

REFERENCES

- Aiache, J., and Beyssac, E. 1995. Powders as dosage forms. In J. Swarbrick, and J.C. Boylan. **Encyclopedia of Pharmaceutical Technology** Vol. 12. pp. 389-420. New York: Academic Press.
- Asker, A.F., and Becker, C.H. 1966. Some spray dried formulation of sulfaethylthiazole for prolonged release medications. **J.Pharm.Sci.** 55: 90.
- Bain, J.C., Tan, S.B., Ganderton, D., and Solomon, M.C. 1991. Comparison of the in vitro release characteristics of a wax matrix and a hydrogel sustained release diclofenac sodium tablet. **Drug Dev.Ind.Pharm.** 17(2): 215-232.
- Bains, D., Boutell, S.L., and Newton, J.M. 1991. Influence of moisture content on the preparation of spherical granules of barium sulfate and microcrystalline cellulose. **Int.J.Pharm.** 69: 233-237.
- Banakar, U., and Speake, W. 1990. Fats and waxes in pharmaceuticals. **Manufacturing Chemist.** Aug: 33, 35, 37.
- Banakar, U., and Speake, W. 1990. Fats and waxes in pharmaceuticals. **Manufacturing Chemist.** Sep: 43, 45, 47.
- Banakar, U.V. In **Pharmaceutical Dissolution Testing.** 1991. pp. 133. New York: Marcel Dekker, Inc.
- Baret, L. and Remon, J.P. 1993. Influence of amount of granulation liquid on the drug release rate from pellets made by extrusion-spheronization. **Int.J.Pharm.** 95: 135-141.
- Baret, L., and Remon, J.P. 1993. Influence of amount of granulation liquid on the drug release rate from pellets made by extrusion-spheronization. **Int.J.Pharm.** 95: 135-141.
- Barett, L., Fanara, D., De Baets, P., and Remon, J.P. 1991. Instrumentation of a gravity feed extruder and the influence of the composition of binary and ternary mixtures on the extrusion forces. **J.Pharm.Pharmacol.** 43: 745-749.
- Bechgaard, H., and Nielsen, G.H. 1978. Controlled release multiple units and single unit doses. **Drug Dev.Ind.Pharm.** 4: 53-67.

- Benita, S., and Donbrow, M. 1981. Release kinetics of sparingly soluble drugs from ethyl cellulose-walled microcapsule: theophylline microcapsules. **J.Pharm.Pharmacol.** 34: 77-82.
- Bianchini, R., Bruni, R., Gazzaniga, A., and Vechio, C. 1992. Influence of extrusion/spheronization processing on the physical properties of d-indobufen pellets containing pH adjusters. **Drug Dev.Ind.Pharm.** 18(14): 1485-1503.
- Blanche, D., Sternagl, H., Podezeck, F., and Newton, J.M. 1995. Some factors influencing the formation and in vitro drug release from matrix pellet prepared by extrusion/spheronization. **Int.J.Pharm.** 119: 203-211.
- Bodmeier, R., Paeratakul, O., Chen, H., and Zhang, W. 1990. Formulation of sustained release wax matrices within hard gelatin capsules in fluidized bed. **Drug Dev.Ind.Pharm.** 16(9): 1505-1519.
- Capan, Y. 1989. Influence of technological factors on formulations of sustained release tablets. **Drug Dev. Ind.Pharm.** 15(6&7): 927-956.
- Celik, M., and Maganti, L., 1994. Formulation and compaction of microspheres. **Drug Dev.Ind.Pharm.** 20(20): 3151-3173.
- Chang, C.M., and Bodmeier, R. 1997. Effect of dissolution media and additives on the drug release from cubic phase delivery systems. **J.Controlled Release.** 46: 215-222.
- Chariot, M., Frances, J., Lewis, G.A., Mathien, D., Pham Tan Luu, R., and Stevens, H.N.E. 1987. A factorial approach to process variables of extrusion spheronization of wet powder masses. **Drug Dev.Ind.Pharm.** 13: 1639-1649.
- Ciftci, K., Capan, Y., Ozturk, O., and Hincal, A.A. 1990. Formulation and in vitro-in vivo evaluation of sustained release lithium carbonate tablets. **Pharm.Res.** 7: 359-363.
- Clarke, F.H., and Caloon, N.M. 1987. Ionization constant by curve fitting: Determination of partition and distribution coefficients of acids and bases and their ions. **J.Pharm.Sci.** 76(8): 611-619.

- Dakkuri, A., Schroeder, H.G., and Deluca, P.P. 1978. Sustained release from inert wax matrix II: Effect of surfactant on triplenammine hydrochloride release. **J.Pharm.Sci.** 67(3): 354-357.
- Dave, S.C., Chakrabarti, T., Srivastava, G.P. 1974. Sustained release tablet formulation of diphenhydramine hydrochloride (Benadryl)-part II. **Indian J.Pharm.** 36: 94-96.
- Draper, E.B., and Becker, C.H. 1966. Some wax formulation of sulfaethylthiazole produced by aqueous dispersion for prolonged release medication. **J.Pharm.Sci.** 55(4): 376-380.
- Dunn, J. 1987. Controlled release formulations of propranolol and verapamil. **J.Clin.Pharmacol.** 27: 22-31.
- Eccleston, G.M. 1992. Emulsions. In J.Swarbrick, J.C. Boylan (ed.), **Encyclopedia of Pharmaceutical Technology**, Vol 5., pp 137-188. New York: Marcel Dekker, Inc.
- Edimo, A., Leterme, P., Denis, J., Trnasnel, M., and Gayot, A.T. 1993. Capacity of lipophilic auxillary substances to give sphere by extrusion-spheronization. **Drug Dev.Ind.Pharm.** 19(7): 827-842.
- Elbers, J.A.C., Bakkenes, H.W., Fokkens, J.G. 1992. Effect of amount and composition of granulation liquid on mixing, extrusion and spheronization. **Drug Dev.Ind.Pharm.** 18: 501-517.
- Emori, H., Ishizaka, T., and Koishi, M. 1984. Effect of acrylic acid polymer and its arrangement on drug release for a wax matrix. **J.Pharm.Sci.** 73: 910-915.
- Evrard, B., and Delattre, L. 1996. In vitro evaluation of lipid matrices for the development of a sustained release sulfamethazine bolus for lambs. **Drug Dev.Ind.Pharm.** 22(2): 111-118.
- Fielden, K.E., Newton, J.M., and Rowe, R.C. 1993. The influence of moisture content on spheronization of extrudate processed by a ram extruder.
- Flanders, P., Dyer, G.A., and Jordan, D. 1987. The control of drug release from conventional melt granulation matrices. **Drug Dev.Ind.Pharm.** 13(6): 1001.

- Follonier, N., and Doellcer, E.T. 1994. Evaluation of hot melt extrusion as a new technique for the production of polymer-based pellets for SR capsule containing high loading of freely soluble drugs. **Drug Dev.Ind.Pharm.** 20: 1323-1339.
- Ford, J.L., Rubinstein, M.H. and Hogan, J.E. 1985b. Propranolol HCl and aminophylline release from matrix tablets containing hydroxypropylmethylcellulose. **Int.J.Pharm.** 24: 339-350.
- Gamlen, M.J. 1985. Pellet manufacture for controlled release. **Manuf.Chem.** 56: 55-59.
- Gattefosse SA. **Data sheet and technical literature: Precirol ATO5, Compritol 888ATO, Gelucire 50/02**, 1998.
- Ghali, E.S., Klinger, G.H., and Schwartz, J.B. 1989. Modified drug release from beads prepared with combinations of two grades of microcrystalline cellulose. **Drug Dev.Ind.Pharm.** 15(9): 1455-1473.
- Ghali, E.S., Klinger, G.H., and Schwartz, J.B. 1989. Thermal treatment of beads with wax for controlled release. **Drug Dev.Ind.Pharm.** 15: 1311-1328.
- Ghibre-Sellassie, I. 1989. Pellets: A general overview. In **Pharmaceutical Pelletization Technology**, pp. 1-13. New York: Marcel Dekker, Inc.
- Goodhart, F.W. 1989. Centrifugal equipment. In **Pharmaceutical Pelletization Technology**, pp. 101-122. New York: Marcel Dekker, Inc.
- Groves, M.J., and Galindez, F.E. 1976. The effect of environment condition on the release of brompheniramine from protein/wax tablets. **Acta.Pharm.Suecica.** 13: 373-384.
- Hamid, I.S., and Becker, C.H. 1970. Release study of sulfaethylthiadiazole from a tablet dosage form from spray-congealed formulation of SETD and wax. **J.Pharm.Sci.** 59(4): 511-514.
- Harris, M.R., and Ghebre, S.I. 1989. Formulations Variables. In I. Ghebre-Sellassie (ed.), **Pharmaceutical Pelletization Technology**, pp. 227. New York: Marcel Dekkar, Inc.

- Harris, M.R., and Ghebre-Sellassie, I. 1989. Formulation variables. In I. Ghebre-Sellassie (ed.), **Pharmaceutical Pelletization Technology**, pp. 217-239. New York: Marcel Dekkar, Inc.
- Harrison, P.J., Newton, J.M., and Rowe, R.C. 1985 b. The characterization of wet powder masses suitable for extrusion-spheronization. **J. Pharm. Pharmacol.** 37: 686-691.
- Harrison, P.J., Newton, J.M., and Rowe, R.C. 1985a. Flow defects in wet powder mass extrusion. **J.Pharm.Pharmacol.** 37: 81-83.
- Hasznos, L., Langer, I., and Gyarmathy, M. 1992. Some factors influencing pellet characteristic made by an extrusion spheronization process. Part I: Effects on size characteristic and moisture content decrease of pellets. **Drug Dev.Ind.Pharm.** 18: 409-437.
- Hellen, L., and Yliruusi, J. 1993. Process variables of instant granulator and spheronizer: III. Shape and Shape distributions of pellets. **Int.J.Pharm.** 96: 217-223.
- Higuchi, T. 1963. Mechanism of sustained action medication: Theoretical analysis of rate of release of solid drug dispersed in solid matrices. **J.Pharm.Sci.** 52(12): 1145-1149.
- Hileman, G.A., Goskonda, S.R., Spalitto, A.J., and Upadrashta, S.M. 1993. A factorial approach to high dose product development by an extrusion-spheronization process. **Drug Dev.Ind.Pharm.** 19: 483-491.
- Ishino, R., and Sunada, H. 1993. Influence of drug solubility and matrix structure on release rate of drugs from wax matrix tablets. **Chem.Pharm.Bull.** 41(1): 196-200.
- Jalal, I.M., Malinowski, H.J., and Smith, W.E. 1972. Tablet granulations composed of spherical-shaped particles. **J.Pharm.Sci.** 61: 1466-1468.
- John, P.M., and Becker, C.H. 1968. Surfactant effects on spray congealed formulation of sulfaethylthiadiazole-wax. **J.Pharm.Sci.** 57(4): 584-588.

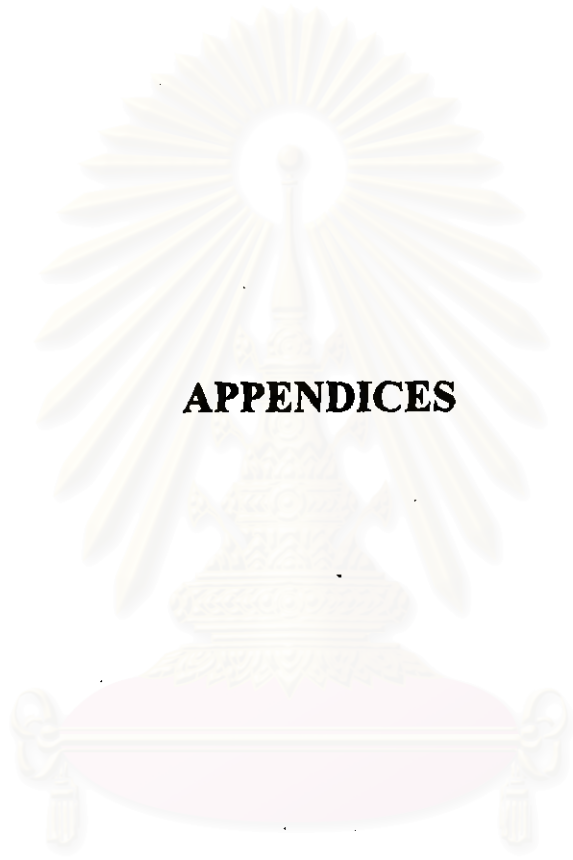
- Ku, CC., Joshi, Y.M., Bergum, J.S., and Jain, N.B. 1993. Bead manufacture by extrusion-spheronization: A statistical design for process optimization. **Drug Dev.Ind.Pharm.** 19: 1505-1519.
- Kumar, K., Chakrabarti, T., and Srivastava, G.P. 1975. Studies on the sustained release tablet formulation of the diethylcarbamazine citrate. **Indian J. Pharm.** 36: 94-96.
- Kumar, K., Chakrabarti, T., and Srivastava, G.P. 1975. Sustained release tablet formulation of diethylcarbamazine citrate (Hetrazan). **Indian J.Pharm.** 37: 57-59.
- Levy, G., and Gumtow, R.H. 1963. Effect of certain tablet formulation factors on dissolution rate of the active ingredient III Tablet lubricants. **J.Pharm.Sci.** 52: 1139-1144.
- Lloanusi, N.O., and Schwartz, J.B. 1998. The effect of wax on compaction of microcrystalline cellulose beads made by extrusion-spheronization. **Drug Dev.Ind.Pharm.** 24(1): 37-44.
- Lucy, S.C.W., Paul, W.S.H., and Celine, V.L. 1993. Spheronization conditions on spheroid shape and size. **Int.J.Pharm.** 96: 59-65.
- Lund, N., ed. 1994. **The pharmaceutical Codex** (12th ed). London: the pharmaceutical press. pp. 1025-1029.
- Maejima, T., Osawa, T., Nakajima, K., Kobayashi, M. 1997. Preparation of spherical beads without any use of solvents by a novel tumbling melt granulation (TMG) method. **Chem.Pharm.Bull.** 45(3): 518-524.
- McGinity, J.W., Cameron, C.G., and Cuff, G.W. 1983. Controlled release theophylline tablet formulations containing acrylic resin. I. Dissolution properties of tablets. **Drug Dev.Ind.Pharm.** 9(1&2): 57-68.
- Mctaggart, C.M., Ganley, J.A., Sickmueller, A., and Walker, S.E. 1984. The evaluation of formulation and processing conditions of a melt granulation process. **Int.J.Pharm.** 19: 139-148.
- Medical Economics, **Physicians' Desk Reference (PDR)** (50th eds.). Montrale, New Jersey, USA.

- Merkus, F.W.H.M., 1986. Controlled and rate controlled drug delivery; principle characteristics, possibilities, and limitations. In H.A.J. Struyker-Boudier (ed.), **Rate Controlled Drug Administration and Action**. pp. 15-47. Florida: CRC Press, Boca Raton.
- Mesiha, M.S., and Valles, J. 1993. A screening study of lubricants in wet powder masses suitable for extrusion-spheronization. **Drug Dev.Ind.Pharm.** 19(8): 943-959.
- Miyagawa, Y., Okabe, T., Yamaguchi, Y., Miyajima, M., Sato, H., and Sunada, H. 1996. Controlled-release of diclofenac sodium from wax matrix granule. **Int.J.Pharm.** 138: 215-224.
- Montousse, C., Pruvost, M., Rodriguez, F., and Brossard, C. 1999. Extrusion-spheronization manufacture of Gelucire® matrix beads. **Drug Dev.Ind.Pharm.** 25(1): 75-80.
- Nace, G.S., and Wood, A.J.J. 1987. Pharmacokinetics of long acting propranolol implications for therapeutic use. **Clinical Pharmacokinetics.** 13: 51-64.
- O'Conner, R.E., and Schwartz, J.B. 1985. Spheronization II: Drug release from drug diluent mixtures. **Drug Dev.Ind.Pharm.** 11(9,10): 1837-1857.
- Otsuka, M., Gao, J., and Matsuda, Y. 1994. Effect of amount of a added water during extrusion-spheronization process on pharmaceutical properties of granules. **Drug Dev.Ind.Pharm.** 20: 2977-2992.
- Parab, P.V., Oh, C.K., and Ritschel, W.A. 1986. Sustained release from precirol (glyceryl palmitostearate) matrix: effects of mannitol and hydroxypropylmethylcellulose on the release of theophylline. **Drug Dev.Ind.Pharm.** 12: 1309-1327.
- Parab, P.V., Oh, C.K., and Ritschel, W.A. 1987. Release of theophylline from ethylcellulose microcapsule alone and in conjunction with fat ebeded (precirol) granules and HPMC. **Drug Dev.Ind.Pharm.** 13(8): 449-472.
- Peh, K.K., and Yuen, K.H. 1995. Development and in-vitro evaluation of a novel multiparticulate matrix controlled release formulation of Theophylline. **Drug Dev.Ind.Pharm.** 21(13): 1545-1555.

- Podezeck, F., and Newton, J.M. 1994. A shape factor to characterize the quality of spheroids. **J.Pharm.Pharmacol.** 46: 82-85.
- Ramaro, C., and Bhagwan, D.R. 1998. Physical characterization of HPMC and HEC and investigation of their use as pelletization aids. **Int.J.Pharm.** 161: 179-193.
- Rekhi, G.S., Mendes, R.W., Porter, S.C., and Jambhekar, S.S. 1989. Aqueous polymeric dispersions for controlled drug delivery wurster process. **Pharm.Tech.** (3): 112, 114, 116, 118, 120, 122, 124, 126.
- Robinson, I.C., and Becker, C.H. 1968. SETD release for synthetic wax prolong release particles I. **J.Pharm.Sci.** 57(1): 49-53.
- Robinson, J.R., and Erikson, S.P. 1966. Theoretical formulation of sustained release dosage forms. **J.Pharm.Sci.** 55: 1254.
- Rowe, R.C. 1985. Spheronization: a novel pill making process?. **Pharm.Int.** 6: 119-123.
- Saraiya, D., and Bolton, S. 1990. The use of precirol to prepare sustained release tablets of theophylline and quinidine gluconate. **Drug Dev.Ind.Pharm.** 16: 1963-1969.
- Schaefer, T., and Mathiesen, C. 1996. Melt pelletization in a high shear mixer. IX effects of binder particle size. **Int.J.Pharm.** 139: 139-148.
- Schaefer, T., and Mathiesen, C. 1996. Melt pelletization in a high shear mixer. VIII effects of binder viscosity. **Int.J.Pharm.** 139: 125-138.
- Schaefer, T., and Mathiesen, C. 1996. Melt pelletization in a high shear mixer. VII effects of product temperature. **Int.J.Pharm.** 134: 105-117.
- Schaefer, T., Holm, P., and Kristensen, H.G. 1990. Melt granulation in a laboratory scale high shear mixer. **Drug Dev.Ind.Pharm.** 16(8): 1249-1277.
- Schaefer, T., Taagegaard, B., Thomsen, L.J., and Kristensen, G. 1993. Melt pelletization in a high shear mixer. V. effects of apparatus variables. **Eur J.Pharm.Sci.** 1: 133-141.

- Schaefer, T., Taagegaard, B., Thomsen, L.J., and Kristensen, H.G. 1993. Melt pelletization in a high shear mixer. IV. Effects of process variables in a laboratory scale mixer. **Eur.J.Pharm.Sci.** 1: 125-131.
- Schwartz, J.B., Njuyen, N.H., and Schmaare, R.L. 1994. Compaction studies on beads: compression and consolidation parameters. **Drug Dev.Ind.Pharm.** 20: 3105-3129.
- Schwartz, J.B., Simonelli, A.P., and Higuchi, W.I. 1968. Drug release from wax matrices I: Analysis of data with first order kinetic and with the diffusion controlled model. **J.Pharm.Sci.** 57(2): 274-277.
- Schwartz, J.B., Simonelli, A.P., and Higuchi, W.I. 1968. Drug release from wax matrices II: Application of a mixture Theory to the sulfanilamide-wax system. **J.Pharm.Sci.** 57(2): 278-282.
- Shaikh, N.H., De Yanes, S.E., Shukla, A.J., Block, L.H., Collins, C.C., and Price, T.C. 1991. Effect of different binders on release characteristics of theophylline from compressed microspheres. **Drug Dev.Ind.Pharm.** 17: 793-804.
- Shanawany, S.E. 1993. Sustained release of nitrofurantoin from inert wax matrixes. **J.Controlled Release.** 26: 11-19.
- Sutananta, W., Craig, D.Q.M., and Newton, J.M. 1995. An evaluation of the mechanisms of drug release from glyceride bases. **J.Pharm.Pharmacol.** 47: 182-187.
- Sutananta, W., Craig, D.Q.M., and Newton, J.M. 1995. An evaluation of the mechanisms of drug release from glyceride bases. **J.Pharm.Pharmacol.** 47: 182-187.
- The United States Pharmaceutical Convention. 1995. **The United States Pharmacopoeia (USP) (23rd rev.ed.)**. Massachusetts: n.p.
- Theeuwes, F., Wong, P.S.L., and Yum, S.II. 1991. Drug delivery and therapeutic systems. In J. Swarbrick, and J.C. Boylan. **Encyclopedia of Pharmaceutical Technology**. (Vol.4). pp. 303-348. New York: Academic Press.

- Thomsen, J.L., Schaefer, T., and Kristensen, H.G. 1994. Prolonged release matrix pellets prepared by melt pelletization II. Hydrophobic substances as meltable binders. **Drug Dev.Ind.Pharm.** 20(7): 1179-1197.
- Thomsen, L.J., Schaefer, T., Sonnergaard, J.M., and Kristensen, H.G. 1993. Prolonged release matrix pellets prepared by melt pelletization. I. process variables. **Drug Dev.Ind.Pharm.** 19(5): 1867-1887.
- Vervaeck, C., Baert, L., and Remon, J.P. 1995. Extrusion-spheronization: a literature review. **Int.J.Pharm.** 116: 131-146.
- Vonk, P., Guillaume, C.P.F., Ramaker, J.S., Vromans, H., and Kossen, N.W.F. 1997. Growth mechanisms of high shear pelletization. **Int.J.Pharm.** 157: 93-102.
- Wade, A., and Weller, P.J. 1994. **Handbook of pharmaceutical excipients**, 2nd ed. London: The pharmaceutical press.
- Wadke, D.A., Serajuddin, Ab.T.M., and Jacobson, J. 1989. Preformulation testing. In H.A. Liebermann, L. Lachman, and J.B. Schwartz **Pharmaceutical Dosage Forms: Tablets**. (vol. 1, 2nd ed.), New York: Marcel Dekkar pp. 1-73.
- Wan, L.S.C., Heng, P.W.S., and Liew, C.V. 1993. Spheronization conditions on spheroid shape and size. **Int.J.Pharm.** 96: 59-65.
- Wang, P.Y. 1989. Lipids as excipients in sustained release insulin implants **Int.J.Pharm.** 54: 223-230.
- Watanabe, Y., Kogoshi, T., Amagai, Y., and Matsumoto, M. 1990. Preparation and evaluation of enteric granules of aspirin prepared by acylglycerols. **Int.J.Pharm.** 64: 147-154.
- Wiseman, E.H., and Federici, N.J. 1968. Development of sustained release aspirin tablet. **J.Pharm.Sci.** 57(9): 1535-1539.
- Zhou, F., Vervaeck, C., Schelkens, M., Lefebvre, R., and Remon, J.P. 1998. Bioavailability of ibuprofen from matrix pellets based on the combination of waxes and starch derivatives. **Int.J.Pharm.** 168: 79-84.



APPENDICES

สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

Appendix A

Calibration Curve

The concentration versus absorbance tables of propranolol HCl in methanol at 290 nm., HCl acid pH 1.2 at 289 nm., and in phosphate buffer pH 6.8 at 289 nm are presented in Tables 27-29, and the standard curves of propranolol HCl in these mediums are illustrated in Figures 106-108, respectively.

Table 27 Absorbance of propranolol HCl in methanol at 290 nm.

Concentration (mcg/ml)	Absorbance
0	0.0000
12	0.2523
18	0.3767
24	0.4990
30	0.6263
36	0.7480
42	0.8697

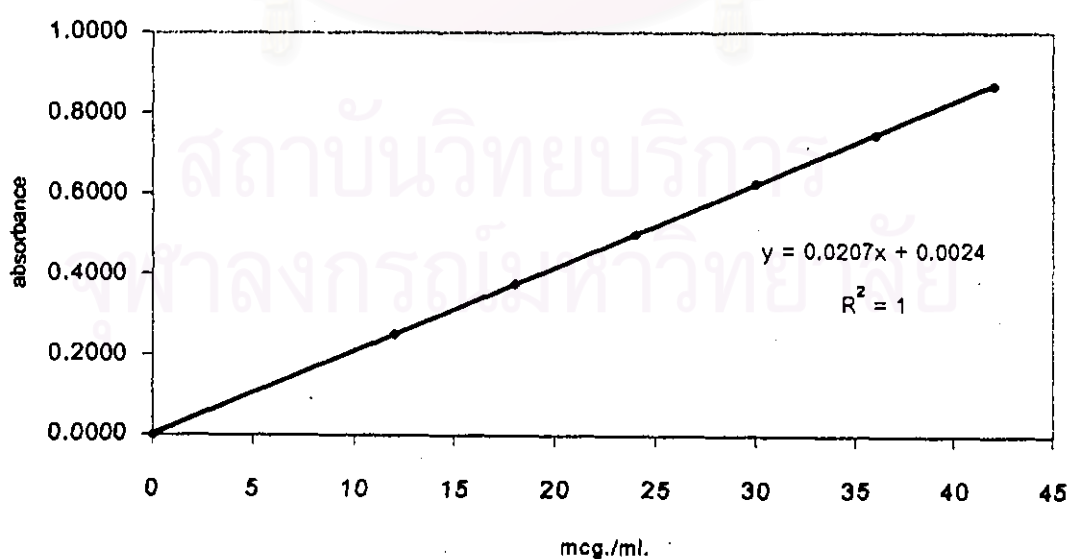


Figure 106 Calibration curve of propranolol HCl in methanol at 290 nm.

Table 28 Absorbance of propranolol HCl in HCl acid pH 1.2 at 289 nm.

