(pH 3 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	W	10.06	10.12	10.58	9.92	10.17 ± 0.29
8.00	W	8.43	8.65	8.34	8.32	8.44 ± 0.15
15.00	W	7.57	7.25	7.40	7.34	7.39 ± 0.14
24.00	W	6.54	6.61	6.52	6.73	6.60 ± 0.09
34.00	W	6.30	6.27	6.19	6.27	6.26 ± 0.05
48.00	W	5.48	5.65	5.63	5.46	5.56 ± 0.10
58.00	W	5.23	5.12	5.26	5.18	5.20 ± 0.06
76.00	X	4.68	4.64	4.94	4.63	4.72 ± 0.15
121.00	X	3.72	3.71	3.71	3.69	3.71 ± 0.02
216.50	X	2.78	2.81	2.72	2.60	2.73 ± 0.09
248.00	X	2.28	2.39	2.41	2.32	2.35 ± 0.06

* calibration curves used.

Zero-order :	conc = 7.6595 - 0.0249 time	r = 0.8810
First- order :	ln conc = 2.0613 - 0.0052 time	r = 0.9634
Second-order :	1/conc = 0.1151 + 0.0012 time	r = 0.9953



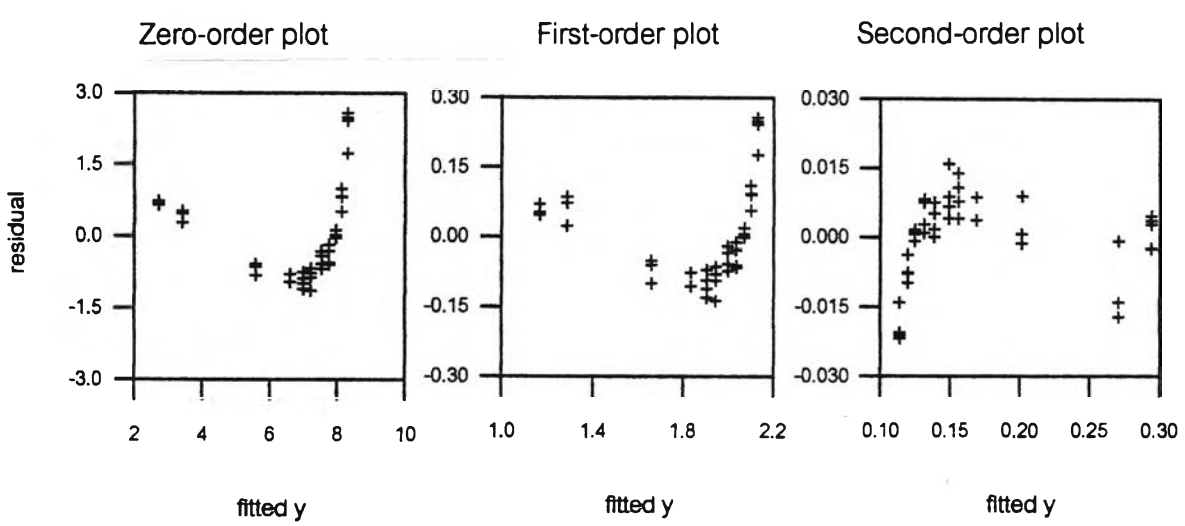
Stability Data of Ranitidine HCl : β–CD complex

(pH 3 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	W	10.72	10.88	10.79	10.03	10.60 ± 0.39
8.00	W	8.63	8.95	8.93	9.11	8.91 ± 0.20
15.00	W	7.92	8.08	7.95	7.98	7.99 ± 0.07
24.00	W	7.46	7.17	7.57	7.21	7.35 ± 0.19
34.00	W	6.96	7.22	6.85	7.13	7.04 ± 0.17
48.00	W	6.08	6.55	6.35	6.44	6.36 ± 0.20
58.00	W	6.00	5.89	6.11	6.25	6.06 ± 0.16
76.00	X	5.63	5.79	5.79	5.63	5.71 ± 0.09
121.00	X	4.99	4.94	4.94	4.75	4.91 ± 0.11
216.50	X	3.70	3.89	3.89	3.94	3.86 ± 0.11
248.00	X	3.37	3.35	3.36	3.43	3.38 ± 0.04

* calibration curves used.

Zero-order :	conc = 8.2990 - 0.0226 time	r = 0.8844
First- order :	ln conc = 2.1300 - 0.0039 time	r = 0.9532
Second-order :	1/conc = 0.1138 + 0.0007 time	r = 0.9877



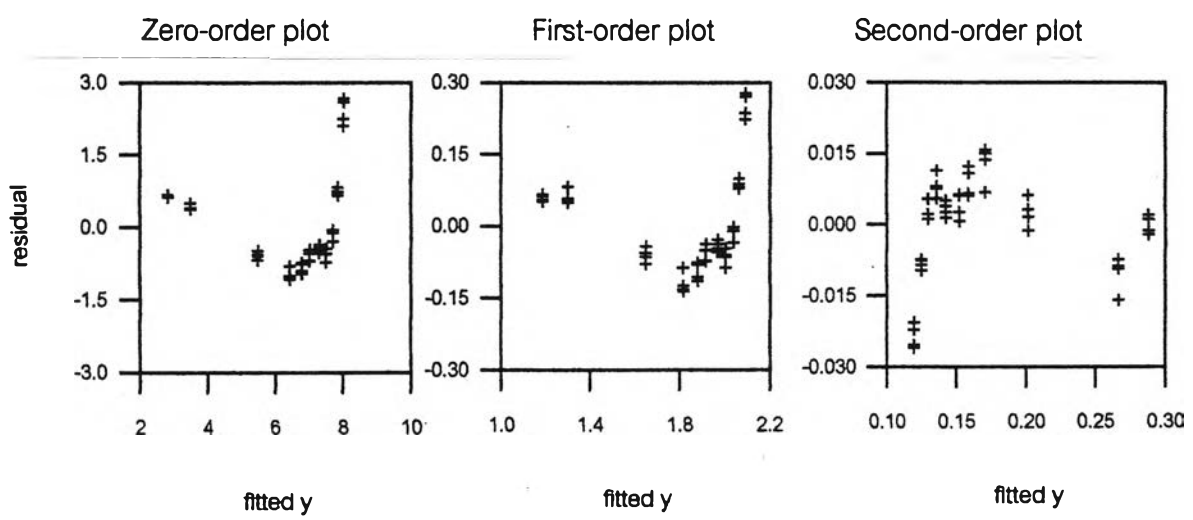
Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 3 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	W	10.26	10.61	10.11	10.68	10.42 ± 0.27
8.00	W	8.58	8.50	8.67	8.52	8.57 ± 0.08
15.00	W	7.58	7.40	7.58	7.64	7.55 ± 0.11
24.00	W	6.79	7.07	6.97	6.95	6.94 ± 0.12
34.00	W	6.94	6.88	6.82	6.77	6.85 ± 0.07
48.00	W	6.31	6.46	6.32	6.54	6.41 ± 0.11
58.00	W	6.04	5.89	6.06	5.84	5.96 ± 0.11
76.00	X	5.41	5.37	5.62	5.35	5.44 ± 0.13
121.00	X	4.99	4.81	4.88	4.92	4.90 ± 0.07
216.50	X	3.99	3.88	3.89	3.86	3.91 ± 0.06
248.00	X	3.45	3.50	3.46	3.49	3.47 ± 0.02

* calibration curves used.

Zero-order :	conc = 8.0121 - 0.0209 time	r = 0.8701
First- order :	ln conc = 2.0906 - 0.0036 time	r = 0.9430
Second-order :	1/conc = 0.1196 + 0.0007 time	r = 0.9830



Stability Data of Ranitidine HCl Solution

(pH 3 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	X	10.20	10.33	9.97	10.19	10.17 ± 0.15
8.00	X	7.36	7.13	6.97	7.00	7.11 ± 0.18
16.00	X	5.49	5.43	5.58	5.54	5.51 ± 0.06
23.00	X	4.92	4.78	4.98	5.04	4.93 ± 0.11
32.00	X	4.19	4.10	4.04	4.14	4.12 ± 0.06
44.00	X	3.56	3.66	3.62	3.62	3.61 ± 0.04
64.50	Y	3.17	3.12	3.13	3.10	3.13 ± 0.03
91.00	Y	2.72	2.78	2.78	2.88	2.79 ± 0.07
117.50	Y	2.60	2.43	2.42	2.56	2.50 ± 0.09
189.00	Z	2.16	2.17	2.26	2.14	2.18 ± 0.05
241.00	Z	1.89	1.93	1.80	1.87	1.87 ± 0.05
385.00	AC	1.48	1.43	1.45	1.41	1.44 ± 0.03
739.00	AD	0.89	0.88	0.87	0.86	0.87 ± 0.01

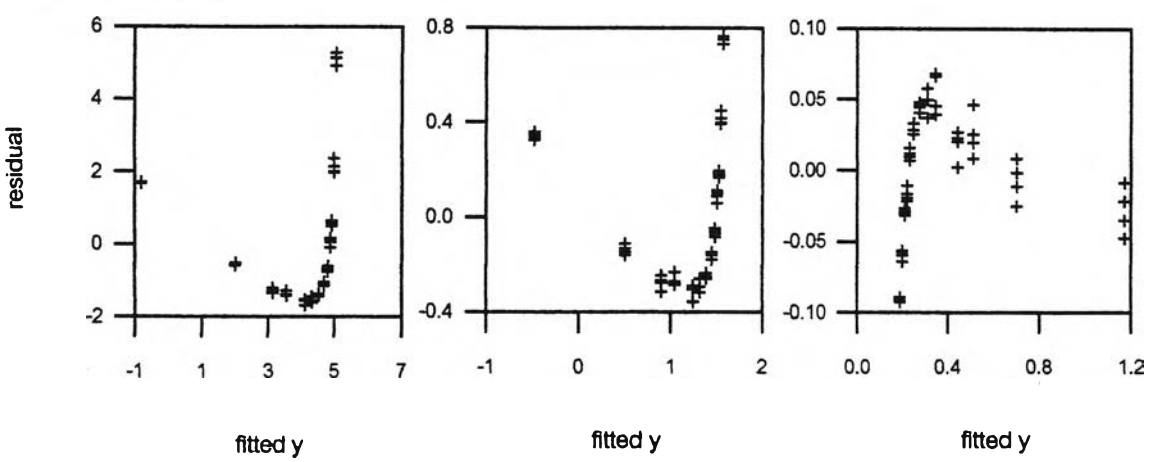
* calibration curves used.

Zero-order : conc = 5.0566 - 0.0079 time r = 0.6454

First- order : ln conc = 1.5693 - 0.0028 time r = 0.8654

Second-order : 1/conc = 0.1892 + 0.0013 time r = 0.9874

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

(pH 3 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	X	10.79	10.84	10.95	10.78	10.84 ± 0.08
8.00	X	7.16	7.06	7.04	6.93	7.05 ± 0.09
16.00	X	6.05	5.79	6.00	6.08	5.98 ± 0.13
23.00	X	5.44	5.59	5.37	5.45	5.46 ± 0.09
32.00	X	4.74	4.99	4.92	4.79	4.86 ± 0.12
44.00	X	4.44	4.19	4.32	4.30	4.31 ± 0.10
64.50	Y	3.76	3.96	3.92	3.87	3.88 ± 0.09
91.00	Y	3.42	3.49	3.55	3.61	3.52 ± 0.08
117.50	Y	3.09	3.28	3.30	3.40	3.27 ± 0.13
189.00	Z	2.53	2.68	2.65	2.68	2.63 ± 0.07
241.00	Z	2.34	2.44	2.41	2.38	2.39 ± 0.04
385.00	AC	1.72	1.80	1.80	1.81	1.78 ± 0.04
739.00	AD	0.95	1.04	1.01	1.04	1.01 ± 0.04

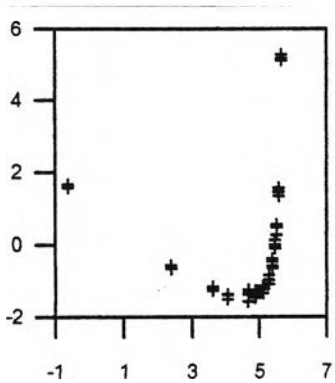
* calibration curves used.

Zero-order : conc = 5.6570 - 0.0085 time r = 0.6873

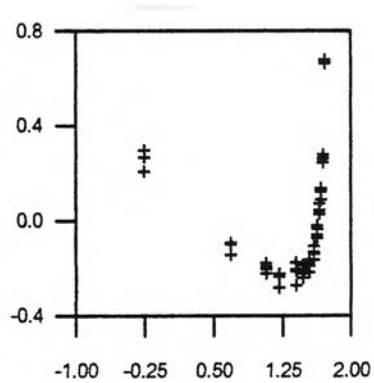
First- order : ln conc = 1.7144 - 0.0027 time r = 0.9010

Second-order : 1/conc = 0.1560 + 0.0011 time r = 0.9924

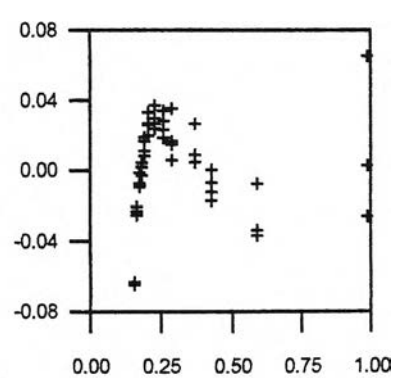
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 3 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	X	10.46	10.61	10.20	10.09	10.34 ± 0.24
8.00	X	7.23	7.77	7.14	7.41	7.39 ± 0.28
16.00	X	6.08	6.08	6.21	6.06	6.11 ± 0.07
23.00	X	5.41	5.64	5.69	5.47	5.55 ± 0.13
32.00	X	4.93	4.96	4.92	4.84	4.91 ± 0.05
44.00	X	4.54	4.40	4.41	4.44	4.45 ± 0.06
64.50	Y	3.88	3.95	3.90	3.97	3.92 ± 0.04
91.00	Y	3.59	3.59	3.47	3.64	3.57 ± 0.07
117.50	Y	3.30	3.41	3.43	3.35	3.37 ± 0.06
189.00	Z	2.79	2.83	2.73	2.84	2.80 ± 0.05
241.00	Z	2.44	2.45	2.46	2.42	2.44 ± 0.02
385.00	AC	2.19	1.99	1.84	1.89	1.98 ± 0.15
739.00	AD	1.08	1.06	1.05	1.10	1.07 ± 0.02

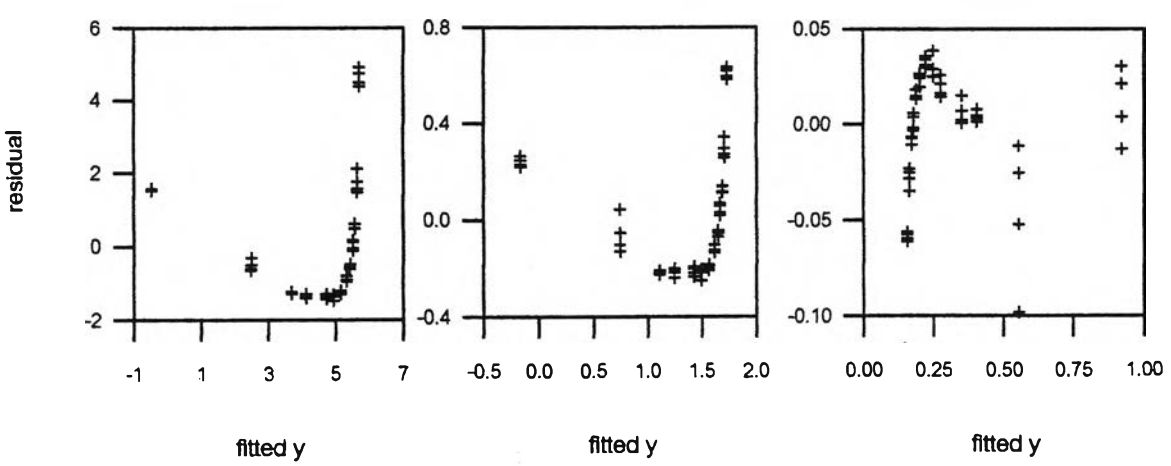
* calibration curves used.

Zero-order : conc = 5.7107 - 0.0084 time r = 0.7053

First- order : ln conc = 1.7289 - 0.0026 time r = 0.9032

Second-order : 1/conc = 0.1554 + 0.0010 time r = 0.9902

Zero-order plot First-order plot Second-order plot



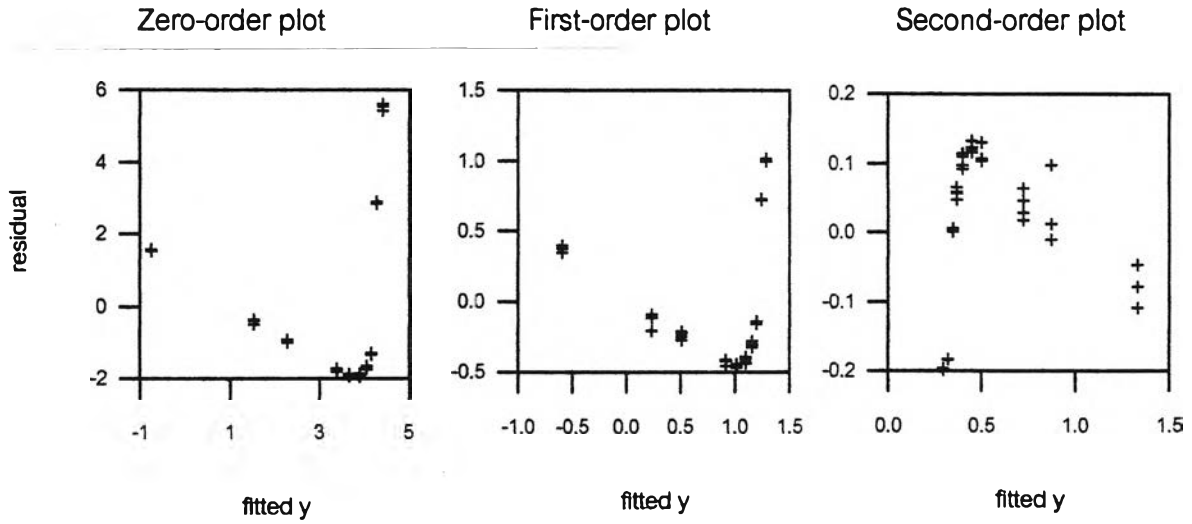
Stability Data of Ranitidine HCl Solution

(pH 3 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	Y	10.02	9.95	9.98	9.83	9.95 ± 0.08
8.00	Y	7.15	7.17	7.13	7.12	7.14 ± 0.02
16.00	Y	2.86	2.84	2.87	2.83	2.85 ± 0.02
23.00	Y	2.35	2.34	2.40	2.30	2.35 ± 0.04
33.00	Y	1.94	2.03	1.96	2.01	1.99 ± 0.04
48.50	Y	1.72	1.76	1.75	1.77	1.75 ± 0.02
66.00	Y	1.64	1.65	1.58	1.65	1.63 ± 0.03
137.50	Z	1.27	1.30	1.33	1.35	1.31 ± 0.03
186.00	Z	1.16	1.13	1.03	1.16	1.12 ± 0.06
333.00	AC	0.80	0.82	0.80	0.78	0.80 ± 0.02

* calibration curves used.

