REFERENCES

[1] Cejka, J. and Wichterlova, B. Catal. Rev. 44(2002): 375.

[2] Hoelderich, W.F., Roseler, J., Heitmann , G. and Liebens, A.T. The use of zeolites in the synthesis of fine and intermediate chemicals Catal. Today 37(1997): 353.

[3] Verhoef, M.S., Kooyman, P.J., van der Waal, J.C., Rigutto, M.S., Peters, J.A.and Van Bekkum, H. Chem. Mater. 13(2001): 683.

[4] Prokesova, P., Mintova, S. Cejka, J.and Bein, T. Preparation of nanosized micro/mesoporous composites via simultaneous synthesis of Beta/MCM-48 phases. Micropor. Mesopor. Mater. 64 (2003): 165.

[5] Cundy, C.S., and Cox, P.A. The hydrothermal synthesis of zeolites: Precusors, intermediates reaction mechanism. Micropor. Mesopor. Matter. 82(2005): 1.

[6] Subotic, B., sk rtic, D., Smit, I. and Sekovanic, L. J. Cryst. Growth 50(1980): 498.

[7] Subotic, B. and Sekovanic, L. J. Cryst Growth 75(1986): 561.

[8] Subotic, B., Smit, I., Madzija, O.and Sekovanic, L . Kinetic study the transformation of zeolite A into zeolite P. Zeolites 2(1982): 135

[9] Zones, S.I. J. Chem. Soc., Faraday Trans. 87(1991): 3709.

[10] Zones, S.I., and Nakagawa, Y. Micropor. Mesopor. Mater. 2 (1994): 557.

[11] Aguado, J., Serrano, D. P., Escola, J. M., Garagorri, E. and Fernández, J. A. Catalytic conversion of polyolefins into fuels over zeolite beta. Polym. Degrad. Stab. 69(2000): 11.

[12] Grieken, R. V., Serrano, D. P., Aguado, J., García, R. and Rojo, C. J. Anal. Appl. Pyrol. 58-59(2001):, 127.

[13] Nakao, R., Kubota, Y., Katada, N., Nishiyama, N., Kunimori, K. and Tomishige, K. Performance and characterization of BEA catalysts for catalytic cracking Appl. Catal. A: General 273(2004), 63.

[14] Blomsma, E., Martens, J. A. and Jacobs, P. A. J. Catal. 165(1997): 241.

[15] Rakshe, B., Veda Ramaswamy, V. and Ramaswam, A. V. J. Catal. 188(1999): 252.

[16] Kumar, N., Masloboischikova, O. V., Kustov, L. M., Hweikkila, T., Salmi, T. and Murzin, D. Y. Ultrason. Sonochem. 14(2007): 122.

[17] Lui, Z. W., Li, H., Asami, K. and Fujimoto, K. Catal. Today. 104(2005): 41.

[18] Bregolato, M., Bolis, V., Busco, C., Ugliengo, P., Bordiga, S., Cavani, F., Ballarini, N., Maselli, L., Passeri, S. and Forni, L. J.Catal. 245(2007): 285.

[19] Junjie, B., Jing, L., Xiangsheng, W., Xiumei, L. and Xinhe, B. J. Mater. Chem. Phys. 77(2003): 406.

[20] Kasture, M. W., Niphadkar, P. S., Sharanappa, N., Mirajkar, S. P., Bokade, V. V. and Joshi, P. N. J. Catal. 227(2004): 375.

[21] Xia, Q.-H. and Tatsumi, T. Mater.Chem. *Phys.* (2005): 89.

[22] Van der Waal, J. C., Rigutto, M. S., Van Bekkum, H. Appl. Catal. A. 167(1998): 331-342.

[23] Hulea, V.and Dumitriu, E. Appl. Catal. *A.* 277(2004): 99.

[24] Wadlinger, R. L., Kerr, G. T., Rosinski, E. J. 1967 US Pat 3,308,069.

[25] Lee, Y. J., Kim, J. H., Kim, S. H. and Hong, S. B., Seo, G. Nanocrystalline beta zeolite: An efficient solid acid catalyst for the liquid-phase degradation of high-density polyethylene. Applied Catalysis B. 83(2008):160.

[26] Aguado, J., Solelo, J. L., Serrano, D. P., Calles, J. A. and Escola, J. M. Catalytic conversion of polyolefins into fuels over MCM-41: comparison with ZSM-5 and amorphous SiO_2-Al_2O_3. Energy & Fuels 11(1997):1225.