Concentration (mcg/ml)	Absorbance
0	0.000
12	0.2347
18	0.3520
24	0.4663
30	0.5807
36	0.6987
42	0.8130

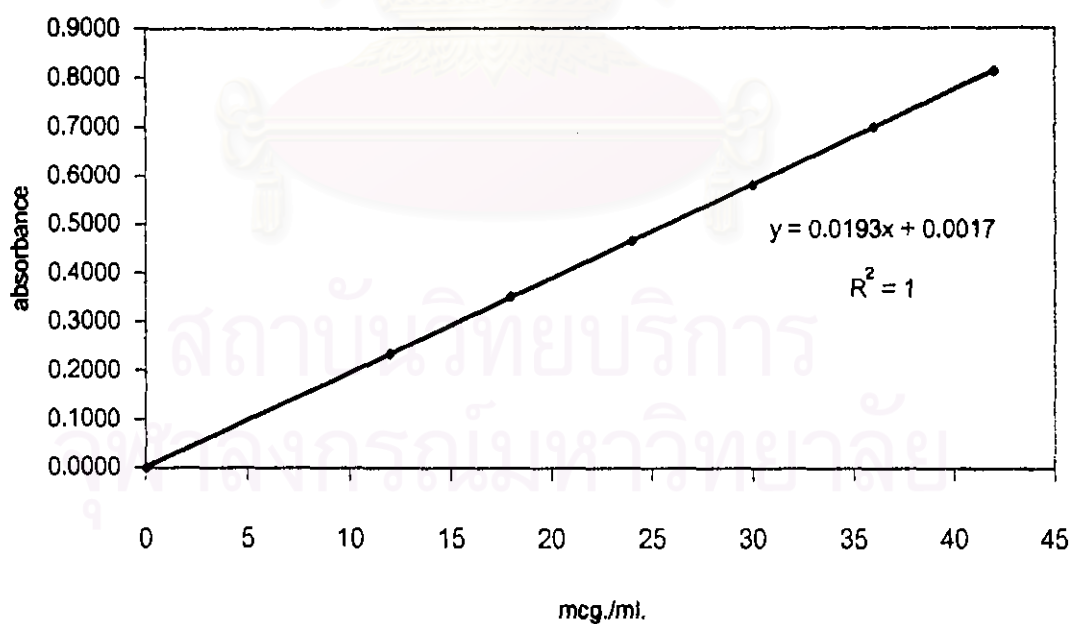


Figure 107 Calibration curve of propranolol HCl in HCl acid pH 1.2 at 289 nm.

Table 29 Absorbance of propranolol HCl in phosphate buffer pH 6.8 at 289 nm.

Concentration (mcg/ml)	Absorbance
0	0.0000
12	0.2360
18	0.3543
24	0.4697
30	0.5897
36	0.7030
42	0.8170

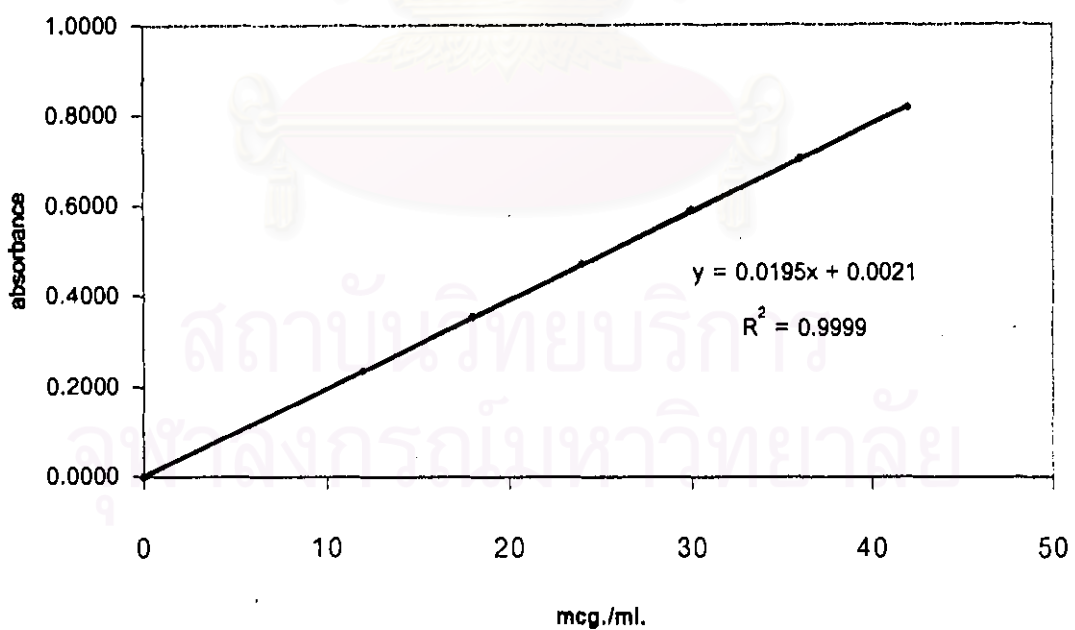


Figure 108 Calibration curve of propranolol HCl in phosphate buffer pH 6.8 at 289 nm.

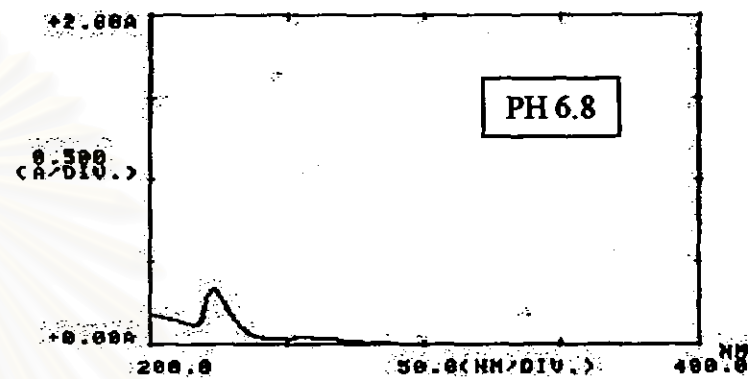
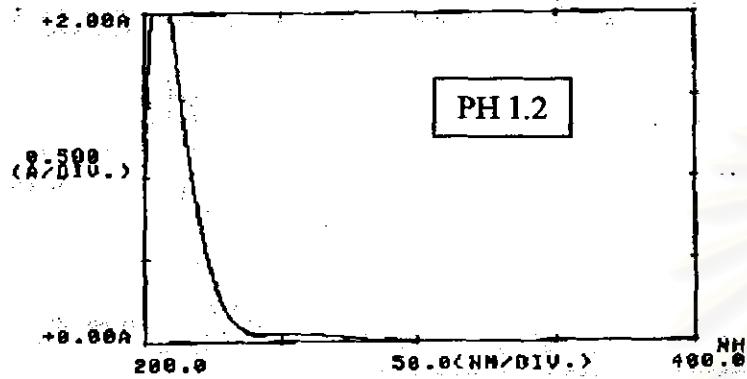


Figure 109 Absorbance scanning of beeswax blank pellet in 0.1 N HCl pH 1.2 and phosphate buffer pH 6.8.

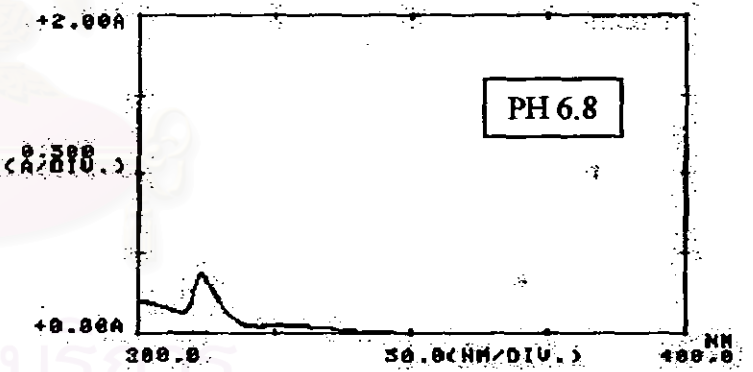
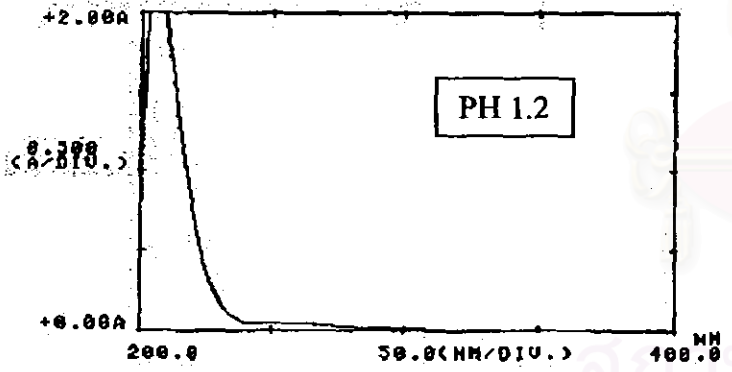


Figure 110 Absorbance scanning of carnauba wax blank pellet in 0.1 N HCl pH 1.2 and phosphate buffer pH 6.8.

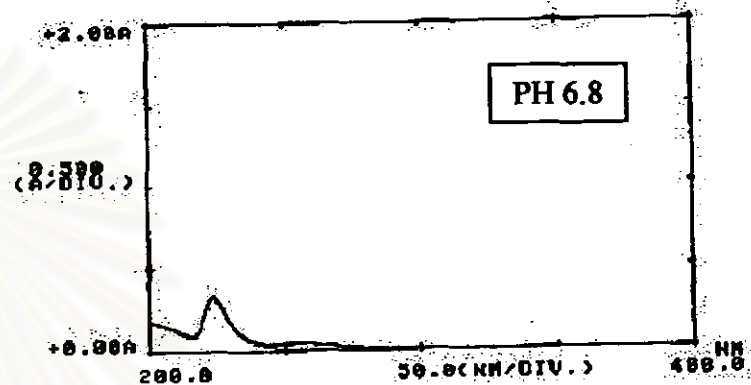
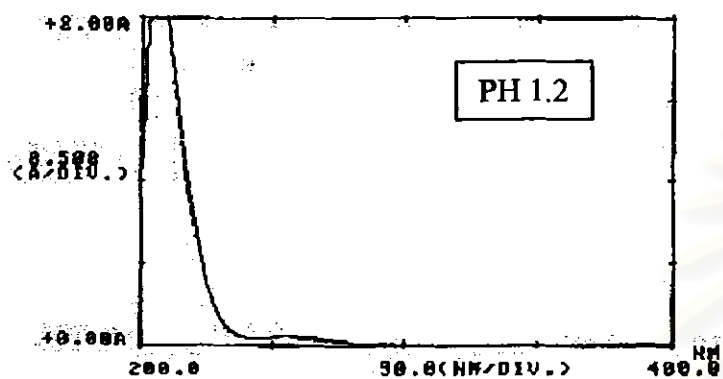


Figure 111 Absorbance scanning of glyceryl monostearate blank pellet in 0.1 N HCl pH 1.2 and phosphate buffer pH 6.8.

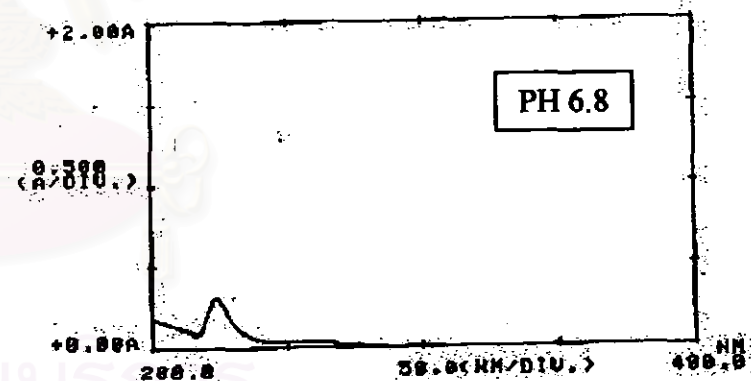
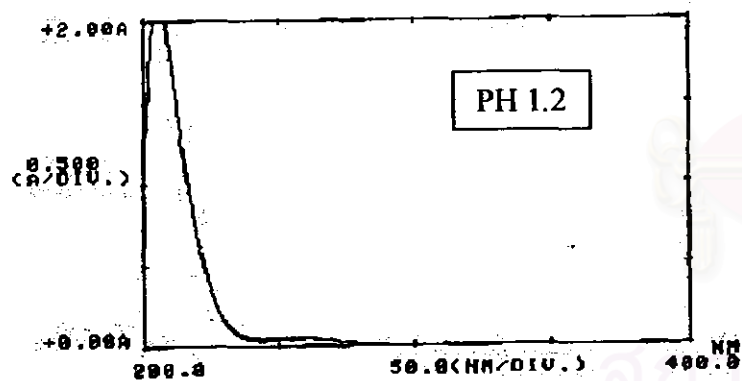


Figure 112 Absorbance scanning of Lubritab® blank pellet in 0.1 N HCl pH 1.2 and phosphate buffer pH 6.8.

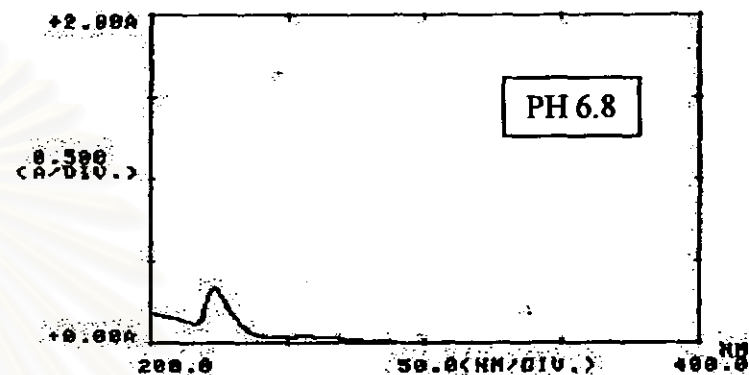
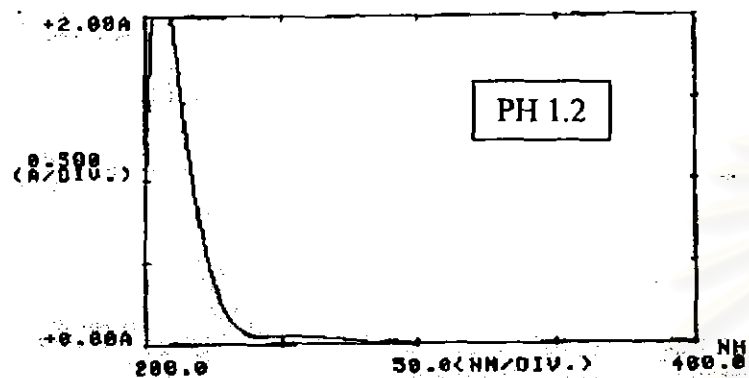


Figure 113 Absorbance scanning of Compritol @ blank pellet in 0.1 N HCl pH 1.2 and phosphate buffer pH 6.8.

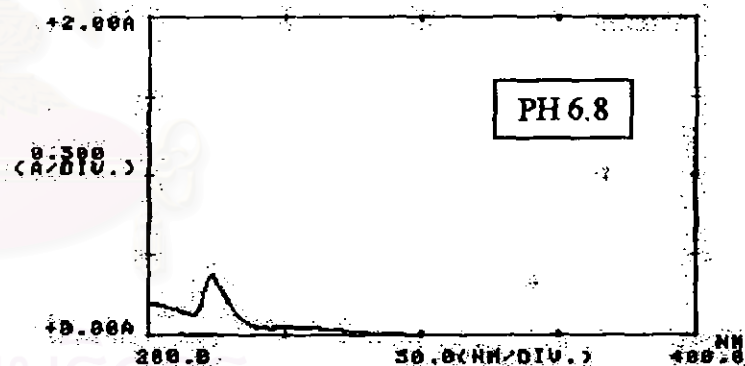
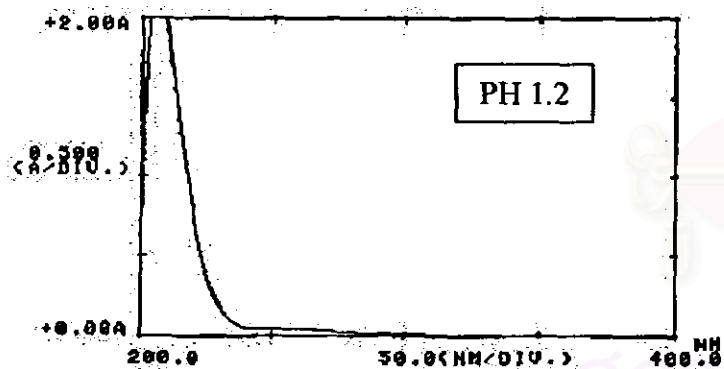


Figure 114 Absorbance scanning of Precirol @ blank pellet in 0.1 N HCl pH 1.2 and phosphate buffer pH 6.8.



Figure 115 Absorbance scanning of Gelucire® blank pellet in 0.1 N HCl pH 1.2 and phosphate buffer pH 6.8.

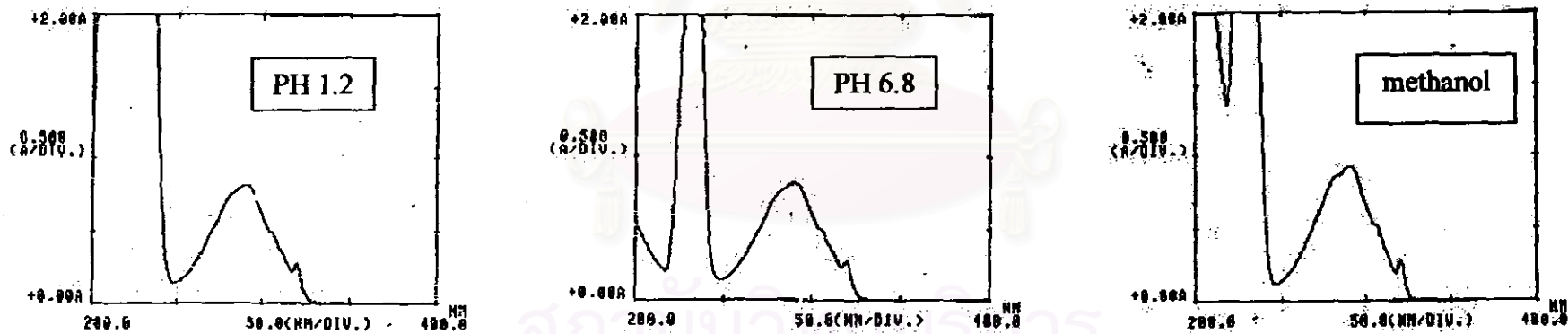


Figure 116 Absorbance scanning of propranolol HCl in 0.1 N HCl pH 1.2, phosphate buffer pH 6.8 and methanol.

Appendix B

Percentage of drug releases

Table 30 Percentage amount of propranolol HCl release from reference capsules, reference tablets, and commercial product (Inderal®)

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	97.61	0.22	0.38	90.82	0.19	0.96
	0.50	0.71	99.28	0.34	-0.14	98.76	0.23	0.09
	0.75	0.87	99.43	0.33	-0.24	97.10	0.28	0.46
	1.00	1.00	98.70	0.38	0.11	97.54	0.51	0.39
	1.50	1.22	97.24	0.65	0.44	97.47	1.03	0.40
	2.00	1.41	96.94	0.13	0.49	97.44	1.10	0.41
	3.00	1.73	96.65	0.49	0.52	97.24	0.76	0.44
	4.00	2.00	96.44	0.81	0.55	97.12	0.75	0.46
	5.00	2.24	96.32	0.23	0.57	97.00	1.36	0.48
6.00	2.45	96.23	0.42	0.58	96.45	0.59	0.55	
propranolol HCl 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	92.23	0.46	0.89	89.25	1.23	1.03
	0.50	0.71	96.51	0.23	0.54	93.58	0.61	0.81
	0.75	0.87	99.94	1.20	-1.22	96.12	0.53	0.59
	1.00	1.00	99.48	0.89	-0.28	99.66	0.52	-0.47
	1.50	1.22	99.02	0.78	-0.01	99.32	0.68	-0.17
	2.00	1.41	98.85	0.65	0.06	99.15	0.67	-0.07
	3.00	1.73	98.49	0.49	0.18	99.02	0.49	-0.01
	4.00	2.00	97.64	0.86	0.37	98.45	0.95	0.19
	5.00	2.24	97.23	0.23	0.44	98.10	0.56	0.28
6.00	2.45	97.12	0.67	0.46	97.79	1.02	0.34	
Inderal 160 mg.	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	1.42	0.23	1.99	0.50	0.10	2.00
	0.50	0.71	3.10	0.62	1.99	1.65	0.22	1.99
	0.75	0.87	5.35	0.94	1.98	3.89	0.48	1.98
	1.00	1.00	7.77	1.21	1.96	6.60	0.51	1.97
	1.50	1.22	12.57	1.66	1.94	12.14	0.68	1.94
	2.00	1.41	16.93	2.06	1.92	17.40	0.88	1.92
	3.00	1.73	24.71	2.60	1.88	27.07	1.21	1.86
	4.00	2.00	31.41	2.73	1.84	35.38	1.27	1.81
	5.00	2.24	37.98	3.47	1.79	42.74	1.27	1.76
	6.00	2.45	43.61	3.73	1.75	48.64	1.35	1.71
	8.00	2.83	52.92	3.47	1.67	58.11	1.98	1.62
	10.00	3.16	60.45	3.37	1.60	65.90	1.28	1.53
12.00	3.46	66.80	3.01	1.52	71.70	0.93	1.45	

Table 31 Percentage amount of propranolol HCl matrix pellet release from series of beeswax.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % beeswax 20 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	46.81	0.98	1.73	37.51	5.99	1.80
	0.50	0.71	85.72	0.84	1.15	77.95	2.91	1.34
	0.75	0.87	96.69	0.40	0.52	93.09	1.32	0.84
	1.00	1.00	98.09	1.32	0.28	97.00	0.90	0.48
	1.50	1.22	98.72	1.47	0.11	97.96	0.98	0.31
	2.00	1.41	99.00	1.57	0.00	97.85	0.71	0.33
	3.00	1.73	101.26	1.62	0.00	97.59	1.09	0.38
	4.00	2.00	99.32	2.18	-0.16	97.75	1.64	0.35
	5.00	2.24	100.10	1.47	0.00	98.96	1.44	0.02
6.00	2.45	99.46	1.37	-0.27	97.82	1.23	0.34	
propranolol HCl 40 % beeswax 30 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	33.62	3.67	1.82	24.76	11.82	1.88
	0.50	0.71	71.15	2.46	1.46	55.50	4.95	1.65
	0.75	0.87	90.59	1.16	0.97	80.94	3.20	1.28
	1.00	1.00	97.11	1.42	0.46	91.11	2.16	0.95
	1.50	1.22	100.30	0.84	0.00	95.42	1.91	0.66
	2.00	1.41	100.89	0.97	0.00	96.84	0.94	0.50
	3.00	1.73	101.58	1.40	0.00	97.73	1.79	0.36
	4.00	2.00	102.79	1.29	0.00	98.86	2.12	0.06
	5.00	2.24	101.20	0.54	0.00	99.02	1.68	-0.01
6.00	2.45	99.25	0.86	-0.13	98.62	1.25	0.14	
propranolol HCl 40 % beeswax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	30.78	6.49	1.84	22.03	8.57	1.89
	0.50	0.71	62.79	7.81	1.57	51.01	10.58	1.69
	0.75	0.87	79.72	6.61	1.31	71.21	9.82	1.46
	1.00	1.00	88.69	5.22	1.05	83.16	7.78	1.23
	1.50	1.22	94.31	3.97	0.76	91.68	5.02	0.92
	2.00	1.41	96.35	2.68	0.56	94.45	3.19	0.74
	3.00	1.73	100.09	2.01	0.00	96.71	3.08	0.52
	4.00	2.00	100.90	1.32	0.00	98.12	1.45	0.27
	5.00	2.24	100.16	2.01	0.00	98.91	2.72	0.04
6.00	2.45	99.78	1.92	-0.66	98.41	2.17	0.20	
propranolol HCl 40 % beeswax 50 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	31.21	0.65	1.84	52.33	5.64	1.68
	0.50	0.71	61.81	0.74	1.58	75.61	4.24	1.39
	0.75	0.87	79.56	0.83	1.31	86.28	3.46	1.14
	1.00	1.00	88.52	0.89	1.06	92.28	3.62	0.89
	1.50	1.22	95.50	1.04	0.65	97.28	2.74	0.43
	2.00	1.41	98.37	1.09	0.21	99.38	2.19	-0.21
	3.00	1.73	100.87	1.38	0.00	103.57	2.43	0.00
	4.00	2.00	102.37	1.43	0.00	103.02	2.72	0.00
	5.00	2.24	99.78	1.23	-0.66	99.87	1.71	-0.89
6.00	2.45	99.65	1.19	-0.46	99.55	2.83	-0.34	