Zero-order :	conc = 4.4062 - 0.0155 time	r = 0.5442
First- order :	ln conc = 1.2859 - 0.0056 time	r = 0.7539
Second-order :	1/conc = 0.2982 + 0.0031 time	r = 0.9407



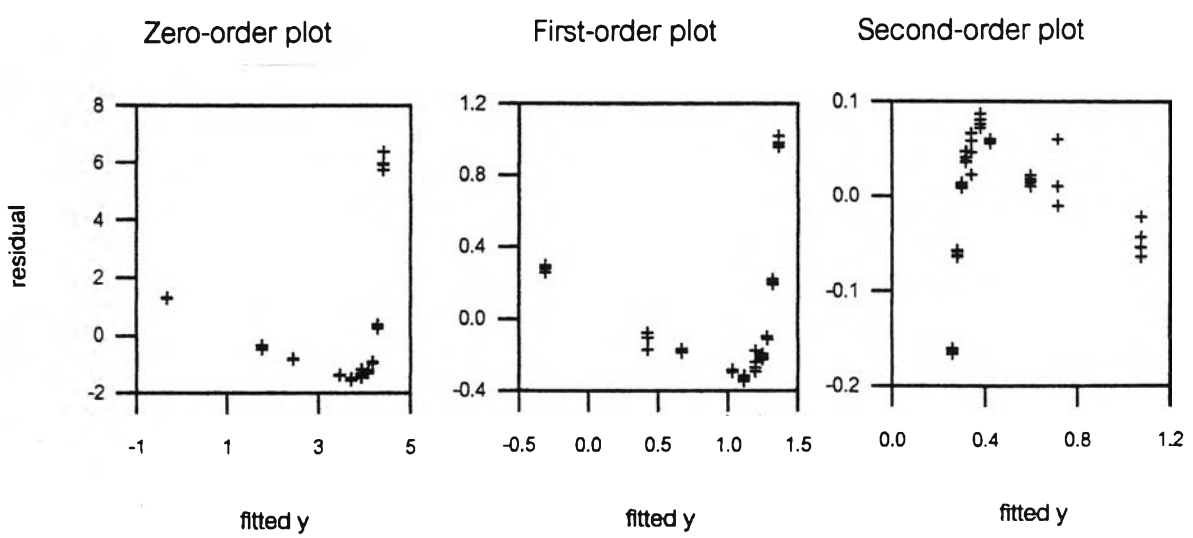
Stability Data of Ranitidine HCl : β–CD complex

(pH 3 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	Y	10.78	10.37	10.13	10.32	10.40 ± 0.27
8.00	Y	4.64	4.53	4.67	4.56	4.60 ± 0.07
16.00	Y	3.23	3.26	3.21	3.25	3.24 ± 0.02
23.00	Y	2.85	2.81	2.84	2.76	2.81 ± 0.04
33.00	Y	2.51	2.59	2.46	2.76	2.58 ± 0.13
48.50	Y	2.22	2.15	2.20	2.18	2.19 ± 0.03
66.00	Y	2.08	2.09	2.10	2.09	2.09 ± 0.01
137.50	Z	1.63	1.62	1.64	1.65	1.63 ± 0.01
186.00	Z	1.29	1.38	1.42	1.38	1.37 ± 0.05
333.00	AC	0.95	0.97	0.99	0.98	0.97 ± 0.02

* calibration curves used.

Zero-order :	conc = 4.3962 - 0.0142 time	r = 0.5482
First- order :	ln conc = 1.3583 - 0.0050 time	r = 0.7972
Second-order :	1/conc = 0.2590 + 0.0024 time	r = 0.9625



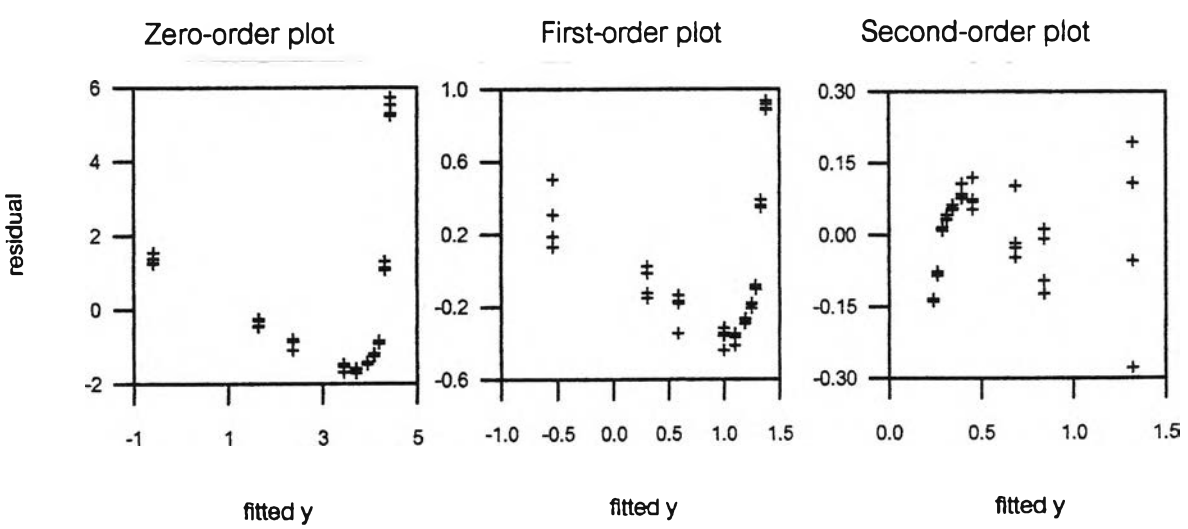
Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 3 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	Y	10.17	9.75	9.99	9.69	9.90 ± 0.22
8.00	Y	5.42	5.62	5.45	5.38	5.47 ± 0.11
16.00	Y	3.29	3.35	3.34	3.28	3.32 ± 0.03
23.00	Y	2.83	2.91	2.89	2.91	2.88 ± 0.03
33.00	Y	2.52	2.46	2.51	2.50	2.50 ± 0.03
48.50	Y	2.08	2.12	1.99	2.11	2.08 ± 0.06
66.00	Y	1.75	1.92	1.98	1.90	1.89 ± 0.10
137.50	Z	1.27	1.52	1.57	1.50	1.46 ± 0.13
186.00	Z	1.20	1.17	1.34	1.39	1.27 ± 0.11
333.00	AC	0.96	0.79	0.66	0.70	0.78 ± 0.13

* calibration curves used.

Zero-order :	conc = 4.4369 - 0.0151 time	r = 0.5871
First- order :	ln conc = 1.3808 - 0.0058 time	r = 0.8304
Second-order :	1/conc = 0.2366 + 0.0032 time	r = 0.9618



Stability Data of Ranitidine HCl Solution

(pH 5 0.10 M Acetate buffer)

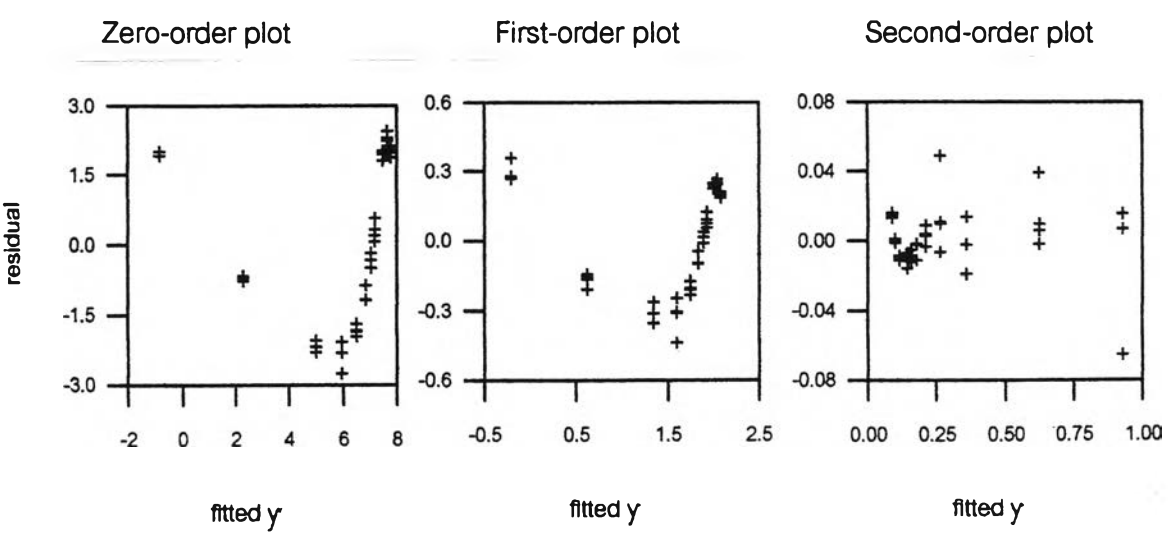
Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	Z	9.75	9.64	9.81	9.89	9.77 ± 0.10
12.00	Z	9.88	9.88	9.94	10.09	9.95 ± 0.10
28.00	Z	9.49	9.27	9.45	9.42	9.41 ± 0.09
55.50	AB	7.75	7.50	7.38	7.25	7.47 ± 0.21
68.00	AB	6.71	6.55	6.87	6.72	6.71 ± 0.13
88.00	AA	5.67	5.66	5.98	5.66	5.74 ± 0.16
120.50	AA	4.64	4.53	4.80	4.66	4.66 ± 0.11
172.00	AB	3.87	3.64	3.19	3.63	3.58 ± 0.28
262.50	AC	2.95	2.81	2.81	2.69	2.82 ± 0.11
520.08	AD	1.58	1.51	1.59	1.61	1.57 ± 0.04
816.00	AE	1.06	1.07	1.07	1.16	1.09 ± 0.05

* calibration curves used.

Zero-order : conc = 7.7622 - 0.0106 time r = 0.8299

First- order : ln conc = 2.0795 - 0.0028 time r = 0.9507

Second-order : 1/conc = 0.0880 + 0.0010 time r = 0.9978



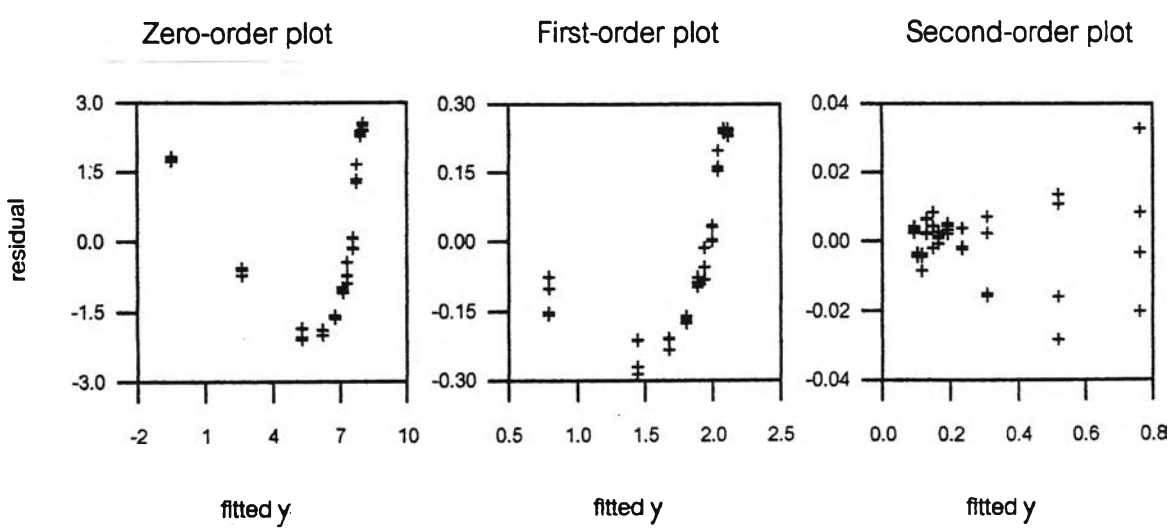
Stability Data of Ranitidine HCl : β–CD complex

(pH 5 0.10 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	Z	10.56	10.42	10.50	10.38	10.47 ± 0.08
12.00	Z	10.24	10.20	10.14	10.25	10.21 ± 0.05
28.00	Z	8.97	9.03	9.04	9.37	9.10 ± 0.18
45.00	AB	7.60	7.62	7.39	7.37	7.49 ± 0.13
68.00	AB	6.57	6.40	6.85	6.40	6.56 ± 0.21
88.00	AA	5.99	6.03	6.11	6.05	6.05 ± 0.05
120.50	AA	5.18	5.10	5.12	5.15	5.14 ± 0.03
172.00	AB	4.33	4.33	4.32	4.22	4.30 ± 0.05
262.50	AC	3.42	3.23	3.18	3.43	3.32 ± 0.13
520.08	AD	1.88	1.89	2.04	1.99	1.95 ± 0.08
816.00	AE	1.30	1.32	1.35	1.26	1.31 ± 0.04

* calibration curves used.

Zero-order :	conc = 8.0026 - 0.0104 time	r = 0.8419
First- order :	ln conc = 2.1109 - 0.0025 time	r = 0.9595
Second-order :	1/conc = 0.0923 + 0.0008 time	r = 0.9988



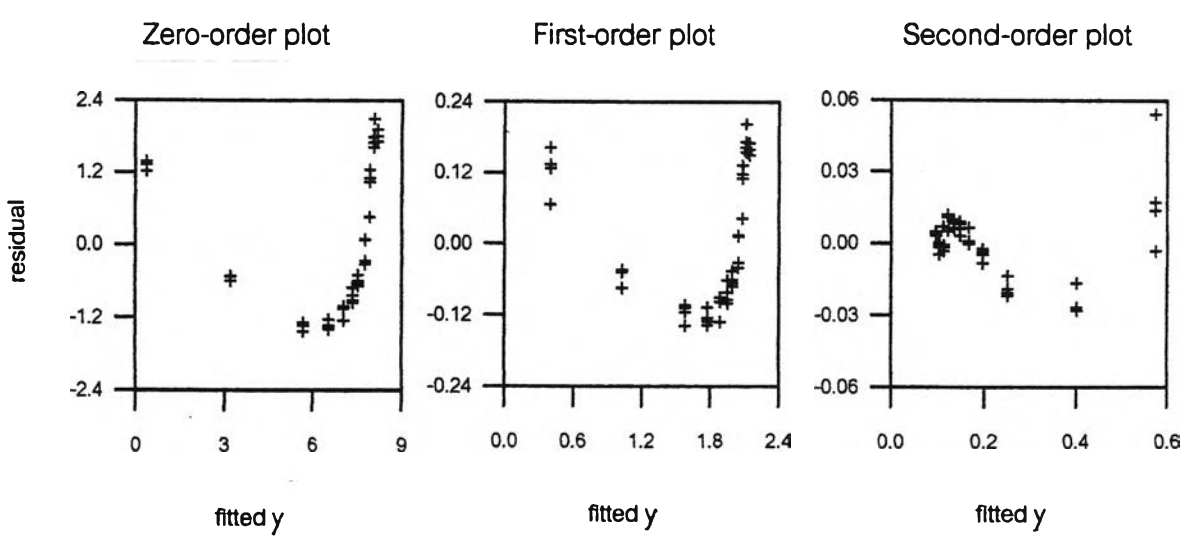
Stability Data of Ranitidine HCl : 2HP-β–CD complex

(pH 5 0.10 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	Z	9.98	10.09	9.89	9.98	9.99 ± 0.08
12.00	Z	9.85	9.76	10.16	9.68	9.86 ± 0.21
28.00	Z	8.37	9.02	9.15	8.95	8.87 ± 0.35
45.00	AB	7.84	7.43	7.49	7.83	7.65 ± 0.22
68.00	AB	6.85	6.93	6.89	7.03	6.93 ± 0.08
88.00	AA	6.42	6.63	6.50	6.38	6.48 ± 0.11
120.50	AA	5.77	6.01	5.97	6.01	5.94 ± 0.11
172.00	AB	5.17	5.20	5.14	5.30	5.20 ± 0.07
262.50	AC	4.23	4.33	4.36	4.38	4.32 ± 0.07
520.08	AD	2.60	2.68	2.67	2.67	2.66 ± 0.04
816.00	AE	1.70	1.59	1.75	1.69	1.68 ± 0.07

* calibration curves used.

Zero-order :	conc = 8.1805 - 0.0096 time	r = 0.8910
First- order :	ln conc = 2.1416 - 0.0021 time	r = 0.9776
Second-order :	1/conc = 0.0961 + 0.0006 time	r = 0.9953



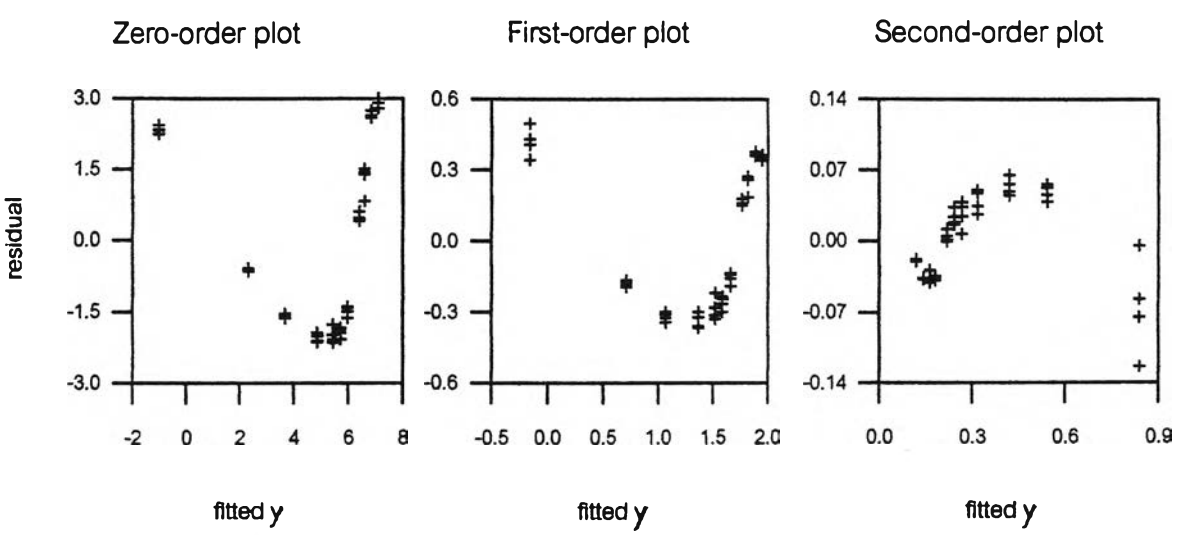
Stability Data of Ranitidine HCl Solution

(pH 5 0.20 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	AA	10.09	9.89	10.00	10.09	10.02 ± 0.10
22.00	AA	9.58	9.45	9.48	9.43	9.48 ± 0.07
43.00	AC	7.42	8.11	8.04	7.99	7.89 ± 0.31
60.00	AB	6.81	7.00	6.85	6.87	6.88 ± 0.08
96.00	AC	4.59	4.56	4.48	4.34	4.49 ± 0.11
119.00	AC	3.84	3.63	3.87	3.76	3.78 ± 0.11
142.00	AC	3.67	3.45	3.29	3.34	3.44 ± 0.17
192.00	AC	2.91	2.84	2.74	2.72	2.80 ± 0.09
291.50	AD	2.15	2.13	2.06	2.10	2.11 ± 0.04
410.00	AD	1.72	1.68	1.67	1.70	1.69 ± 0.02
696.00	AE	1.40	1.31	1.28	1.20	1.30 ± 0.08

* calibration curves used.

Zero-order :	conc = 7.0986 - 0.0117 time	r = 0.7724
First- order :	ln conc = 1.9503 - 0.0030 time	r = 0.8983
Second-order :	1/conc = 0.1194 + 0.0010 time	r = 0.9803



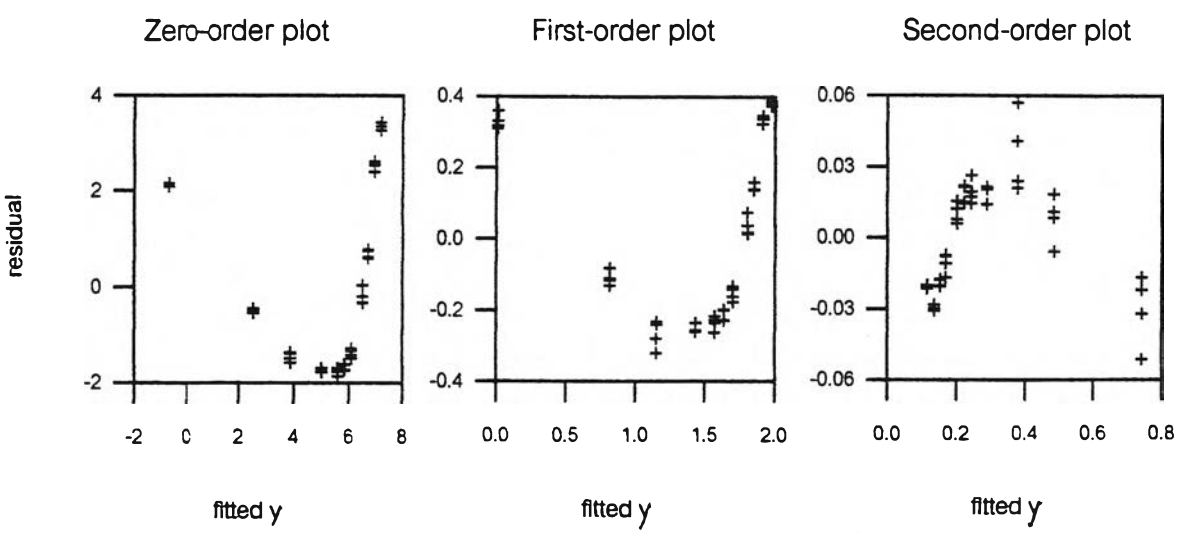
Stability Data of Ranitidine HCl : β–CD complex

(pH 5 0.20 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	AA	10.61	10.45	10.53	10.61	10.55 ± 0.08
22.00	AA	9.33	9.55	9.47	9.51	9.47 ± 0.10
43.00	AC	7.46	7.30	7.47	7.32	7.38 ± 0.09
60.00	AB	6.18	6.54	6.30	6.16	6.29 ± 0.18
96.00	AC	4.81	4.60	4.67	4.77	4.71 ± 0.09
119.00	AC	4.09	4.10	4.21	4.22	4.15 ± 0.07
142.00	AC	3.71	3.88	3.81	3.84	3.81 ± 0.07
192.00	AC	3.23	3.31	3.23	3.24	3.25 ± 0.04
291.50	AD	2.30	2.49	2.51	2.39	2.42 ± 0.10
410.00	AD	2.02	1.99	2.09	2.03	2.03 ± 0.04
696.00	AE	1.41	1.45	1.38	1.39	1.41 ± 0.03

* calibration curves used.