[27] Ding, L., Zheng, Y., Zhang, Z., Ring, Z.and Chen, J. Efect of agitation on the synthesis of zeolite beta its synthesis mechanism in absence of alkali cation. Micropor. Mesopor. Mater. 94(2006): 1.

[28] Selvam, T., Bandarapu, B., Mabande, G. T. P., Toufar, H. and Schwieger, W. Hydrothermal transformation of layered sodium silicate, kanemite, into zeolite beta (BEA). Micropor. Mesopor. Mat*er.* 64(2003): 41.

[29] Jon, H., Nakahata, K., Lu, B., Oumi, Y. and Sano, T. Hydrothermal conversion of FAU into BEA zeolites. Micropor. Mesopor. Mater. 94(2006): 72.

[30] Takewaki, T., Hwang, S. J., Yamashita, H. and Davis, M. E. Synthesis of BEA-type molecular sieves using mesoporous materials as reagent. Micropor. Mesopor. Mater. 32(1999): 265.

[31] Perez-Pariente, J., Matertens, J.A. and Jacobs, P.A. Factors affecting the synthesis efficiency of zeolite BETA from aluminosilicate gels containing alkali and tetaethylammonium ions. Zeolites 8(1988): 46.

[32] Camblor, M.A., Lorma, A . and Valencin, S. Characterization of nanocrystalline zeolite beta. Micropor. Mesopor. Mater. 25(1998): 59.

[33] Mintova, S., Valtchev, V., On froy, T., Marichal, G. and Knozinger, H. Bein. Variation of the Si/Al ratio in nanoszed zeolite beta crystals. Micropor. Meso. Mater. (2006).

[34] Ding, L. and Zheng,Y. Nanocrystalline zeolite beta: The effect of template agent on crystal size. Materials research Bulletin. 42(2007): 584.

[35] Majano, G., Mintova, S., Ovsitser, O., Mihailova, B. and Bein, T. Zeolite beta nanosized assemlies. Micropor. Mesopor. Mater. 80(2005): 227.

[36] Kadgaonkar, M.D., Kasture, M.W., Bhange, D.S., Joshi, P.N., Ramaswamy, V. and Kumar, R. NCL-7, a novel all silica analog of polymorph B rich member of BEA family: Synthesis and characterization. Micropor. Mesopor. Mater. 101(2007): 108.

[37] Sakthivel, A., Iida, A, Komura, K., Sugi, Y. and Chary, K.V.R. Nanosize β-zeolites with tunable particle sizes: Synthesis by the dry gel conversion (DGC) method in the presence of surfactants, characterization and catalytic properties. Micropor. Mesopor. Mater. 119(2009): 322.

[38] Kong, L., Chen, H., Tai, J., Shen, J., Zhange, S. and Chen, J. Synthesis of small crystal zeolite beta in a biphasic H_2O-CTAB-alcohol system. Mater. Lett. 63(2009): 343.

[39] Mazaj, M., Stevens, W.J.J., Logar, N.Z., Ristic, A., Tusar, N.N., Arcon, I., Daneu, N., Meynen, V. and Cool, P., Vansant, E.F., Kaucic, V. Synthesis and structural investigation on aluminium-free Ti-Beta/SBA-15 composite. Micropor. Mesopor. Mater. 117(2009): 458.

[40] Prasetyoko, D., Ramli, Z., Endud, S., Hamaan, H. and Sulikowski, B. Conversion of rice husk ash to zeolite beta. Waste Management. 26(2006): 1173-1179.

[41] Selvam, T., Aresipathi, C., Mabande, G.T.P., Toufar, H. and Schwieger, W. Solid state transformation of TEAOH-intercalated kanemite into zeolite beta (BEA). J. Mat. Chem. 15(2005): 2013.

[42] Chen, S., Yang, Y., Zhang, K. and Wang, J. BETA zeolite made from mesoporous material and its hydrocracking performance. Catal. today. 16(2006): 2.

[43] Lewis, F. and Sami, M., Chemistry of Petrochemical Proceess, 2na edition New York, Gulf Professional , 2001.