Table 32 Percentage amount of propranolol HCl matrix pellet release from series of carnauba wax.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % carnauba wax 20 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	90.90	0.99	0.96	86.69	3.52	1.12
	0.50	0.71	100.73	0.56	0.00	98.81	0.53	0.07
	0.75	0.87	101.49	0.49	0.00	100.91	0.76	0.00
	1.00	1.00	102.36	0.13	0.00	101.67	0.07	0.00
	1.50	1.22	102.39	1.70	0.00	101.42	1.40	0.00
	2.00	1.41	101.30	1.26	0.00	101.15	2.27	0.00
	3.00	1.73	103.39	1.18	0.00	102.36	0.77	0.00
	4.00	2.00	101.23	1.14	0.00	101.15	0.65	0.00
	5.00	2.24	100.09	1.26	0.00	100.25	0.49	0.00
6.00	2.45	99.89	1.19	-0.97	99.86	0.48	-0.87	
propranolol HCl 40 % carnauba wax 30 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	81.07	1.10	1.28	73.83	0.72	1.42
	0.50	0.71	97.42	0.09	0.41	91.72	0.71	0.92
	0.75	0.87	101.25	0.53	0.00	97.20	0.76	0.45
	1.00	1.00	101.48	0.58	0.00	98.31	0.85	0.23
	1.50	1.22	101.27	0.29	0.00	99.95	0.72	-1.26
	2.00	1.41	101.52	0.26	0.00	101.16	0.17	0.00
	3.00	1.73	102.06	0.78	0.00	101.46	0.56	0.00
	4.00	2.00	101.23	0.77	0.00	99.99	0.71	-1.89
	5.00	2.24	100.47	0.63	0.00	99.46	0.23	-0.27
6.00	2.45	98.67	0.53	0.12	98.63	0.17	0.14	
propranolol HCl 40 % carnauba wax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	82.98	0.74	1.23	71.66	2.55	1.45
	0.50	0.71	98.09	0.68	0.28	89.39	1.14	1.03
	0.75	0.87	101.98	0.49	0.00	96.29	1.43	0.57
	1.00	1.00	103.82	0.44	0.00	100.42	0.91	0.00
	1.50	1.22	104.50	0.62	0.00	102.13	0.83	0.00
	2.00	1.41	104.94	0.28	0.00	102.59	1.06	0.00
	3.00	1.73	103.14	1.79	0.00	103.58	0.13	0.00
	4.00	2.00	102.65	0.24	0.00	101.76	1.79	0.00
	5.00	2.24	101.72	0.65	0.00	100.26	1.65	0.00
6.00	2.45	100.69	0.17	0.00	99.73	1.13	-0.58	
propranolol HCl 40 % carnauba wax 50 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	53.58	1.08	1.67	48.24	0.18	1.71
	0.50	0.71	72.36	0.41	1.44	64.81	0.94	1.55
	0.75	0.87	84.84	0.30	1.18	76.17	0.58	1.38
	1.00	1.00	91.69	0.27	0.92	83.41	0.85	1.22
	1.50	1.22	97.68	0.19	0.37	90.52	0.74	0.98
	2.00	1.41	100.03	0.60	0.00	94.82	0.18	0.71
	3.00	1.73	99.93	1.97	-1.17	97.32	0.56	0.43
	4.00	2.00	101.13	0.35	0.00	99.26	1.00	-0.13
	5.00	2.24	100.49	0.68	0.00	99.87	1.25	-0.89
6.00	2.45	99.49	0.33	-0.29	99.46	0.98	-0.27	

Table 33 Percentage amount of propranolol HCl matrix pellet release from series of glyceryl monostearate.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % GMS 20 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	59.43	0.72	1.61	58.25	0.28	1.62
	0.50	0.71	87.70	0.59	1.09	85.25	0.24	1.17
	0.75	0.87	101.12	1.35	0.00	98.12	1.35	0.27
	1.00	1.00	101.88	0.91	0.00	99.68	1.99	-0.49
	1.50	1.22	102.45	1.48	0.00	101.86	0.87	0.00
	2.00	1.41	100.98	2.74	0.00	99.97	2.38	-1.51
	3.00	1.73	102.24	1.67	0.00	100.93	1.73	0.00
	4.00	2.00	101.48	1.26	0.00	100.47	1.24	0.00
	5.00	2.24	100.01	1.37	0.00	100.12	1.17	0.00
6.00	2.45	99.98	1.46	-1.74	99.99	0.24	-1.89	
propranolol HCl 40 % GMS 30 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	56.22	0.45	1.64	54.29	1.78	1.66
	0.50	0.71	83.70	0.88	1.21	80.15	1.54	1.30
	0.75	0.87	97.08	0.71	0.47	91.18	0.51	0.95
	1.00	1.00	102.12	0.49	0.00	96.89	0.15	0.49
	1.50	1.22	102.11	2.83	0.00	102.17	0.49	0.00
	2.00	1.41	104.07	1.25	0.00	102.83	1.05	0.00
	3.00	1.73	104.50	2.00	0.00	104.31	0.24	0.00
	4.00	2.00	102.26	1.90	0.00	98.76	0.45	0.09
	5.00	2.24	101.22	1.35	0.00	99.35	0.32	-0.19
6.00	2.45	98.67	0.88	0.12	99.41	0.79	-0.23	
propranolol HCl 40 % GMS 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	57.58	0.53	1.63	54.83	1.87	1.65
	0.50	0.71	78.18	0.90	1.34	72.24	0.89	1.44
	0.75	0.87	94.15	0.86	0.77	84.16	0.82	1.20
	1.00	1.00	101.87	0.35	0.00	91.10	1.27	0.95
	1.50	1.22	105.83	0.25	0.00	97.62	1.01	0.38
	2.00	1.41	106.48	0.19	0.00	101.22	0.99	0.00
	3.00	1.73	104.99	1.23	0.00	101.67	0.57	0.00
	4.00	2.00	102.16	1.21	0.00	100.57	0.43	0.00
	5.00	2.24	101.27	0.88	0.00	100.11	0.66	0.00
6.00	2.45	100.68	0.92	0.00	99.87	1.13	-0.87	
propranolol HCl 40 % GMS 50 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	31.64	1.13	1.83	37.74	1.68	1.79
	0.50	0.71	50.46	1.08	1.69	55.43	0.06	1.65
	0.75	0.87	65.70	1.10	1.54	68.64	0.99	1.50
	1.00	1.00	78.25	0.39	1.34	75.88	1.14	1.38
	1.50	1.22	94.41	2.11	0.75	87.84	0.73	1.09
	2.00	1.41	102.61	0.83	0.00	91.27	1.37	0.94
	3.00	1.73	105.36	0.69	0.00	98.26	1.34	0.24
	4.00	2.00	106.04	0.98	0.00	100.36	1.24	0.00
	5.00	2.24	104.22	0.85	0.00	99.77	1.25	-0.63
6.00	2.45	103.65	0.89	0.00	99.46	0.85	-0.27	

Table 34 Percentage amount of propranolol HCl matrix pellet release from series of Lubritab®.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % lubritab 20 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	69.93	4.48	1.48	71.62	2.27	1.45
	0.50	0.71	94.90	1.14	0.71	93.21	3.93	0.83
	0.75	0.87	98.23	0.59	0.25	97.27	4.85	0.44
	1.00	1.00	98.42	1.08	0.20	98.42	5.19	0.20
	1.50	1.22	99.15	1.12	-0.07	98.18	4.95	0.26
	2.00	1.41	99.43	1.43	-0.24	98.61	4.88	0.14
	3.00	1.73	100.48	1.59	0.00	98.83	4.83	0.07
	4.00	2.00	99.88	1.00	-0.91	99.04	4.95	-0.02
	5.00	2.24	99.84	1.24	-0.80	99.00	3.64	0.00
6.00	2.45	99.26	1.65	-0.13	98.90	2.25	0.04	
propranolol HCl 40 % lubritab 30 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	67.08	3.07	1.52	63.20	5.30	1.57
	0.50	0.71	94.08	0.52	0.77	89.05	2.04	1.04
	0.75	0.87	98.70	1.05	0.11	96.19	1.27	0.58
	1.00	1.00	99.24	1.16	-0.12	97.68	0.77	0.37
	1.50	1.22	99.49	0.50	-0.29	99.02	1.35	-0.01
	2.00	1.41	99.73	1.28	-0.57	99.16	0.83	-0.08
	3.00	1.73	100.34	0.47	0.00	97.47	0.56	0.40
	4.00	2.00	99.85	0.65	-0.81	98.62	0.24	0.14
	5.00	2.24	99.00	0.49	0.00	98.47	0.13	0.18
6.00	2.45	98.88	0.52	0.05	98.35	0.26	0.22	
propranolol HCl 40 % lubritab 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	63.05	2.61	1.57	59.89	3.50	1.60
	0.50	0.71	91.24	1.07	0.94	86.46	2.03	1.13
	0.75	0.87	98.93	0.84	0.03	95.41	2.26	0.66
	1.00	1.00	100.64	0.88	0.00	99.87	5.59	-0.88
	1.50	1.22	99.16	2.26	-0.08	98.01	5.05	0.30
	2.00	1.41	101.14	0.44	0.00	98.67	3.52	0.12
	3.00	1.73	101.34	0.83	0.00	96.11	4.89	0.59
	4.00	2.00	100.78	0.78	0.00	98.54	2.26	0.16
	5.00	2.24	99.90	0.75	-1.00	98.42	1.47	0.20
6.00	2.45	99.77	0.54	-0.63	98.33	1.82	0.22	
propranolol HCl 40 % lubritab 50 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	33.64	7.70	1.82	38.97	3.44	1.79
	0.50	0.71	62.65	5.53	1.57	60.67	3.17	1.59
	0.75	0.87	78.71	3.77	1.33	72.51	2.63	1.44
	1.00	1.00	87.66	3.27	1.09	81.00	2.91	1.28
	1.50	1.22	96.27	2.38	0.57	88.13	1.77	1.07
	2.00	1.41	100.27	2.33	0.00	92.50	1.59	0.88
	3.00	1.73	102.36	1.99	0.00	97.09	1.65	0.46
	4.00	2.00	103.10	1.38	0.00	98.79	1.96	0.08
	5.00	2.24	101.22	1.32	0.00	98.65	1.78	0.13
6.00	2.45	100.24	1.23	0.00	98.72	1.26	0.11	

Table 35 Percentage amount of propranolol HCl matrix pellet release from series of Compritol®.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % compritol 20 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	25.68	6.21	1.87	19.49	5.99	1.91
	0.50	0.71	60.14	9.33	1.60	55.52	2.91	1.65
	0.75	0.87	83.63	6.20	1.21	80.01	1.32	1.30
	1.00	1.00	95.12	3.53	0.69	91.62	0.90	0.92
	1.50	1.22	102.45	1.45	0.00	99.31	0.98	-0.16
	2.00	1.41	104.14	0.23	0.00	101.06	0.71	0.00
	3.00	1.73	104.43	1.59	0.00	101.80	1.09	0.00
	4.00	2.00	105.53	0.50	0.00	102.93	1.64	0.00
	5.00	2.24	102.18	0.86	0.00	101.75	1.44	0.00
6.00	2.45	100.92	0.92	0.00	100.65	1.23	0.00	
propranolol HCl 40 % compritol 30 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	28.30	1.76	1.86	31.71	5.54	1.83
	0.50	0.71	58.38	2.44	1.62	58.44	4.46	1.62
	0.75	0.87	78.23	1.83	1.34	76.60	3.00	1.37
	1.00	1.00	89.17	1.67	1.03	86.59	1.29	1.13
	1.50	1.22	100.76	1.53	0.00	96.58	0.54	0.53
	2.00	1.41	104.46	0.70	0.00	100.75	0.54	0.00
	3.00	1.73	105.19	0.92	0.00	102.69	1.20	0.00
	4.00	2.00	106.89	2.25	0.00	103.54	0.62	0.00
	5.00	2.24	103.22	1.49	0.00	101.48	0.63	0.00
6.00	2.45	102.14	1.43	0.00	99.65	0.78	-0.46	
propranolol HCl 40 % compritol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	24.09	1.15	1.88	21.52	5.45	1.89
	0.50	0.71	48.40	1.87	1.71	44.06	2.95	1.75
	0.75	0.87	65.03	1.54	1.54	59.95	1.88	1.60
	1.00	1.00	75.54	1.38	1.39	70.10	1.31	1.48
	1.50	1.22	88.43	0.96	1.06	82.33	1.20	1.25
	2.00	1.41	96.13	0.56	0.59	89.04	1.47	1.04
	3.00	1.73	100.55	0.75	0.00	96.26	1.09	0.57
	4.00	2.00	101.87	1.09	0.00	99.93	0.78	-1.18
	5.00	2.24	99.88	1.23	-0.91	99.74	0.69	-0.59
6.00	2.45	99.79	1.41	-0.67	98.59	0.52	0.15	
propranolol HCl 40 % compritol 50 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	18.02	0.61	1.91	18.95	3.32	1.91
	0.50	0.71	33.24	0.67	1.82	34.08	1.93	1.82
	0.75	0.87	43.01	0.98	1.76	43.79	0.94	1.75
	1.00	1.00	49.49	1.23	1.70	50.28	0.92	1.70
	1.50	1.22	58.75	0.72	1.62	58.91	0.23	1.61
	2.00	1.41	65.01	0.91	1.54	65.61	0.13	1.54
	3.00	1.73	74.96	0.89	1.40	75.65	0.58	1.39
	4.00	2.00	82.06	0.55	1.25	82.19	1.01	1.25
	5.00	2.24	88.21	0.84	1.07	87.82	0.30	1.09
6.00	2.45	93.46	0.66	0.82	94.76	1.13	0.72	
8.00	2.83	100.15	0.17	0.00	100.23	0.96	0.00	

Table 36 Percentage amount of propranolol HCl matrix pellet release from series of Precirol®.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % precirol 20 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	56.58	4.32	1.64	53.74	7.61	1.67
	0.50	0.71	91.97	1.74	0.90	84.61	3.68	1.19
	0.75	0.87	103.26	0.93	0.00	97.04	2.34	0.47
	1.00	1.00	105.36	0.92	0.00	101.33	1.37	0.00
	1.50	1.22	105.38	1.01	0.00	103.92	1.52	0.00
	2.00	1.41	106.37	0.84	0.00	103.63	0.66	0.00
	3.00	1.73	107.10	0.68	0.00	105.50	0.65	0.00
	4.00	2.00	104.28	0.83	0.00	103.28	0.45	0.00
5.00	2.24	103.22	0.95	0.00	102.50	0.26	0.00	
6.00	2.45	102.17	0.15	0.00	101.87	0.75	0.00	
propranolol HCl 40 % precirol 30 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	49.38	3.02	1.70	45.99	1.74	1.73
	0.50	0.71	78.66	3.16	1.33	74.44	0.45	1.41
	0.75	0.87	94.02	1.89	0.78	87.97	0.48	1.08
	1.00	1.00	99.66	2.46	-0.46	94.72	0.73	0.72
	1.50	1.22	103.55	1.51	0.00	100.08	0.77	0.00
	2.00	1.41	103.83	1.20	0.00	101.97	1.00	0.00
	3.00	1.73	104.55	1.45	0.00	103.20	1.51	0.00
	4.00	2.00	104.29	2.19	0.00	103.95	1.21	0.00
5.00	2.24	102.84	1.82	0.00	102.17	1.32	0.00	
6.00	2.45	101.26	1.49	0.00	101.28	1.56	0.00	
propranolol HCl 40 % precirol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	23.84	1.33	1.88	18.22	5.53	1.91
	0.50	0.71	57.45	1.86	1.63	50.30	2.88	1.70
	0.75	0.87	76.65	2.56	1.37	69.80	2.31	1.48
	1.00	1.00	87.86	2.41	1.08	80.57	2.18	1.29
	1.50	1.22	97.55	3.24	0.39	90.73	2.41	0.97
	2.00	1.41	99.76	1.71	-0.62	95.90	2.07	0.61
	3.00	1.73	101.17	2.85	0.00	97.50	2.53	0.40
	4.00	2.00	102.77	1.91	0.00	98.82	2.19	0.07
5.00	2.24	101.25	1.86	0.00	99.14	1.83	-0.07	
6.00	2.45	100.69	1.83	0.00	99.87	1.65	-0.88	
propranolol HCl 40 % precirol 50 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	21.08	0.23	1.90	25.17	2.63	1.87
	0.50	0.71	45.46	1.11	1.74	48.27	1.41	1.71
	0.75	0.87	63.85	1.13	1.56	63.20	0.92	1.57
	1.00	1.00	75.55	1.21	1.39	73.09	1.23	1.43
	1.50	1.22	88.64	1.64	1.06	84.72	1.19	1.18
	2.00	1.41	96.44	1.31	0.55	91.75	1.55	0.92
	3.00	1.73	101.11	1.95	0.00	96.93	1.07	0.49
	4.00	2.00	103.64	2.09	0.00	100.41	1.34	0.00
5.00	2.24	101.48	1.85	0.00	99.86	1.26	-0.85	
6.00	2.45	100.57	1.32	0.00	99.65	1.64	-0.45	

Table 37 Percentage amount of propranolol HCl matrix pellet release from series of Gelucire 50/02®.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % gelucire 30 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	64.58	1.19	1.55	60.41	0.66	1.60
	0.50	0.71	91.19	0.77	0.95	84.99	0.53	1.18
	0.75	0.87	101.75	0.76	0.00	95.40	0.31	0.66
	1.00	1.00	103.93	0.96	0.00	99.52	3.39	-0.32
	1.50	1.22	104.47	0.31	0.00	102.04	0.18	0.00
	2.00	1.41	104.42	0.22	0.00	102.27	1.94	0.00
	3.00	1.73	104.75	1.05	0.00	103.11	1.16	0.00
	4.00	2.00	105.45	0.10	0.00	104.14	0.50	0.00
	5.00	2.24	103.29	1.87	0.00	102.05	0.89	0.00
6.00	2.45	102.14	1.26	0.00	101.09	0.57	0.00	
propranolol HCl 40 % gelucire 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	60.23	1.46	1.60	53.83	1.37	1.66
	0.50	0.71	78.35	0.81	1.34	71.32	1.35	1.46
	0.75	0.87	93.61	3.70	0.81	83.74	1.10	1.21
	1.00	1.00	96.43	4.56	0.55	90.82	0.78	0.96
	1.50	1.22	103.14	1.24	0.00	98.20	0.62	0.26
	2.00	1.41	104.00	0.97	0.00	101.37	0.28	0.00
	3.00	1.73	105.30	0.59	0.00	102.79	0.69	0.00
	4.00	2.00	104.90	0.93	0.00	104.30	0.83	0.00
	5.00	2.24	103.26	1.65	0.00	103.27	0.85	0.00
6.00	2.45	102.36	0.88	0.00	102.16	0.65	0.00	
propranolol HCl 40 % gelucire 50 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	47.62	4.02	1.72	39.70	1.87	1.78
	0.50	0.71	77.51	4.55	1.35	64.45	0.89	1.55
	0.75	0.87	92.92	3.96	0.85	80.37	0.82	1.29
	1.00	1.00	99.11	3.37	-0.05	89.14	1.27	1.04
	1.50	1.22	102.07	3.39	0.00	98.06	1.01	0.29
	2.00	1.41	102.20	3.38	0.00	101.18	0.99	0.00
	3.00	1.73	103.34	3.70	0.00	105.00	0.57	0.00
	4.00	2.00	104.42	3.60	0.00	105.92	0.43	0.00
	5.00	2.24	103.79	3.27	0.00	104.26	0.66	0.00
6.00	2.45	102.53	2.90	0.00	103.28	1.13	0.00	

Table 38 Percentage amount of propranolol HCl matrix pellet release from various concentration of propranolol HCl and bees wax at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % beeswax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	46.95	5.12	1.72	44.07	0.74	1.75
	0.50	0.71	65.08	4.15	1.54	62.03	1.27	1.58
	0.75	0.87	76.01	2.20	1.38	72.41	1.27	1.44
	1.00	1.00	80.49	3.63	1.29	79.33	1.46	1.32
	1.50	1.22	86.11	2.90	1.14	85.69	1.12	1.16
	2.00	1.41	88.77	3.15	1.05	89.42	1.14	1.02
	3.00	1.73	92.28	2.45	0.89	91.99	0.91	0.90
	4.00	2.00	94.98	2.73	0.70	93.73	0.68	0.80
	5.00	2.24	97.51	2.46	0.40	94.86	0.58	0.71
6.00	2.45	99.29	2.81	-0.15	96.11	1.12	0.59	
propranolol HCl 30 % beeswax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	15.58	5.35	1.93	19.37	2.23	1.91
	0.50	0.71	52.42	2.25	1.68	48.98	3.87	1.71
	0.75	0.87	68.81	2.07	1.49	65.69	3.18	1.54
	1.00	1.00	77.74	2.29	1.35	75.11	2.77	1.40
	1.50	1.22	84.64	2.59	1.19	84.53	3.68	1.19
	2.00	1.41	88.73	2.12	1.05	87.86	3.14	1.08
	3.00	1.73	92.66	3.09	0.87	90.74	2.98	0.97
	4.00	2.00	95.47	3.35	0.66	92.76	2.79	0.86
	5.00	2.24	97.72	3.15	0.36	94.51	2.80	0.74
6.00	2.45	99.32	2.37	-0.17	95.98	2.69	0.60	
propranolol HCl 50 % beeswax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	30.69	9.11	1.84	24.54	1.80	1.88
	0.50	0.71	47.28	8.58	1.72	40.75	3.02	1.77
	0.75	0.87	57.59	8.62	1.63	50.38	3.86	1.70
	1.00	1.00	64.56	8.31	1.55	56.66	3.41	1.64
	1.50	1.22	71.33	7.10	1.46	64.17	2.68	1.55
	2.00	1.41	75.70	7.25	1.39	67.69	3.80	1.51
	3.00	1.73	78.40	6.39	1.33	71.12	4.02	1.46
	4.00	2.00	81.51	5.54	1.27	75.09	4.02	1.40
	5.00	2.24	84.50	5.88	1.19	79.74	4.06	1.31
6.00	2.45	87.69	5.94	1.09	84.43	4.10	1.19	

Table 39 Percentage amount of propranolol HCl matrix pellet release from various concentration of propranolol HCl and carnauba wax at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % carnauba wax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	75.30	0.72	1.39	69.38	0.43	1.49
	0.50	0.71	86.47	0.50	1.13	80.30	0.53	1.29
	0.75	0.87	87.72	0.24	1.09	85.23	1.84	1.17
	1.00	1.00	88.76	0.87	1.05	85.48	1.06	1.16
	1.50	1.22	87.97	0.44	1.08	85.54	0.79	1.16
	2.00	1.41	89.20	0.38	1.03	86.35	0.66	1.14
	3.00	1.73	90.62	0.55	0.97	88.71	0.64	1.05
	4.00	2.00	91.28	0.56	0.94	90.69	0.73	0.97
5.00	2.24	91.93	0.79	0.91	91.25	0.58	0.94	
6.00	2.45	92.87	0.57	0.85	91.80	0.43	0.91	
propranolol HCl 30 % carnauba wax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	69.66	0.87	1.48	62.54	0.38	1.57
	0.50	0.71	83.20	0.58	1.23	76.90	0.85	1.36
	0.75	0.87	88.37	0.51	1.07	82.10	0.24	1.25
	1.00	1.00	89.72	0.46	1.01	84.15	0.87	1.20
	1.50	1.22	90.69	0.59	0.97	86.34	0.51	1.14
	2.00	1.41	91.14	0.83	0.95	87.72	0.69	1.09
	3.00	1.73	92.30	0.49	0.89	90.25	0.66	0.99
	4.00	2.00	93.39	0.28	0.82	93.18	0.78	0.83
5.00	2.24	94.16	0.28	0.77	94.85	0.50	0.71	
6.00	2.45	94.99	0.19	0.70	96.02	0.51	0.60	
propranolol HCl 50 % carnauba wax 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	55.63	1.26	1.65	50.37	0.43	1.70
	0.50	0.71	76.56	0.60	1.37	70.43	0.62	1.47
	0.75	0.87	86.44	0.23	1.13	80.93	0.23	1.28
	1.00	1.00	91.09	0.27	0.95	85.36	0.40	1.17
	1.50	1.22	93.39	0.15	0.82	90.47	0.34	0.98
	2.00	1.41	94.08	0.22	0.77	91.44	0.55	0.93
	3.00	1.73	95.38	0.18	0.66	93.60	0.69	0.81
	4.00	2.00	96.61	0.21	0.53	95.74	0.39	0.63
5.00	2.24	97.50	0.21	0.40	96.97	0.32	0.48	
6.00	2.45	98.15	0.11	0.27	97.85	0.32	0.33	

Table 40 Percentage amount of propranolol HCl matrix pellet release from various concentration of propranolol HCl and glyceryl monostearate at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % GMS 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	47.92	0.71	1.72	46.50	0.28	1.73
	0.50	0.71	70.59	0.67	1.47	68.53	0.24	1.50
	0.75	0.87	85.78	0.44	1.15	81.22	1.35	1.27
	1.00	1.00	94.17	0.66	0.77	87.88	1.99	1.08
	1.50	1.22	99.73	0.17	-0.57	94.51	0.87	0.74
	2.00	1.41	99.64	0.12	-0.45	98.22	2.38	0.25
	3.00	1.73	100.41	0.12	0.00	100.14	1.73	0.00
	4.00	2.00	100.31	0.12	0.00	100.42	1.24	0.00
	5.00	2.24	100.00	0.21	-2.30	100.60	1.17	0.00
6.00	2.45	101.22	0.51	0.00	101.06	0.24	0.00	
propranolol HCl 30 % GMS 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	49.24	0.82	1.71	48.63	1.10	1.71
	0.50	0.71	69.82	0.88	1.48	68.21	0.35	1.50
	0.75	0.87	84.12	0.65	1.20	79.47	1.29	1.31
	1.00	1.00	93.16	0.60	0.84	86.49	0.50	1.13
	1.50	1.22	99.58	0.34	-0.37	92.43	0.47	0.88
	2.00	1.41	101.36	0.36	0.00	95.60	0.89	0.64
	3.00	1.73	102.95	1.71	0.00	98.47	0.81	0.18
	4.00	2.00	103.78	1.37	0.00	101.37	0.57	0.00
	5.00	2.24	103.57	0.77	0.00	102.30	0.31	0.00
6.00	2.45	104.38	0.70	0.00	102.97	0.32	0.00	
propranolol HCl 50 % GMS 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	33.95	0.42	1.82	40.11	0.82	1.78
	0.50	0.71	50.32	1.20	1.70	55.93	0.91	1.64
	0.75	0.87	61.85	1.08	1.58	67.05	0.92	1.52
	1.00	1.00	70.49	1.01	1.47	74.51	0.79	1.41
	1.50	1.22	83.12	1.40	1.23	83.21	0.40	1.23
	2.00	1.41	90.20	1.30	0.99	88.02	0.40	1.08
	3.00	1.73	95.88	0.88	0.62	93.42	0.13	0.82
	4.00	2.00	97.36	1.46	0.42	96.14	0.72	0.59
	5.00	2.24	98.62	1.52	0.14	98.31	0.27	0.23
6.00	2.45	100.27	1.51	0.00	99.86	0.39	-0.87	