Zero-order :	conc = 7.1785 - 0.0113 time	r = 0.7790
First- order :	ln conc = 1.9731 - 0.0028 time	r = 0.9152
Second-order :	1/conc = 0.1157 + 0.0009 time	r = 0.9919



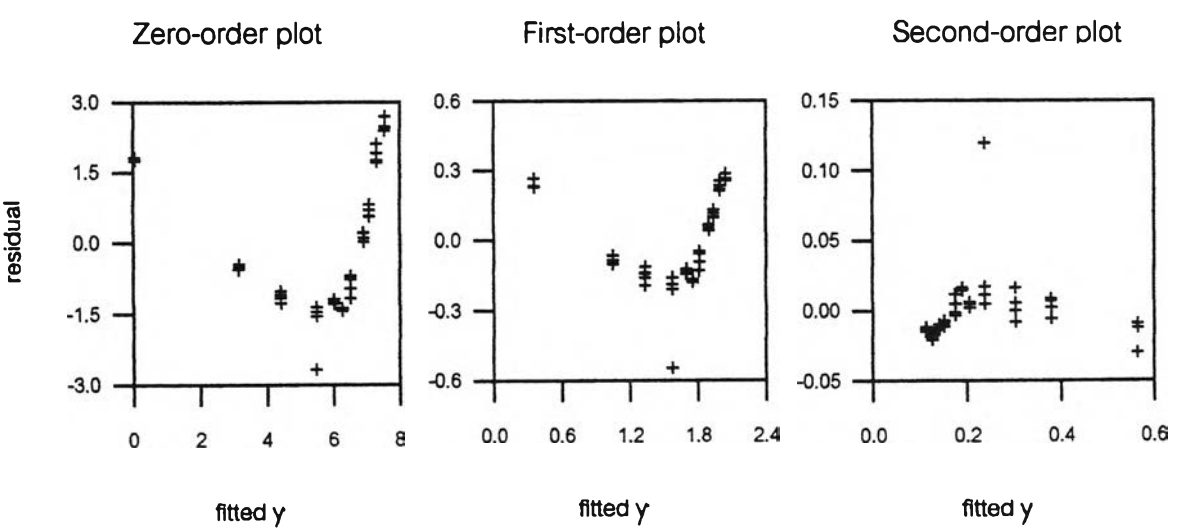
Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 5 0.20 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	AA	10.24	10.02	9.94	10.01	10.05 ± 0.13
22.00	AA	9.07	9.03	9.23	9.42	9.19 ± 0.18
43.00	AC	7.79	7.65	7.66	7.90	7.75 ± 0.12
60.00	AB	6.93	7.11	7.01	7.13	7.05 ± 0.09
96.00	AC	5.76	5.82	5.35	5.56	5.63 ± 0.21
119.00	AC	4.89	4.88	4.84	4.87	4.87 ± 0.02
142.00	AC	4.83	4.74	4.76	4.77	4.77 ± 0.04
192.00	AC	2.80	4.13	3.93	4.02	3.72 ± 0.62
291.50	AD	3.25	3.14	3.40	3.31	3.27 ± 0.11
410.00	AD	2.59	2.62	2.68	2.58	2.62 ± 0.04
696.00	AE	1.81	1.81	1.80	1.87	1.82 ± 0.03

* calibration curves used.

Zero-order :	conc = 7.5501 - 0.0108 time	r = 0.8300
First- order :	ln conc = 2.0412 - 0.0024 time	r = 0.9316
Second-order :	1/conc = 0.1126 + 0.0006 time	r = 0.9861



Stability Data of Ranitidine HCl Solution

(pH 5 0.30 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	AC	9.76	9.51	9.49	9.50	9.56 ± 0.13
24.00	AC	9.54	9.36	9.33	9.30	9.38 ± 0.11
39.75	AC	8.19	8.25	8.35	8.37	8.29 ± 0.08
53.00	AD	7.17	7.19	7.36	7.13	7.21 ± 0.10
67.00	AD	5.95	5.97	5.99	5.74	5.91 ± 0.11
92.00	AD	4.48	4.39	4.37	4.39	4.41 ± 0.05
125.00	AD	3.58	3.36	3.30	3.51	3.44 ± 0.13
168.00	AD	3.02	3.09	3.08	3.11	3.08 ± 0.04
217.50	AD	2.47	2.49	2.49	2.52	2.49 ± 0.02
279.00	AE	2.14	1.93	2.12	2.05	2.06 ± 0.09
405.00	AE	1.75	1.74	1.75	1.74	1.74 ± 0.01
534.00	AE	1.44	1.48	1.44	1.42	1.45 ± 0.02

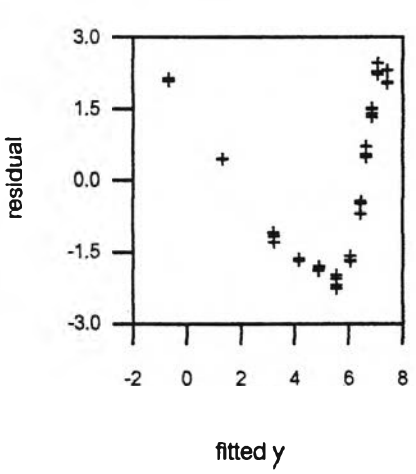
* calibration curves used.

Zero-order : conc = 7.4563 - 0.0152 time r = 0.8288

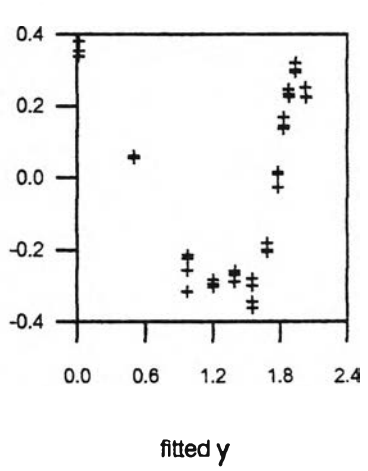
First- order : ln conc = 2.0273 - 0.0038 time r = 0.9252

Second-order : 1/conc = 0.1060 + 0.0012 time r = 0.9863

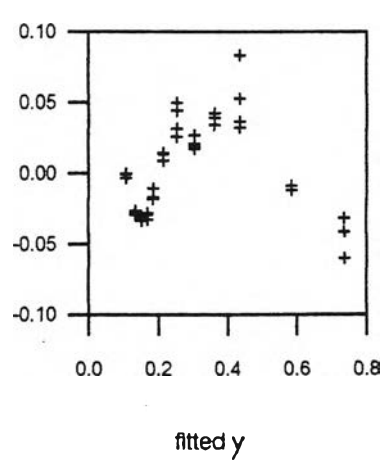
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

(pH 5 0.30 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	AC	10.13	10.70	10.62	10.57	10.50 ± 0.26
24.00	AC	9.45	9.36	9.42	9.41	9.41 ± 0.04
39.75	AC	7.58	7.84	8.15	7.86	7.86 ± 0.23
53.00	AD	6.50	7.05	6.65	6.76	6.74 ± 0.23
67.00	AD	5.63	5.47	5.62	5.53	5.56 ± 0.08
92.00	AD	4.51	4.19	4.38	4.62	4.42 ± 0.18
125.00	AD	3.79	3.79	3.82	3.89	3.82 ± 0.05
168.00	AD	3.32	3.24	3.20	3.36	3.28 ± 0.07
217.50	AD	2.95	2.93	2.79	2.89	2.89 ± 0.07
279.00	AE	2.55	2.51	2.55	2.54	2.54 ± 0.02
405.00	AE	1.94	1.96	2.12	2.12	2.03 ± 0.10
534.00	AE	1.71	1.74	1.71	1.79	1.73 ± 0.04

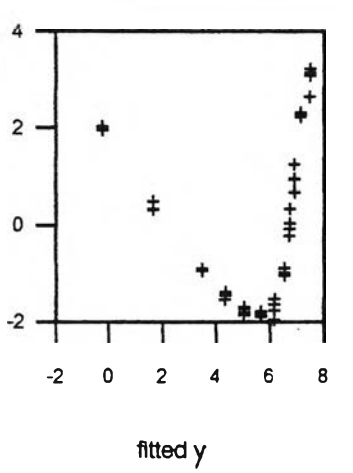
* calibration curves used.

Zero-order : conc = 7.4849 - 0.0145 time r = 0.8111

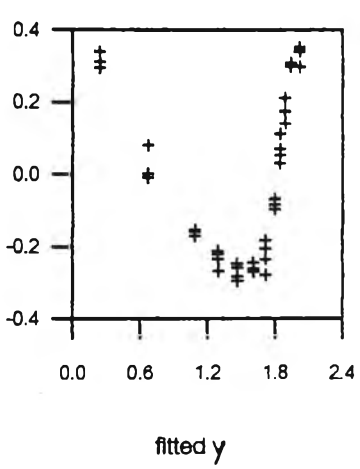
First- order : ln conc = 2.0177 - 0.0033 time r = 0.9180

Second-order : 1/conc = 0.1163 + 0.0009 time r = 0.9846

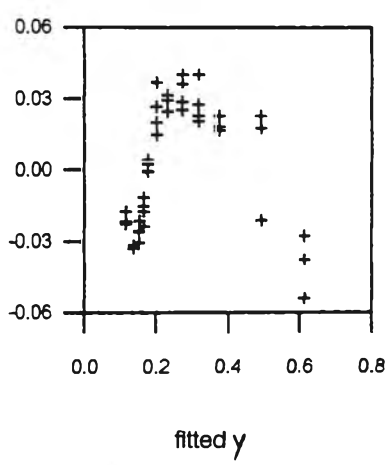
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : 2HP –β–CD complex

(pH 5 0.30 M Acetate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	AC	10.08	9.86	10.00	9.90	9.96 ± 0.10
24.00	AC	9.45	8.86	9.03	8.96	9.08 ± 0.26
39.75	AC	8.10	8.11	8.21	8.02	8.11 ± 0.08
53.00	AD	7.25	7.31	7.18	7.05	7.20 ± 0.11
67.00	AD	6.52	6.43	6.52	6.53	6.50 ± 0.05
92.00	AD	5.37	5.49	5.44	5.48	5.44 ± 0.06
125.00	AD	4.56	4.59	4.58	4.48	4.55 ± 0.05
168.00	AD	4.09	4.33	3.82	4.28	4.13 ± 0.23
217.50	AD	3.71	3.61	3.67	3.67	3.66 ± 0.04
279.00	AE	3.33	3.19	3.21	3.18	3.23 ± 0.07
405.00	AE	2.55	2.39	2.54	2.68	2.54 ± 0.12
534.00	AE	2.28	2.20	1.93	2.15	2.14 ± 0.15

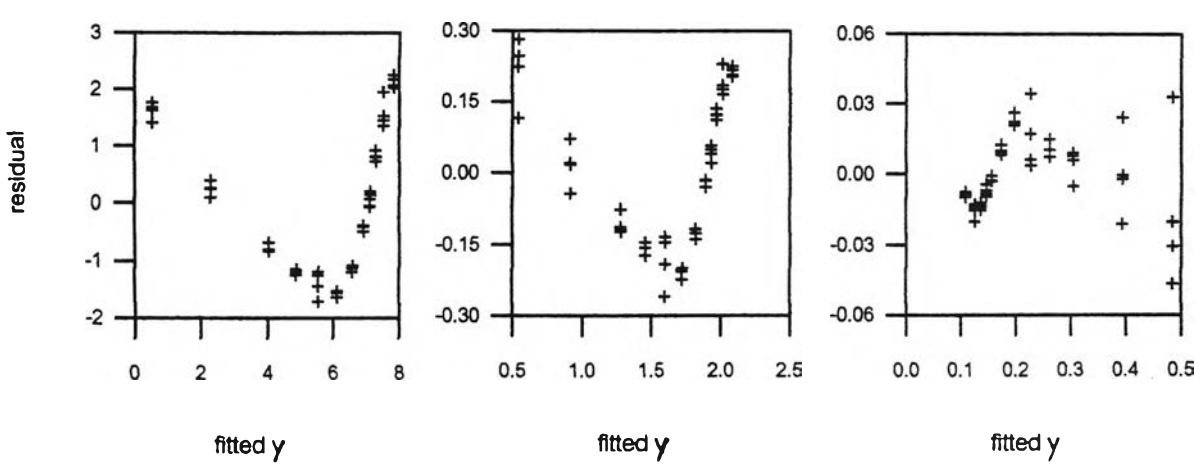
* calibration curves used.

Zero-order : conc = 7.8309 - 0.0137 time r = 0.8683

First- order : ln conc = 2.0850 - 0.0029 time r = 0.9479

Second-order : 1/conc = 0.1090 + 0.0007 time r = 0.9896

Zero-order plot First-order plot Second-order plot



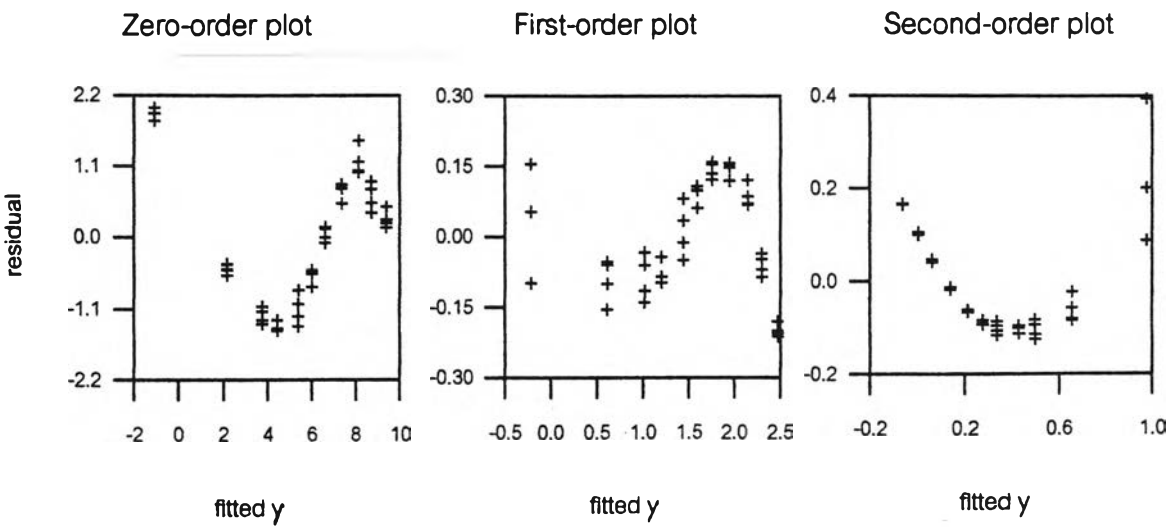
Stability Data of Ranitidine HCl Solution

(pH 7 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	9.86	9.66	9.54	9.61	9.67 ± 0.14
168.00	C	9.57	9.09	9.24	9.45	9.34 ± 0.21
312.42	E	9.15	9.29	9.62	9.13	9.30 ± 0.23
503.17	G	7.87	8.15	8.10	8.17	8.08 ± 0.14
687.42	I	6.73	6.51	6.60	6.76	6.65 ± 0.12
839.08	K	5.48	5.44	5.43	5.23	5.39 ± 0.11
986.00	L	4.58	4.17	4.37	4.02	4.29 ± 0.25
1217.00	N	3.01	3.05	3.18	3.01	3.06 ± 0.08
1390.00	P	2.61	2.68	2.47	2.41	2.54 ± 0.13
1780.00	R	1.67	1.75	1.74	1.58	1.68 ± 0.07
2575.00	W	0.94	0.85	0.85	0.73	0.84 ± 0.08

* calibration curves used.

Zero-order :	conc = 9.3932 - 0.0041 time	r = 0.9454
First- order :	ln conc = 2.4687 - 0.0010 time	r = 0.9890
Second-order :	1/conc = - 0.0631 + 0.0004 time	r = 0.9291



Stability Data of Ranitidine HCl : β–CD complex

(pH 7 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	10.27	10.51	10.59	10.81	10.55 ± 0.23
144.17	C	10.10	9.99	10.74	10.96	10.45 ± 0.47
308.00	E	8.77	8.95	9.30	9.39	9.10 ± 0.29
374.58	E	8.09	7.80	8.29	8.36	8.13 ± 0.25
448.42	F	7.44	6.95	7.15	6.91	7.11 ± 0.24
503.17	G	6.34	6.55	6.44	6.75	6.52 ± 0.18
646.67	I	4.41	4.71	4.67	5.02	4.70 ± 0.25
784.50	J	3.92	3.91	4.02	4.05	3.98 ± 0.07
909.92	L	3.33	3.24	2.98	3.11	3.16 ± 0.15
1144.92	M	2.55	2.55	2.29	2.15	2.39 ± 0.20
1663.00	Q	1.71	1.74	1.83	1.53	1.70 ± 0.13
2380.00	V	0.84	0.94	0.87	0.77	0.85 ± 0.07

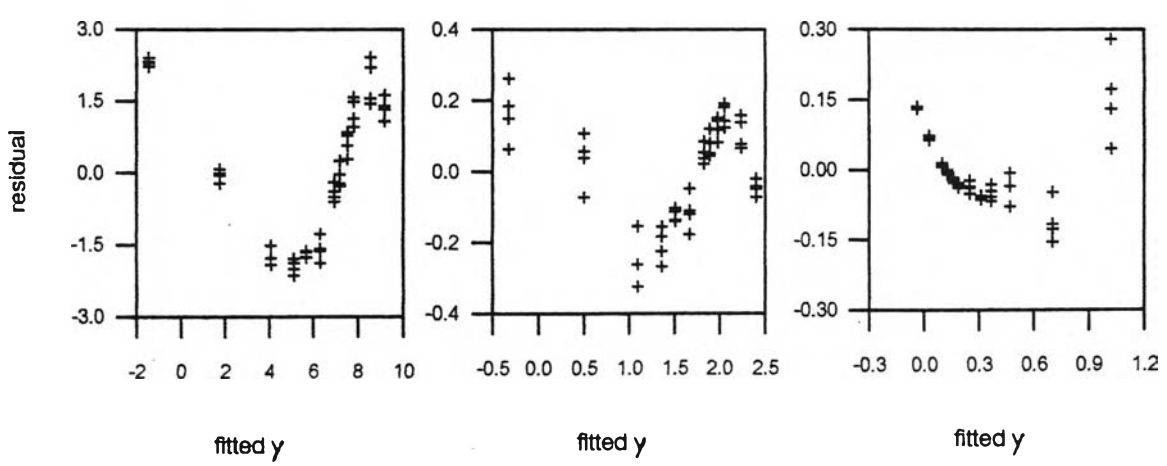
* calibration curves used.