[44] Yanik, J., Uddin, M.A., Ikeuchi, K. and Sakata, Y. The Catalytic effet of red mud on the degradation of Poly (Vinyl Chloride) Contain Polgymar mixture into Fuel Oil. Polym. Degrad. Stab. 73(2001): 335.

[45] Gobin, K. and Manos, G., Polymer Degradation to Fuels Over microporous Catalysts as a novel tertiary plastic recycle melted. Polym. Degrad. Stab. 83(2004): 267.

[46] Lin, Y-H. and Yen, H-Y., Fluidised bad Pyrolysis of polypropylene over cracking catalysts for Producing hydrocarbons. Polym. Degrad. Stab. 89(2005): 101.

[47] Aguado, J., Serrano, D.P., Miguel G.S., Escola, S.M. and Rodriguez, J.M. Catalytic activity of zeolitic and mesostrueture catalysts in the cracking of pure and waste polyolefins. J. Anal. Appl. Pyrol. 78(2007): 78.

[48] Arandes, J.M., Torre, I., Azkoiti, M.J., Castano, P., Bibao, J. and Lasa, H. Effect of catalyst properties on the cracking of polypropylene pyrolysis waxes under FCC conditions. Catalysis Today. 133-135(2008): 413.

[49] Kumuar, M.S., Hole, A. and Chen, D. The influence of pore geometry of Pt containing ZSM-5, Beta and SBA-15 catalysts on dehydrogenation of propane. Micropor. Mesopor. Mater. 126(2009): 152

[50] Katada, N., Suzuki, K., Nada, T., Miyatani, W. and Taniguchi, F. Correlation of the cracking activity with solid acidity and adsorption property on zeolites. Appl. Catal. A: General. 373(2010): 208-213.

[51] Serrano, D.P., Aguado, J., Escola, J.M., Rodriguez, J.M., Morselli, L. and Orsi, R., Thermal and catalytic cracking of a LDPE – EVA copolymer mixture, J. Anal. Appl. Pyrol. 68(2003): 481.

[52] Breck, D.W., Zeolite Molecular Sieves, Structure, Chemistry and Use. New York: John Wiley and Sons.(1974)

[53] Anonymous, (2001). D458: Zeolite Industry trends and worldwide Markets in 2010. frost & Sullivan.

[54] Flanigen E.M. (1991). Zeolile and Molecular Sieve An Historical Perspective in Bekkum, HV., Flanigen, E.M. and Jansen, J.C. "Introduction to Zeolite Science and Practice, Studies in Surface Science and Catalysis." 58. Amsterdam: Elsevier.

[55] Barrer, R.M. (1982). Hydrothermal Chemistry of Zeolites. London: Academic Press.

[56] Szostak, R. Molecular Sieve Principles of Synthesis and Identification, New Van Nostrand Reinhold, New York, 1988, 1.

[57] Meier, M.W., Olson, D.H., and Boerlocher, C. (1996). Atlas of Zeoite strueture type. 4th edition Amsterdam: International Zeolite Association.

[58] Juttu, G. Modified Microporous Aluminosilicates As Novel Solid Acid Catalyst. Ph.D thesis University of Delaware, 2001.

[59] Costa, C., Dzikh, I.P., Lopes, J.M., Lemos, F., and Ribeiro, F.R., Activity-acdity relationship in zeolile ZSM-5.Application of Bronsted-type equations. J. Mol. Catal A : 154(2000): 193.

[60] Bangnasco, G. Improving the selectivity of NH_3 TPD measurements. J. catal. 159(1996): 249.

[61] Szostak, R. Molecular Sieves: Principles of synthesis and Identification. Van Nostrand Reinhold catalysis series, New York, 1989.

[62] Kiricsi, I., Flego, C., Pazzuconi, G., Parker, J.W.O., Millini, R., Perego, C. and Bellussi, G., Progress Toward Understanding Zeolite β Activity: An IR and ^{27}Al NMR Spectroscopy Study. J. phy. Chem. 98(1994): 4627.

[63] Bourgeat-Lami, E., Massiani, P., Di Renso, F., Espiau, P. and Fajula, F. (1991). Study of the State of Aluminium in Zeolite β. *Appl Catal. A*. 72(1991): 139.

[64] Kuehl, G.H. and imken, H.K.C., Acid Sites in Zeolite Beta: Effects of Ammonium Exchange and Steaming. Micropor. Mesopor. Matter.35(2000): 521.