Table 41 Percentage amount of propranolol HCl matrix pellet release from various concentration of propranolol HCl and Lubritab® at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % lubritab 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	48.94	7.52	1.71	41.12	3.40	1.77
	0.50	0.71	86.20	2.25	1.14	79.45	1.99	1.31
	0.75	0.87	95.37	1.81	0.67	90.32	1.60	0.99
	1.00	1.00	96.51	1.56	0.54	93.33	1.73	0.82
	1.50	1.22	96.97	1.25	0.48	95.49	2.30	0.65
	2.00	1.41	97.72	1.06	0.36	95.46	1.65	0.66
	3.00	1.73	99.24	0.49	-0.12	97.72	1.35	0.36
	4.00	2.00	100.47	0.69	0.00	98.37	1.21	0.21
	5.00	2.24	100.83	1.05	0.00	98.91	1.04	0.04
6.00	2.45	101.48	1.12	0.00	99.54	1.15	-0.34	
propranolol HCl 30 % lubritab 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	39.48	0.60	1.78	46.45	4.69	1.73
	0.50	0.71	83.36	0.60	1.22	80.99	2.09	1.28
	0.75	0.87	96.07	1.07	0.59	91.69	1.26	0.92
	1.00	1.00	97.70	0.91	0.36	95.39	0.70	0.66
	1.50	1.22	98.38	1.08	0.21	97.25	0.41	0.44
	2.00	1.41	99.04	0.42	-0.02	97.85	0.33	0.33
	3.00	1.73	99.51	0.59	-0.31	98.69	0.33	0.12
	4.00	2.00	100.37	0.61	0.00	99.47	0.28	-0.27
	5.00	2.24	101.15	0.73	0.00	99.93	0.17	-1.12
6.00	2.45	101.48	0.28	0.00	100.37	0.32	0.00	
propranolol HCl 50 % lubritab 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	36.19	0.67	1.80	27.90	4.83	1.86
	0.50	0.71	70.49	0.73	1.47	72.63	1.39	1.44
	0.75	0.87	86.11	1.08	1.14	84.93	0.65	1.18
	1.00	1.00	91.03	0.46	0.95	90.93	0.58	0.96
	1.50	1.22	92.83	1.11	0.86	94.31	0.76	0.76
	2.00	1.41	93.67	0.77	0.80	95.28	0.43	0.67
	3.00	1.73	95.29	0.66	0.67	96.95	0.37	0.48
	4.00	2.00	96.56	0.31	0.54	98.24	0.24	0.25
	5.00	2.24	97.72	0.13	0.36	99.49	0.06	-0.29
6.00	2.45	98.61	0.13	0.14	100.06	0.18	0.00	

Table 42 Percentage amount of propranolol HCl matrix pellet release from various concentration of propranolol HCl and Compritol® at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % compritol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	49.73	2.39	1.70	52.31	1.83	1.68
	0.50	0.71	67.98	1.50	1.51	69.54	1.26	1.48
	0.75	0.87	82.07	1.03	1.25	83.10	1.15	1.23
	1.00	1.00	88.38	0.05	1.07	88.33	1.51	1.07
	1.50	1.22	93.68	1.66	0.80	92.27	1.51	0.89
	2.00	1.41	94.11	0.83	0.77	93.74	0.31	0.80
	3.00	1.73	95.01	0.80	0.70	95.70	0.39	0.63
	4.00	2.00	95.92	0.53	0.61	96.80	0.35	0.51
	5.00	2.24	96.33	0.53	0.56	98.00	0.37	0.30
6.00	2.45	96.94	0.34	0.49	98.62	0.50	0.14	
propranolol HCl 30 % compritol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	33.37	4.18	1.82	33.76	2.88	1.82
	0.50	0.71	68.29	4.85	1.50	64.20	3.63	1.55
	0.75	0.87	84.32	2.85	1.20	79.14	2.99	1.32
	1.00	1.00	91.95	2.32	0.91	86.09	3.33	1.14
	1.50	1.22	95.85	2.83	0.62	91.45	2.85	0.93
	2.00	1.41	96.43	2.04	0.55	92.56	2.44	0.87
	3.00	1.73	97.59	1.39	0.38	94.70	2.29	0.72
	4.00	2.00	98.81	1.17	0.08	96.27	1.65	0.57
	5.00	2.24	100.03	1.03	0.00	97.92	1.06	0.32
6.00	2.45	100.42	0.82	0.00	99.38	0.63	-0.21	
propranolol HCl 50 % compritol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	22.40	1.45	1.89	24.76	2.38	1.88
	0.50	0.71	41.05	0.75	1.77	43.11	0.86	1.76
	0.75	0.87	53.49	0.30	1.67	55.04	0.73	1.65
	1.00	1.00	61.96	0.69	1.58	63.38	0.68	1.56
	1.50	1.22	72.46	0.49	1.44	74.14	0.55	1.41
	2.00	1.41	82.09	1.07	1.25	83.29	0.51	1.22
	3.00	1.73	90.74	1.18	0.97	90.72	0.39	0.97
	4.00	2.00	92.02	0.75	0.90	91.91	0.45	0.91
	5.00	2.24	93.23	0.55	0.83	93.04	0.37	0.84
6.00	2.45	94.28	0.28	0.76	94.24	0.38	0.76	

Table 43 Percentage amount of propranolol HCl matrix pellet release from various concentration of propranolol HCl and Precirol® at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % precirol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	38.08	0.64	1.79	39.64	9.09	1.78
	0.50	0.71	65.91	0.82	1.53	63.91	3.19	1.56
	0.75	0.87	84.30	1.60	1.20	81.33	2.40	1.27
	1.00	1.00	91.60	1.14	0.92	89.42	2.68	1.02
	1.50	1.22	95.68	1.22	0.64	94.43	2.30	0.75
	2.00	1.41	96.81	1.14	0.50	96.31	2.15	0.57
	3.00	1.73	98.32	1.24	0.23	97.72	1.62	0.36
	4.00	2.00	99.06	1.02	-0.03	99.04	1.04	-0.02
	5.00	2.24	99.71	1.00	-0.54	100.17	0.71	0.00
6.00	2.45	100.45	1.01	0.00	101.10	0.61	0.00	
propranolol HCl 30 % precirol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	28.81	1.01	1.85	35.42	8.29	1.81
	0.50	0.71	62.35	1.06	1.58	63.46	4.31	1.56
	0.75	0.87	79.13	0.75	1.32	78.24	3.51	1.34
	1.00	1.00	87.79	1.03	1.09	84.85	2.08	1.18
	1.50	1.22	92.93	1.48	0.85	90.96	1.63	0.96
	2.00	1.41	94.96	1.44	0.70	93.92	2.18	0.78
	3.00	1.73	96.16	1.22	0.58	95.50	1.44	0.65
	4.00	2.00	97.24	0.79	0.44	96.83	1.17	0.50
	5.00	2.24	98.00	0.91	0.30	98.03	1.18	0.29
6.00	2.45	98.95	1.01	0.02	99.04	0.73	-0.02	
propranolol HCl 50 % precirol 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	29.03	1.83	1.85	33.76	0.18	1.82
	0.50	0.71	54.46	1.33	1.66	55.23	0.84	1.65
	0.75	0.87	70.43	1.48	1.47	68.44	0.23	1.50
	1.00	1.00	81.52	1.06	1.27	78.33	0.88	1.34
	1.50	1.22	92.87	1.29	0.85	87.33	0.35	1.10
	2.00	1.41	96.19	1.79	0.58	92.54	0.59	0.87
	3.00	1.73	98.46	1.57	0.19	95.79	0.96	0.62
	4.00	2.00	99.27	1.65	-0.14	97.15	1.09	0.45
	5.00	2.24	99.88	1.68	-0.94	98.36	1.09	0.21
6.00	2.45	100.57	1.92	0.00	99.19	0.84	-0.09	

Table 44 Percentage amount of propranolol HCl matrix pellet release from various concentration of propranolol HCl and Gelucire® at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % gelucire 40 % matrix pellet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	48.21	0.41	1.71	52.90	0.85	1.67
	0.50	0.71	68.89	1.00	1.49	70.73	1.44	1.47
	0.75	0.87	82.52	0.82	1.24	81.53	0.74	1.27
	1.00	1.00	89.57	0.98	1.02	89.10	1.01	1.04
	1.50	1.22	93.85	1.24	0.79	95.75	0.75	0.63
	2.00	1.41	94.76	1.62	0.72	98.62	0.66	0.14
	3.00	1.73	96.14	1.60	0.59	99.75	0.50	-0.59
	4.00	2.00	97.35	1.31	0.42	100.99	0.46	0.00
	5.00	2.24	98.64	1.19	0.13	102.00	0.25	0.00
6.00	2.45	99.75	1.02	-0.61	103.05	0.06	0.00	
propranolol HCl 30 % gelucire 40 % matrix pellet	0.25	0.50	48.24	3.18	1.71	45.93	0.96	1.73
	0.50	0.71	70.72	3.01	1.47	67.11	2.32	1.52
	0.75	0.87	85.20	3.14	1.17	81.17	1.11	1.27
	1.00	1.00	93.41	2.20	0.82	88.90	1.81	1.05
	1.50	1.22	97.96	2.22	0.31	95.50	1.69	0.65
	2.00	1.41	99.27	1.80	-0.14	98.57	1.71	0.16
	3.00	1.73	100.00	1.79	0.00	100.01	1.47	0.00
	4.00	2.00	100.80	1.90	0.00	101.25	1.42	0.00
	5.00	2.24	101.72	1.72	0.00	102.05	1.39	0.00
	6.00	2.45	102.38	1.64	0.00	102.78	1.47	0.00
propranolol HCl 50 % gelucire 40 % matrix pellet	0.25	0.50	51.19	1.94	1.69	59.12	0.46	1.61
	0.50	0.71	74.15	0.73	1.41	78.04	0.36	1.34
	0.75	0.87	89.05	1.98	1.04	89.45	0.37	1.02
	1.00	1.00	96.11	0.97	0.59	96.53	0.33	0.54
	1.50	1.22	97.05	1.41	0.47	100.58	0.66	0.00
	2.00	1.41	96.84	0.58	0.50	101.39	0.38	0.00
	3.00	1.73	98.15	0.59	0.27	102.78	0.55	0.00
	4.00	2.00	99.09	0.93	-0.04	104.09	0.56	0.00
	5.00	2.24	100.31	0.71	0.00	104.90	0.96	0.00
	6.00	2.45	100.76	0.85	0.00	105.32	1.42	0.00

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Table 45 Percentage amount of propranolol HCl matrix tablet release from series of beeswax.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % beeswax 20 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	16.03	0.34	1.92	15.96	0.09	1.92
	0.50	0.71	22.86	0.25	1.89	23.04	0.11	1.89
	0.75	0.87	28.26	0.56	1.86	29.00	0.16	1.85
	1.00	1.00	32.79	0.43	1.83	33.12	0.31	1.83
	1.50	1.22	41.68	0.21	1.77	41.47	2.08	1.77
	2.00	1.41	53.14	1.09	1.67	46.44	0.21	1.73
	3.00	1.73	74.08	2.30	1.41	55.88	0.32	1.64
	4.00	2.00	85.88	1.78	1.15	68.13	0.39	1.50
	5.00	2.24	93.21	1.54	0.83	80.88	0.78	1.28
	6.00	2.45	96.43	1.54	0.55	87.04	0.51	1.11
	8.00	2.83	100.70	1.43	0.00	95.08	0.66	0.69
10.00	3.16	102.96	0.36	0.00	98.82	0.35	0.07	
12.00	3.46	104.37	0.78	0.00	100.71	1.44	0.00	
propranolol HCl 40 % beeswax 30 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	13.20	0.27	1.94	13.28	0.09	1.94
	0.50	0.71	18.83	0.36	1.91	18.83	0.02	1.91
	0.75	0.87	24.59	0.55	1.88	23.92	0.23	1.88
	1.00	1.00	28.13	0.34	1.86	26.51	0.18	1.87
	1.50	1.22	36.43	0.63	1.80	33.62	1.02	1.82
	2.00	1.41	48.36	0.16	1.71	38.77	0.38	1.79
	3.00	1.73	67.63	1.18	1.51	52.36	0.62	1.68
	4.00	2.00	78.49	1.06	1.33	68.17	0.44	1.50
	5.00	2.24	86.06	1.59	1.14	78.82	1.46	1.33
	6.00	2.45	90.71	1.84	0.97	85.43	1.32	1.16
	8.00	2.83	97.44	2.29	0.41	94.42	1.41	0.75
10.00	3.16	101.71	1.15	0.00	99.38	1.59	-0.21	
12.00	3.46	104.12	0.47	0.00	101.78	1.17	0.00	
propranolol HCl 40 % beeswax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.99	1.75	1.95	10.90	0.18	1.95
	0.50	0.71	13.97	2.50	1.93	15.13	0.03	1.93
	0.75	0.87	17.21	2.96	1.92	18.26	0.20	1.91
	1.00	1.00	20.08	3.37	1.90	20.97	0.19	1.90
	1.50	1.22	25.12	4.49	1.87	26.17	0.37	1.87
	2.00	1.41	28.98	4.64	1.85	30.59	0.43	1.84
	3.00	1.73	36.92	5.76	1.80	36.29	0.23	1.80
	4.00	2.00	47.02	8.14	1.72	41.75	0.48	1.77
	5.00	2.24	56.81	7.83	1.64	46.33	0.39	1.73
	6.00	2.45	64.25	8.40	1.55	50.08	0.35	1.70
	8.00	2.83	76.28	6.98	1.38	59.32	0.98	1.61
10.00	3.16	83.87	6.73	1.21	65.66	0.90	1.54	
12.00	3.46	88.68	6.42	1.05	70.18	1.16	1.47	
propranolol HCl 40 % beeswax 50 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	7.06	0.65	1.97	6.92	0.76	1.97
	0.50	0.71	9.90	0.74	1.95	8.98	0.88	1.96
	0.75	0.87	12.36	0.83	1.94	10.86	0.89	1.95
	1.00	1.00	14.59	0.89	1.93	12.51	0.78	1.94
	1.50	1.22	18.23	1.04	1.91	15.12	0.49	1.93
	2.00	1.41	21.27	1.09	1.90	17.20	0.39	1.92
	3.00	1.73	26.96	1.38	1.86	20.14	0.61	1.90
	4.00	2.00	30.84	1.43	1.84	23.52	0.98	1.88
	5.00	2.24	34.76	1.34	1.81	27.08	1.43	1.86
	6.00	2.45	38.52	1.72	1.79	30.88	1.15	1.84
	8.00	2.83	44.89	1.81	1.74	36.94	0.58	1.80
10.00	3.16	50.79	1.84	1.69	41.76	0.62	1.77	
12.00	3.46	56.08	2.08	1.64	46.14	0.24	1.73	

Table 46 Percentage amount of propranolol HCl matrix tablet release from series of carnauba wax.

Formulation	time	time (1/2)	Dissolution medium						
			0.1 N HCl			Phosphate buffer pH 6.8			
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained	
propranolol HCl 40 % carnauba wax 20 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	0.25	0.50	16.63	0.11	1.92	16.11	0.08	1.92	
	0.50	0.71	23.52	0.23	1.88	23.22	0.13	1.89	
	0.75	0.87	29.86	1.15	1.85	28.59	0.50	1.85	
	1.00	1.00	34.75	0.46	1.81	33.38	0.23	1.82	
	1.50	1.22	45.26	1.47	1.74	40.22	0.57	1.78	
	2.00	1.41	58.33	1.19	1.62	47.66	0.99	1.72	
	3.00	1.73	90.74	1.67	0.97	62.61	2.03	1.57	
	4.00	2.00	100.84	0.94	0.00	85.59	1.74	1.16	
	5.00	2.24	102.89	0.83	0.00	95.80	1.65	0.62	
	6.00	2.45	104.51	0.63	0.00	101.68	0.24	0.00	
	8.00	2.83	105.08	0.35	0.00	101.28	0.57	0.00	
10.00	3.16	103.28	0.44	0.00	100.90	0.62	0.00		
12.00	3.46	101.47	0.65	0.00	99.66	0.35	-0.47		
propranolol HCl 40 % carnauba wax 30 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	
	0.25	0.50	14.99	0.15	1.93	14.74	0.27	1.93	
	0.50	0.71	21.00	0.20	1.90	20.64	0.36	1.90	
	0.75	0.87	26.26	0.43	1.87	25.03	0.53	1.87	
	1.00	1.00	31.31	0.06	1.84	28.50	1.14	1.85	
	1.50	1.22	46.08	1.39	1.73	36.14	1.12	1.81	
	2.00	1.41	65.00	2.17	1.54	46.96	1.85	1.72	
	3.00	1.73	97.39	1.03	0.42	76.88	3.67	1.36	
	4.00	2.00	101.56	0.40	0.00	97.22	0.98	0.44	
	5.00	2.24	101.02	0.22	0.00	99.23	0.63	-0.11	
	6.00	2.45	101.14	0.36	0.00	100.10	0.47	0.00	
	8.00	2.83	102.78	0.78	0.00	100.58	1.36	0.00	
10.00	3.16	100.42	0.54	0.00	99.77	1.26	-0.63		
12.00	3.46	99.87	0.69	-0.88	99.59	2.48	-0.38		
propranolol HCl 40 % carnauba wax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	
	0.25	0.50	12.22	0.10	1.94	11.95	0.30	1.94	
	0.50	0.71	17.33	0.17	1.92	16.86	0.31	1.92	
	0.75	0.87	21.93	0.46	1.89	20.53	0.39	1.90	
	1.00	1.00	25.93	0.78	1.87	23.63	0.53	1.88	
	1.50	1.22	33.13	1.18	1.83	28.98	0.87	1.85	
	2.00	1.41	38.38	2.11	1.79	33.40	0.82	1.82	
	3.00	1.73	48.15	2.96	1.71	41.01	1.57	1.77	
	4.00	2.00	57.45	5.07	1.63	48.13	2.12	1.71	
	5.00	2.24	69.13	9.06	1.49	54.65	2.92	1.66	
	6.00	2.45	84.83	7.25	1.18	60.81	2.93	1.59	
	8.00	2.83	96.67	4.78	0.52	74.15	3.84	1.41	
10.00	3.16	102.79	2.59	0.00	88.62	3.12	1.06		
12.00	3.46	105.79	2.00	0.00	97.95	3.64	0.31		
propranolol HCl 40 % carnauba wax 50 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	
	0.25	0.50	10.62	0.27	1.95	9.04	0.22	1.96	
	0.50	0.71	14.42	0.06	1.93	12.53	0.29	1.94	
	0.75	0.87	17.69	0.09	1.92	15.29	0.27	1.93	
	1.00	1.00	20.40	0.08	1.90	17.56	0.25	1.92	
	1.50	1.22	24.96	0.09	1.88	21.30	0.20	1.90	
	2.00	1.41	28.93	0.15	1.85	24.64	0.35	1.88	
	3.00	1.73	35.53	0.22	1.81	30.75	0.22	1.84	
	4.00	2.00	41.33	0.54	1.77	36.00	0.34	1.81	
	5.00	2.24	45.96	0.45	1.73	40.40	0.41	1.78	
	6.00	2.45	50.59	0.27	1.69	45.02	0.04	1.74	
	8.00	2.83	58.35	0.27	1.62	52.79	0.28	1.67	
10.00	3.16	66.10	0.29	1.53	59.36	0.52	1.61		
12.00	3.46	71.93	1.74	1.45	64.70	0.39	1.55		

Table 47 Percentage amount of propranolol HCl matrix tablet release from series of glyceryl monostearate.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % GMS 20 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	12.05	0.19	1.94	14.96	0.42	1.93
	0.50	0.71	18.31	0.18	1.91	22.19	0.49	1.89
	0.75	0.87	23.55	0.26	1.88	27.73	0.67	1.86
	1.00	1.00	27.84	0.45	1.86	31.59	0.98	1.84
	1.50	1.22	34.87	0.54	1.81	38.42	1.14	1.79
	2.00	1.41	41.16	0.31	1.77	44.17	0.69	1.75
	3.00	1.73	51.36	0.09	1.69	53.15	1.54	1.67
	4.00	2.00	59.70	0.58	1.61	59.58	1.54	1.61
	5.00	2.24	65.82	0.53	1.53	66.84	2.26	1.52
	6.00	2.45	73.97	0.92	1.42	73.55	2.47	1.42
	8.00	2.83	86.38	1.00	1.13	83.17	2.97	1.23
10.00	3.16	94.89	0.82	0.71	89.90	2.05	1.00	
12.00	3.46	99.35	0.51	-0.18	94.05	1.79	0.77	
propranolol HCl 40 % GMS 30 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	10.40	0.86	1.95	13.18	1.00	1.94
	0.50	0.71	15.33	1.09	1.93	18.42	0.27	1.91
	0.75	0.87	19.67	1.21	1.90	22.75	0.49	1.89
	1.00	1.00	23.42	1.29	1.88	26.09	0.55	1.87
	1.50	1.22	30.00	1.47	1.85	31.58	0.70	1.84
	2.00	1.41	35.31	1.83	1.81	36.78	1.33	1.80
	3.00	1.73	45.03	1.87	1.74	45.26	1.53	1.74
	4.00	2.00	53.49	2.17	1.67	52.97	1.87	1.67
	5.00	2.24	60.55	1.93	1.60	58.43	1.95	1.62
	6.00	2.45	66.28	2.39	1.53	62.92	2.08	1.57
	8.00	2.83	77.77	3.42	1.35	74.05	0.60	1.41
10.00	3.16	88.09	3.57	1.08	82.85	1.01	1.23	
12.00	3.46	94.86	2.94	0.71	88.77	0.66	1.05	
propranolol HCl 40 % GMS 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	8.38	0.55	1.96	9.34	0.15	1.96
	0.50	0.71	12.74	0.62	1.94	13.81	0.20	1.94
	0.75	0.87	16.54	0.74	1.92	17.35	0.32	1.92
	1.00	1.00	19.80	0.82	1.90	20.16	0.30	1.90
	1.50	1.22	26.11	0.21	1.87	24.51	0.54	1.88
	2.00	1.41	30.15	0.54	1.84	28.32	0.59	1.86
	3.00	1.73	38.41	0.54	1.79	34.41	0.53	1.82
	4.00	2.00	45.83	0.57	1.73	39.58	0.53	1.78
	5.00	2.24	52.01	0.84	1.68	44.21	0.68	1.75
	6.00	2.45	57.33	0.31	1.63	48.50	0.53	1.71
	8.00	2.83	66.47	1.33	1.53	56.27	0.88	1.64
10.00	3.16	74.50	1.51	1.41	62.38	0.66	1.58	
12.00	3.46	81.75	2.22	1.26	67.34	0.94	1.51	
propranolol HCl 40 % GMS 50 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	7.25	0.21	1.97	9.07	0.64	1.96
	0.50	0.71	10.85	0.18	1.95	13.08	0.81	1.94
	0.75	0.87	14.01	0.12	1.93	16.41	0.96	1.92
	1.00	1.00	16.75	0.07	1.92	19.26	1.08	1.91
	1.50	1.22	21.25	0.17	1.90	23.88	1.22	1.88
	2.00	1.41	25.64	0.20	1.87	27.90	1.32	1.86
	3.00	1.73	33.46	0.84	1.82	32.26	1.20	1.83
	4.00	2.00	40.39	1.45	1.78	38.06	1.38	1.79
	5.00	2.24	46.38	1.97	1.73	42.80	1.37	1.76
	6.00	2.45	52.09	1.96	1.68	46.89	2.06	1.73
	8.00	2.83	62.45	1.98	1.57	54.94	2.72	1.65
10.00	3.16	72.04	1.54	1.45	62.68	3.43	1.57	
12.00	3.46	80.77	1.70	1.28	71.59	5.18	1.45	

Table 48 Percentage amount of propranolol HCl matrix tablet release from series of Lubritab®.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % lubritab 20 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	16.15	2.03	1.92	16.73	2.27	1.92
	0.50	0.71	24.59	3.78	1.88	25.11	3.93	1.87
	0.75	0.87	30.93	4.03	1.84	31.60	4.85	1.84
	1.00	1.00	35.49	4.04	1.81	36.05	5.19	1.81
	1.50	1.22	44.22	3.99	1.75	43.50	4.95	1.75
	2.00	1.41	52.60	3.91	1.68	48.84	4.88	1.71
	3.00	1.73	72.58	3.58	1.44	59.57	4.83	1.61
	4.00	2.00	92.15	2.78	0.89	70.37	4.95	1.47
	5.00	2.24	98.94	0.70	0.03	82.28	3.64	1.25
	6.00	2.45	100.33	0.22	0.00	91.02	3.08	0.95
	8.00	2.83	101.53	1.00	0.00	98.04	1.08	0.29
10.00	3.16	101.25	1.57	0.00	99.50	1.05	-0.30	
12.00	3.46	102.44	0.51	0.00	99.77	1.34	-0.64	
propranolol HCl 40 % lubritab 30 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	13.42	0.25	1.94	13.30	0.11	1.94
	0.50	0.71	19.04	0.58	1.91	18.67	0.08	1.91
	0.75	0.87	23.85	0.90	1.88	23.10	0.19	1.89
	1.00	1.00	28.28	0.99	1.86	27.35	0.77	1.86
	1.50	1.22	35.13	1.56	1.81	33.04	0.54	1.83
	2.00	1.41	41.43	1.66	1.77	38.83	0.27	1.79
	3.00	1.73	54.34	1.71	1.66	46.88	0.86	1.73
	4.00	2.00	72.97	2.22	1.43	54.97	0.62	1.65
	5.00	2.24	84.49	1.90	1.19	63.28	1.34	1.56
	6.00	2.45	90.88	1.67	0.96	71.44	1.31	1.46
	8.00	2.83	97.52	2.03	0.39	85.64	2.11	1.16
10.00	3.16	101.20	2.01	0.00	92.46	1.91	0.88	
12.00	3.46	101.73	1.18	0.00	99.44	0.74	-0.25	
propranolol HCl 40 % lubritab 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	10.84	0.15	1.95	10.27	0.23	1.95
	0.50	0.71	15.75	0.50	1.93	14.75	1.73	1.93
	0.75	0.87	20.03	0.92	1.90	18.34	0.34	1.91
	1.00	1.00	23.50	1.17	1.88	21.16	0.06	1.90
	1.50	1.22	29.37	1.34	1.85	26.88	0.53	1.86
	2.00	1.41	33.50	1.38	1.82	31.10	1.05	1.84
	3.00	1.73	41.05	1.35	1.77	38.10	1.31	1.79
	4.00	2.00	47.33	1.31	1.72	43.64	0.88	1.75
	5.00	2.24	53.05	1.51	1.67	48.85	1.52	1.71
	6.00	2.45	57.90	1.37	1.62	53.11	1.27	1.67
	8.00	2.83	66.72	1.92	1.52	60.86	1.67	1.59
10.00	3.16	77.07	1.89	1.36	67.31	1.67	1.51	
12.00	3.46	85.69	2.22	1.16	73.62	0.75	1.42	
propranolol HCl 40 % lubritab 50 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	8.45	0.75	1.96	9.72	0.33	1.96
	0.50	0.71	10.49	1.51	1.95	11.56	0.30	1.95
	0.75	0.87	12.98	1.76	1.94	13.94	0.29	1.93
	1.00	1.00	15.62	1.37	1.93	16.05	0.37	1.92
	1.50	1.22	19.79	0.96	1.90	19.28	0.39	1.91
	2.00	1.41	23.06	0.85	1.89	22.05	0.43	1.89
	3.00	1.73	28.78	1.43	1.85	25.89	0.30	1.87
	4.00	2.00	32.90	0.80	1.83	29.81	0.64	1.85
	5.00	2.24	36.69	0.99	1.80	33.43	0.50	1.82
	6.00	2.45	40.22	0.82	1.78	36.23	0.79	1.80
	8.00	2.83	46.35	0.88	1.73	41.75	0.55	1.77
10.00	3.16	52.35	1.06	1.68	46.98	1.12	1.72	
12.00	3.46	57.98	0.98	1.62	51.07	0.77	1.69	