Zero-order : conc = 9.1894 - 0.0045 time r = 0.8938

First- order : ln conc = 2.4010 - 0.0011 time r = 0.9829

Second-order : 1/conc = -0.0369 + 0.0004 time r = 0.9621

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 7 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	10.07	9.42	9.68	9.35	9.63 ± 0.33
144.17	C	10.65	10.98	10.86	10.37	10.71 ± 0.27
308.00	E	8.99	8.75	8.84	8.66	8.81 ± 0.14
374.58	E	8.22	8.21	8.22	8.22	8.22 ± 0.01
448.42	F	7.77	7.56	7.64	7.87	7.71 ± 0.14
503.17	G	7.14	6.91	7.14	7.41	7.15 ± 0.20
646.67	I	6.10	5.88	6.17	5.57	5.93 ± 0.27
784.50	J	4.71	4.59	4.74	4.71	4.69 ± 0.06
909.92	L	3.62	3.68	3.80	3.92	3.76 ± 0.13
1144.92	M	2.77	2.62	2.59	2.70	2.67 ± 0.08
1663.00	Q	1.72	1.73	1.67	1.74	1.71 ± 0.03
2380.00	V	0.83	0.75	0.86	0.78	0.81 ± 0.05

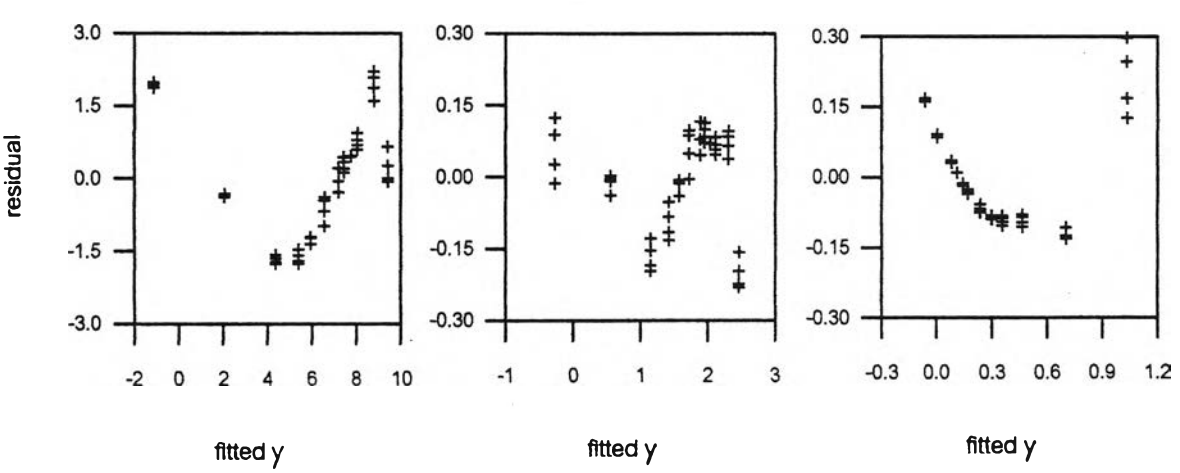
* calibration curves used.

Zero-order : conc = 9.4151 - 0.0044 time r = 0.9275

First- order : ln conc = 2.4664 - 0.0012 time r = 0.9911

Second-order : 1/conc = -0.0614 + 0.0005 time r = 0.9448

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl Solution

(pH 7 0.10 M Phosphate buffer)

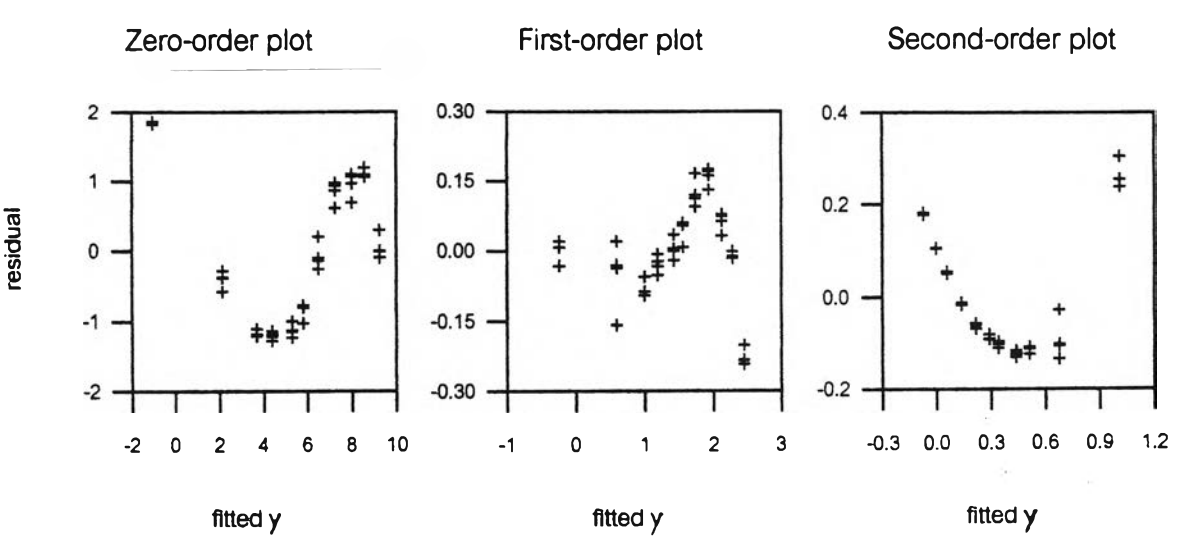
Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	9.53	9.14	9.23	9.22	9.28 ± 0.17
168.00	C	9.62	9.65	9.75	9.63	9.66 ± 0.06
312.42	E	8.67	9.05	9.08	8.95	8.94 ± 0.18
503.17	G	8.08	8.19	7.83	8.15	8.06 ± 0.16
687.42	I	6.23	6.69	6.38	6.34	6.41 ± 0.20
861.08	K	5.00	4.99	4.76	5.02	4.94 ± 0.12
986.00	L	4.16	4.14	4.06	4.29	4.16 ± 0.10
1217.00	N	3.09	3.23	3.15	3.18	3.16 ± 0.06
1390.00	P	2.49	2.47	2.49	2.57	2.50 ± 0.04
1780.00	R	1.74	1.84	1.54	1.75	1.72 ± 0.13
2575.00	W	0.76	0.80	0.79	0.80	0.79 ± 0.02

* calibration curves used.

Zero-order : conc = 9.2292 - 0.0040 time r = 0.9437

First- order : ln conc = 2.4552 - 0.0010 time r = 0.9910

Second-order : 1/conc = - 0.0724 + 0.0004 time r = 0.9246



Stability Data of Ranitidine HCl : β–CD complex

(pH 7 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	10.38	10.29	10.35	10.38	10.35 ± 0.05
144.17	C	9.69	9.67	9.51	9.74	9.65 ± 0.10
308.00	E	7.91	7.78	8.07	8.56	8.08 ± 0.34
368.25	E	7.18	6.69	6.97	7.03	6.97 ± 0.20
431.17	F	5.91	6.59	6.37	6.55	6.35 ± 0.31
503.17	G	5.48	5.48	6.13	5.86	5.74 ± 0.32
614.67	H	4.71	4.71	4.72	4.79	4.73 ± 0.04
740.42	J	3.90	3.72	3.93	3.95	3.87 ± 0.11
839.08	K	3.30	3.38	3.22	3.27	3.29 ± 0.07
1004.92	L	2.70	2.75	2.88	2.93	2.81 ± 0.11
1350.67	O	1.95	1.94	1.99	2.06	1.99 ± 0.06
2380.00	V	0.78	0.77	0.79	0.79	0.78 ± 0.01

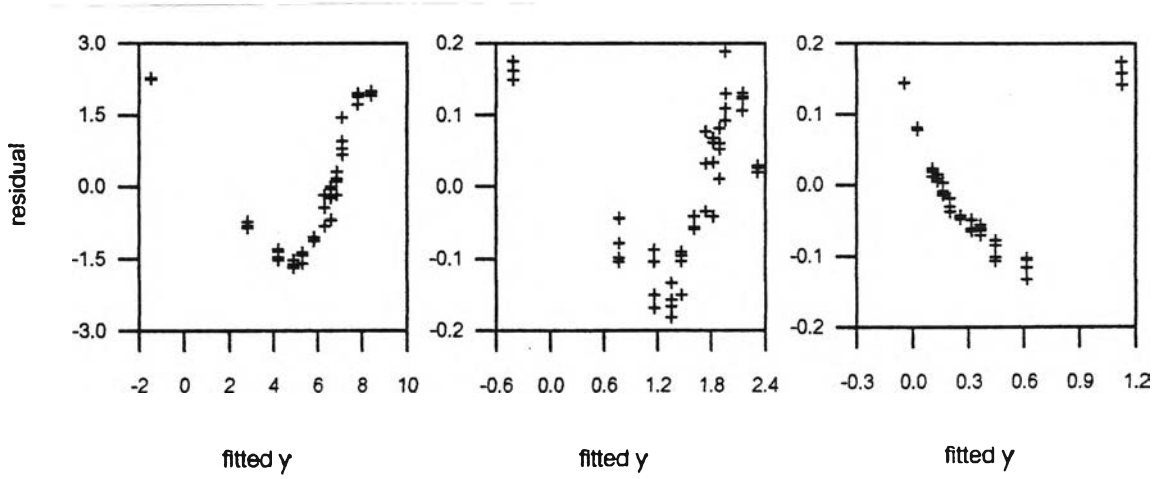
* calibration curves used.

Zero-order : conc = 8.3837 - 0.0041 time r = 0.8803

First- order : ln conc = 2.3111 - 0.0011 time r = 0.9888

Second-order : 1/conc = -0.0470 + 0.0005 time r = 0.9642

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 7 0.10 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	10.23	10.34	10.11	10.29	10.24 ± 0.10
144.17	C	9.52	9.71	9.87	9.69	9.70 ± 0.14
308.00	E	8.55	8.40	8.93	8.77	8.66 ± 0.23
368.25	E	7.86	7.92	7.62	8.10	7.88 ± 0.20
431.17	F	7.37	7.52	7.19	7.06	7.29 ± 0.20
503.17	G	6.50	6.43	6.68	6.64	6.56 ± 0.12
614.67	H	5.81	6.09	5.62	5.69	5.80 ± 0.21
740.42	J	4.55	4.38	4.75	4.40	4.52 ± 0.17
861.08	K	3.62	3.52	3.80	3.92	3.71 ± 0.18
1004.92	L	3.58	3.28	3.24	3.27	3.34 ± 0.16
1350.67	O	2.37	2.28	2.00	2.38	2.26 ± 0.18
2380.00	V	0.86	0.76	0.80	0.76	0.79 ± 0.05

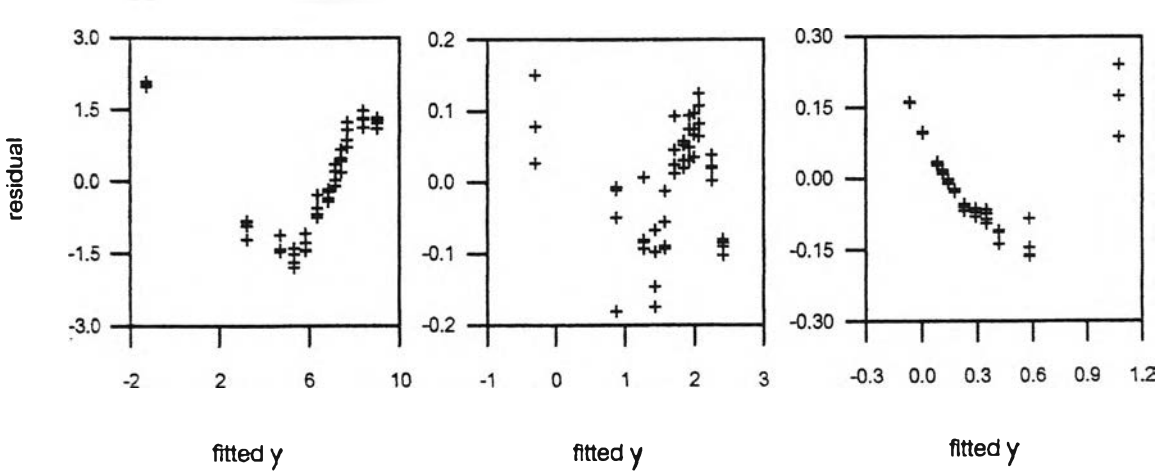
* calibration curves used.

Zero-order : conc = 9.0157 - 0.0043 time r = 0.9161

First- order : ln conc = 2.4159 - 0.0011 time r = 0.9937

Second-order : 1/conc = -0.0633 + 0.0005 time r = 0.9449

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl Solution

(pH 7 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	10.48	9.70	10.47	10.18	10.21 ± 0.37
168.00	C	10.05	9.58	9.71	9.43	9.69 ± 0.27
312.42	E	8.82	9.03	8.64	8.57	8.76 ± 0.21
449.17	F	7.43	7.47	7.65	7.30	7.46 ± 0.14
503.17	G	6.70	6.59	7.11	7.15	6.89 ± 0.28
646.67	I	4.96	5.33	4.65	5.07	5.00 ± 0.28
740.42	J	4.51	4.32	4.30	4.25	4.34 ± 0.12
839.08	K	3.27	3.75	3.39	3.53	3.49 ± 0.21
986.00	L	3.01	3.01	3.03	3.43	3.12 ± 0.21
1350.67	O	1.97	1.98	1.66	1.83	1.86 ± 0.15
1780.00	R	1.05	1.25	1.26	1.19	1.19 ± 0.10
2575.00	W	0.55	0.54	0.53	0.51	0.53 ± 0.02

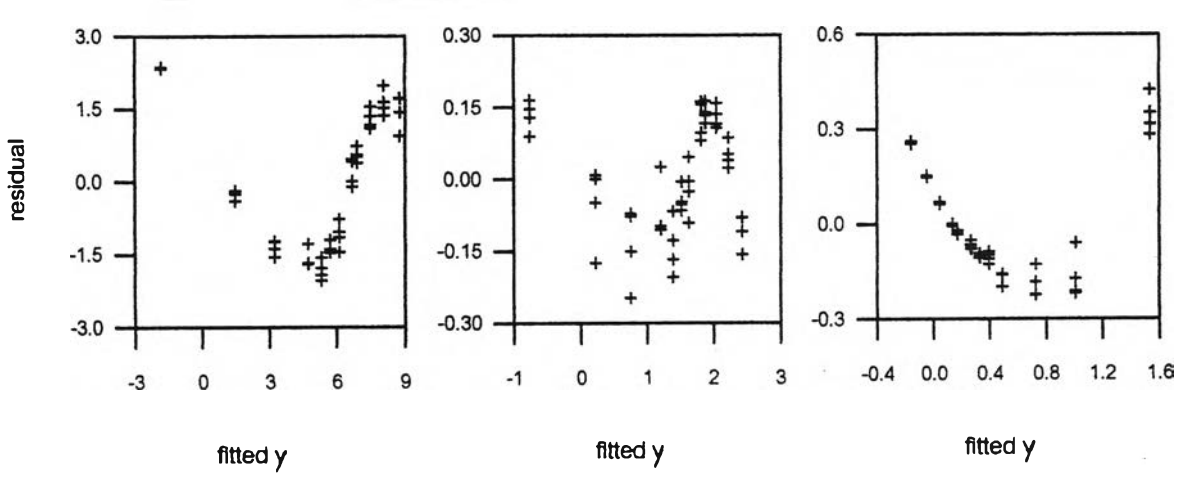
* calibration curves used.

Zero-order : conc = 8.7559 - 0.0041 time r = 0.8996

First- order : ln conc = 2.4293 - 0.0012 time r = 0.9916

Second-order : 1/conc = - 0.1590 + 0.0007 time r = 0.9398

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

(pH 7 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	10.90	10.90	10.28	10.21	10.57 ± 0.38
144.17	C	8.22	7.88	7.95	7.86	7.98 ± 0.17
308.00	E	5.04	5.11	5.38	5.04	5.14 ± 0.16
368.25	E	5.06	4.73	5.02	4.54	4.84 ± 0.25
431.17	F	4.41	4.50	4.84	4.27	4.50 ± 0.24
503.17	G	3.71	3.69	3.86	3.83	3.77 ± 0.08
614.67	H	3.36	3.16	3.24	3.34	3.28 ± 0.09
740.42	J	2.60	2.83	2.71	2.69	2.71 ± 0.09
839.08	K	2.39	2.26	2.41	2.28	2.33 ± 0.08
1048.75	L	1.79	1.83	1.71	2.24	1.89 ± 0.24
1463.42	P	1.09	1.15	1.11	1.18	1.14± 0.04
2215.42	T	0.63	0.60	0.65	0.66	0.63 ± 0.03

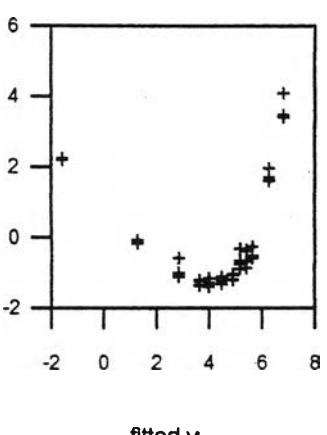
* calibration curves used.

Zero-order : conc = 6.8035 - 0.0038 time r = 0.8153

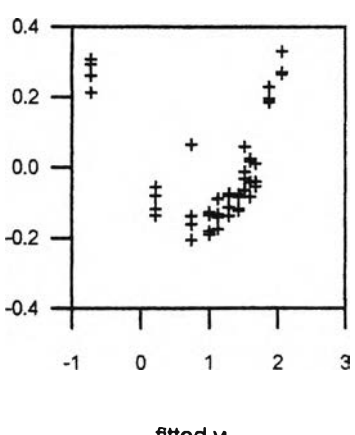
First- order : ln conc = 2.0588 - 0.0013 time r = 0.9775

Second-order : 1/conc = -0.0460 + 0.0007 time r = 0.9767

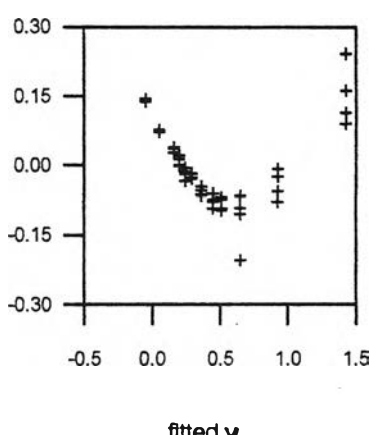
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 7 0.20 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	B	10.65	10.79	10.62	10.74	10.70 ± 0.08
144.17	C	8.55	8.56	8.88	8.37	8.59 ± 0.21
308.00	E	5.47	5.39	5.72	5.57	5.54 ± 0.14
368.25	E	5.02	4.80	5.00	6.00	5.21 ± 0.54
431.17	F	4.16	5.00	4.40	4.18	4.43 ± 0.39
503.17	G	3.65	3.79	3.75	3.59	3.70 ± 0.09
614.67	H	3.57	3.38	3.32	3.42	3.42 ± 0.11
740.42	J	2.59	2.92	2.85	2.79	2.79 ± 0.14
839.08	K	2.34	2.54	2.44	2.53	2.46 ± 0.09
1048.75	L	1.75	1.69	2.70	2.00	2.04 ± 0.47
1463.42	P	1.14	1.20	1.15	1.26	1.19 ± 0.05
2215.42	T	0.62	0.66	0.67	0.63	0.65 ± 0.02

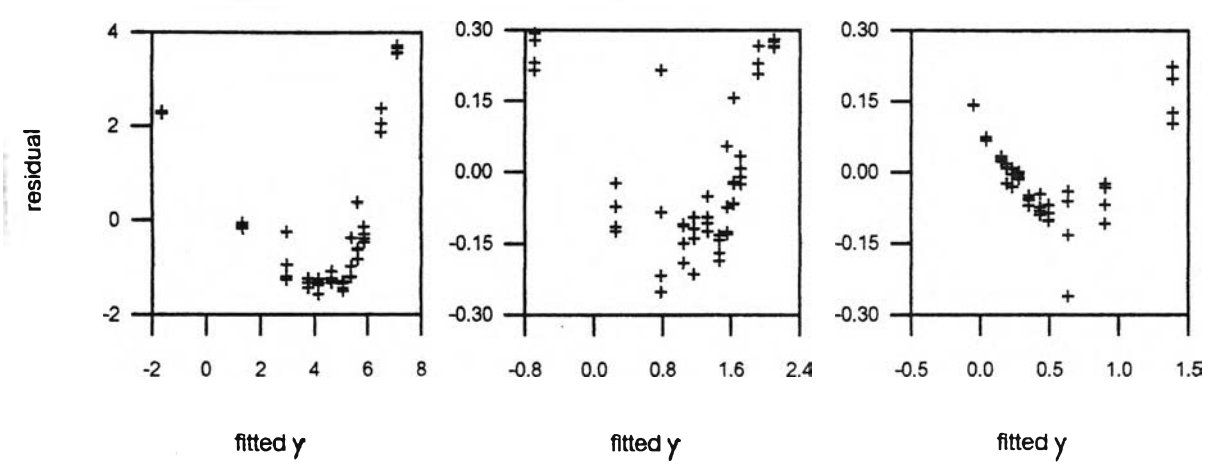
* calibration curves used.