[65] Zainab, R. Rhenium-Impregnated Zeolitea: Synthesis, Characterization and Modification as Catalysts in the Metathesis of Alkenes. Thesis of PhD. UTM, 1995.

[66] Listiorini, E., Ramli, Z. and Hamdam, H., Optimization and reactivity study of silica in the synthesis of zeolites from rice husk ash. J. Teknologi

[67] Bajpai, P.K., Synthesis of mordenite type. Zeolites. 6(1986): 2.

[68] Suzuki, K. and Hayakawa, T., The effect of seeding in the synthesis of zeolite ZSM-48 in the presence of tetraethylammonium ion. Micropor. Mesopor. Matter. 77(2005): 131.

[69] Dutta, P.K., Rao, K.M. and Kresge, C.T., Kennedy, G.J. Examination of the growth dynamic of zeolites ZSM-5 and mordenite from inorganic reactants compositions. Micropor. Mesopor. Matter. 3(1994): 17.

[70] Treacy, M.M.J., Higgins, J.B., Ballmoos, R.V. Collection of simulated XRD powder patterns for zeolite. 3rd edition. Amsterdam: Elsevier, 1996.

[71] Higgin, J.B., La Pierre, R.B., Schlenker, J.L., Rohrman, A.C., Wood, J.D., Kerr, G.T. and Rohrbaugh, W.J. The framework topology of zeolite beta. Zeolites. 8(1998): 446.

[72] Jansen, J.C., Creighton, E.J., Njo, S.L., Koningsveid, H. and Bekkum, H.V. On the remarkable behavior of zeolite beta in acid catalysis. Catal. Today. 38(1997):205.

[73] Corma, A., Navarro, M.T., Rey, F. and Valencia, S. Synthesis of pure polymorph C of beta zeolite in a fluoride-free system. Chem. Commun. (2001): 1486.

[74] Aguilar, J., Corma, A., Melo, F.V. and Sastre, E. Alkylation of biphenyl with propylene using acid catalysts. Catal. Today. 55(2000), 225.

[75] Absil, R.P.L., Hatzikos, G.H. (1998). Hydrocarbon conversion process using zeolite beta catalysts. (U.S. Patent. 5, 833-840).

[76] Corma, A., Climent, M.J., Garcia, H. and Primo, J. Design of synthetic zeolites as catalysts in organic reactions. Acylation of anisole by acyl chlorides or carboxylic acids over acid zeolites. Appl. Catal. A. 49(1989): 109.

[77] Soler-Illia, G. J. A. A., Sanchez, C., Lebeau, B. and Patarin, J. "Chemical strategies to design textured materials: from microporous and mesoporous oxides to nanonetworks and hierarchical structures", Chem. Rev. 102(2002): 4093.

[78] Tanev, P. T. and Pinnavania, T. J. "Mesoporous silica molecular sieves prepared by ionic and neutral surfactant templating: a comparison of physical properties" Chem. Mater. 8(1996): 2068.

[79] Sun, J., Zhu, G., Chen, Y., Li, J., Wang, L., Peng, Y., Li, H. and Qiu, S. Synthesis, surface and crystal structure investigation of the large zeolite beta crystal. Micro. Mesopor. Mater. 102(2007): 242.

[80] Ying, J.Y., Mehnert, C. P. and Wong, M. S. "Synthesis and applications of supramolecular-templated mesoporous materials" Angew. Chem. Int. Ed. 38(1999), 56.

[81] Kresge, C.T., Leonowicz, M.E., Roth, W.J., Vartuli, J.C. and Beck, J.S. Oedered mesoporous molecular sieves synthesized by a liquid crystal template mechanism. Nature. 359(1992): 710.

[82] Chiranjeevi, T., Muthu Kumaran, G. and Gupta, J.K. Synthesis and characterization of acidic properties of Al-HMS materials of varying Si/Al ratios. Thermochimica Acta. 443 (2006): 87.

[83] Inagaki, S. and Fukushima, Y. Adsorption of water vapor hydrophobicity of ordered mesoporous silica, FSM-16. Micropor. Mesopor. Mater. 21(1998): 667.

[84] Zhao, D., Feng, J., Hua, Q.,Malosh, N. and Fredrickson, G.H., Chmelka, B.F., Stucky, G.D. Triblockcopolymer synthesis of mesoporous silica with 50 to 300 angstrom pore. Science. 279(1998): 548

[85] Soler-Illia, G. J. A. A., Crepaldi, E. L., Grosso, D. and Sanchez, C. Block copolymer-templated mesoporous oxides Curr. Opin. Colloid Interface Sci. *8*(2003): 109.