Table 49 Percentage amount of propranolol HCl matrix tablet release from series of Compritol®.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl pH 1.2			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % compritol 20 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	12.67	0.15	1.94	13.32	0.19	1.94
	0.50	0.71	18.42	0.05	1.91	19.08	0.30	1.91
	0.75	0.87	23.08	0.09	1.89	23.46	0.40	1.88
	1.00	1.00	26.92	0.20	1.86	27.18	0.34	1.86
	1.50	1.22	33.51	0.86	1.82	32.17	0.45	1.83
	2.00	1.41	38.04	0.44	1.79	36.80	0.25	1.80
	3.00	1.73	46.38	0.07	1.73	44.56	0.48	1.74
	4.00	2.00	53.42	0.08	1.67	51.05	0.73	1.69
	5.00	2.24	60.57	0.14	1.60	56.65	0.54	1.64
	6.00	2.45	68.28	0.48	1.50	60.85	0.31	1.59
	8.00	2.83	83.23	1.71	1.22	70.59	2.47	1.47
	10.00	3.16	92.97	1.71	0.85	80.47	1.89	1.29
12.00	3.46	98.60	1.22	0.15	89.01	0.48	1.04	
propranolol HCl 40 % compritol 30 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.88	0.23	1.95	10.92	0.10	1.95
	0.50	0.71	13.59	0.35	1.94	14.65	0.37	1.93
	0.75	0.87	16.73	0.40	1.92	17.72	0.34	1.92
	1.00	1.00	19.31	0.49	1.91	20.26	0.29	1.90
	1.50	1.22	23.53	0.56	1.88	24.37	0.32	1.88
	2.00	1.41	27.37	0.72	1.86	27.53	0.31	1.86
	3.00	1.73	33.38	0.51	1.82	33.07	0.32	1.83
	4.00	2.00	38.78	0.71	1.79	37.66	0.21	1.79
	5.00	2.24	43.46	0.46	1.75	42.06	0.47	1.76
	6.00	2.45	47.85	0.54	1.72	46.07	0.34	1.73
	8.00	2.83	57.22	0.78	1.63	52.38	0.43	1.68
	10.00	3.16	68.49	0.70	1.50	58.90	0.26	1.61
12.00	3.46	79.29	0.56	1.32	64.96	0.36	1.54	
propranolol HCl 40 % compritol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	7.94	0.19	1.96	7.94	0.19	1.96
	0.50	0.71	10.82	0.34	1.95	10.51	0.24	1.95
	0.75	0.87	13.13	0.46	1.94	12.60	0.26	1.94
	1.00	1.00	15.02	0.55	1.93	14.32	0.23	1.93
	1.50	1.22	18.08	0.60	1.91	17.11	0.27	1.92
	2.00	1.41	20.64	0.68	1.90	19.48	0.32	1.91
	3.00	1.73	25.12	1.03	1.87	22.39	0.22	1.89
	4.00	2.00	28.62	0.70	1.85	25.76	0.15	1.87
	5.00	2.24	31.66	0.67	1.83	28.88	0.15	1.85
	6.00	2.45	34.35	0.55	1.82	31.41	0.35	1.84
	8.00	2.83	39.51	0.56	1.78	36.61	0.38	1.80
	10.00	3.16	44.62	0.82	1.74	42.01	0.41	1.76
12.00	3.46	48.96	0.65	1.71	45.78	0.17	1.73	
propranolol HCl 40 % compritol 50 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	6.71	0.19	1.97	6.43	0.18	1.97
	0.50	0.71	8.53	0.21	1.96	8.37	0.14	1.96
	0.75	0.87	10.01	0.24	1.95	9.90	0.23	1.95
	1.00	1.00	11.23	0.29	1.95	11.29	0.23	1.95
	1.50	1.22	13.07	0.26	1.94	13.01	0.31	1.94
	2.00	1.41	14.58	0.29	1.93	14.57	0.40	1.93
	3.00	1.73	17.11	0.22	1.92	17.44	0.46	1.92
	4.00	2.00	19.33	0.27	1.91	19.52	0.56	1.91
	5.00	2.24	21.15	0.23	1.90	21.40	0.51	1.90
	6.00	2.45	22.88	0.30	1.89	23.05	0.64	1.89
	8.00	2.83	26.50	0.81	1.87	28.02	0.72	1.86
	10.00	3.16	29.02	0.49	1.85	30.74	0.60	1.84
12.00	3.46	31.52	0.34	1.84	33.53	0.41	1.82	

Table 50 Percentage amount of propranolol HCl matrix tablet release from series of Precirol®.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl pH 1.2			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 40 % precirol 20 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	14.14	0.16	1.93	13.07	0.10	1.94
	0.50	0.71	20.47	0.19	1.90	19.38	0.07	1.91
	0.75	0.87	25.30	0.27	1.87	24.41	0.11	1.88
	1.00	1.00	29.25	0.15	1.85	29.03	0.39	1.85
	1.50	1.22	35.83	0.44	1.81	36.14	0.44	1.81
	2.00	1.41	41.76	0.35	1.77	41.54	0.25	1.77
	3.00	1.73	50.85	1.37	1.69	52.10	1.56	1.68
	4.00	2.00	59.31	0.45	1.61	57.91	1.23	1.62
	5.00	2.24	67.85	0.33	1.51	65.12	0.90	1.54
	6.00	2.45	76.44	0.32	1.37	72.36	1.33	1.44
	8.00	2.83	92.79	1.31	0.86	85.89	1.34	1.15
	10.00	3.16	101.88	1.69	0.00	95.13	1.11	0.69
12.00	3.46	107.22	0.62	0.00	102.29	1.43	0.00	
propranolol HCl 40 % precirol 30 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.29	0.84	1.96	9.96	0.15	1.95
	0.50	0.71	14.23	1.03	1.93	14.19	0.14	1.93
	0.75	0.87	18.82	1.08	1.91	17.97	0.18	1.91
	1.00	1.00	22.55	1.01	1.89	21.49	0.17	1.89
	1.50	1.22	27.81	0.70	1.86	26.92	0.29	1.86
	2.00	1.41	32.73	0.70	1.83	32.06	0.15	1.83
	3.00	1.73	40.90	0.85	1.77	40.16	0.22	1.78
	4.00	2.00	49.65	1.95	1.70	46.70	0.53	1.73
	5.00	2.24	54.26	0.42	1.66	51.86	0.60	1.68
	6.00	2.45	59.60	0.63	1.61	57.06	0.37	1.63
	8.00	2.83	71.25	1.07	1.46	65.81	1.38	1.53
	10.00	3.16	89.88	0.78	1.01	75.67	0.98	1.39
12.00	3.46	100.89	1.14	0.00	85.87	0.97	1.15	
propranolol HCl 40 % precirol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	6.48	0.29	1.97	7.48	0.25	1.97
	0.50	0.71	10.17	0.35	1.95	10.47	0.19	1.95
	0.75	0.87	13.30	0.43	1.94	13.31	0.16	1.94
	1.00	1.00	15.99	0.45	1.92	15.69	0.23	1.93
	1.50	1.22	20.33	0.58	1.90	19.81	0.21	1.90
	2.00	1.41	25.04	1.03	1.87	23.14	0.35	1.89
	3.00	1.73	30.71	0.90	1.84	29.77	0.23	1.85
	4.00	2.00	36.31	1.22	1.80	34.59	1.65	1.82
	5.00	2.24	41.01	1.30	1.77	39.35	0.85	1.78
	6.00	2.45	45.85	1.25	1.73	43.28	0.95	1.75
	8.00	2.83	54.25	1.21	1.66	50.33	1.41	1.70
	10.00	3.16	61.32	1.51	1.59	56.36	1.51	1.64
12.00	3.46	66.94	1.32	1.52	61.90	1.85	1.58	
propranolol HCl 40 % precirol 50 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	5.34	0.75	1.98	6.92	0.28	1.97
	0.50	0.71	8.50	1.51	1.96	9.69	0.21	1.96
	0.75	0.87	11.23	1.76	1.95	12.18	0.25	1.94
	1.00	1.00	13.52	1.37	1.94	14.36	0.35	1.93
	1.50	1.22	17.18	0.96	1.92	17.94	0.37	1.91
	2.00	1.41	20.37	0.85	1.90	21.10	0.51	1.90
	3.00	1.73	26.01	1.43	1.87	25.73	0.41	1.87
	4.00	2.00	30.47	0.80	1.84	30.27	0.41	1.84
	5.00	2.24	34.63	0.99	1.82	34.42	0.54	1.82
	6.00	2.45	38.45	0.82	1.79	37.93	0.88	1.79
	8.00	2.83	45.17	0.88	1.74	44.08	1.36	1.75
	10.00	3.16	51.92	1.06	1.68	49.94	1.03	1.70
12.00	3.46	57.41	0.98	1.63	54.97	1.36	1.65	

Table 51 Percentage amount of propranolol HCl matrix tablet release from series of Gelucire®.

Formulation	time	time (1/2)	Dissolution medium						
			0.1 N HCl pH 1.2			Phosphate buffer pH 6.8			
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained	
propranolol HCl 40 % gelucire 30 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	0.25	0.50	10.53	0.40	1.95	12.09	0.41	1.94	1.94
	0.50	0.71	16.68	0.49	1.92	17.31	0.18	1.92	1.92
	0.75	0.87	23.38	0.60	1.88	23.32	0.37	1.88	1.88
	1.00	1.00	27.44	0.52	1.86	26.16	0.65	1.87	1.87
	1.50	1.22	35.59	0.65	1.81	32.90	0.56	1.83	1.83
	2.00	1.41	42.21	0.77	1.76	38.40	0.59	1.79	1.79
	3.00	1.73	53.59	1.21	1.67	48.32	0.88	1.71	1.71
	4.00	2.00	66.27	1.95	1.53	57.69	1.26	1.63	1.63
	5.00	2.24	78.11	1.69	1.34	67.23	0.23	1.52	1.52
	6.00	2.45	86.69	2.27	1.12	75.30	0.59	1.39	1.39
	8.00	2.83	95.89	0.87	0.61	86.26	1.52	1.14	1.14
10.00	3.16	102.14	0.58	0.00	93.35	2.60	0.82	0.82	
12.00	3.46	105.69	0.67	0.00	98.56	1.64	0.16	0.16	
propranolol HCl 40 % gelucire 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00
	0.25	0.50	9.27	0.51	1.96	10.09	0.49	1.95	1.95
	0.50	0.71	14.18	0.65	1.93	14.74	0.34	1.93	1.93
	0.75	0.87	18.89	0.77	1.91	18.84	0.13	1.91	1.91
	1.00	1.00	22.99	0.82	1.89	22.20	0.30	1.89	1.89
	1.50	1.22	29.45	0.63	1.85	27.54	0.61	1.86	1.86
	2.00	1.41	35.30	0.90	1.81	31.99	0.35	1.83	1.83
	3.00	1.73	44.10	1.40	1.75	39.60	0.65	1.78	1.78
	4.00	2.00	52.41	1.56	1.68	45.99	0.44	1.73	1.73
	5.00	2.24	58.95	3.01	1.61	50.84	1.08	1.69	1.69
	6.00	2.45	65.15	2.88	1.54	55.73	1.66	1.65	1.65
	8.00	2.83	78.19	2.92	1.34	66.61	1.51	1.52	1.52
10.00	3.16	88.44	3.29	1.06	75.64	2.14	1.39	1.39	
12.00	3.46	95.32	2.87	0.67	83.87	1.74	1.21	1.21	
propranolol HCl 40 % gelucire 50 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00
	0.25	0.50	10.83	0.45	1.95	10.51	0.25	1.95	1.95
	0.50	0.71	15.37	0.53	1.93	14.49	0.50	1.93	1.93
	0.75	0.87	19.36	0.64	1.91	17.73	0.51	1.92	1.92
	1.00	1.00	22.67	0.57	1.89	20.45	0.55	1.90	1.90
	1.50	1.22	28.21	1.09	1.86	24.24	0.36	1.88	1.88
	2.00	1.41	32.46	0.84	1.83	27.86	0.46	1.86	1.86
	3.00	1.73	40.43	1.27	1.78	34.02	0.20	1.82	1.82
	4.00	2.00	45.53	1.48	1.74	37.79	0.25	1.79	1.79
	5.00	2.24	50.79	1.76	1.69	41.69	0.24	1.77	1.77
	6.00	2.45	56.01	2.00	1.64	45.54	0.30	1.74	1.74
	8.00	2.83	66.05	2.52	1.53	52.92	0.34	1.67	1.67
10.00	3.16	73.34	2.70	1.43	57.56	0.45	1.63	1.63	
12.00	3.46	80.48	3.13	1.29	61.95	0.58	1.58	1.58	

Table 52 Percentage amount of propranolol HCl matrix tablet release from various concentration of propranolol HCl and bees wax at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % beeswax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	11.16	0.35	1.95	7.31	0.35	1.97
	0.50	0.71	13.42	0.32	1.94	10.44	0.44	1.95
	0.75	0.87	16.44	0.31	1.92	13.81	0.56	1.94
	1.00	1.00	19.21	0.29	1.91	16.69	0.62	1.92
	1.50	1.22	23.69	0.53	1.88	21.37	0.72	1.90
	2.00	1.41	27.23	0.66	1.86	25.40	0.87	1.87
	3.00	1.73	33.66	0.78	1.82	32.45	1.12	1.83
	4.00	2.00	39.04	0.94	1.79	37.92	1.26	1.79
	5.00	2.24	43.87	1.11	1.75	43.45	1.40	1.75
	6.00	2.45	48.24	1.12	1.71	48.61	1.54	1.71
	8.00	2.83	56.83	1.56	1.64	55.98	2.20	1.64
10.00	3.16	63.77	1.55	1.56	63.90	2.12	1.56	
12.00	3.46	69.84	1.42	1.48	70.06	2.90	1.48	
propranolol HCl 30 % beeswax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	7.26	0.12	1.97	6.77	0.19	1.97
	0.50	0.71	9.43	0.11	1.96	9.57	0.24	1.96
	0.75	0.87	11.83	0.15	1.95	12.22	0.26	1.94
	1.00	1.00	13.97	0.28	1.93	14.52	0.30	1.93
	1.50	1.22	17.58	0.40	1.92	17.98	0.27	1.91
	2.00	1.41	20.83	0.47	1.90	21.40	0.31	1.90
	3.00	1.73	25.97	0.40	1.87	26.34	0.46	1.87
	4.00	2.00	30.33	0.63	1.84	30.86	0.32	1.84
	5.00	2.24	34.80	0.42	1.81	34.23	0.32	1.82
	6.00	2.45	38.20	0.52	1.79	37.80	0.37	1.79
	8.00	2.83	44.47	0.59	1.74	43.75	0.68	1.75
10.00	3.16	49.64	0.66	1.70	49.01	0.78	1.71	
12.00	3.46	54.43	0.77	1.66	53.68	0.92	1.67	
propranolol HCl 50 % beeswax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.04	0.21	1.96	6.89	0.05	1.97
	0.50	0.71	9.97	0.26	1.95	9.37	0.21	1.96
	0.75	0.87	11.92	0.40	1.94	11.66	0.19	1.95
	1.00	1.00	13.82	0.67	1.94	13.64	0.17	1.94
	1.50	1.22	17.22	0.86	1.92	16.56	0.16	1.92
	2.00	1.41	20.29	0.81	1.90	19.38	0.12	1.91
	3.00	1.73	25.06	0.99	1.87	23.77	0.27	1.88
	4.00	2.00	29.34	0.93	1.85	26.98	0.62	1.86
	5.00	2.24	33.05	0.85	1.83	30.28	0.35	1.84
	6.00	2.45	36.37	0.90	1.80	32.98	0.45	1.83
	8.00	2.83	39.98	0.90	1.78	37.67	0.95	1.79
10.00	3.16	45.53	0.95	1.74	42.15	0.89	1.76	
12.00	3.46	50.19	0.85	1.70	45.30	1.37	1.74	

Table 53 Percentage amount of propranolol HCl matrix tablet release from various concentration of propranolol HCl and carnauba wax at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % carnauba wax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	13.47	0.35	1.94	12.98	0.20	1.94
	0.50	0.71	18.75	0.48	1.91	17.38	0.34	1.92
	0.75	0.87	23.33	0.58	1.88	20.97	0.17	1.90
	1.00	1.00	27.49	0.62	1.86	24.34	0.15	1.88
	1.50	1.22	34.85	0.69	1.81	30.67	0.30	1.84
	2.00	1.41	41.86	0.56	1.76	37.20	0.85	1.80
	3.00	1.73	59.54	1.28	1.61	51.97	1.60	1.68
	4.00	2.00	76.44	2.65	1.37	68.08	1.83	1.50
	5.00	2.24	84.53	1.40	1.19	79.97	1.93	1.30
	6.00	2.45	87.92	1.32	1.08	86.36	1.27	1.13
	8.00	2.83	91.14	0.58	0.95	88.90	0.86	1.05
10.00	3.16	93.44	0.25	0.82	91.36	1.00	0.94	
12.00	3.46	96.22	0.19	0.58	94.32	0.74	0.75	
propranolol HCl 30 % carnauba wax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	12.76	0.21	1.94	13.49	0.22	1.94
	0.50	0.71	16.95	0.62	1.92	16.32	0.34	1.92
	0.75	0.87	21.33	0.48	1.90	19.87	0.35	1.90
	1.00	1.00	25.58	0.43	1.87	23.04	0.39	1.89
	1.50	1.22	34.17	0.83	1.82	28.92	0.35	1.85
	2.00	1.41	46.22	1.69	1.73	35.82	0.36	1.81
	3.00	1.73	75.90	4.17	1.38	57.03	1.83	1.63
	4.00	2.00	92.44	0.86	0.88	77.53	2.38	1.35
	5.00	2.24	94.47	0.29	0.74	88.24	2.22	1.07
	6.00	2.45	95.54	0.61	0.65	91.42	1.59	0.93
	8.00	2.83	95.40	0.75	0.66	94.69	0.82	0.73
10.00	3.16	97.17	0.47	0.45	96.33	0.62	0.57	
12.00	3.46	98.36	0.48	0.21	97.97	0.08	0.31	
propranolol HCl 50 % carnauba wax 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	15.79	0.75	1.93	15.62	1.65	1.93
	0.50	0.71	19.32	0.63	1.91	17.57	0.30	1.92
	0.75	0.87	23.40	0.67	1.88	21.18	0.24	1.90
	1.00	1.00	26.31	0.47	1.87	23.96	0.28	1.88
	1.50	1.22	31.55	0.45	1.84	28.30	0.01	1.86
	2.00	1.41	36.00	0.25	1.81	32.41	0.23	1.83
	3.00	1.73	42.91	0.47	1.76	38.47	0.22	1.79
	4.00	2.00	48.51	0.47	1.71	43.48	0.24	1.75
	5.00	2.24	52.94	0.88	1.67	47.10	0.65	1.72
	6.00	2.45	58.26	0.17	1.62	51.67	0.41	1.68
	8.00	2.83	68.16	0.49	1.50	58.88	0.54	1.61
10.00	3.16	77.75	1.16	1.35	64.71	0.60	1.55	
12.00	3.46	83.75	0.47	1.21	69.23	0.29	1.49	

Table 54 Percentage amount of propranolol HCl matrix tablet release from various concentration of propranolol HCl and glyceryl monostearate at 40 %.

Formulation	time	time (1/2)	Dissolution medium						
			0.1 N HCl			Phosphate buffer pH 6.8			
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained	
propranolol HCl 20 % GMS 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	0.25	0.50	10.33	0.53	1.95	10.74	0.75	1.95	1.95
	0.50	0.71	14.54	0.87	1.93	15.86	0.90	1.93	1.93
	0.75	0.87	17.98	0.76	1.91	18.84	0.03	1.91	1.91
	1.00	1.00	21.43	0.74	1.90	21.55	0.11	1.89	1.89
	1.50	1.22	27.04	0.64	1.86	26.17	0.43	1.87	1.87
	2.00	1.41	32.00	0.65	1.83	30.05	0.43	1.84	1.84
	3.00	1.73	40.25	0.84	1.78	36.43	0.50	1.80	1.80
	4.00	2.00	47.67	1.30	1.72	42.19	0.71	1.76	1.76
	5.00	2.24	55.33	1.86	1.65	47.36	0.86	1.72	1.72
	6.00	2.45	62.43	2.10	1.57	52.21	0.68	1.68	1.68
	8.00	2.83	74.98	2.83	1.40	60.17	0.79	1.60	1.60
10.00	3.16	88.16	4.98	1.07	69.82	3.51	1.48	1.48	
12.00	3.46	96.81	3.33	0.50	78.41	4.68	1.33	1.33	
propranolol HCl 30 % GMS 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00
	0.25	0.50	9.65	0.20	1.96	9.83	0.23	1.96	1.96
	0.50	0.71	13.32	0.17	1.94	13.81	0.20	1.94	1.94
	0.75	0.87	16.82	0.22	1.92	17.21	0.26	1.92	1.92
	1.00	1.00	20.20	0.22	1.90	20.06	0.21	1.90	1.90
	1.50	1.22	25.80	0.34	1.87	24.61	0.24	1.88	1.88
	2.00	1.41	30.61	0.39	1.84	28.53	0.29	1.85	1.85
	3.00	1.73	38.63	0.65	1.79	35.71	0.61	1.81	1.81
	4.00	2.00	46.18	2.03	1.73	41.58	0.36	1.77	1.77
	5.00	2.24	53.71	2.07	1.67	46.39	0.25	1.73	1.73
	6.00	2.45	59.98	3.71	1.60	50.23	0.38	1.70	1.70
	8.00	2.83	73.87	3.41	1.42	58.15	0.69	1.62	1.62
10.00	3.16	84.56	4.82	1.19	66.84	1.99	1.52	1.52	
12.00	3.46	93.14	4.53	0.84	76.06	2.29	1.38	1.38	
propranolol HCl 50 % GMS 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00
	0.25	0.50	4.86	0.16	1.98	9.06	0.24	1.96	1.96
	0.50	0.71	6.70	0.23	1.97	11.94	0.25	1.94	1.94
	0.75	0.87	8.55	0.28	1.96	14.47	0.25	1.93	1.93
	1.00	1.00	10.42	0.36	1.95	16.78	0.21	1.92	1.92
	1.50	1.22	16.10	0.58	1.92	21.09	0.25	1.90	1.90
	2.00	1.41	21.41	0.67	1.90	24.81	0.34	1.88	1.88
	3.00	1.73	30.31	0.58	1.84	31.32	0.41	1.84	1.84
	4.00	2.00	37.91	0.65	1.79	36.68	0.62	1.80	1.80
	5.00	2.24	44.94	0.72	1.74	41.27	0.30	1.77	1.77
	6.00	2.45	51.54	1.72	1.69	45.55	0.60	1.74	1.74
	8.00	2.83	63.75	1.14	1.56	54.10	1.13	1.66	1.66
10.00	3.16	73.27	0.16	1.43	62.12	1.17	1.58	1.58	
12.00	3.46	80.44	1.63	1.29	68.91	1.33	1.49	1.49	

Table 55 Percentage amount of propranolol HCl matrix tablet release from various concentration of propranolol HCl and Lubritab® at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % lubritab 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	8.31	0.24	1.96	12.68	0.11	1.94
	0.50	0.71	12.81	0.22	1.94	17.58	0.44	1.92
	0.75	0.87	17.47	0.22	1.92	21.52	0.23	1.89
	1.00	1.00	21.36	0.21	1.90	24.84	0.22	1.88
	1.50	1.22	27.66	0.27	1.86	30.40	0.28	1.84
	2.00	1.41	32.91	0.34	1.83	35.41	0.34	1.81
	3.00	1.73	42.59	1.17	1.76	43.68	0.31	1.75
	4.00	2.00	51.21	1.33	1.69	54.53	1.17	1.66
	5.00	2.24	60.85	1.49	1.59	59.23	0.27	1.61
	6.00	2.45	71.29	1.93	1.46	67.36	0.97	1.51
	8.00	2.83	84.63	1.37	1.19	79.69	1.24	1.31
10.00	3.16	92.00	0.58	0.90	89.52	0.41	1.02	
12.00	3.46	97.02	0.28	0.47	94.12	0.60	0.77	
propranolol HCl 30 % lubritab 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.57	0.43	1.96	11.99	0.71	1.94
	0.50	0.71	13.82	0.24	1.94	16.33	0.78	1.92
	0.75	0.87	17.59	0.23	1.92	19.92	0.67	1.90
	1.00	1.00	20.96	0.40	1.90	23.13	0.69	1.89
	1.50	1.22	26.22	0.45	1.87	28.15	0.58	1.86
	2.00	1.41	30.80	0.50	1.84	32.74	0.73	1.83
	3.00	1.73	42.24	0.48	1.76	39.88	0.57	1.78
	4.00	2.00	48.57	0.84	1.71	47.68	0.74	1.72
	5.00	2.24	54.15	0.59	1.66	53.62	0.82	1.67
	6.00	2.45	60.23	0.96	1.60	57.56	0.72	1.63
	8.00	2.83	71.55	0.55	1.45	65.95	0.88	1.53
10.00	3.16	81.51	1.11	1.27	75.45	0.80	1.39	
12.00	3.46	88.18	1.31	1.07	83.46	1.11	1.22	
propranolol HCl 50 % lubritab 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	10.73	0.14	1.95	10.48	0.23	1.95
	0.50	0.71	13.33	2.22	1.94	14.16	1.73	1.93
	0.75	0.87	16.74	1.81	1.92	17.25	0.34	1.92
	1.00	1.00	19.62	1.53	1.91	19.84	0.06	1.90
	1.50	1.22	23.91	2.95	1.88	24.57	0.53	1.88
	2.00	1.41	28.17	2.38	1.86	27.77	1.05	1.86
	3.00	1.73	33.34	3.58	1.82	34.10	1.31	1.82
	4.00	2.00	39.14	3.24	1.78	39.05	0.88	1.79
	5.00	2.24	44.32	2.93	1.75	42.96	1.52	1.76
	6.00	2.45	48.65	2.32	1.71	46.43	1.27	1.73
	8.00	2.83	54.90	1.06	1.65	52.65	1.67	1.68
10.00	3.16	62.04	3.78	1.58	58.01	1.67	1.62	
12.00	3.46	68.49	3.62	1.50	63.08	0.75	1.57	