Zero-order : conc = 7.0669 - 0.0039 time r = 0.8165

First- order : ln conc = 2.0986 - 0.0013 time r = 0.9754

Second-order : 1/conc = -0.0489 + 0.0006 time r = 0.9728

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl Solution

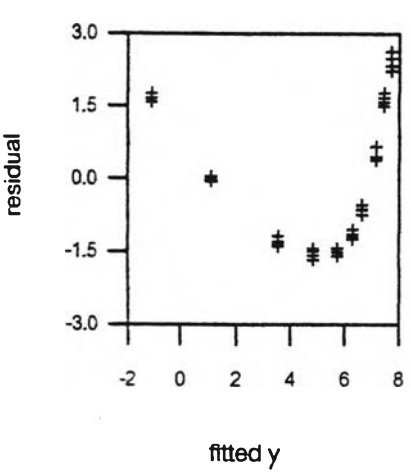
(pH 9 0.10 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	9.93	10.34	10.03	10.20	10.12 ± 0.18
57.83	N	9.21	9.11	9.03	8.94	9.07 ± 0.12
120.00	O	7.82	7.59	7.54	7.61	7.64 ± 0.12
230.75	P	5.90	6.01	6.00	6.10	6.00 ± 0.08
304.25	P	5.25	5.10	5.15	5.06	5.14 ± 0.08
423.67	Q	4.31	4.24	4.16	4.24	4.24 ± 0.06
617.50	R	3.36	3.40	3.18	3.27	3.30 ± 0.10
903.25	S	2.18	2.13	2.23	2.34	2.22 ± 0.09
1426.00	W	1.08	1.14	1.13	1.04	1.10 ± 0.05
1891.00	Z	0.60	0.52	0.70	0.60	0.61 ± 0.08

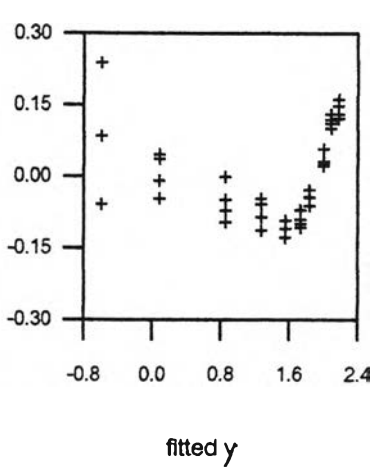
* calibration curves used.

Zero-order :	conc = 7.7139 - 0.0046 time	r = 0.8924
First- order :	ln conc = 2.1753 - 0.0015 time	r = 0.9943
Second-order :	1/conc = - 0.0267 + 0.0008 time	r = 0.9514

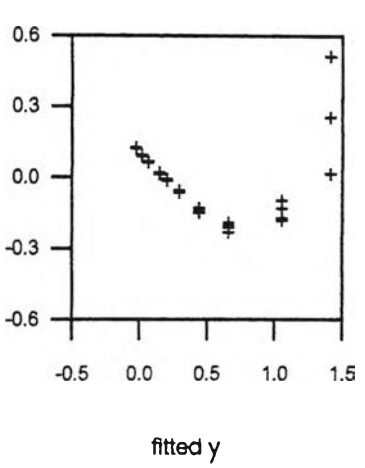
Zero-order plot



First-order plot



Second-order plot



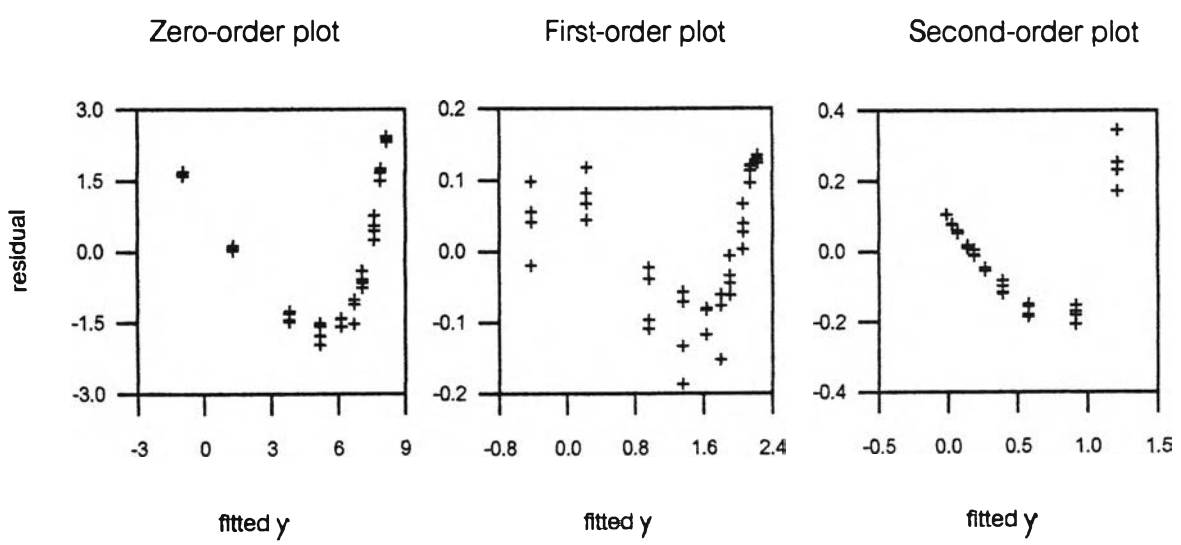
Stability Data of Ranitidine HCl : β–CD complex

(pH 9 0.10 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	10.55	10.60	10.61	10.49	10.56 ± 0.05
57.83	N	9.63	9.40	9.65	9.57	9.56 ± 0.11
120.00	O	8.04	8.14	8.37	7.85	8.10 ± 0.22
230.75	P	6.30	6.66	6.48	6.41	6.46 ± 0.15
304.25	P	5.60	5.69	5.60	5.19	5.52 ± 0.22
423.67	Q	4.71	4.55	4.72	4.72	4.67 ± 0.08
617.50	R	3.23	3.68	3.41	3.63	3.49 ± 0.21
903.25	S	2.51	2.37	2.34	2.55	2.44 ± 0.11
1426.00	W	1.36	1.31	1.41	1.34	1.35 ± 0.04
1891.00	Z	0.69	0.72	0.64	0.68	0.68 ± 0.03

* calibration curves used.

Zero-order :	conc = 8.1742 - 0.0048 time	r = 0.8974
First- order :	ln conc = 2.2266 - 0.0014 time	r = 0.9942
Second-order :	1/conc = -0.0099 + 0.0006 time	r = 0.9508



Stability Data of Ranitidine HCl : 2HP–β–CD complex

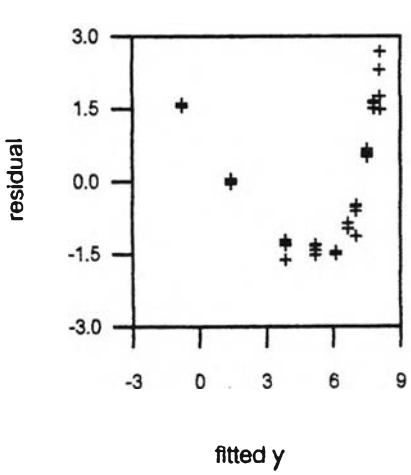
(pH 9 0.10 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	10.77	9.57	10.39	9.84	10.14 ± 0.54
57.83	N	9.32	9.43	9.47	9.43	9.41 ± 0.07
120.00	O	8.09	8.03	8.13	8.19	8.11 ± 0.07
230.75	P	6.48	5.87	6.52	6.39	6.32 ± 0.30
304.25	P	5.68	5.80	5.69	5.80	5.74 ± 0.07
423.67	Q	4.59	4.60	4.65	4.64	4.62 ± 0.03
617.50	R	3.89	3.78	3.68	3.87	3.81 ± 0.10
903.25	S	2.24	2.64	2.54	2.59	2.50 ± 0.18
1426.00	W	1.38	1.46	1.40	1.36	1.40 ± 0.05
1891.00	Z	0.83	0.79	0.77	0.80	0.80 ± 0.02

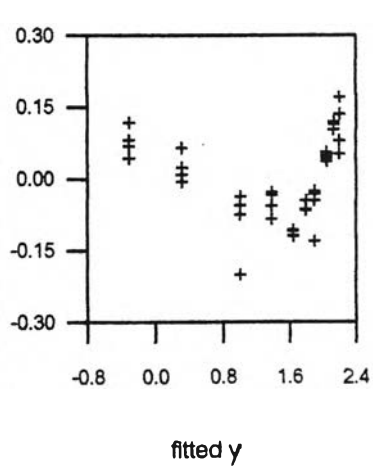
* calibration curves used.

Zero-order :	conc = 8.0844 - 0.0047 time	r = 0.9059
First- order :	ln conc = 2.2065 - 0.0013 time	r = 0.9942
Second-order :	1/conc = 0.0139 + 0.0006 time	r = 0.9658

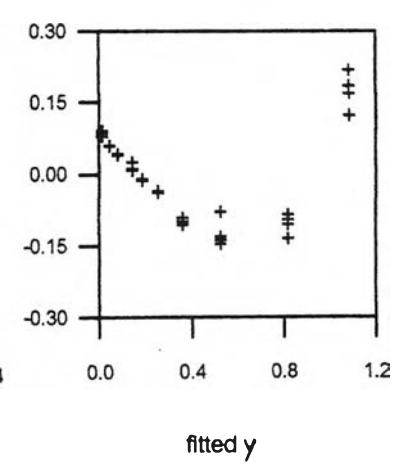
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl Soiution

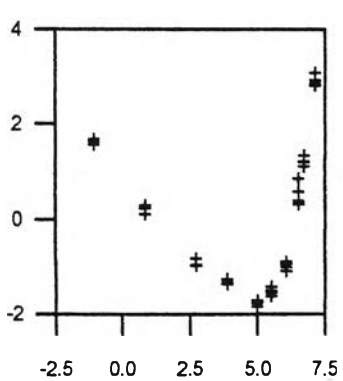
(pH 9 0.20 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	10.21	9.94	9.99	10.05	10.05 ± 0.12
57.83	N	7.82	7.92	7.93	8.05	7.93 ± 0.09
86.08	N	6.84	7.11	7.37	6.91	7.06 ± 0.24
151.67	O	5.12	5.05	4.97	5.17	5.08 ± 0.09
230.75	P	4.00	3.89	4.08	3.96	3.99 ± 0.08
304.25	P	3.28	3.23	3.24	3.16	3.23 ± 0.05
466.42	Q	2.52	2.60	2.54	2.50	2.54 ± 0.04
631.00	R	1.90	1.74	1.76	1.75	1.79 ± 0.07
900.33	S	1.08	1.13	0.95	1.11	1.06 ± 0.08
1174.00	U	0.61	0.50	0.61	0.56	0.57 ± 0.05

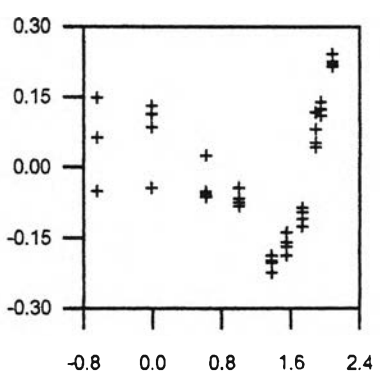
* calibration curves used.

Zero-order :	conc = 7.1214 - 0.0070 time	r = 0.8671
First- order :	ln conc = 2.0805 - 0.0023 time	r = 0.9880
Second-order :	1/conc = - 0.0262 + 0.0013 time	r = 0.9469

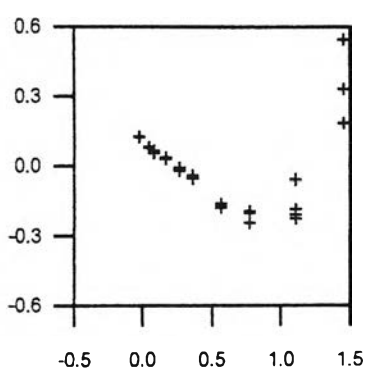
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

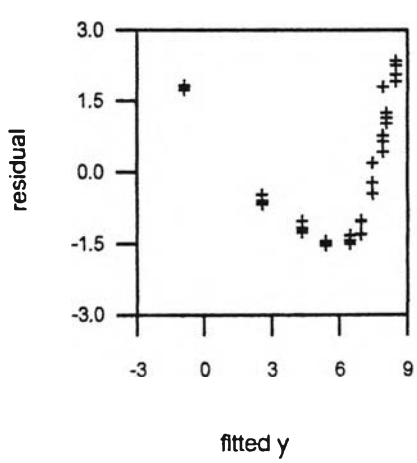
(pH 9 0.20 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	10.74	10.84	10.40	10.54	10.63 ± 0.20
57.83	N	9.35	9.24	9.13	9.35	9.27 ± 0.10
86.08	N	8.56	8.34	9.71	8.68	8.82 ± 0.61
151.67	O	7.03	7.26	7.67	7.03	7.25 ± 0.30
230.75	P	5.67	5.95	5.93	5.65	5.80 ± 0.16
304.25	P	5.04	5.16	5.15	4.98	5.08 ± 0.09
466.42	Q	3.91	3.93	3.96	3.87	3.92 ± 0.04
631.00	R	3.14	3.31	3.16	3.06	3.17 ± 0.10
900.33	S	1.91	1.90	2.08	1.95	1.96 ± 0.08
1426.00	W	0.82	0.93	0.89	0.82	0.86 ± 0.05

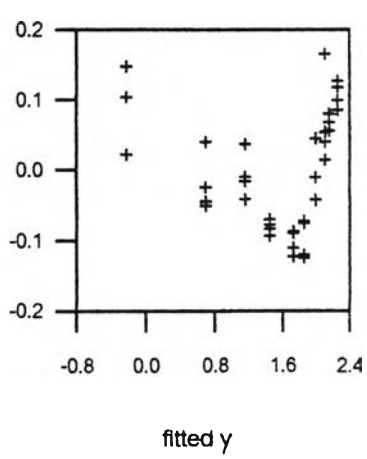
* calibration curves used.

Zero-order :	conc = 8.4769 - 0.0066 time	r = 0.9044
First- order :	ln conc = 2.2563 - 0.0017 time	r = 0.9942
Second-order :	1/conc = 0.0124 + 0.0007 time	r = 0.9560

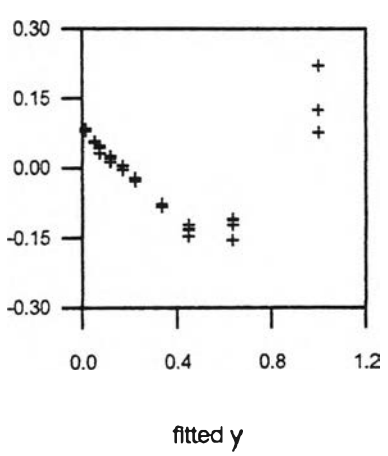
Zero-order plot



First-order plot



Second-order plot



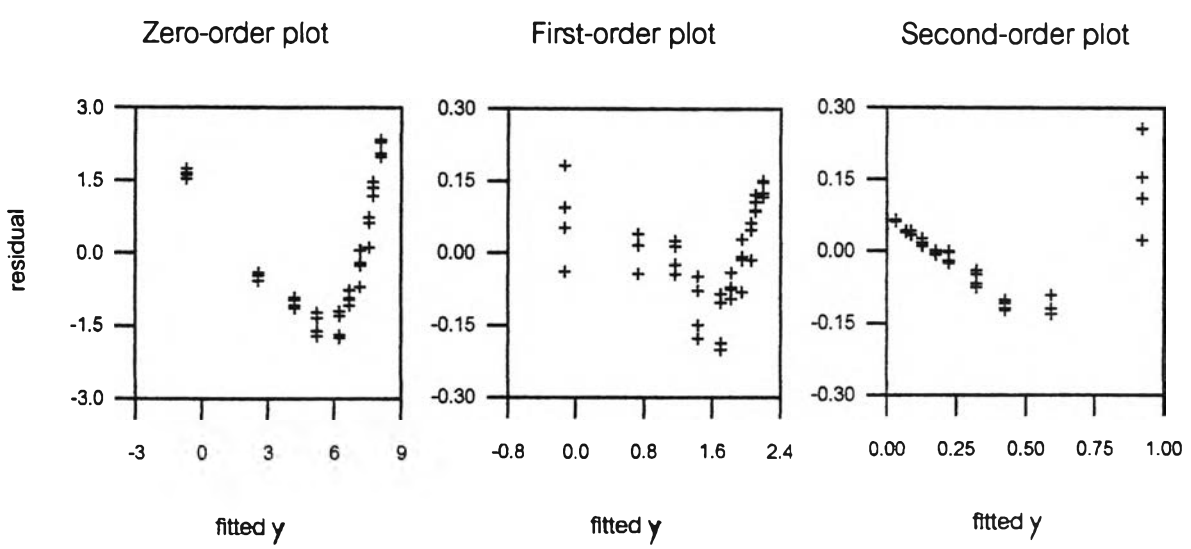
Stability Data of Ranitidine HCl : 2HP –β–CD complex

(pH 9 0.20 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	10.40	10.09	10.17	10.44	10.27 ± 0.17
57.83	N	9.09	8.92	9.22	8.93	9.04 ± 0.14
86.08	N	7.69	8.31	8.19	8.19	8.10 ± 0.27
151.67	O	6.96	7.22	6.92	6.48	6.90 ± 0.31
230.75	P	5.73	5.75	5.61	5.93	5.75 ± 0.13
304.25	P	5.03	4.94	4.54	4.48	4.75 ± 0.28
466.42	Q	3.89	3.52	3.62	4.01	3.76 ± 0.23
631.00	R	3.08	3.30	3.14	3.26	3.19 ± 0.10
900.33	S	2.11	2.16	1.99	2.11	2.09 ± 0.07
1426.00	W	1.06	0.97	0.85	0.93	0.95 ± 0.09

* calibration curves used.

Zero-order :	conc = 8.1009 - 0.0062 time	r = 0.9006
First- order :	ln conc = 2.1949 - 0.0016 time	r = 0.9908
Second-order :	1/conc = 0.0334 + 0.0006 time	r = 0.9582



Stability Data of Ranitidine HCl Solution

(pH 9 0.30 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	9.86	9.81	9.83	9.67	9.79 ± 0.08
41.33	N	8.30	7.93	8.30	8.11	8.16 ± 0.18
58.17	N	6.90	7.21	7.20	7.32	7.16 ± 0.18
86.08	N	5.86	5.99	6.23	5.92	6.00 ± 0.16
112.67	O	4.99	5.02	5.07	5.12	5.05 ± 0.06
163.42	O	3.54	3.78	3.81	3.38	3.63 ± 0.21
230.75	P	3.20	3.08	3.04	3.16	3.12 ± 0.07
304.25	P	2.71	2.41	2.65	2.61	2.59 ± 0.13
466.42	Q	1.82	1.85	1.85	1.73	1.81 ± 0.06
622.25	R	1.26	1.33	1.36	1.24	1.30 ± 0.06
897.92	S	0.68	0.67	0.70	0.76	0.70 ± 0.04
1169.00	U	0.54	0.41	0.36	0.39	0.42 ± 0.08

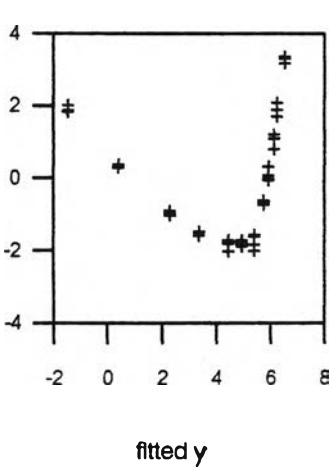
* calibration curves used.

Zero-order : conc = 6.5041 - 0.0068 time r = 0.8275

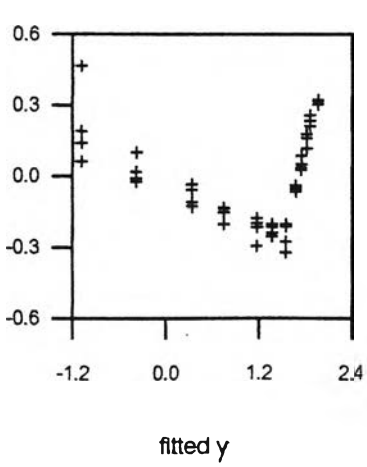
First- order : ln conc = 1.9663 - 0.0026 time r = 0.9786

Second-order : 1/conc = - 0.0443 + 0.0018 time r = 0.9547

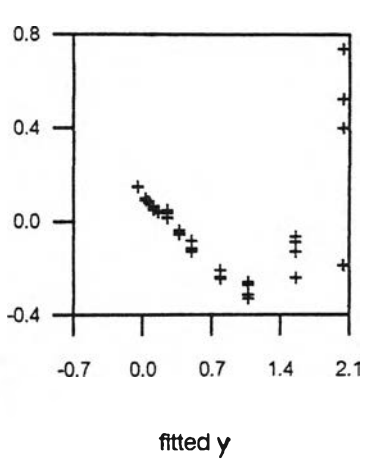
Zero-order plot



First-order plot



Second-order plot



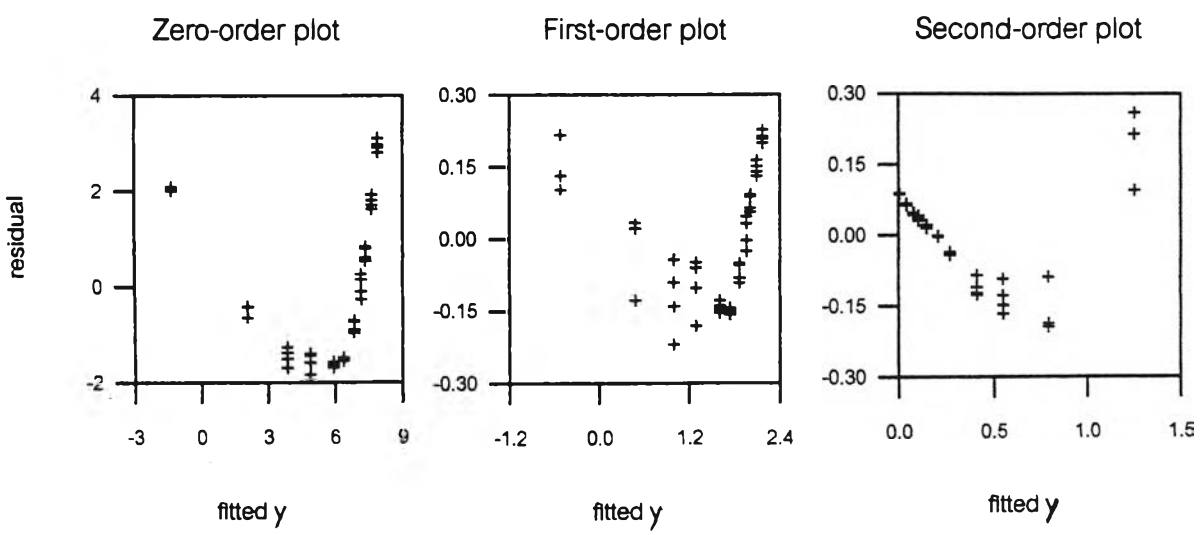
Stability Data of Ranitidine HCl : β–CD complex

(pH 9 0.30 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	11.01	10.81	10.86	10.71	10.85 ± 0.13
41.33	N	9.55	9.33	9.44	9.25	9.39 ± 0.13
86.08	N	8.14	8.18	7.95	7.88	8.04 ± 0.15
112.67	O	7.07	7.32	7.43	6.91	7.18 ± 0.24
163.42	O	5.94	5.88	6.13	6.11	6.02 ± 0.13
230.75	P	4.92	4.85	4.88	4.90	4.89 ± 0.03
304.25	P	4.24	4.30	4.27	4.35	4.29 ± 0.05
466.42	Q	3.29	3.47	3.04	3.43	3.31 ± 0.20
622.25	R	2.18	2.60	2.36	2.48	2.40 ± 0.18
897.92	S	1.65	1.67	1.42	1.65	1.60 ± 0.12
1426.00	W	0.74	0.68	0.68	0.66	0.69 ± 0.03

* calibration curves used.

Zero-order :	conc = 7.8974 - 0.0065 time	r = 0.8653
First- order :	ln conc = 2.1713 - 0.0019 time	r = 0.9870
Second-order :	1/conc = 0.0046 + 0.0009 time	r = 0.9620



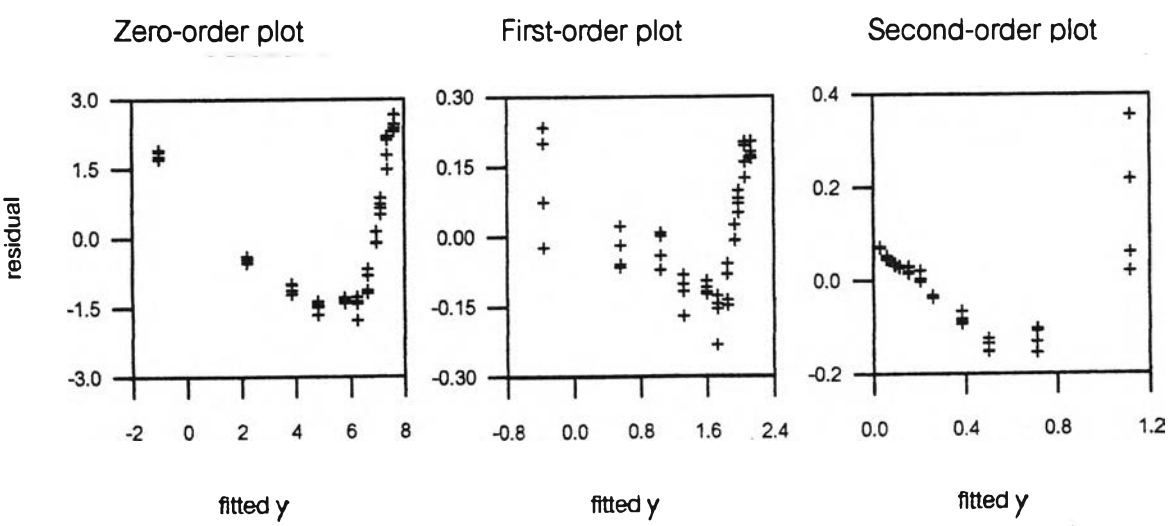
Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 9 0.30 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	M	10.30	9.93	10.08	10.00	10.08 ± 0.16
41.33	N	9.16	8.86	9.50	9.57	9.27 ± 0.33
86.08	N	7.84	7.97	7.76	7.61	7.80 ± 0.15
112.67	O	7.08	6.84	7.08	6.85	6.96 ± 0.13
163.42	O	5.96	5.51	5.45	5.83	5.69 ± 0.25
230.75	P	4.86	4.45	4.81	4.95	4.77 ± 0.22
304.25	P	4.43	4.37	4.39	4.49	4.42 ± 0.06
466.42	Q	3.36	3.14	3.43	3.31	3.31 ± 0.12
622.25	R	2.64	2.84	2.86	2.72	2.77 ± 0.10
897.92	S	1.65	1.79	1.64	1.72	1.70 ± 0.07
1426.00	W	0.68	0.75	0.88	0.85	0.79 ± 0.09

* calibration curves used.

Zero-order :	conc = 7.6310 - 0.0061 time	r = 0.8726
First- order :	ln conc = 2.1289 - 0.0017 time	r = 0.9860
Second-order :	1/conc = 0.0276 + 0.0008 time	r = 0.9588



Stability Data of Ranitidine HCl Solution

(pH 11 0.10 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	11.34	12.34	12.44	11.07	11.80 ± 0.69
35.25	H	9.79	9.87	9.74	10.17	9.89 ± 0.19
146.75	H	6.54	6.47	6.03	6.15	6.30 ± 0.24
178.42	I	6.19	5.55	5.77	5.48	5.75 ± 0.32
220.50	I	4.67	4.74	4.73	5.20	4.84 ± 0.24
272.50	J	3.88	3.87	4.53	3.91	4.05 ± 0.32
315.83	J	3.35	3.25	3.43	3.60	3.41 ± 0.15
371.17	K	2.92	2.76	2.80	2.75	2.81 ± 0.08
411.50	K	2.75	2.66	2.66	2.59	2.67 ± 0.07
537.00	L	1.90	1.89	2.06	2.02	1.97 ± 0.08
677.00	M	1.35	1.47	1.47	1.55	1.46 ± 0.08
995.50	P	0.76	0.79	0.80	0.74	0.77 ± 0.03
1208.00	Q	0.55	0.52	0.52	0.52	0.53 ± 0.02

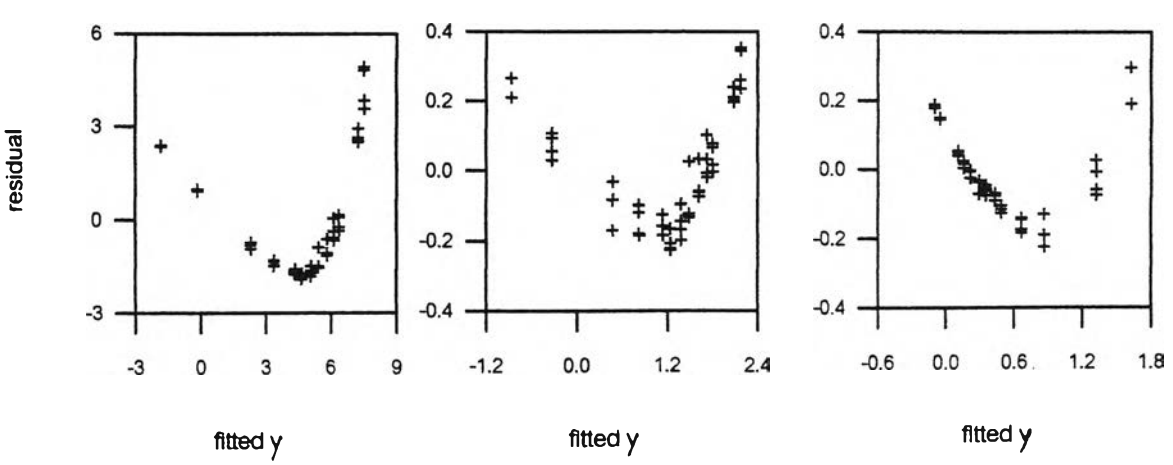
* calibration curves used.

Zero-order : conc = 7.5185 - 0.0077 time r = 0.8157

First- order : ln conc = 2.1678 - 0.0025 time r = 0.9832

Second-order : 1/conc = - 0.0981 + 0.0014 time r = 0.9671

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

(pH 11 0.10 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	11.39	11.39	11.52	11.61	11.48 ± 0.11
35.25	H	9.95	9.72	9.72	10.26	9.91 ± 0.26
146.75	H	6.60	6.75	6.61	6.73	6.67 ± 0.08
178.42	I	5.66	6.03	6.40	5.88	5.99 ± 0.31
220.50	I	5.39	5.27	5.15	5.26	5.27 ± 0.10
272.50	J	4.37	4.27	4.46	4.36	4.37 ± 0.08
315.83	J	3.85	3.92	3.96	3.97	3.92 ± 0.05
371.17	K	3.34	3.46	3.47	3.31	3.39 ± 0.08
411.50	K	3.13	3.27	3.17	3.10	3.17 ± 0.08
537.00	L	2.46	2.50	2.55	2.50	2.50 ± 0.04
749.00	N	1.67	1.62	1.66	1.64	1.65 ± 0.02
1208.00	Q	0.73	0.73	0.70	0.74	0.72 ± 0.02

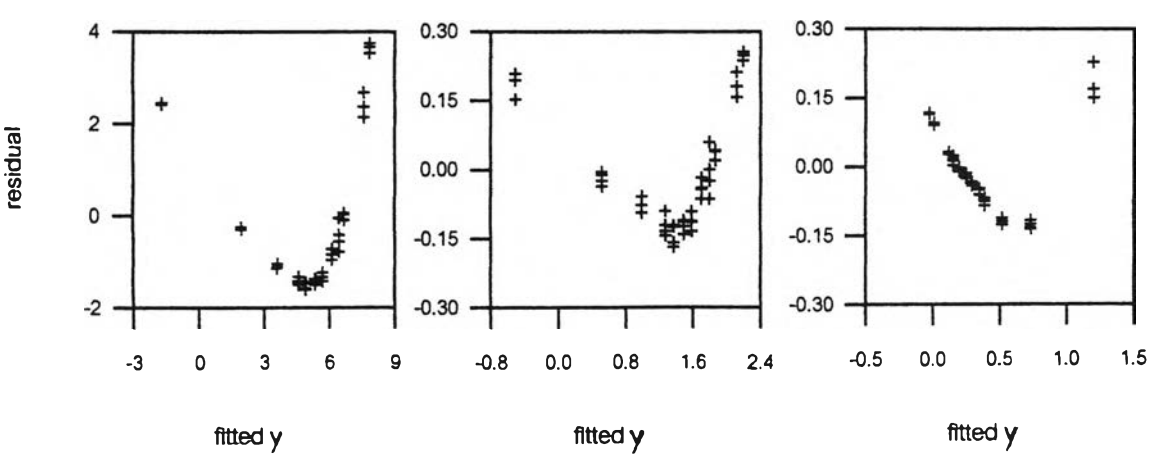
* calibration curves used.

Zero-order : conc = 7.8568 - 0.0079 time r = 0.8310

First- order : ln conc = 2.1957 - 0.0022 time r = 0.9842

Second-order : 1/conc = -0.0292 + 0.0010 time r = 0.9645

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 11 0.10 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	11.63	10.98	12.06	11.26	11.48 ± 0.47
35.25	H	9.55	9.25	9.29	9.45	9.39 ± 0.14
146.75	H	6.77	7.36	8.10	7.99	7.55 ± 0.62
178.42	I	5.86	5.95	6.03	5.92	5.94 ± 0.07
220.50	I	5.60	5.50	5.57	5.52	5.55 ± 0.04
272.50	J	4.69	4.74	4.71	4.75	4.72 ± 0.03
315.83	J	4.27	4.33	4.26	4.34	4.30 ± 0.04
371.17	K	3.62	3.72	3.77	3.62	3.68 ± 0.07
411.50	K	3.52	3.58	3.43	3.46	3.50 ± 0.07
537.00	L	2.93	2.94	2.95	2.85	2.92 ± 0.04
749.00	N	1.94	2.01	2.03	2.16	2.03 ± 0.09
1208.00	Q	0.95	1.01	0.95	1.07	0.99 ± 0.06

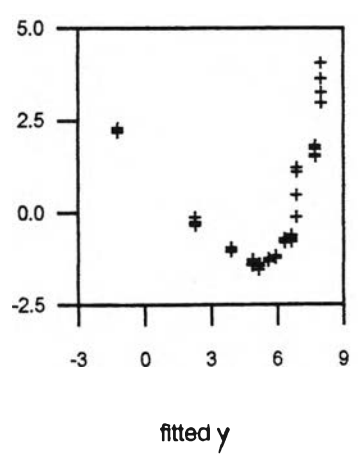
* calibration curves used.

Zero-order : conc = 8.0048 - 0.0076 time r = 0.8417

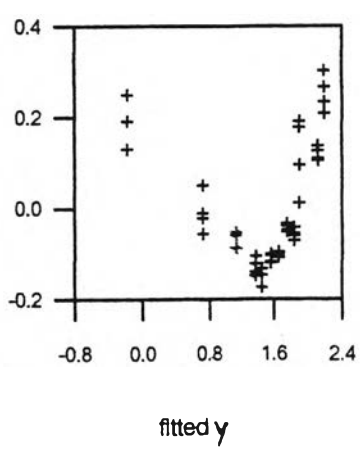
First- order : ln conc = 2.1879 - 0.0020 time r = 0.9791

Second-order : 1/conc = 0.0232 + 0.0007 time r = 0.9747

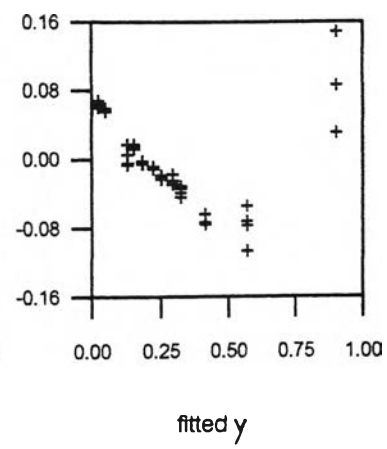
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl Solution

(pH 11 0.20 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	11.75	10.95	11.06	11.26	11.25 ± 0.35
35.25	H	8.56	10.10	9.21	9.41	9.32 ± 0.63
146.75	H	3.90	3.76	3.84	4.02	3.88 ± 0.11
178.42	I	2.96	3.07	2.98	3.56	3.14 ± 0.28
220.50	I	2.22	2.54	2.28	2.22	2.32 ± 0.15
272.50	J	1.52	1.62	1.60	1.61	1.59 ± 0.05
315.83	J	1.29	1.27	1.36	1.37	1.32 ± 0.05
371.17	K	1.09	1.01	1.04	1.02	1.04 ± 0.04
442.00	L	0.75	0.67	0.72	0.73	0.72 ± 0.04
566.08	L	0.53	0.50	0.46	0.47	0.49 ± 0.03
658.00	M	0.38	0.33	0.36	0.36	0.36 ± 0.02

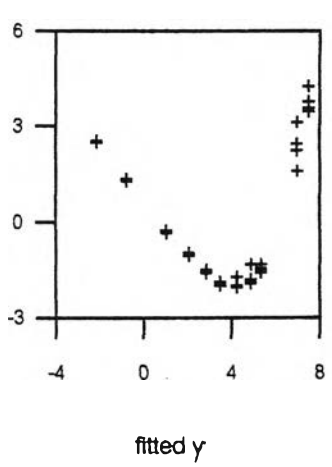
* calibration curves used.

Zero-order : conc = 7.4952 - 0.0147 time r = 0.8223

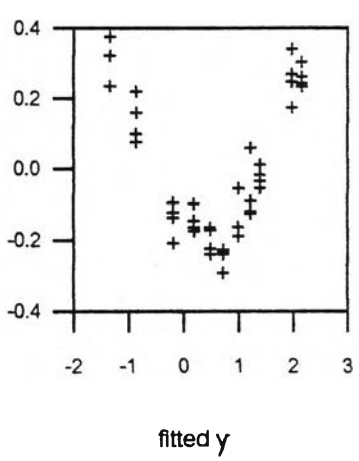
First- order : ln conc = 2.1602 - 0.0053 time r = 0.9822

Second-order : 1/conc = - 0.2808 + 0.0040 time r = 0.9569

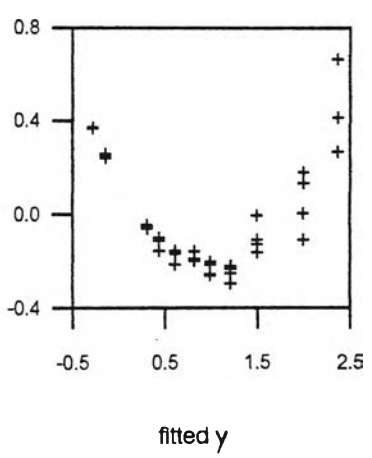
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

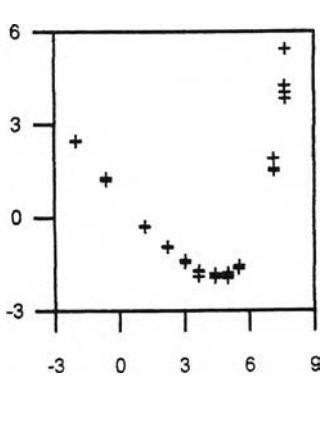
(pH 11 0.20 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	11.92	13.10	11.50	11.70	12.05 ± 0.72
35.25	H	8.72	8.65	8.68	9.05	8.78 ± 0.18
146.75	H	3.94	3.86	3.97	3.96	3.93 ± 0.05
178.42	I	3.13	3.28	3.10	3.16	3.16 ± 0.08
220.50	I	2.59	2.50	2.63	2.61	2.58 ± 0.06
272.50	J	1.93	1.96	1.77	1.97	1.91 ± 0.09
315.83	J	1.66	1.57	1.67	1.58	1.62 ± 0.05
371.17	K	1.26	1.30	1.27	1.27	1.27 ± 0.02
442.00	L	0.91	0.90	0.89	0.87	0.89 ± 0.02
566.08	L	0.64	0.58	0.59	0.56	0.59 ± 0.03
658.00	M	0.48	0.46	0.47	0.49	0.47 ± 0.01

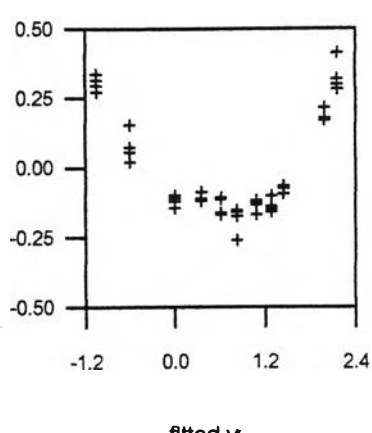
* calibration curves used.