Table 56 Percentage amount of propranolol HCl matrix tablet release from various concentration of propranolol HCl and Compritol® at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl pH 1.2			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % compritol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.11	0.07	1.96	8.29	1.06	1.96
	0.50	0.71	12.37	0.11	1.94	11.31	1.25	1.95
	0.75	0.87	15.19	0.25	1.93	13.96	1.29	1.93
	1.00	1.00	17.36	0.16	1.92	16.60	0.78	1.92
	1.50	1.22	21.21	0.19	1.90	20.65	0.39	1.90
	2.00	1.41	24.60	0.18	1.88	23.79	0.10	1.88
	3.00	1.73	30.24	0.33	1.84	29.29	0.34	1.85
	4.00	2.00	36.18	0.51	1.80	35.65	0.42	1.81
	5.00	2.24	42.38	0.31	1.76	42.10	0.37	1.76
	6.00	2.45	48.59	0.62	1.71	48.49	0.44	1.71
	8.00	2.83	59.58	1.04	1.61	55.13	0.35	1.65
10.00	3.16	73.20	1.15	1.43	65.27	0.61	1.54	
12.00	3.46	81.45	0.83	1.27	73.68	0.36	1.42	
propranolol HCl 30 % compritol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.13	0.38	1.96	9.84	0.50	1.96
	0.50	0.71	12.38	0.29	1.94	12.85	0.45	1.94
	0.75	0.87	14.93	0.53	1.93	15.60	0.51	1.93
	1.00	1.00	17.25	0.62	1.92	17.97	0.58	1.91
	1.50	1.22	21.00	0.67	1.90	21.72	0.49	1.89
	2.00	1.41	24.37	0.70	1.88	24.89	0.75	1.88
	3.00	1.73	30.04	0.84	1.84	30.34	0.88	1.84
	4.00	2.00	35.24	0.98	1.81	34.72	1.25	1.81
	5.00	2.24	40.02	0.99	1.78	38.90	0.91	1.79
	6.00	2.45	44.58	1.10	1.74	42.62	1.08	1.76
	8.00	2.83	54.11	0.38	1.66	49.91	1.07	1.70
10.00	3.16	60.37	1.26	1.60	55.83	0.42	1.65	
12.00	3.46	67.29	2.43	1.51	67.43	0.40	1.51	
propranolol HCl 50 % compritol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	7.49	0.31	1.97	6.89	0.18	1.97
	0.50	0.71	10.14	0.33	1.95	9.15	0.20	1.96
	0.75	0.87	12.09	0.37	1.94	10.96	0.20	1.95
	1.00	1.00	13.72	0.39	1.94	12.43	0.23	1.94
	1.50	1.22	16.25	0.41	1.92	14.74	0.26	1.93
	2.00	1.41	18.38	0.40	1.91	16.73	0.29	1.92
	3.00	1.73	21.77	0.65	1.89	20.22	0.26	1.90
	4.00	2.00	24.76	0.75	1.88	23.01	0.31	1.89
	5.00	2.24	27.38	0.47	1.86	25.51	0.39	1.87
	6.00	2.45	29.95	0.69	1.85	27.95	0.35	1.86
	8.00	2.83	33.99	0.41	1.82	31.12	0.68	1.84
10.00	3.16	38.26	0.54	1.79	35.35	0.35	1.81	
12.00	3.46	42.02	0.71	1.76	38.81	0.54	1.79	

Table 57 Percentage amount of propranolol HCl matrix tablet release from various concentration of propranolol HCl and Precirol® at 40 %.

Formulation	time	time (1/2)	Dissolution medium					
			0.1 N HCl pH 1.2			Phosphate buffer pH 6.8		
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained
propranolol HCl 20 % precirol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	9.29	0.18	1.96	8.96	0.31	1.96
	0.50	0.71	12.84	0.27	1.94	12.46	0.51	1.94
	0.75	0.87	15.95	0.17	1.92	15.55	0.51	1.93
	1.00	1.00	18.62	0.13	1.91	18.35	0.54	1.91
	1.50	1.22	23.26	0.02	1.89	22.97	0.61	1.89
	2.00	1.41	27.34	0.10	1.86	27.03	0.63	1.86
	3.00	1.73	34.41	0.09	1.82	33.70	0.83	1.82
	4.00	2.00	40.93	0.34	1.77	39.58	0.92	1.78
	5.00	2.24	47.59	0.76	1.72	45.16	0.47	1.74
	6.00	2.45	52.24	0.44	1.68	49.11	1.38	1.71
	8.00	2.83	61.59	0.19	1.58	57.78	1.45	1.63
10.00	3.16	71.14	0.45	1.46	65.48	1.33	1.54	
12.00	3.46	81.68	0.99	1.26	71.56	1.62	1.45	
propranolol HCl 30 % precirol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	5.12	0.18	1.98	7.78	0.28	1.96
	0.50	0.71	8.55	0.29	1.96	11.06	0.29	1.95
	0.75	0.87	12.20	0.27	1.94	13.97	0.23	1.93
	1.00	1.00	15.44	0.27	1.93	16.66	0.24	1.92
	1.50	1.22	20.68	0.16	1.90	21.14	0.21	1.90
	2.00	1.41	24.98	0.13	1.88	25.14	0.25	1.87
	3.00	1.73	31.95	0.48	1.83	31.81	0.23	1.83
	4.00	2.00	38.00	0.28	1.79	37.24	0.30	1.80
	5.00	2.24	43.92	0.21	1.75	42.78	0.27	1.76
	6.00	2.45	49.06	0.42	1.71	46.39	0.21	1.73
	8.00	2.83	57.02	0.47	1.63	53.91	0.29	1.66
10.00	3.16	64.81	1.01	1.55	59.50	0.22	1.61	
12.00	3.46	74.65	1.89	1.40	65.05	0.82	1.54	
propranolol HCl 50 % precirol 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00
	0.25	0.50	7.89	0.16	1.96	8.20	0.01	1.96
	0.50	0.71	10.77	0.91	1.95	11.46	0.04	1.95
	0.75	0.87	13.34	0.07	1.94	14.37	0.09	1.93
	1.00	1.00	15.55	0.09	1.93	16.79	0.10	1.92
	1.50	1.22	19.26	0.08	1.91	20.58	0.18	1.90
	2.00	1.41	22.49	0.09	1.89	23.99	0.44	1.88
	3.00	1.73	28.80	0.23	1.85	31.20	0.62	1.84
	4.00	2.00	33.79	0.45	1.82	35.99	0.52	1.81
	5.00	2.24	38.34	0.25	1.79	40.40	0.81	1.78
	6.00	2.45	42.09	0.32	1.76	43.82	0.92	1.75
	8.00	2.83	49.27	0.44	1.71	50.32	1.18	1.70
10.00	3.16	56.49	0.63	1.64	56.80	1.42	1.64	
12.00	3.46	62.60	0.73	1.57	62.27	2.18	1.58	

Table 58 Percentage amount of propranolol HCl matrix tablet release from various concentration of propranolol HCl and Gelucire® at 40 %.

Formulation	time	time (1/2)	Dissolution medium						
			0.1 N HCl pH 1.2			Phosphate buffer pH 6.8			
			Mean %	SD	log % drug remained	Mean %	SD	log % drug remained	
propranolol HCl 20 % gelucire 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	2.00
	0.25	0.50	8.78	0.22	1.96	11.43	0.03	1.95	1.95
	0.50	0.71	13.56	0.35	1.94	15.37	0.17	1.93	1.93
	0.75	0.87	18.29	0.41	1.91	19.53	0.41	1.91	1.91
	1.00	1.00	22.22	0.41	1.89	23.14	0.50	1.89	1.89
	1.50	1.22	28.93	0.66	1.85	29.12	0.51	1.85	1.85
	2.00	1.41	34.95	0.93	1.81	34.52	0.52	1.82	1.82
	3.00	1.73	49.97	5.36	1.70	46.86	0.48	1.73	1.73
	4.00	2.00	76.32	5.36	1.37	66.42	0.34	1.53	1.53
	5.00	2.24	95.93	5.01	0.61	93.35	3.51	0.82	0.82
	6.00	2.45	99.66	2.10	-0.47	100.33	0.17	0.00	0.00
	8.00	2.83	101.18	1.83	0.00	101.58	0.81	0.00	0.00
10.00	3.16	100.46	0.34	0.00	100.43	0.46	0.00	0.00	
12.00	3.46	100.23	0.34	0.00	100.01	0.52	0.00	0.00	
propranolol HCl 30 % gelucire 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00
	0.25	0.50	13.03	0.39	1.94	12.98	0.66	1.94	1.94
	0.50	0.71	18.32	0.36	1.91	18.00	0.65	1.91	1.91
	0.75	0.87	23.01	0.59	1.89	22.17	0.75	1.89	1.89
	1.00	1.00	26.99	0.81	1.86	25.88	0.96	1.87	1.87
	1.50	1.22	33.86	1.11	1.82	31.59	1.09	1.84	1.84
	2.00	1.41	46.00	3.60	1.73	39.41	3.78	1.78	1.78
	3.00	1.73	88.35	10.73	1.07	81.05	10.13	1.28	1.28
	4.00	2.00	98.78	1.35	0.09	96.44	1.63	0.55	0.55
	5.00	2.24	100.26	0.33	0.00	98.27	1.42	0.24	0.24
	6.00	2.45	100.12	0.78	0.00	98.77	0.45	0.09	0.09
	8.00	2.83	99.98	0.32	-1.70	99.23	0.21	-0.11	-0.11
10.00	3.16	99.46	0.25	-0.26	99.47	0.64	-0.27	-0.27	
12.00	3.46	99.12	0.27	-0.06	99.68	0.45	-0.49	-0.49	
propranolol HCl 50 % gelucire 40 % matrix tablet	0.00	0.00	0.00	0.00	2.00	0.00	0.00	2.00	2.00
	0.25	0.50	12.82	0.28	1.94	12.42	0.26	1.94	1.94
	0.50	0.71	18.42	0.35	1.91	17.22	0.42	1.92	1.92
	0.75	0.87	23.63	0.25	1.88	21.88	1.37	1.89	1.89
	1.00	1.00	26.95	0.58	1.86	24.54	0.57	1.88	1.88
	1.50	1.22	33.69	0.82	1.82	30.15	0.50	1.84	1.84
	2.00	1.41	40.58	1.04	1.77	35.89	0.50	1.81	1.81
	3.00	1.73	48.59	0.71	1.71	45.53	0.72	1.74	1.74
	4.00	2.00	61.15	4.53	1.59	50.22	1.21	1.70	1.70
	5.00	2.24	76.91	13.74	1.36	58.11	2.42	1.62	1.62
	6.00	2.45	98.88	2.36	0.05	64.75	4.34	1.55	1.55
	8.00	2.83	101.34	1.07	0.00	82.13	6.54	1.25	1.25
10.00	3.16	102.22	0.59	0.00	95.35	6.47	0.67	0.67	
12.00	3.46	102.92	0.86	0.00	99.39	1.80	-0.21	-0.21	

Release rate

Table 59 The release rate of propranolol HCl from matrix tablet produced from propranolol HCl at 40 % with various concentration of beeswax in 0.1 N HCl.

mean time	release rate (%/hour)			
	pl 40% beeswax 20%	pl 40% beeswax 30%	pl 40% beeswax 40%	pl 40 % beeswax 50 %
	pH 1.2	pH 1.2	pH 1.2	pH 1.2
0.125	64.12	52.78	39.95	28.24
0.375	27.33	22.52	15.92	11.36
0.625	21.58	23.04	12.98	9.82
0.875	18.11	14.19	11.49	8.92
1.250	17.78	16.60	10.08	7.29
1.750	22.92	23.85	7.71	6.08
2.500	20.94	19.27	7.94	5.68
3.500	11.81	10.86	10.10	3.88
4.500	7.32	7.58	9.79	3.92
5.500	3.22	4.65	7.44	3.76
7.000	2.13	3.36	6.02	3.19
9.000	1.13	2.14	3.79	2.95
11.000	0.70	1.21	2.41	2.64

Table 60 The release rate of propranolol HCl from matrix tablet produced from propranolol HCl at 40 % with various concentration of beeswax in phosphate buffer pH 6.8.

mean time	release rate (%/hour)			
	pl 40% beeswax 20%	pl 40% beeswax 30%	pl 40% beeswax 40%	pl 40% beeswax 50 %
	pH 6.8	pH 6.8	pH 6.8	pH 6.8
0.125	63.85	53.12	43.61	27.68
0.375	28.31	22.20	16.92	8.25
0.625	23.85	20.35	12.52	7.52
0.875	16.47	10.35	10.81	6.59
1.250	16.70	14.22	10.41	5.22
1.750	9.94	10.31	8.84	4.16
2.500	9.45	13.58	5.70	2.94
3.500	12.24	15.81	5.46	3.38
4.500	12.76	10.66	4.58	3.56
5.500	6.15	6.60	3.74	3.79
7.000	4.02	4.50	4.62	3.03
9.000	1.87	2.48	3.17	2.41
11.000	0.95	1.20	2.26	2.19

Table 61 The release rate of propranolol HCl from matrix tablet produced from beeswax at 40 % with various concentration of propranolol HCl in 0.1 N HCl.

mean time	release rate (%/hour.)		
	pl 20% beeswax 40%	pl 30% beeswax 40%	pl 50% beeswax 40%
	pH 1.2	pH 1.2	pH 1.2
0.125	44.66	29.04	36.15
0.375	9.01	8.68	3.74
0.625	12.08	9.62	7.80
0.875	11.09	8.54	7.58
1.250	8.96	7.23	6.79
1.750	7.08	6.49	6.15
2.500	6.43	5.15	4.78
3.500	5.38	4.36	4.28
4.500	4.84	4.47	3.71
5.500	4.36	3.40	3.31
7.000	4.30	3.14	1.81
9.000	3.47	2.59	2.78
11.000	3.04	2.39	2.33

Table 62 The release rate of propranolol HCl from matrix tablet produced from beeswax at 40 % with various concentration of propranolol HCl in phosphate buffer pH 6.8.

mean time	rate (%/hour.)		
	pl 20% beeswax 40%	pl 30% beeswax 40%	pl 50% beeswax 40%
	pH 6.8	pH 6.8	pH 6.8
0.125	29.26	27.06	27.57
0.375	12.50	11.23	9.90
0.625	13.46	10.57	9.18
0.875	11.53	9.20	7.91
1.250	9.36	6.93	5.84
1.750	8.07	6.84	5.65
2.500	7.04	4.94	4.39
3.500	5.47	4.52	3.22
4.500	5.53	3.37	3.29
5.500	5.16	3.57	2.70
7.000	3.69	2.98	2.34
9.000	3.96	2.63	2.24
11.000	3.08	2.34	1.57

Table 63 The release rate of propranolol HCl from matrix tablet produced from propranolol HCl at 40 % with various concentration of Compritol® in 0.1 N HCl.

mean time	release rate (%/hour)			
	pl 40% compritol 20%	pl 40% compritol 30%	pl 40% compritol 40%	pl 40% compritol 50 %
	pH 1.2	pH 1.2	pH 1.2	pH 1.2
0.125	50.69	39.51	31.77	26.85
0.375	22.99	14.87	11.52	7.27
0.625	18.63	12.54	9.21	5.93
0.875	15.38	10.31	7.59	4.86
1.250	13.18	8.45	6.12	3.69
1.750	9.05	7.67	5.11	3.02
2.500	8.35	6.01	4.48	2.52
3.500	7.03	5.40	3.50	2.23
4.500	7.15	4.68	3.05	1.82
5.500	7.71	4.39	2.69	1.73
7.000	7.48	4.69	2.58	1.81
9.000	4.87	5.63	2.56	1.26
11.000	2.81	5.40	2.17	1.25

Table 64 The release rate of propranolol HCl from matrix tablet produced from propranolol HCl at 40 % with various concentration of Compritol® in phosphate buffer pH 6.8.

mean time	release rate (%/hour)			
	pl 40% compritol 20%	pl 40% compritol 30%	pl 40% compritol 40%	pl 40% compritol 50 %
	pH 6.8	pH 6.8	pH 6.8	pH 6.8
0.125	53.26	43.68	31.75	25.71
0.375	23.07	14.93	10.30	7.76
0.625	17.51	12.28	8.34	6.14
0.875	14.88	10.14	6.88	5.54
1.250	9.99	8.22	5.58	3.44
1.750	9.26	6.33	4.75	3.13
2.500	7.76	5.54	2.91	2.87
3.500	6.49	4.59	3.37	2.08
4.500	5.60	4.40	3.12	1.87
5.500	4.21	4.01	2.52	1.66
7.000	4.87	3.16	2.60	2.48
9.000	4.94	3.26	2.70	1.36
11.000	4.27	3.03	1.88	1.39

Table 65 The release rate of propranolol HCl from matrix tablet produced from Compritol® at 40 % with various concentration of propranolol HCl in 0.1 N HCl.

mean time	release rate (%/hour.)		
	pl 20% compritol 40%	pl 30% compritol 40%	pl 50% compritol 40%
	pH 1.2	pH 1.2	pH 1.2
0.125	36.44	36.54	29.94
0.375	13.05	13.00	10.60
0.625	11.28	10.20	7.82
0.875	8.65	9.25	6.50
1.250	7.70	7.51	5.07
1.750	6.78	6.75	4.26
2.500	5.64	5.66	3.39
3.500	5.94	5.20	2.99
4.500	6.21	4.78	2.61
5.500	6.21	4.57	2.57
7.000	5.49	4.76	2.02
9.000	6.81	3.13	2.14
11.000	4.13	3.46	1.88

Table 66 The release rate of propranolol HCl from matrix tablet produced from Compritol® at 40 % with various concentration of propranolol HCl in phosphate buffer pH 6.8.

mean time	release rate (%/hour.)		
	pl 20% compritol 40%	pl 30% compritol 40%	pl 50% compritol 40%
	pH 6.8	pH 6.8	pH 6.8
0.125	33.15	39.37	27.55
0.375	12.08	12.01	9.06
0.625	10.60	11.01	7.24
0.875	10.56	9.49	5.88
1.250	8.11	7.49	4.62
1.750	6.28	6.34	3.97
2.500	5.50	5.45	3.49
3.500	6.36	4.38	2.80
4.500	6.45	4.18	2.49
5.500	6.39	3.72	2.44
7.000	3.32	3.64	1.58
9.000	5.07	2.96	2.12
11.000	4.21	5.80	1.73

Appendix C

Release rate

Table 67 Values for rate, amount released, and the corresponding reciprocal for the release blank propranolol HCl matrix and Inderal®.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % matrix pellet	0.125	363.28	90.82	0.0110	390.45	97.61	0.0102
	0.375	31.76	98.76	0.0101	6.66	99.28	0.0101
	0.625	-6.62	97.10	0.0103	0.61	99.43	0.0101
	0.875	1.73	97.54	0.0103	-2.91	98.70	0.0101
	1.250	-0.14	97.47	0.0103	-2.92	97.24	0.0103
	1.750	-0.05	97.44	0.0103	-0.61	96.94	0.0103
	2.500	-0.21	97.24	0.0103	-0.28	96.65	0.0103
	3.500	-0.11	97.12	0.0103	-0.22	96.44	0.0104
	4.500	-0.12	97.00	0.0103	-0.11	96.32	0.0104
	5.500	-0.55	96.45	0.0104	-0.09	96.23	0.0104
propranolol HCl 40 % matrix tablet	0.125	320.48	80.12	0.0125	342.20	85.55	0.0117
	0.375	23.08	85.89	0.0116	14.72	89.23	0.0112
	0.625	12.96	89.13	0.0112	17.72	93.66	0.0107
	0.875	17.28	93.45	0.0107	14.32	97.24	0.0103
	1.250	8.86	97.88	0.0102	5.16	99.82	0.0100
	1.750	2.54	99.15	0.0101	-1.94	98.85	0.0101
	2.500	-0.13	99.02	0.0101	-0.36	98.49	0.0102
	3.500	-0.57	98.45	0.0102	-0.85	97.64	0.0102
	4.500	-0.35	98.10	0.0102	-0.41	97.23	0.0103
	5.500	-0.31	97.79	0.0102	-0.11	97.12	0.0103
Inderal 160 mg.	0.125	5.66	1.42	0.7062	1.99	0.50	2.0080
	0.375	6.72	3.10	0.3231	4.60	1.65	0.6064
	0.625	9.03	5.35	0.1868	8.96	3.89	0.2571
	0.875	9.67	7.77	0.1287	10.83	6.60	0.1516
	1.250	9.61	12.57	0.0795	11.08	12.14	0.0824
	1.750	8.70	16.93	0.0591	10.52	17.40	0.0575
	2.500	7.78	24.71	0.0405	9.68	27.07	0.0369
	3.500	6.70	31.41	0.0318	8.31	35.38	0.0283
	4.500	6.58	37.98	0.0263	7.36	42.74	0.0234
	5.500	5.63	43.61	0.0229	5.90	48.64	0.0206
	7.000	4.66	52.92	0.0189	4.74	58.11	0.0172
9.000	3.76	60.45	0.0165	3.90	65.90	0.0152	
11.000	3.17	66.80	0.0150	2.90	71.70	0.0139	

Table 68 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet containing various amounts of beeswax.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % beeswax 20 % matrix tablet	0.125	64.12	16.03	0.0624	63.85	15.96	0.0626
	0.375	27.33	22.86	0.0437	28.31	23.04	0.0434
	0.625	21.58	28.26	0.0354	23.85	29.00	0.0345
	0.875	18.11	32.79	0.0305	16.47	33.12	0.0302
	1.250	17.78	41.68	0.0240	16.70	41.47	0.0241
	1.750	22.92	53.14	0.0188	9.94	46.44	0.0215
	2.500	20.94	74.08	0.0135	9.45	55.88	0.0179
	3.500	11.81	85.88	0.0116	12.24	68.13	0.0147
	4.500	7.32	93.21	0.0107	12.76	80.88	0.0124
	5.500	3.22	96.43	0.0104	6.15	87.04	0.0115
	7.000	2.13	100.70	0.0099	4.02	95.08	0.0105
9.000	1.13	102.96	0.0097	1.87	98.82	0.0101	
11.000	0.70	104.37	0.0096	0.95	100.71	0.0099	
propranolol HCl 40 % beeswax 30 % matrix tablet	0.125	52.78	13.20	0.0758	53.12	13.28	0.0753
	0.375	22.52	18.83	0.0531	22.20	18.83	0.0531
	0.625	23.04	24.59	0.0407	20.35	23.92	0.0418
	0.875	14.19	28.13	0.0355	10.35	26.51	0.0377
	1.250	16.60	36.43	0.0274	14.22	33.62	0.0297
	1.750	23.85	48.36	0.0207	10.31	38.77	0.0258
	2.500	19.27	67.63	0.0148	13.58	52.36	0.0191
	3.500	10.86	78.49	0.0127	15.81	68.17	0.0147
	4.500	7.58	86.06	0.0116	10.66	78.82	0.0127
	5.500	4.65	90.71	0.0110	6.60	85.43	0.0117
	7.000	3.36	97.44	0.0103	4.50	94.42	0.0106
9.000	2.14	101.71	0.0098	2.48	99.38	0.0101	
11.000	1.21	104.12	0.0096	1.20	101.78	0.0098	
propranolol HCl 40 % beeswax 40 % matrix tablet	0.125	39.95	9.99	0.1001	43.61	10.90	0.0917
	0.375	15.92	13.97	0.0716	16.92	15.13	0.0661
	0.625	12.98	17.21	0.0581	12.52	18.26	0.0548
	0.875	11.49	20.08	0.0498	10.81	20.97	0.0477
	1.250	10.08	25.12	0.0398	10.41	26.17	0.0382
	1.750	7.71	28.98	0.0345	8.84	30.59	0.0327
	2.500	7.94	36.92	0.0271	5.70	36.29	0.0276
	3.500	10.10	47.02	0.0213	5.46	41.75	0.0240
	4.500	9.79	56.81	0.0176	4.58	46.33	0.0216
	5.500	7.44	64.25	0.0156	3.74	50.08	0.0200
	7.000	6.02	76.28	0.0131	4.62	59.32	0.0169
9.000	3.79	83.87	0.0119	3.17	65.66	0.0152	
11.000	2.41	88.68	0.0113	2.26	70.18	0.0142	
propranolol HCl 40 % beeswax 50 % matrix tablet	0.125	28.24	7.06	0.1416	27.68	6.92	0.1445
	0.375	11.36	9.90	0.1010	8.25	8.98	0.1113
	0.625	9.82	12.36	0.0809	7.52	10.86	0.0921
	0.875	8.92	14.59	0.0686	6.59	12.51	0.0799
	1.250	7.29	18.23	0.0548	5.22	15.12	0.0661
	1.750	6.08	21.27	0.0470	4.16	17.20	0.0581
	2.500	5.68	26.96	0.0371	2.94	20.14	0.0496
	3.500	3.88	30.84	0.0324	3.38	23.52	0.0425
	4.500	3.92	34.76	0.0288	3.56	27.08	0.0369
	5.500	3.76	38.52	0.0260	3.79	30.88	0.0324
	7.000	3.19	44.89	0.0223	3.03	36.94	0.0271
9.000	2.95	50.79	0.0197	2.41	41.76	0.0239	
11.000	2.64	56.08	0.0178	2.19	46.14	0.0217	