Zero-order :	conc = 7.6669 - 0.0147 time	r = 0.8188
First- order :	ln conc = 2.1598 - 0.0049 time	r = 0.9823
Second-order :	1/conc = -0.1689 + 0.0031 time	r = 0.9653

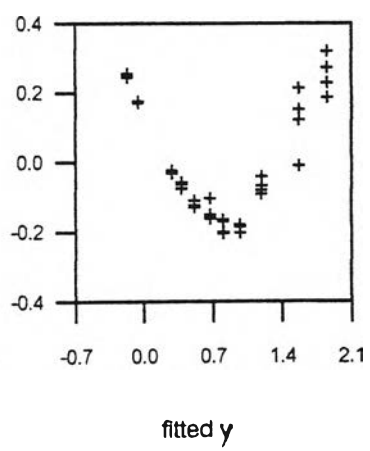
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 11 0.20 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	10.93	11.15	11.32	11.37	11.19 ± 0.20
35.25	H	8.49	8.31	8.88	8.39	8.52 ± 0.25
146.75	H	4.39	4.43	4.55	4.72	4.52 ± 0.15
178.42	I	3.55	3.58	3.60	3.70	3.61 ± 0.06
220.50	I	3.03	2.86	2.96	2.87	2.93 ± 0.08
272.50	J	2.31	2.25	2.40	2.24	2.30 ± 0.07
315.83	J	2.05	1.99	1.90	2.00	1.99 ± 0.06
371.17	K	1.63	1.61	1.56	1.57	1.59 ± 0.03
442.00	L	1.26	1.27	1.28	1.10	1.23 ± 0.09
566.08	L	0.83	0.82	0.84	0.81	0.83 ± 0.01
677.00	M	0.64	0.64	0.55	0.60	0.61 ± 0.04
877.08	O	0.31	0.34	0.33	0.31	0.32 ± 0.02

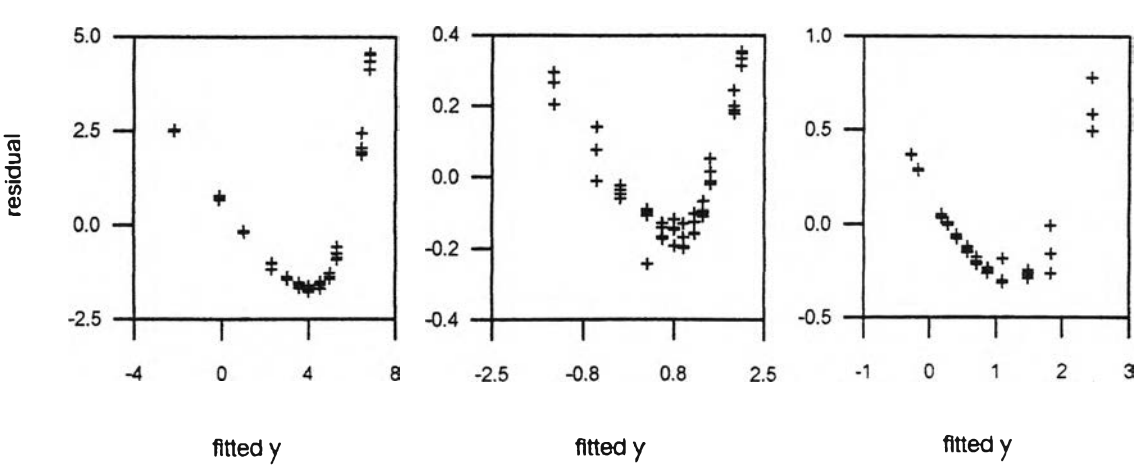
* calibration curves used.

Zero-order : conc = 6.8066 - 0.0102 time r = 0.8017

First- order : ln conc = 2.0779 - 0.0039 time r = 0.9851

Second-order : 1/conc = -0.2786 + 0.0031 time r = 0.9387

Zero-order plot First-order plot Second-order plot



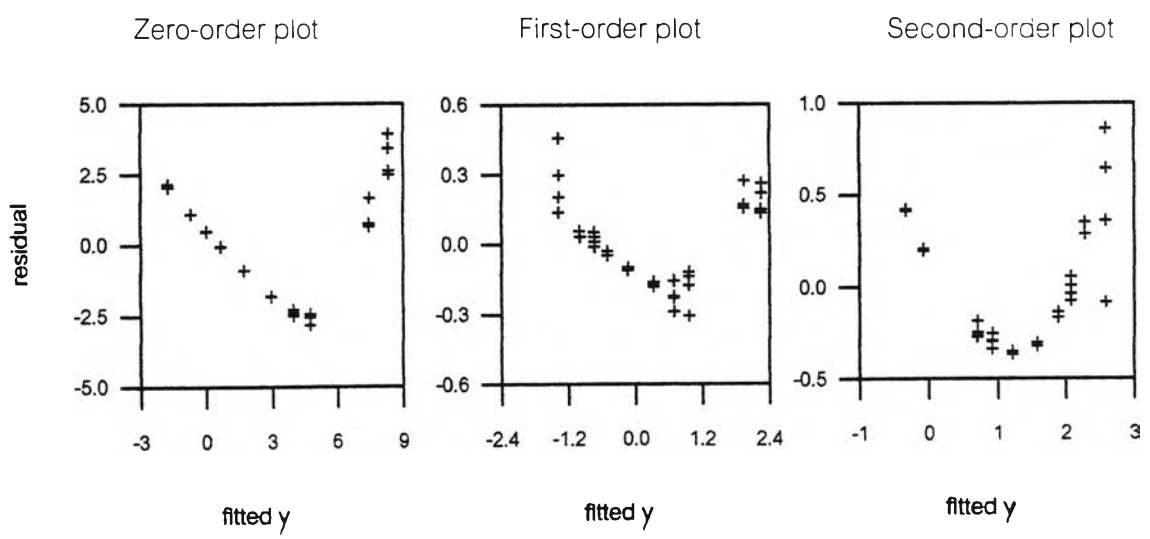
Stability Data of Ranitidine HCl Solution

(pH 11 0.30 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	12.26	10.95	11.74	10.80	11.44 ± 0.68
35.25	H	8.21	8.21	8.10	9.11	8.41 ± 0.47
146.75	H	2.28	2.32	2.20	1.93	2.18 ± 0.18
178.42	I	1.59	1.58	1.49	1.70	1.59 ± 0.09
220.50	I	1.17	1.16	1.15	1.15	1.16 ± 0.01
272.50	J	0.78	0.78	0.79	0.78	0.78 ± 0.01
315.83	J	0.57	0.57	0.58	0.58	0.57 ± 0.01
342.08	J	0.49	0.48	0.50	0.47	0.49 ± 0.01
371.17	K	0.39	0.38	0.39	0.39	0.38 ± 0.01
414.17	K	0.34	0.40	0.31	0.29	0.33 ± 0.05

* calibration curves used.

Zero-order :	conc = 8.3165 - 0.0243 time	r = 0.8702
First- order :	ln conc = 2.2458 - 0.0087 time	r = 0.9889
Second-order :	1/conc = - 0.3306 + 0.0070 time	r = 0.9459



Stability Data of Ranitidine HCl : β–CD complex

(pH 11 0.30 M Glycine - NaOH buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	11.40	11.50	11.78	11.78	11.62 ± 0.20
35.25	H	7.72	7.74	7.79	7.76	7.75 ± 0.03
146.75	H	2.35	2.46	2.29	2.34	2.36 ± 0.07
178.42	I	1.72	1.64	1.69	1.69	1.69 ± 0.03
220.50	I	1.20	1.20	1.26	1.22	1.22 ± 0.03
272.50	J	0.85	0.87	0.91	0.89	0.88 ± 0.02
315.83	J	0.69	0.66	0.67	0.70	0.68 ± 0.02
342.08	J	0.54	0.52	0.52	0.54	0.53 ± 0.01
371.17	K	0.47	0.42	0.45	0.43	0.44 ± 0.02
414.17	K	0.33	0.33	0.33	0.35	0.34 ± 0.01

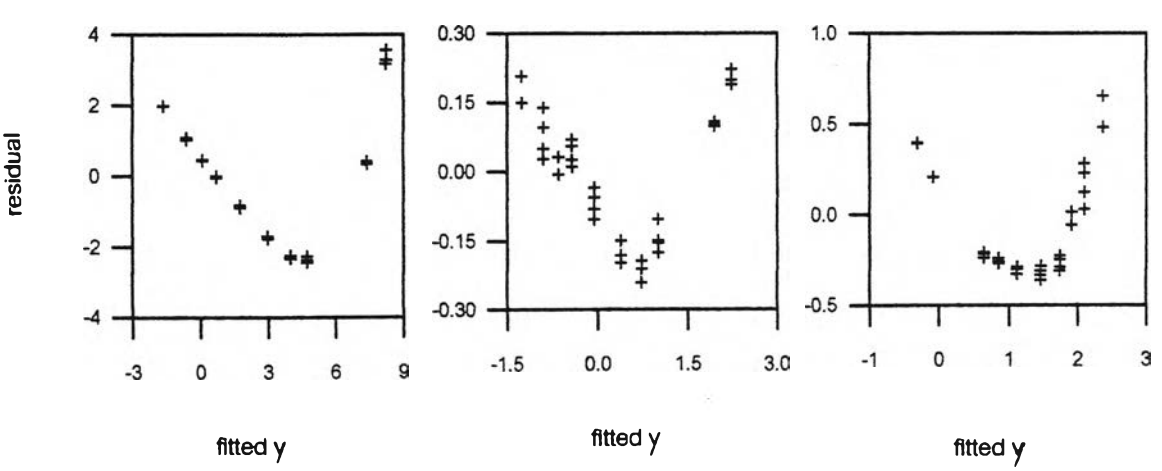
* calibration curves used.

Zero-order : conc = 8.2119 - 0.0238 time r = 0.8714

First- order : ln conc = 2.2434 - 0.0085 time r = 0.9922

Second-order : 1/conc = -0.3084 + 0.0065 time r = 0.9387

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

(pH 11 0.30 M Glycine - NaOH buffer)

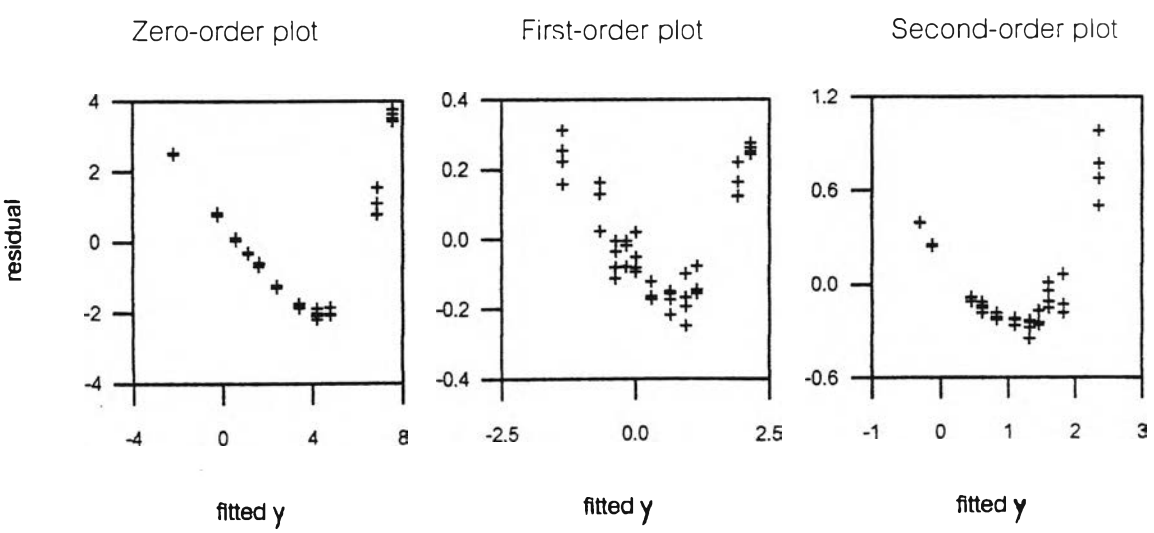
Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL				
		n1	n2	n3	n4	Average conc ± SD
0.00	H	11.17	11.04	10.96	11.30	11.12 ± 0.15
35.25	H	7.66	7.97	8.42	7.64	7.92 ± 0.36
146.75	H	2.75	2.74	2.94	2.72	2.79 ± 0.10
178.42	I	2.11	2.17	2.00	2.32	2.15 ± 0.13
220.50	I	1.62	1.55	1.65	1.66	1.62 ± 0.05
272.50	J	1.15	1.14	1.14	1.20	1.16 ± 0.03
315.83	J	1.03	0.92	0.96	0.93	0.96 ± 0.05
342.08	J	0.83	0.84	0.84	0.78	0.82 ± 0.03
371.17	K	0.69	0.67	0.62	0.64	0.65 ± 0.03
414.17	K	0.53	0.61	0.59	0.61	0.59 ± 0.04
518.08	L	0.35	0.30	0.33	0.32	0.33 ± 0.02

* calibration curves used.

Zero-order : conc = 7.5348 - 0.0188 time r = 0.8484

First- order : ln conc = 2.1506 - 0.0068 time r = 0.9877

Second-order : 1/conc = -0.3017 + 0.0051 time r = 0.9276



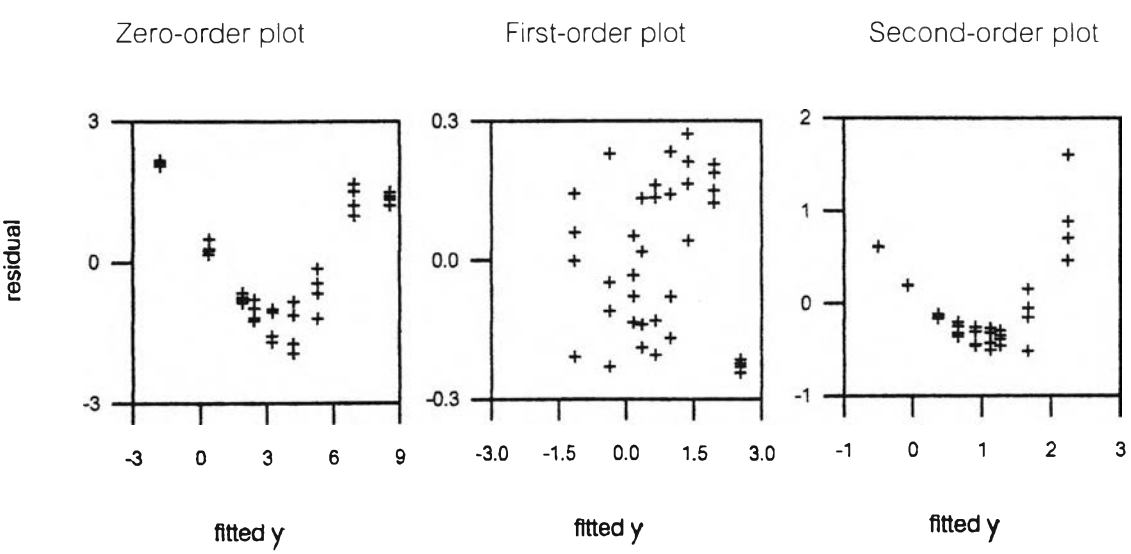
Stability Data of Ranitidine HCl Solution

(pH 13 0.03 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	T	10.06	9.78	9.91	9.98	9.93 ± 0.12
1.00	T	8.45	7.92	8.14	8.60	8.28 ± 0.31
2.00	T	5.15	4.85	4.09	4.63	4.68 ± 0.45
2.67	T	3.36	3.07	2.46	2.25	2.79 ± 0.52
3.25	T	2.24	2.18	1.67	1.55	1.91 ± 0.35
3.75	T	1.63	1.45	1.24	1.18	1.38 ± 0.21
4.08	T	1.14	1.24	1.09	1.03	1.12 ± 0.09
5.00	T	0.87	0.66	0.62	0.55	0.67 ± 0.14
6.33	T	0.37	0.34	0.32	0.26	0.32 ± 0.04

* calibration curve used.

Zero-order :	conc = 8.5627 - 1.6375 time	r = 0.9216
First- order :	ln conc = 2.5247 - 0.5787 time	r = 0.9884
Second-order :	1/conc = -0.5049 + 0.4344 time	r = 0.8603



Stability Data of Ranitidine HCl : β–CD complex

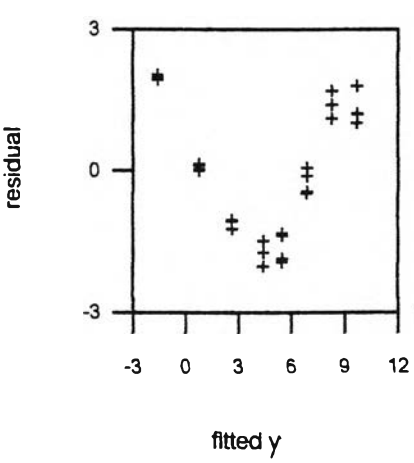
(pH 13 0.03 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	T	10.93	10.92	11.51	10.73	11.02 ± 0.34
1.00	T	10.00	9.71	9.41	9.71	9.71 ± 0.24
2.00	T	6.95	6.78	6.46	6.42	6.65 ± 0.25
3.00	T	4.16	4.11	3.55	3.62	3.86 ± 0.32
3.75	T	2.94	2.69	2.40	2.69	2.68 ± 0.22
5.00	T	1.61	1.59	1.43	1.43	1.52 ± 0.10
6.33	T	0.90	0.93	0.83	0.79	0.86 ± 0.06
8.00	T	0.38	0.46	0.40	0.36	0.40 ± 0.04

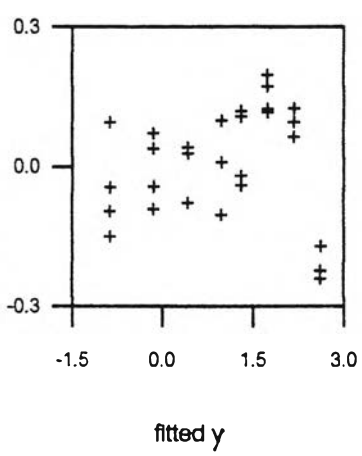
* calibration curve used.

Zero-order :	conc = 9.7141 - 1.4103 time	r = 0.9342
First- order :	ln conc = 2.6141 - 0.4358 time	r = 0.9944
Second-order :	1/conc = -0.3290 + 0.2737 time	r = 0.8858

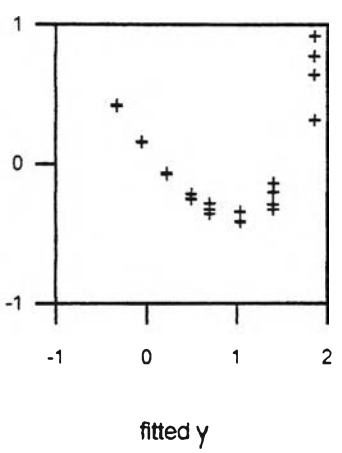
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

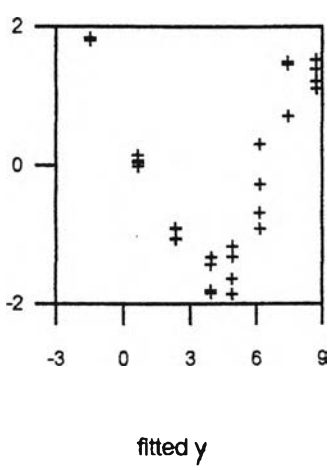
(pH 13 0.03 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	T	10.10	9.93	10.24	9.82	10.02 ± 0.19
1.00	T	8.93	8.90	8.15	8.93	8.73 ± 0.39
2.00	T	6.48	5.89	5.48	5.25	5.77 ± 0.54
3.00	T	3.72	3.25	3.57	3.03	3.39 ± 0.31
3.75	T	2.61	2.50	2.13	2.09	2.33 ± 0.26
5.00	T	1.43	1.42	1.27	1.28	1.35 ± 0.09
6.33	T	0.80	0.72	0.63	0.69	0.71 ± 0.07
8.00	T	0.36	0.32	0.32	0.33	0.33 ± 0.02

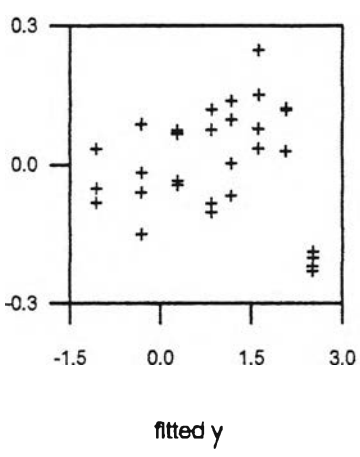
* calibration curve used.