Table 69 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet containing various amounts of carnauba wax.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % carnauba wax 20 % matrix tablet	0.125	66.51	16.63	0.0601	64.46	16.11	0.0621
	0.375	27.55	23.52	0.0425	28.43	23.22	0.0431
	0.625	25.40	29.86	0.0335	21.46	28.59	0.0350
	0.875	19.55	34.75	0.0288	19.17	33.38	0.0300
	1.250	21.01	45.26	0.0221	13.68	40.22	0.0249
	1.750	26.14	58.33	0.0171	14.88	47.66	0.0210
	2.500	32.41	90.74	0.0110	14.95	62.61	0.0160
	3.500	10.11	100.84	0.0099	22.97	85.59	0.0117
	4.500	2.04	102.89	0.0097	10.21	95.80	0.0104
	5.500	1.62	104.51	0.0096	5.89	101.68	0.0098
	7.000	0.29	105.08	0.0095	-0.20	101.28	0.0099
9.000	-0.90	103.28	0.0097	-0.19	100.90	0.0099	
11.000	-0.91	101.47	0.0099	-0.62	99.66	0.0100	
propranolol HCl 40 % carnauba wax 30 % matrix tablet	0.125	59.94	14.99	0.0667	58.98	14.74	0.0678
	0.375	24.06	21.00	0.0476	23.58	20.64	0.0485
	0.625	21.02	26.26	0.0381	17.55	25.03	0.0400
	0.875	20.22	31.31	0.0319	13.90	28.50	0.0351
	1.250	29.54	46.08	0.0217	15.28	36.14	0.0277
	1.750	37.82	65.00	0.0154	21.63	46.96	0.0213
	2.500	32.39	97.39	0.0103	29.92	76.88	0.0130
	3.500	4.17	101.56	0.0098	20.35	97.22	0.0103
	4.500	-0.54	101.02	0.0099	2.00	99.23	0.0101
	5.500	0.11	101.14	0.0099	0.87	100.10	0.0100
	7.000	0.82	102.78	0.0097	0.24	100.58	0.0099
9.000	-1.18	100.42	0.0100	-0.41	99.77	0.0100	
11.000	-0.28	99.87	0.0100	-0.09	99.59	0.0100	
propranolol HCl 40 % carnauba wax 40 % matrix tablet	0.125	48.86	12.22	0.0819	47.81	11.95	0.0837
	0.375	20.47	17.33	0.0577	19.62	16.86	0.0593
	0.625	18.38	21.93	0.0456	14.67	20.53	0.0487
	0.875	16.01	25.93	0.0386	12.42	23.63	0.0423
	1.250	14.41	33.13	0.0302	10.71	28.98	0.0345
	1.750	10.50	38.38	0.0261	8.83	33.40	0.0299
	2.500	9.77	48.15	0.0208	7.61	41.01	0.0244
	3.500	9.29	57.45	0.0174	7.12	48.13	0.0208
	4.500	11.69	69.13	0.0145	6.52	54.65	0.0183
	5.500	15.69	84.83	0.0118	6.16	60.81	0.0164
	7.000	5.92	96.67	0.0103	6.67	74.15	0.0135
9.000	3.06	102.79	0.0097	7.24	88.62	0.0113	
11.000	1.50	105.79	0.0095	4.67	97.95	0.0102	
propranolol HCl 40 % carnauba wax 50 % matrix tablet	0.125	42.48	10.62	0.0942	36.17	9.04	0.1106
	0.375	15.20	14.42	0.0693	13.94	12.53	0.0798
	0.625	13.08	17.69	0.0565	11.06	15.29	0.0654
	0.875	10.82	20.40	0.0490	9.06	17.56	0.0570
	1.250	9.12	24.96	0.0401	7.49	21.30	0.0470
	1.750	7.94	28.93	0.0346	6.68	24.64	0.0406
	2.500	6.60	35.53	0.0281	6.12	30.75	0.0325
	3.500	5.81	41.33	0.0242	5.24	36.00	0.0278
	4.500	4.63	45.96	0.0218	4.40	40.40	0.0248
	5.500	4.63	50.59	0.0198	4.63	45.02	0.0222
	7.000	3.88	58.35	0.0171	3.89	52.79	0.0189
9.000	3.88	66.10	0.0151	3.28	59.36	0.0168	
11.000	2.91	71.93	0.0139	2.67	64.70	0.0155	

Table 70 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet containing various amounts of GMS.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % GMS 20 % matrix tablet	0.125	48.22	12.05	0.0830	59.83	14.96	0.0669
	0.375	25.03	18.31	0.0546	28.91	22.19	0.0451
	0.625	20.96	23.55	0.0425	22.19	27.73	0.0361
	0.875	17.16	27.84	0.0359	15.44	31.59	0.0317
	1.250	14.06	34.87	0.0287	13.66	38.42	0.0260
	1.750	12.58	41.16	0.0243	11.49	44.17	0.0226
	2.500	10.20	51.36	0.0195	8.98	53.15	0.0188
	3.500	8.34	59.70	0.0167	6.43	59.58	0.0168
	4.500	6.12	65.82	0.0152	7.26	66.84	0.0150
	5.500	8.15	73.97	0.0135	6.71	73.55	0.0136
	7.000	6.21	86.38	0.0116	4.81	83.17	0.0120
9.000	4.25	94.89	0.0105	3.37	89.90	0.0111	
11.000	2.23	99.35	0.0101	2.08	94.05	0.0106	
propranolol HCl 40 % GMS 30 % matrix tablet	0.125	41.60	10.40	0.0962	52.70	13.18	0.0759
	0.375	19.72	15.33	0.0652	20.99	18.42	0.0543
	0.625	17.34	19.67	0.0508	17.29	22.75	0.0440
	0.875	15.02	23.42	0.0427	13.40	26.09	0.0383
	1.250	13.15	30.00	0.0333	10.98	31.58	0.0317
	1.750	10.63	35.31	0.0283	10.39	36.78	0.0272
	2.500	9.72	45.03	0.0222	8.48	45.26	0.0221
	3.500	8.46	53.49	0.0187	7.71	52.97	0.0189
	4.500	7.06	60.55	0.0165	5.46	58.43	0.0171
	5.500	5.73	66.28	0.0151	4.50	62.92	0.0159
	7.000	5.74	77.77	0.0129	5.57	74.05	0.0135
9.000	5.16	88.09	0.0114	4.40	82.85	0.0121	
11.000	3.39	94.86	0.0105	2.96	88.77	0.0113	
propranolol HCl 40 % GMS 40 % matrix tablet	0.125	33.52	8.38	0.1193	37.37	9.34	0.1070
	0.375	17.42	12.74	0.0785	17.88	13.81	0.0724
	0.625	15.20	16.54	0.0605	14.13	17.35	0.0576
	0.875	13.05	19.80	0.0505	11.24	20.16	0.0496
	1.250	12.62	26.11	0.0383	8.71	24.51	0.0408
	1.750	8.09	30.15	0.0332	7.61	28.32	0.0353
	2.500	8.26	38.41	0.0260	6.09	34.41	0.0291
	3.500	7.43	45.83	0.0218	5.17	39.58	0.0253
	4.500	6.18	52.01	0.0192	4.64	44.21	0.0226
	5.500	5.32	57.33	0.0174	4.29	48.50	0.0206
	7.000	4.57	66.47	0.0150	3.89	56.27	0.0178
9.000	4.02	74.50	0.0134	3.05	62.38	0.0160	
11.000	3.62	81.75	0.0122	2.48	67.34	0.0149	
propranolol HCl 40 % GMS 50 % matrix pellet	0.125	29.00	7.25	0.1379	36.27	9.07	0.1103
	0.375	14.40	10.85	0.0922	16.06	13.08	0.0764
	0.625	12.64	14.01	0.0714	13.30	16.41	0.0610
	0.875	10.96	16.75	0.0597	11.41	19.26	0.0519
	1.250	9.00	21.25	0.0471	9.24	23.88	0.0419
	1.750	8.79	25.64	0.0390	8.04	27.90	0.0358
	2.500	7.82	33.46	0.0299	4.36	32.26	0.0310
	3.500	6.93	40.39	0.0248	5.80	38.06	0.0263
	4.500	5.99	46.38	0.0216	4.75	42.80	0.0234
	5.500	5.70	52.09	0.0192	4.09	46.89	0.0213
	7.000	5.18	62.45	0.0160	4.02	54.94	0.0182
9.000	4.80	72.04	0.0139	3.87	62.68	0.0160	
11.000	4.37	80.77	0.0124	4.46	71.59	0.0140	

Table 71 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet containing various amounts of Lubritab®.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % lubritab 20 % matrix tablet	0.125	64.58	16.15	0.0619	66.93	16.73	0.0598
	0.375	33.78	24.59	0.0407	33.52	25.11	0.0398
	0.625	25.37	30.93	0.0323	25.96	31.60	0.0316
	0.875	18.23	35.49	0.0282	17.79	36.05	0.0277
	1.250	17.45	44.22	0.0226	14.90	43.50	0.0230
	1.750	16.77	52.60	0.0190	10.67	48.84	0.0205
	2.500	19.98	72.58	0.0138	10.73	59.57	0.0168
	3.500	19.57	92.15	0.0109	10.80	70.37	0.0142
	4.500	6.79	98.94	0.0101	11.91	82.28	0.0122
	5.500	1.39	100.33	0.0100	8.74	91.02	0.0110
	7.000	0.60	101.53	0.0098	3.51	98.04	0.0102
9.000	-0.14	101.25	0.0099	0.73	99.50	0.0101	
11.000	0.59	102.44	0.0098	0.14	99.77	0.0100	
propranolol HCl 40 % lubritab 30 % matrix tablet	0.125	53.70	13.42	0.0745	53.22	13.30	0.0752
	0.375	22.47	19.04	0.0525	21.46	18.67	0.0536
	0.625	19.24	23.85	0.0419	17.72	23.10	0.0433
	0.875	17.72	28.28	0.0354	17.01	27.35	0.0366
	1.250	13.70	35.13	0.0285	11.37	33.04	0.0303
	1.750	12.60	41.43	0.0241	11.59	38.83	0.0258
	2.500	12.91	54.34	0.0184	8.05	46.88	0.0213
	3.500	18.63	72.97	0.0137	8.09	54.97	0.0182
	4.500	11.52	84.49	0.0118	8.31	63.28	0.0158
	5.500	6.39	90.88	0.0110	8.16	71.44	0.0140
	7.000	3.32	97.52	0.0103	7.10	85.64	0.0117
9.000	1.84	101.20	0.0099	3.41	92.46	0.0108	
11.000	0.26	101.73	0.0098	3.49	99.44	0.0101	
propranolol HCl 40 % lubritab 40 % matrix tablet	0.125	43.34	10.84	0.0923	41.08	10.27	0.0974
	0.375	19.67	15.75	0.0635	17.91	14.75	0.0678
	0.625	17.10	20.03	0.0499	14.38	18.34	0.0545
	0.875	13.89	23.50	0.0426	11.28	21.16	0.0473
	1.250	11.75	29.37	0.0340	11.44	26.88	0.0372
	1.750	8.26	33.50	0.0298	8.45	31.10	0.0322
	2.500	7.55	41.05	0.0244	7.00	38.10	0.0262
	3.500	6.28	47.33	0.0211	5.54	43.64	0.0229
	4.500	5.72	53.05	0.0189	5.21	48.85	0.0205
	5.500	4.86	57.90	0.0173	4.26	53.11	0.0188
	7.000	4.41	66.72	0.0150	3.88	60.86	0.0164
9.000	5.18	77.07	0.0130	3.22	67.31	0.0149	
11.000	4.31	85.69	0.0117	3.16	73.62	0.0136	
propranolol HCl 40 % lubritab 50 % matrix tablet	0.125	33.80	8.45	0.1183	38.90	9.72	0.1028
	0.375	8.16	10.49	0.0953	7.34	11.56	0.0865
	0.625	9.98	12.98	0.0770	9.53	13.94	0.0717
	0.875	10.54	15.62	0.0640	8.44	16.05	0.0623
	1.250	8.35	19.79	0.0505	6.47	19.28	0.0519
	1.750	6.54	23.06	0.0434	5.54	22.05	0.0453
	2.500	5.72	28.78	0.0348	3.84	25.89	0.0386
	3.500	4.13	32.90	0.0304	3.92	29.81	0.0335
	4.500	3.78	36.69	0.0273	3.63	33.43	0.0299
	5.500	3.53	40.22	0.0249	2.80	36.23	0.0276
	7.000	3.07	46.35	0.0216	2.76	41.75	0.0240
9.000	3.00	52.35	0.0191	2.62	46.98	0.0213	
11.000	2.81	57.98	0.0172	2.04	51.07	0.0196	

Table 72 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet containing various amounts of Compritol®.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % compritol 20 % matrix tablet	0.125	50.69	12.67	0.0789	53.26	13.32	0.0751
	0.375	22.99	18.42	0.0543	23.07	19.08	0.0524
	0.625	18.63	23.08	0.0433	17.51	23.46	0.0426
	0.875	15.38	26.92	0.0371	14.88	27.18	0.0368
	1.250	13.18	33.51	0.0298	9.99	32.17	0.0311
	1.750	9.05	38.04	0.0263	9.26	36.80	0.0272
	2.500	8.35	46.38	0.0216	7.76	44.56	0.0224
	3.500	7.03	53.42	0.0187	6.49	51.05	0.0196
	4.500	7.15	60.57	0.0165	5.60	56.65	0.0177
	5.500	7.71	68.28	0.0146	4.21	60.85	0.0164
	7.000	7.48	83.23	0.0120	4.87	70.59	0.0142
9.000	4.87	92.97	0.0108	4.94	80.47	0.0124	
11.000	2.81	98.60	0.0101	4.27	89.01	0.0112	
propranolol HCl 40 % compritol 30 % matrix tablet	0.125	39.51	9.88	0.1012	43.68	10.92	0.0916
	0.375	14.87	13.59	0.0736	14.93	14.65	0.0683
	0.625	12.54	16.73	0.0598	12.28	17.72	0.0564
	0.875	10.31	19.31	0.0518	10.14	20.26	0.0494
	1.250	8.45	23.53	0.0425	8.22	24.37	0.0410
	1.750	7.67	27.37	0.0365	6.33	27.53	0.0363
	2.500	6.01	33.38	0.0300	5.54	33.07	0.0302
	3.500	5.40	38.78	0.0258	4.59	37.66	0.0266
	4.500	4.68	43.46	0.0230	4.40	42.06	0.0238
	5.500	4.39	47.85	0.0209	4.01	46.07	0.0217
	7.000	4.69	57.22	0.0175	3.16	52.38	0.0191
9.000	5.63	68.49	0.0146	3.26	58.90	0.0170	
11.000	5.40	79.29	0.0126	3.03	64.96	0.0154	
propranolol HCl 40 % compritol 40 % matrix tablet	0.125	31.77	7.94	0.1259	31.75	7.94	0.1260
	0.375	11.52	10.82	0.0924	10.30	10.51	0.0951
	0.625	9.21	13.13	0.0762	8.34	12.60	0.0794
	0.875	7.59	15.02	0.0666	6.88	14.32	0.0699
	1.250	6.12	18.08	0.0553	5.58	17.11	0.0585
	1.750	5.11	20.64	0.0484	4.75	19.48	0.0513
	2.500	4.48	25.12	0.0398	2.91	22.39	0.0447
	3.500	3.50	28.62	0.0349	3.37	25.76	0.0388
	4.500	3.05	31.66	0.0316	3.12	28.88	0.0346
	5.500	2.69	34.35	0.0291	2.52	31.41	0.0318
	7.000	2.58	39.51	0.0253	2.60	36.61	0.0273
9.000	2.56	44.62	0.0224	2.70	42.01	0.0238	
11.000	2.17	48.96	0.0204	1.88	45.78	0.0218	
propranolol HCl 40 % compritol 50 % matrix tablet	0.125	26.85	6.71	0.1490	25.71	6.43	0.1556
	0.375	7.27	8.53	0.1172	7.76	8.37	0.1195
	0.625	5.93	10.01	0.0999	6.14	9.90	0.1010
	0.875	4.86	11.23	0.0891	5.54	11.29	0.0886
	1.250	3.69	13.07	0.0765	3.44	13.01	0.0769
	1.750	3.02	14.58	0.0686	3.13	14.57	0.0686
	2.500	2.52	17.11	0.0585	2.87	17.44	0.0573
	3.500	2.23	19.33	0.0517	2.08	19.52	0.0512
	4.500	1.82	21.15	0.0473	1.87	21.40	0.0467
	5.500	1.73	22.88	0.0437	1.66	23.05	0.0434
	7.000	1.81	26.50	0.0377	2.48	28.02	0.0357
9.000	1.26	29.02	0.0345	1.36	30.74	0.0325	
11.000	1.25	31.52	0.0317	1.39	33.53	0.0298	

Table 73 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet containing various amounts of Precirol®.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % precirol 20 % matrix tablet	0.125	56.55	14.14	0.0707	52.28	13.07	0.0765
	0.375	25.33	20.47	0.0488	25.24	19.38	0.0516
	0.625	19.32	25.30	0.0395	20.12	24.41	0.0410
	0.875	15.80	29.25	0.0342	18.49	29.03	0.0344
	1.250	13.16	35.83	0.0279	14.21	36.14	0.0277
	1.750	11.85	41.76	0.0239	10.80	41.54	0.0241
	2.500	9.09	50.85	0.0197	10.56	52.10	0.0192
	3.500	8.46	59.31	0.0169	5.81	57.91	0.0173
	4.500	8.55	67.85	0.0147	7.22	65.12	0.0154
	5.500	8.59	76.44	0.0131	7.24	72.36	0.0138
	7.000	8.17	92.79	0.0108	6.76	85.89	0.0116
9.000	4.54	101.88	0.0098	4.62	95.13	0.0105	
11.000	2.67	107.22	0.0093	3.58	102.29	0.0098	
propranolol HCl 40 % precirol 30 % matrix tablet	0.125	37.14	9.29	0.1077	39.83	9.96	0.1004
	0.375	19.77	14.23	0.0703	16.93	14.19	0.0705
	0.625	18.35	18.82	0.0531	15.10	17.97	0.0557
	0.875	14.93	22.55	0.0443	14.08	21.49	0.0465
	1.250	10.52	27.81	0.0360	10.87	26.92	0.0371
	1.750	9.83	32.73	0.0306	10.28	32.06	0.0312
	2.500	8.17	40.90	0.0244	8.10	40.16	0.0249
	3.500	8.75	49.65	0.0201	6.54	46.70	0.0214
	4.500	4.61	54.26	0.0184	5.16	51.86	0.0193
	5.500	5.34	59.60	0.0168	5.21	57.06	0.0175
	7.000	5.83	71.25	0.0140	4.37	65.81	0.0152
9.000	9.31	89.88	0.0111	4.93	75.67	0.0132	
11.000	5.50	100.89	0.0099	5.10	85.87	0.0116	
propranolol HCl 40 % precirol 40 % matrix tablet	0.125	25.90	6.48	0.1544	29.93	7.48	0.1337
	0.375	14.77	10.17	0.0983	11.96	10.47	0.0955
	0.625	12.51	13.30	0.0752	11.37	13.31	0.0751
	0.875	10.78	15.99	0.0625	9.50	15.69	0.0637
	1.250	8.67	20.33	0.0492	8.24	19.81	0.0505
	1.750	9.42	25.04	0.0399	6.66	23.14	0.0432
	2.500	5.68	30.71	0.0326	6.63	29.77	0.0336
	3.500	5.60	36.31	0.0275	4.82	34.59	0.0289
	4.500	4.70	41.01	0.0244	4.76	39.35	0.0254
	5.500	4.84	45.85	0.0218	3.93	43.28	0.0231
	7.000	4.20	54.25	0.0184	3.53	50.33	0.0199
9.000	3.54	61.32	0.0163	3.01	56.36	0.0177	
11.000	2.81	66.94	0.0149	2.77	61.90	0.0162	
propranolol HCl 40 % precirol 50 % matrix tablet	0.125	21.36	5.34	0.1873	27.66	6.92	0.1446
	0.375	12.62	8.50	0.1177	11.12	9.69	0.1032
	0.625	10.94	11.23	0.0890	9.95	12.18	0.0821
	0.875	9.15	13.52	0.0740	8.73	14.36	0.0696
	1.250	7.32	17.18	0.0582	7.15	17.94	0.0557
	1.750	6.37	20.37	0.0491	6.31	21.10	0.0474
	2.500	5.65	26.01	0.0384	4.64	25.73	0.0389
	3.500	4.46	30.47	0.0328	4.53	30.27	0.0330
	4.500	4.16	34.63	0.0289	4.15	34.42	0.0291
	5.500	3.81	38.45	0.0260	3.51	37.93	0.0264
	7.000	3.36	45.17	0.0221	3.08	44.08	0.0227
9.000	3.37	51.92	0.0193	2.93	49.94	0.0200	
11.000	2.74	57.41	0.0174	2.52	54.97	0.0182	

Table 74 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet containing various amounts of Gelucire®.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 40 % gelucire 30 % matrix tablet	0.125	42.11	10.53	0.0950	48.35	12.09	0.0827
	0.375	24.60	16.68	0.0600	20.90	17.31	0.0578
	0.625	26.81	23.38	0.0428	24.02	23.32	0.0429
	0.875	16.22	27.44	0.0364	11.36	26.16	0.0382
	1.250	16.30	35.59	0.0281	13.48	32.90	0.0304
	1.750	13.24	42.21	0.0237	11.00	38.40	0.0260
	2.500	11.39	53.59	0.0187	9.92	48.32	0.0207
	3.500	12.67	66.27	0.0151	9.37	57.69	0.0173
	4.500	11.84	78.11	0.0128	9.53	67.23	0.0149
	5.500	8.58	86.69	0.0115	8.07	75.30	0.0133
	7.000	4.60	95.89	0.0104	5.48	86.26	0.0116
9.000	3.13	102.14	0.0098	3.54	93.35	0.0107	
11.000	1.77	105.69	0.0095	2.61	98.56	0.0101	
propranolol HCl 40 % gelucire 40 % matrix tablet	0.125	37.08	9.27	0.1079	40.38	10.09	0.0991
	0.375	19.64	14.18	0.0705	18.58	14.74	0.0678
	0.625	18.82	18.89	0.0530	16.40	18.84	0.0531
	0.875	16.40	22.99	0.0435	13.45	22.20	0.0450
	1.250	12.93	29.45	0.0340	10.67	27.54	0.0363
	1.750	11.70	35.30	0.0283	8.90	31.99	0.0313
	2.500	8.80	44.10	0.0227	7.62	39.60	0.0253
	3.500	8.31	52.41	0.0191	6.39	45.99	0.0217
	4.500	6.54	58.95	0.0170	4.85	50.84	0.0197
	5.500	6.20	65.15	0.0153	4.89	55.73	0.0179
	7.000	6.52	78.19	0.0128	5.44	66.61	0.0150
9.000	5.13	88.44	0.0113	4.52	75.64	0.0132	
11.000	3.44	95.32	0.0105	4.11	83.87	0.0119	
propranolol HCl 40 % gelucire 50 % matrix tablet	0.125	43.32	10.83	0.0923	42.05	10.51	0.0951
	0.375	18.18	15.37	0.0650	15.89	14.49	0.0690
	0.625	15.94	19.36	0.0517	12.97	17.73	0.0564
	0.875	13.26	22.67	0.0441	10.91	20.45	0.0489
	1.250	11.07	28.21	0.0354	7.58	24.24	0.0412
	1.750	8.50	32.46	0.0308	7.23	27.86	0.0359
	2.500	7.97	40.43	0.0247	6.16	34.02	0.0294
	3.500	5.11	45.53	0.0220	3.77	37.79	0.0265
	4.500	5.26	50.79	0.0197	3.90	41.69	0.0240
	5.500	5.21	56.01	0.0179	3.85	45.54	0.0220
	7.000	5.02	66.05	0.0151	3.69	52.92	0.0189
9.000	3.65	73.34	0.0136	2.32	57.56	0.0174	
11.000	3.57	80.48	0.0124	2.20	61.95	0.0161	

Table 75 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet with series of beeswax at different loading dose.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 20 % beeswax 40 % matrix tablet	0.125	44.66	11.16	0.0896	29.26	7.31	0.1367
	0.375	9.01	13.42	0.0745	12.50	10.44	0.0958
	0.625	12.08	16.44	0.0608	13.46	13.81	0.0724
	0.875	11.09	19.21	0.0521	11.53	16.69	0.0599
	1.250	8.96	23.69	0.0422	9.36	21.37	0.0468
	1.750	7.08	27.23	0.0367	8.07	25.40	0.0394
	2.500	6.43	33.66	0.0297	7.04	32.45	0.0308
	3.500	5.38	39.04	0.0256	5.47	37.92	0.0264
	4.500	4.84	43.87	0.0228	5.53	43.45	0.0230
	5.500	4.36	48.24	0.0207	5.16	48.61	0.0206
	7.000	4.30	56.83	0.0176	3.69	55.98	0.0179
9.000	3.47	63.77	0.0157	3.96	63.90	0.0156	
11.000	3.04	69.84	0.0143	3.08	70.06	0.0143	
propranolol HCl 30 % beeswax 40 % matrix tablet	0.125	29.04	7.26	0.1378	27.06	6.77	0.1478
	0.375	8.68	9.43	0.1061	11.23	9.57	0.1045
	0.625	9.62	11.83	0.0845	10.57	12.22	0.0819
	0.875	8.54	13.97	0.0716	9.20	14.52	0.0689
	1.250	7.23	17.58	0.0569	6.93	17.98	0.0556
	1.750	6.49	20.83	0.0480	6.84	21.40	0.0467
	2.500	5.15	25.97	0.0385	4.94	26.34	0.0380
	3.500	4.36	30.33	0.0330	4.52	30.86	0.0324
	4.500	4.47	34.80	0.0287	3.37	34.23	0.0292
	5.500	3.40	38.20	0.0262	3.57	37.80	0.0265
	7.000	3.14	44.47	0.0225	2.98	43.75	0.0229
9.000	2.59	49.64	0.0201	2.63	49.01	0.0204	
11.000	2.39	54.43	0.0184	2.34	53.68	0.0186	
propranolol HCl 50 % beeswax 40 % matrix tablet	0.125	36.15	9.04	0.1107	27.57	6.89	0.1451
	0.375	3.74	9.97	0.1003	9.90	9.37	0.1067
	0.625	7.80	11.92	0.0839	9.18	11.66	0.0857
	0.875	7.58	13.82	0.0724	7.91	13.64	0.0733
	1.250	6.79	17.22	0.0581	5.84	16.56	0.0604
	1.750	6.15	20.29	0.0493	5.65	19.38	0.0516
	2.500	4.78	25.06	0.0399	4.39	23.77	0.0421
	3.500	4.28	29.34	0.0341	3.22	26.98	0.0371
	4.500	3.71	33.05	0.0303	3.29	30.28	0.0330
	5.500	3.31	36.37	0.0275	2.70	32.98	0.0303
	7.000	1.81	39.98	0.0250	2.34	37.67	0.0265
9.000	2.78	45.53	0.0220	2.24	42.15	0.0237	
11.000	2.33	50.19	0.0199	1.57	45.30	0.0221	