Zero-order :	conc = 8.7136 - 1.2746 time	r = 0.9298
First- order :	ln conc = 2.5143 - 0.4465 time	r = 0.9946
Second-order :	1/conc = -0.4083 + 0.3288 time	r = 0.8869

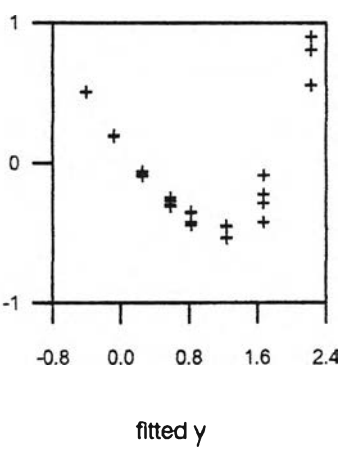
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl Solution

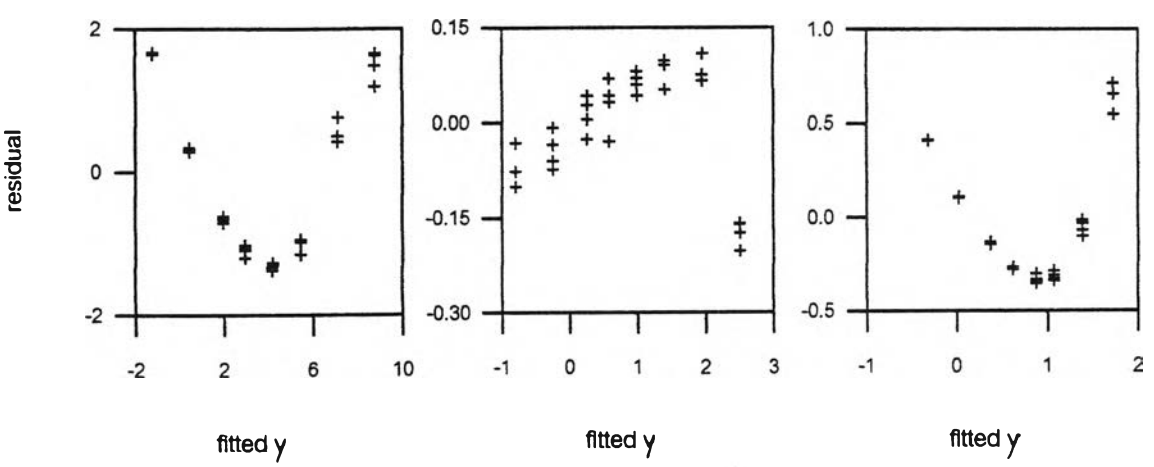
(pH 13 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	U	10.42	10.44	9.98	10.27	10.28 ± 0.21
1.00	U	7.88	7.62	7.88	7.55	7.73 ± 0.17
2.00	U	4.30	4.50	4.50	4.47	4.44 ± 0.09
2.75	U	2.82	2.93	2.87	2.90	2.88 ± 0.05
3.50	U	1.74	1.87	1.92	1.85	1.84 ± 0.08
4.08	U	1.27	1.36	1.34	1.31	1.32 ± 0.04
5.00	U	0.73	0.74	0.78	0.76	0.75 ± 0.02
6.00	U	0.44	0.41	0.42	0.44	0.43 ± 0.01

* calibration curve used.

Zero-order :	conc = 8.7898 - 1.6704 time	r = 0.9430
First- order :	ln conc = 2.5042 - 0.5489 time	r = 0.9965
Second-order :	1/conc = -0.3121+ 0.3398 time	r = 0.8888

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

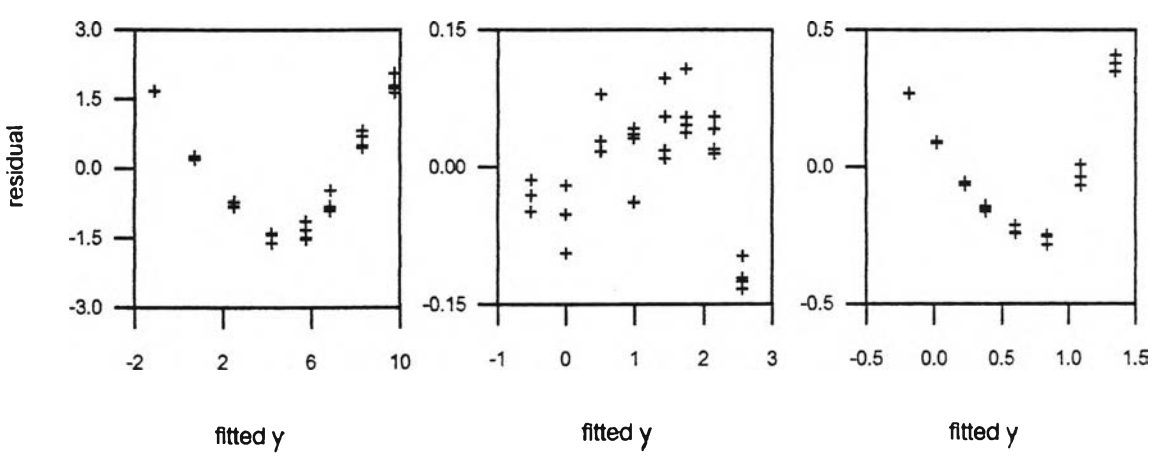
(pH 13 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	U	11.40	11.82	11.54	11.50	11.57 ± 0.18
1.00	U	9.01	8.81	8.77	9.13	8.93 ± 0.17
2.00	U	5.95	6.05	6.00	6.38	6.10 ± 0.19
2.75	U	4.64	4.45	4.25	4.29	4.41 ± 0.18
3.83	U	2.80	2.79	2.60	2.82	2.75 ± 0.10
5.00	U	1.81	1.81	1.72	1.70	1.76 ± 0.06
6.25	U	0.98	0.95	0.95	0.91	0.95 ± 0.03
7.50	U	0.59	0.57	0.58	0.57	0.58 ± 0.01

* calibration curve used.

Zero-order :	conc = 9.7526 - 1.4467 time	r = 0.9452
First- order :	ln conc = 2.5671 - 0.4107 time	r = 0.9979
Second-order :	1/conc = -0.1833 + 0.2039 time	r = 0.9142

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

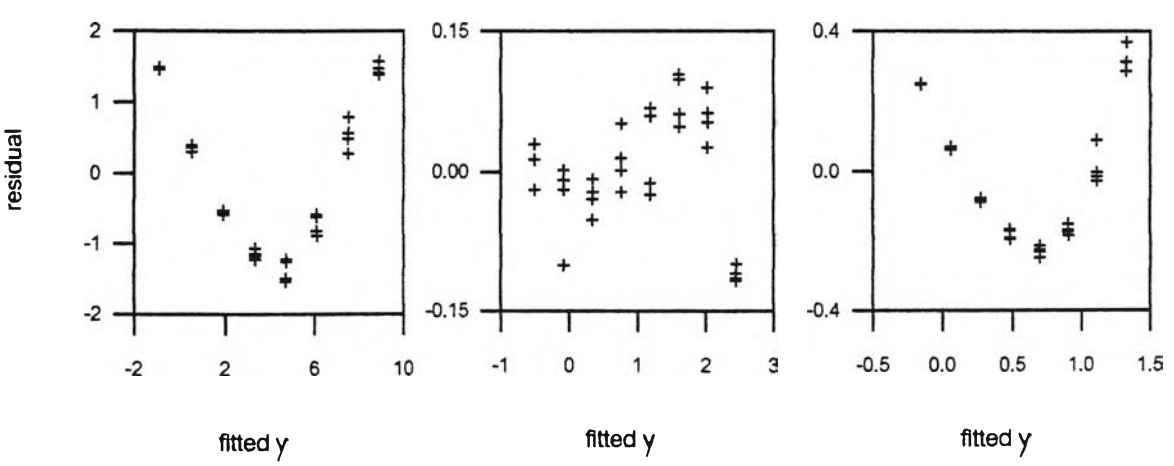
(pH 13 0.05 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	U	10.32	10.30	10.48	10.38	10.37 ± 0.08
1.00	U	8.30	7.79	8.08	8.00	8.04 ± 0.21
2.00	U	5.49	5.52	5.29	5.22	5.38 ± 0.15
3.00	U	3.46	3.18	3.22	3.49	3.33 ± 0.16
4.00	U	2.25	2.17	2.14	2.09	2.16 ± 0.07
5.00	U	1.36	1.37	1.33	1.39	1.36 ± 0.02
6.00	U	0.92	0.83	0.91	0.90	0.89 ± 0.04
7.00	U	0.62	0.59	0.61	0.59	0.60 ± 0.01

* calibration curve used

Zero-order :	conc = 8.9085 - 1.3972 time	r = 0.9498
First- order :	ln conc = 2.4492 - 0.4224 time	r = 0.9980
Second-order :	1/conc = -0.1538 + 0.2114 time	r = 0.9278

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl Solution

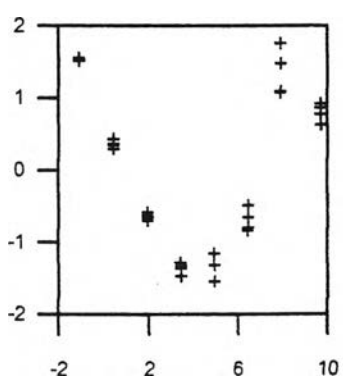
(pH 13 0.08 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	V	10.60	10.65	10.51	10.36	10.53 ± 0.13
1.00	V	9.40	9.68	9.00	9.02	9.28 ± 0.33
1.83	V	5.77	5.63	5.59	5.94	5.73 ± 0.16
2.67	V	3.60	3.76	3.60	3.37	3.58 ± 0.16
3.50	V	2.09	2.13	1.95	2.06	2.06 ± 0.08
4.33	V	1.26	1.34	1.22	1.29	1.28 ± 0.05
5.17	V	0.85	0.76	0.78	0.71	0.78 ± 0.06
6.00	V	0.43	0.46	0.44	0.47	0.45 ± 0.02

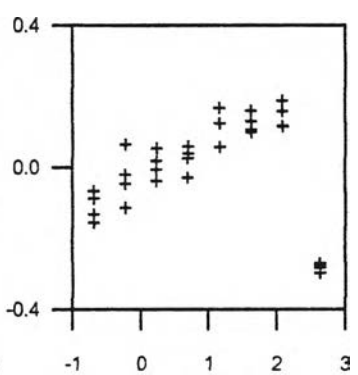
* calibration curve used.

Zero-order :	conc = 9.7287 - 1.8020 time	r = 0.9542
First- order :	ln conc = 2.6358 - 0.5541 time	r = 0.9918
Second-order :	1/conc = -0.2968 + 0.3193 time	r = 0.8866

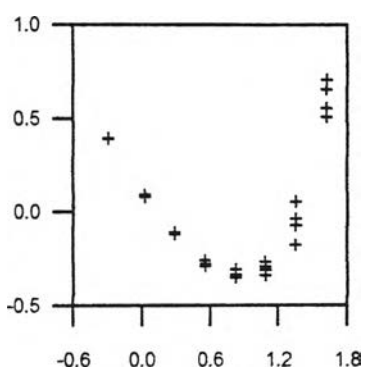
Zero-order plot



First-order plot



Second-order plot



Stability Data of Ranitidine HCl : β–CD complex

(pH 13 0.08 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	V	11.11	11.36	11.15	11.40	11.25 ± 0.14
1.00	V	9.68	8.91	9.39	9.27	9.31 ± 0.32
2.00	V	5.86	5.95	5.57	5.54	5.73 ± 0.20
2.83	V	3.75	3.75	3.71	3.54	3.69 ± 0.10
3.67	V	2.55	2.35	2.57	2.53	2.50 ± 0.10
4.50	V	1.52	1.53	1.40	1.46	1.47 ± 0.06
5.75	V	0.92	0.92	0.82	0.93	0.90 ± 0.05
7.00	V	0.51	0.47	0.46	0.47	0.48 ± 0.02

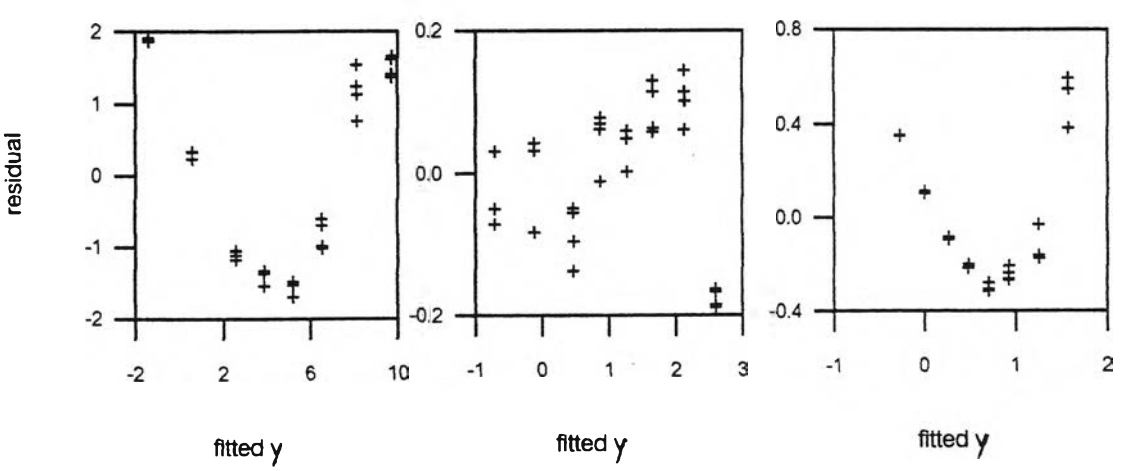
* calibration curve used.

Zero-order : conc = 9.7394 - 1.5917 time r = 0.9378

First- order : ln conc = 2.5969 - 0.4717 time r = 0.9959

Second-order : 1/conc = -0.26265 + 0.2630 time r = 0.9004

Zero-order plot First-order plot Second-order plot



Stability Data of Ranitidine HCl : 2HP–β–CD complex

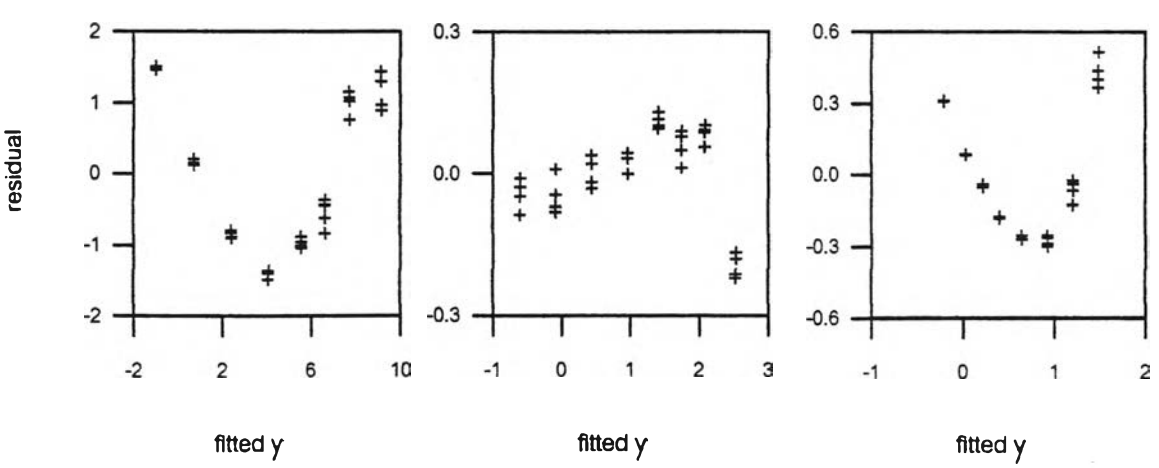
(pH 13 0.08 M Phosphate buffer)

Time (hr)	Cal.*	Concentration of ranitidine HCl remaining (mg/mL)				
		n1	n2	n3	n4	Average conc ± SD
0.00	V	10.46	10.13	10.60	10.05	10.31 ± 0.26
1.00	V	8.87	8.78	8.47	8.74	8.72 ± 0.17
1.75	V	6.19	6.01	6.26	5.79	6.06 ± 0.21
2.50	V	4.50	4.59	4.66	4.53	4.57 ± 0.07
3.50	V	2.61	2.73	2.70	2.73	2.69 ± 0.06
4.67	V	1.52	1.50	1.58	1.61	1.55 ± 0.05
5.83	V	0.88	0.85	0.86	0.93	0.88 ± 0.04
7.00	V	0.52	0.50	0.54	0.53	0.52 ± 0.02

* calibration curve used.

Zero-order :	conc = 9.1593 - 1.4464 time	r = 0.9534
First- order :	ln conc = 2.5277 - 0.4476 time	r = 0.9957
Second-order :	1/conc = -0.2124 + 0.2424 time	r = 0.9142

Zero-order plot First-order plot Second-order plot



APPENDIX III

t Statistics for Comparison of Degradation Rate Constants

Modified t - test

$$T = \frac{\hat{a}_1 - \hat{a}_2 - (a_1 - a_2)}{\sqrt{\frac{1}{S_{t1}} + \frac{1}{S_{t2}}}\ \sqrt{\frac{SSE\,1 + SSE\,2}{n_1 + n_2 - 4}}} \qquad ; t\,(n_1 + n_2 - 4)$$

$$S_{t1} = \sum_{i=1}^{n_1} t_i^2 - \frac{1}{n_1}\left[\sum_{i=1}^{n_1} t_i\right]^2$$

$$S_{t2} = \sum_{i=1}^{n_2} t_i^2 - \frac{1}{n_2}\left[\sum_{i=1}^{n_2} t_i\right]^2$$

$$SSE1 = \sum_{i=1}^{n_1} A_{i1}^2 - \frac{1}{n_1}\left[\sum_{i=1}^{n_1} A_{i1}\right]^2 - \hat{a}_1^2 S_{t1}$$

$$SSE2 = \sum_{i=1}^{n_2} A_{i2}^2 - \frac{1}{n_2}\left[\sum_{i=1}^{n_2} A_{i2}\right]^2 - \hat{a}_2^2 S_{t2}$$

$\hat{a}_1$: slope of the straight line 1, $y = \hat{a}_1 t + b_1$

$\hat{a}_2$: slope of the straight line 2, $y = \hat{a}_2 t + b_2$

(1) $H_o : a_1 - a_2 = 0$; $H_1 : a_1 - a_2 \neq 0$

Reject H_o if $|T| > t_{\alpha/2}(n_1 + n_2 - 4)$

(2) $H_o : a_1 - a_2 = 0$; $H_1 : a_1 - a_2 > 0$

Reject H_o if $T > t_{\alpha}(n_1 + n_2 - 4)$

(3) $H_o : a_1 - a_2 = 0$; $H_1 : a_1 - a_2 < 0$

Reject H_o if $|T| > t_{\alpha}(n_1 + n_2 - 4)$

VITA

Mr. Charoendej Ngamkitpaiboon was born on December 19, 1972 in Bangkok, Thailand. He received his Bachelor of Science in Pharmacy Degree from the Faculty of Pharmacy, Mahidol University, Bangkok, Thailand in 1995. After graduation, he had worked at Biolab Co. Ltd., Samutprakarn for one year before he entered the Master's Degree program in Pharmacy at Chulalongkorn University.