Table 76 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet with series of car. wax at different loading dose.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 20 % carnauba wax 40 % matrix tablet	0.125	53.89	13.47	0.0742	51.93	12.98	0.0770
	0.375	21.10	18.75	0.0533	17.58	17.38	0.0575
	0.625	18.34	23.33	0.0429	14.35	20.97	0.0477
	0.875	16.62	27.49	0.0364	13.50	24.34	0.0411
	1.250	14.71	34.85	0.0287	12.65	30.67	0.0326
	1.750	14.02	41.86	0.0239	13.06	37.20	0.0269
	2.500	17.68	59.54	0.0168	14.78	51.97	0.0192
	3.500	16.90	76.44	0.0131	16.10	68.08	0.0147
	4.500	8.09	84.53	0.0118	11.89	79.97	0.0125
	5.500	3.39	87.92	0.0114	6.39	86.36	0.0116
	7.000	1.61	91.14	0.0110	1.27	88.90	0.0112
9.000	1.15	93.44	0.0107	1.23	91.36	0.0109	
11.000	1.39	96.22	0.0104	1.48	94.32	0.0106	
propranolol HCl 30 % carnauba wax 40 % matrix tablet	0.125	51.05	12.76	0.0784	53.96	13.49	0.0741
	0.375	16.75	16.95	0.0590	11.31	16.32	0.0613
	0.625	17.52	21.33	0.0469	14.22	19.87	0.0503
	0.875	17.00	25.58	0.0391	12.64	23.04	0.0434
	1.250	17.19	34.17	0.0293	11.76	28.92	0.0346
	1.750	24.09	46.22	0.0216	13.80	35.82	0.0279
	2.500	29.69	75.90	0.0132	21.22	57.03	0.0175
	3.500	16.54	92.44	0.0108	20.50	77.53	0.0129
	4.500	2.02	94.47	0.0106	10.72	88.24	0.0113
	5.500	1.08	95.54	0.0105	3.18	91.42	0.0109
	7.000	-0.07	95.40	0.0105	1.63	94.69	0.0106
9.000	0.88	97.17	0.0103	0.82	96.33	0.0104	
11.000	0.60	98.36	0.0102	0.82	97.97	0.0102	
propranolol HCl 50 % carnauba wax 40 % matrix tablet	0.125	63.16	15.79	0.0633	62.50	15.62	0.0640
	0.375	14.12	19.32	0.0518	7.78	17.57	0.0569
	0.625	16.34	23.40	0.0427	14.45	21.18	0.0472
	0.875	11.62	26.31	0.0380	11.13	23.96	0.0417
	1.250	10.48	31.55	0.0317	8.67	28.30	0.0353
	1.750	8.90	36.00	0.0278	8.22	32.41	0.0309
	2.500	6.91	42.91	0.0233	6.06	38.47	0.0260
	3.500	5.60	48.51	0.0206	5.02	43.48	0.0230
	4.500	4.43	52.94	0.0189	3.62	47.10	0.0212
	5.500	5.32	58.26	0.0172	4.57	51.67	0.0194
	7.000	4.95	68.16	0.0147	3.60	58.88	0.0170
9.000	4.79	77.75	0.0129	2.92	64.71	0.0155	
11.000	3.00	83.75	0.0119	2.26	69.23	0.0144	

Table 77 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet with series of GMS at different loading dose.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 20 % GMS 40 % matrix tablet	0.125	41.33	10.33	0.0968	42.96	10.74	0.0931
	0.375	16.84	14.54	0.0688	20.46	15.86	0.0631
	0.625	13.75	17.98	0.0556	11.92	18.84	0.0531
	0.875	13.82	21.43	0.0467	10.85	21.55	0.0464
	1.250	11.22	27.04	0.0370	9.24	26.17	0.0382
	1.750	9.90	32.00	0.0313	7.77	30.05	0.0333
	2.500	8.25	40.25	0.0248	6.37	36.43	0.0275
	3.500	7.42	47.67	0.0210	5.76	42.19	0.0237
	4.500	7.66	55.33	0.0181	5.17	47.36	0.0211
	5.500	7.10	62.43	0.0160	4.86	52.21	0.0192
	7.000	6.27	74.98	0.0133	3.98	60.17	0.0166
9.000	6.59	88.16	0.0113	4.83	69.82	0.0143	
11.000	4.32	96.81	0.0103	4.29	78.41	0.0128	
propranolol HCl 30 % GMS 40 % matrix tablet	0.125	38.59	9.65	0.1037	39.30	9.83	0.1018
	0.375	14.71	13.32	0.0751	15.94	13.81	0.0724
	0.625	13.97	16.82	0.0595	13.60	17.21	0.0581
	0.875	13.52	20.20	0.0495	11.41	20.06	0.0498
	1.250	11.20	25.80	0.0388	9.10	24.61	0.0406
	1.750	9.62	30.61	0.0327	7.83	28.53	0.0351
	2.500	8.02	38.63	0.0259	7.19	35.71	0.0280
	3.500	7.54	46.18	0.0217	5.87	41.58	0.0240
	4.500	7.54	53.71	0.0186	4.80	46.39	0.0216
	5.500	6.27	59.98	0.0167	3.84	50.23	0.0199
	7.000	6.94	73.87	0.0135	3.96	58.15	0.0172
9.000	5.34	84.56	0.0118	4.35	66.84	0.0150	
11.000	4.29	93.14	0.0107	4.61	76.06	0.0131	
propranolol HCl 50 % GMS 40 % matrix tablet	0.125	19.45	4.86	0.2056	36.24	9.06	0.1104
	0.375	7.36	6.70	0.1492	11.54	11.94	0.0837
	0.625	7.40	8.55	0.1169	10.11	14.47	0.0691
	0.875	7.48	10.42	0.0959	9.24	16.78	0.0596
	1.250	11.36	16.10	0.0621	8.63	21.09	0.0474
	1.750	10.62	21.41	0.0467	7.44	24.81	0.0403
	2.500	8.89	30.31	0.0330	6.51	31.32	0.0319
	3.500	7.60	37.91	0.0264	5.36	36.68	0.0273
	4.500	7.03	44.94	0.0223	4.59	41.27	0.0242
	5.500	6.60	51.54	0.0194	4.28	45.55	0.0220
	7.000	6.11	63.75	0.0157	4.28	54.10	0.0185
9.000	4.76	73.27	0.0136	4.01	62.12	0.0161	
11.000	3.59	80.44	0.0124	3.40	68.91	0.0145	

Table 78 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet with series of Lubritab® at different loading dose.

Formulation	Mean time	Disolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 20 % lubritab 40 % matrix tablet	0.125	33.22	8.31	0.1204	50.70	12.68	0.0789
	0.375	18.01	12.81	0.0781	19.60	17.58	0.0569
	0.625	18.66	17.47	0.0572	15.76	21.52	0.0465
	0.875	15.57	21.36	0.0468	13.31	24.84	0.0403
	1.250	12.60	27.66	0.0361	11.11	30.40	0.0329
	1.750	10.49	32.91	0.0304	10.03	35.41	0.0282
	2.500	9.68	42.59	0.0235	8.27	43.68	0.0229
	3.500	8.62	51.21	0.0195	10.85	54.53	0.0183
	4.500	9.65	60.85	0.0164	4.71	59.23	0.0169
	5.500	10.43	71.29	0.0140	8.12	67.36	0.0148
	7.000	6.67	84.63	0.0118	6.16	79.69	0.0125
9.000	3.69	92.00	0.0109	4.92	89.52	0.0112	
11.000	2.51	97.02	0.0103	2.30	94.12	0.0106	
propranolol HCl 30 % lubritab 40 % matrix tablet	0.125	38.29	9.57	0.1045	47.98	11.99	0.0834
	0.375	16.98	13.82	0.0724	17.33	16.33	0.0613
	0.625	15.09	17.59	0.0568	14.36	19.92	0.0502
	0.875	13.47	20.96	0.0477	12.87	23.13	0.0432
	1.250	10.51	26.22	0.0381	10.02	28.15	0.0355
	1.750	9.17	30.80	0.0325	9.19	32.74	0.0305
	2.500	11.44	42.24	0.0237	7.14	39.88	0.0251
	3.500	6.32	48.57	0.0206	7.80	47.68	0.0210
	4.500	5.59	54.15	0.0185	5.95	53.62	0.0186
	5.500	6.07	60.23	0.0166	3.94	57.56	0.0174
	7.000	5.66	71.55	0.0140	4.19	65.95	0.0152
9.000	4.98	81.51	0.0123	4.75	75.45	0.0133	
11.000	3.33	88.18	0.0113	4.00	83.46	0.0120	
propranolol HCl 50 % lubritab 40 % matrix tablet	0.125	42.91	10.73	0.0932	41.92	10.48	0.0954
	0.375	10.40	13.33	0.0750	14.73	14.16	0.0706
	0.625	13.63	16.74	0.0598	12.36	17.25	0.0580
	0.875	11.52	19.62	0.0510	10.34	19.84	0.0504
	1.250	8.59	23.91	0.0418	9.46	24.57	0.0407
	1.750	8.51	28.17	0.0355	6.41	27.77	0.0360
	2.500	5.18	33.34	0.0300	6.33	34.10	0.0293
	3.500	5.79	39.14	0.0256	4.94	39.05	0.0256
	4.500	5.18	44.32	0.0226	3.92	42.96	0.0233
	5.500	4.33	48.65	0.0206	3.47	46.43	0.0215
	7.000	3.13	54.90	0.0182	3.11	52.65	0.0190
9.000	3.57	62.04	0.0161	2.68	58.01	0.0172	
11.000	3.23	68.49	0.0146	2.54	63.08	0.0159	

Table 79 Values for rate, amount released and the corresponding reciprocal for release of propranolol HCl tablet with series of Compritol® at different loading dose.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 20 % compritol 40 % matrix tablet	0.125	36.44	9.11	0.1098	33.15	8.29	0.1207
	0.375	13.05	12.37	0.0808	12.08	11.31	0.0884
	0.625	11.28	15.19	0.0658	10.60	13.96	0.0716
	0.875	8.65	17.36	0.0576	10.56	16.60	0.0602
	1.250	7.70	21.21	0.0472	8.11	20.65	0.0484
	1.750	6.78	24.60	0.0407	6.28	23.79	0.0420
	2.500	5.64	30.24	0.0331	5.50	29.29	0.0341
	3.500	5.94	36.18	0.0276	6.36	35.65	0.0280
	4.500	6.21	42.38	0.0236	6.45	42.10	0.0238
	5.500	6.21	48.59	0.0206	6.39	48.49	0.0206
	7.000	5.49	59.58	0.0168	3.32	55.13	0.0181
9.000	6.81	73.20	0.0137	5.07	65.27	0.0153	
11.000	4.13	81.45	0.0123	4.21	73.68	0.0136	
propranolol HCl 30 % compritol 40 % matrix tablet	0.125	36.54	9.13	0.1095	39.37	9.84	0.1016
	0.375	13.00	12.38	0.0808	12.01	12.85	0.0779
	0.625	10.20	14.93	0.0670	11.01	15.60	0.0641
	0.875	9.25	17.25	0.0580	9.49	17.97	0.0556
	1.250	7.51	21.00	0.0476	7.49	21.72	0.0460
	1.750	6.75	24.37	0.0410	6.34	24.89	0.0402
	2.500	5.66	30.04	0.0333	5.45	30.34	0.0330
	3.500	5.20	35.24	0.0284	4.38	34.72	0.0288
	4.500	4.78	40.02	0.0250	4.18	38.90	0.0257
	5.500	4.57	44.58	0.0224	3.72	42.62	0.0235
	7.000	4.76	54.11	0.0185	3.64	49.91	0.0200
9.000	3.13	60.37	0.0166	2.96	55.83	0.0179	
11.000	3.46	67.29	0.0149	5.80	67.43	0.0148	
propranolol HCl 50 % compritol 40 % matrix tablet	0.125	29.94	7.49	0.1336	27.55	6.89	0.1452
	0.375	10.60	10.14	0.0987	9.06	9.15	0.1092
	0.625	7.82	12.09	0.0827	7.24	10.96	0.0912
	0.875	6.50	13.72	0.0729	5.88	12.43	0.0804
	1.250	5.07	16.25	0.0615	4.62	14.74	0.0678
	1.750	4.26	18.38	0.0544	3.97	16.73	0.0598
	2.500	3.39	21.77	0.0459	3.49	20.22	0.0495
	3.500	2.99	24.76	0.0404	2.80	23.01	0.0435
	4.500	2.61	27.38	0.0365	2.49	25.51	0.0392
	5.500	2.57	29.95	0.0334	2.44	27.95	0.0358
	7.000	2.02	33.99	0.0294	1.58	31.12	0.0321
9.000	2.14	38.26	0.0261	2.12	35.35	0.0283	
11.000	1.88	42.02	0.0238	1.73	38.81	0.0258	

Table 80 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet with series of Precirol[®] at different loading dose.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 20 % precirol 40 % matrix tablet	0.125	37.15	9.29	0.1077	35.84	8.96	0.1116
	0.375	14.22	12.84	0.0779	14.02	12.46	0.0802
	0.625	12.43	15.95	0.0627	12.36	15.55	0.0643
	0.875	10.69	18.62	0.0537	11.18	18.35	0.0545
	1.250	9.28	23.26	0.0430	9.23	22.97	0.0435
	1.750	8.16	27.34	0.0366	8.13	27.03	0.0370
	2.500	7.07	34.41	0.0291	6.66	33.70	0.0297
	3.500	6.52	40.93	0.0244	5.88	39.58	0.0253
	4.500	6.65	47.59	0.0210	5.58	45.16	0.0221
	5.500	4.65	52.24	0.0191	3.95	49.11	0.0204
	7.000	4.68	61.59	0.0162	4.33	57.78	0.0173
9.000	4.77	71.14	0.0141	3.85	65.48	0.0153	
11.000	5.27	81.68	0.0122	3.04	71.56	0.0140	
propranolol HCl 30 % precirol 40 % matrix tablet	0.125	20.49	5.12	0.1952	31.13	7.78	0.1285
	0.375	13.70	8.55	0.1170	13.09	11.06	0.0905
	0.625	14.62	12.20	0.0820	11.68	13.97	0.0716
	0.875	12.95	15.44	0.0648	10.74	16.66	0.0600
	1.250	10.48	20.68	0.0484	8.96	21.14	0.0473
	1.750	8.60	24.98	0.0400	7.99	25.14	0.0398
	2.500	6.98	31.95	0.0313	6.67	31.81	0.0314
	3.500	6.04	38.00	0.0263	5.43	37.24	0.0269
	4.500	5.92	43.92	0.0228	5.54	42.78	0.0234
	5.500	5.14	49.06	0.0204	3.61	46.39	0.0216
	7.000	3.98	57.02	0.0175	3.76	53.91	0.0185
9.000	3.90	64.81	0.0154	2.80	59.50	0.0168	
11.000	4.92	74.65	0.0134	2.77	65.05	0.0154	
propranolol HCl 50 % precirol 40 % matrix tablet	0.125	31.54	7.89	0.1268	32.79	8.20	0.1220
	0.375	11.56	10.77	0.0928	13.04	11.46	0.0873
	0.625	10.24	13.34	0.0750	11.64	14.37	0.0696
	0.875	8.85	15.55	0.0643	9.69	16.79	0.0596
	1.250	7.43	19.26	0.0519	7.58	20.58	0.0486
	1.750	6.46	22.49	0.0445	6.81	23.99	0.0417
	2.500	6.31	28.80	0.0347	7.21	31.20	0.0321
	3.500	4.98	33.79	0.0296	4.79	35.99	0.0278
	4.500	4.55	38.34	0.0261	4.41	40.40	0.0248
	5.500	3.76	42.09	0.0238	3.43	43.82	0.0228
	7.000	3.59	49.27	0.0203	3.25	50.32	0.0199
9.000	3.61	56.49	0.0177	3.24	56.80	0.0176	
11.000	3.06	62.60	0.0160	2.74	62.27	0.0161	

Table 81 Values for rate, amount released and the corresponding reciprocal for the release of propranolol HCl tablet with series of Gelucire® at different loading dose.

Formulation	Mean time	Dissolution medium					
		0.1 N HCl			Phosphate buffer pH 6.8		
		dQ/dt	Q	1/Q	dQ/dt	Q	1/Q
propranolol HCl 20 % gelucire 40 % matrix tablet	0.125	35.10	8.78	0.1139	45.70	11.43	0.0875
	0.375	19.14	13.56	0.0737	15.79	15.37	0.0650
	0.625	18.91	18.29	0.0547	16.62	19.53	0.0512
	0.875	15.71	22.22	0.0450	14.43	23.14	0.0432
	1.250	13.42	28.93	0.0346	11.97	29.12	0.0343
	1.750	12.05	34.95	0.0286	10.80	34.52	0.0290
	2.500	15.02	49.97	0.0200	12.34	46.86	0.0213
	3.500	26.35	76.32	0.0131	19.55	66.42	0.0151
	4.500	19.61	95.93	0.0104	26.93	93.35	0.0107
	5.500	3.73	99.66	0.0100	6.98	100.33	0.0100
	7.000	0.76	101.18	0.0099	0.63	101.58	0.0098
9.000	-0.36	100.46	0.0100	-0.58	100.43	0.0100	
11.000	-0.11	100.23	0.0100	-0.21	100.01	0.0100	
propranolol HCl 30 % gelucire 40 % matrix tablet	0.125	52.14	13.03	0.0767	51.93	12.98	0.0770
	0.375	21.13	18.32	0.0546	20.08	18.00	0.0555
	0.625	18.77	23.01	0.0435	16.67	22.17	0.0451
	0.875	15.93	26.99	0.0370	14.86	25.88	0.0386
	1.250	13.74	33.86	0.0295	11.41	31.59	0.0317
	1.750	24.29	46.00	0.0217	15.65	39.41	0.0254
	2.500	42.35	88.35	0.0113	41.64	81.05	0.0123
	3.500	10.43	98.78	0.0101	15.39	96.44	0.0104
	4.500	1.48	100.26	0.0100	1.83	98.27	0.0102
	5.500	-0.14	100.12	0.0100	0.50	98.77	0.0101
	7.000	-0.07	99.98	0.0100	0.23	99.23	0.0101
9.000	-0.26	99.46	0.0101	0.12	99.47	0.0101	
11.000	-0.17	99.12	0.0101	0.11	99.68	0.0100	
propranolol HCl 50 % gelucire 40 % matrix tablet	0.125	51.26	12.82	0.0780	49.66	12.42	0.0805
	0.375	22.40	18.42	0.0543	19.22	17.22	0.0581
	0.625	20.86	23.63	0.0423	18.62	21.88	0.0457
	0.875	13.27	26.95	0.0371	10.65	24.54	0.0407
	1.250	13.18	33.69	0.0297	11.21	30.15	0.0332
	1.750	13.78	40.58	0.0246	11.49	35.89	0.0279
	2.500	8.00	48.59	0.0206	9.64	45.53	0.0220
	3.500	12.57	61.15	0.0164	4.69	50.22	0.0199
	4.500	15.76	76.91	0.0130	7.89	58.11	0.0172
	5.500	21.97	98.88	0.0101	6.65	64.75	0.0154
	7.000	1.23	101.34	0.0099	8.69	82.13	0.0122
9.000	0.44	102.22	0.0098	6.61	95.35	0.0105	
11.000	0.35	102.92	0.0097	2.02	99.39	0.0101	

Appendix D

Table 82 sieve analysis of each pellet formulation from different loading dose.

formulation	Percent retained on each sieve sizes*					
	14	18	20	25	30	Pan
PL 20%, beeswax 40%	0.10	25.58	<u>41.68</u>	24.89	3.65	4.09
PL 30%, beeswax 40%	0.05	<u>48.68</u>	34.32	12.25	1.24	3.45
PL 50%, beeswax 40%	0.03	<u>35.21</u>	31.99	14.44	2.85	15.48
PL 20%, carnauba wax 40%	0.19	5.86	26.37	<u>43.58</u>	10.75	13.24
PL 30%, carnauba wax 40%	0.06	<u>42.67</u>	36.85	17.74	1.24	1.44
PL 50%, carnauba wax 40%	<u>71.63</u>	23.66	3.22	1.27	0.11	0.11
PL 20%, GMS 40%	0.17	<u>74.74</u>	18.61	5.39	0.52	0.56
PL 30%, GMS 40%	0.35	<u>74.76</u>	18.23	5.85	0.41	0.39
PL 50%, GMS 40%	4.34	<u>87.65</u>	6.35	1.31	0.22	0.12
PL 20%, lubritab 40%	0.53	<u>60.83</u>	23.93	14.06	0.62	0.03
PL 30%, lubritab 40%	0.46	<u>41.39</u>	26.65	28.02	3.22	0.26
PL 50%, lubritab 40%	8.89	<u>38.05</u>	23.39	22.14	5.20	2.32
PL 20%, compritol 40%	0.02	<u>56.16</u>	23.43	18.11	1.43	0.85
PL 30%, compritol 40%	0.12	<u>62.45</u>	22.14	13.93	1.11	0.24
PL 50%, compritol 40%	0.72	<u>80.40</u>	12.97	5.34	0.46	0.11
PL 20%, precirol 40%	3.88	<u>69.44</u>	18.31	8.19	0.15	0.03
PL 30%, precirol 40%	1.06	<u>67.28</u>	19.83	11.13	0.54	0.16
PL 50%, precirol 40%	0.42	<u>62.95</u>	21.41	13.57	1.31	0.35
PL 20%, gelucire 40%	30.18	<u>68.12</u>	1.18	0.41	0.07	0.04
PL 30%, gelucire 40%	30.38	<u>67.85</u>	1.00	0.49	0.16	0.11
PL 50%, gelucire 40%	<u>86.64</u>	12.70	0.18	0.12	0.24	0.12

* underlined the highest percent yield of sieve analysis.

Table 83 Sieve analysis of each pellet formulation from different wax content.

formulation	Percent retained on each sieve sizes*					
	14	18	20	25	30	Pan
PL 40%, beeswax 20%	7.82	<u>77.27</u>	14.01	0.90	0.00	0.00
PL 40%, beeswax 30%	31.31	<u>66.07</u>	2.44	0.18	0.00	0.00
PL 40%, beeswax 40%	13.28	<u>77.56</u>	8.20	0.97	0.00	0.00
PL 40%, beeswax 50%	4.60	<u>32.48</u>	25.61	26.08	5.57	5.66
PL 40%, carnauba wax 20%	11.64	<u>41.76</u>	24.31	19.74	1.74	0.81
PL 40%, carnauba wax 30%	0.95	20.43	<u>40.59</u>	31.69	4.22	2.11
PL 40%, carnauba wax 40%	3.87	<u>35.84</u>	29.18	26.39	2.33	2.40
PL 40%, carnauba wax 50%	0.19	24.03	<u>37.86</u>	29.28	5.20	3.44
PL 40%, GMS 20%	3.88	<u>71.33</u>	16.38	7.86	0.56	0.00
PL 40%, GMS 30%	4.43	<u>68.28</u>	19.22	7.65	0.41	0.00
PL 40%, GMS 40%	1.94	<u>71.67</u>	18.30	7.62	0.47	0.00
PL 40%, GMS 50%	9.98	<u>84.21</u>	4.58	1.18	0.04	0.00
PL 40%, lubritab 20%	9.05	<u>68.69</u>	16.30	5.95	0.00	0.00
PL 40%, lubritab 30%	2.19	<u>58.58</u>	21.97	15.95	1.31	0.00
PL 40%, lubritab 40%	0.71	<u>43.16</u>	25.57	26.17	3.78	0.60
PL 40%, lubritab 50%	24.84	<u>42.90</u>	15.51	13.76	2.32	0.68
PL 40%, compritol 20%	0.20	<u>67.20</u>	19.54	12.25	0.77	0.04
PL 40%, compritol 30%	0.08	<u>58.76</u>	21.73	15.91	2.05	1.47
PL 40%, compritol 40%	0.10	<u>60.32</u>	20.42	16.15	1.59	1.43
PL 40%, compritol 50%	0.70	<u>65.54</u>	18.86	12.74	1.50	0.67
PL 40%, precirol 20%	0.60	<u>61.96</u>	22.35	14.32	0.74	0.03
PL 40%, precirol 30%	0.10	<u>54.38</u>	22.70	18.63	2.76	1.43
PL 40%, precirol 40%	0.41	<u>54.76</u>	22.31	19.36	2.54	0.62
PL 40%, precirol 50%	1.73	<u>63.11</u>	20.56	13.83	0.73	0.05
PL 40%, gelucire 30%	18.51	<u>78.62</u>	2.35	0.45	0.07	0.00
PL 40%, gelucire 40%	17.42	<u>81.24</u>	0.81	0.33	0.14	0.06
PL 40%, gelucire 50%	25.28	<u>70.99</u>	2.84	0.57	0.15	0.17

- underlined the highest percent yield of sieve analysis.

Vita

Mr. Monchai Siurai was born on March 16, 1973. He received his Bachelor of Science in Pharmacy degree with second class honor in 1994 from the Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand.



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