[86] Melosh, N.A., Lipic, P., Bates, F.A. and Stucky, G.D. Molecular and mesoscopic structure of transparent block copolymer silica monoliths Macromolecules. 32(1999): 4332.

[87] Klug, H. and Alexander, L. X-ray Diffractio Procedures, John Wiley & Sons, Inc. New York, 1954.

[88] Gabriel, B.L. SEM: A User's Manual for Material Science, Ohio: American Society for Metal, 1985.

[89] Basic operating principles of the sorptomatic 1990. [Online]. Available from: http://saf.chem.ox.ac.uk./Instruments/BET/sorpoptprin

[90] Analysis software user's manual, BELSORP, BEL JAPAN, INC. 57.

[91] Elliott, P.B., Leslie, G.J. and Paul, P.H. The determination of pore volume and area distributions in porous substances. I Computations from nitrogen isotherms. Contribution from the multiple fellowships of Baugh and Sons Company, Mellon Institute 73(1995): 373.

[92] Brunauer, S., Emmett, P.M. and Teller, E. Adsorption of gases in mutimolecular layers. The Bureau of chemistry and solids and george Washington University, 60 (1938): 309.

[93] Bagnasco, G. Improving the seledtivity of NH_3- TPD measurements. J. Catal. 159(1996): 249.

[94] Hunger, M., Schenk, U., Breuninger, R., Glaser, R. and Weikamp, J. Characterization of the acid sites in MCM-41 type materials by spectroscopic and catalytic technique. Micropor. Mesopor. Mater. 27(1999): 261.

[95] Sorum, L., Gronli, M.G. and Hustad, J.E. Pyrolysis characteristics and kinetics of municipal solid wastes. Fuel 80(2001): 1217.

[96] Faravelli, T., Thermal degradation of polystyrene. J. Anal. Appl. Pyrolysis 60(2001): 103.

[97] Mastral, F.J., Pyrolysis of high-density polyethylene in a fluidized bed reactor. J. Anal. Appl. Pyrolysis 169(2002): 1.

[98] Garforth, A.A., Production of hydrocarbons by catalytic degradation of high density polyethylene in a laboratory fluidized-bed reactor. Appl. Catal. A. 169(1998): 331.

[99] Cha, W.S., Kim, S.B. and Macoy, B.J., Study of polystyrene degradation using continuous distribution kinetics in a bubling reactor. Korean J. Chem. Eng. 19(2002): 239.

[100] Dolezal, Z., Pacakova, V. and Kovarova, J. The effects of controlled aging and blending of low-and high-degradation studied by pyrolysis gas chromatography. J. Anal. Appl. Pyrolysis. 57(2001): 177.

[101] Scott, D.S. Fast pyrolysis of plastic wastes. Energy & Fules. 4(1990): 407.

[102] Kaminsky, W., Predel, M. and Sadiki, A., Feedstock recycling of polymers by pyrolysis in a fluidized bed. Polym. Degrad. Stab. 85(2004): 1045-1050.

[103] Miskolczi, N., Thermal degradation of municipal plastic waste for production of fule-like hydrocarbons. Polym. Degrad. Stab. 86(2004): 357.

[104] Sakata, K., Thermal degradation of polyethylene mixed with poly(vinyl chloride) and poly(ethyleneterephthalate). Polym. Degrad. Stab. 53(1996): 111.

[105] Cullis, C.F. and Hirschler, M.M, The Combustion of organic polymers. Oxford Clarendon Press, 1981.

[106] Demirbas, A. Pyrolysis of municipal plastic waste for recovery of gasoline-range hydrocarbons. J. Anal. Appl. Pyrolysis 72(2004): 97.

[107] Peterson, J.D., Vyazovkin, S. and Wight, C.A., Kinetics of the thermal and thermo-oxidative degradation of polystyrene, polyethylene and poly(propylene). Macromolecular Chem. and Phys. 202(2001): 775.

[108] Kiang, J.K.Y., Uden, P.C. and Chien, J.C.W. Polymer reactions—Part VII: Thermal pyrolysis of polypropylene. Polym. Degrad. Stab. 2(1980): 113.

[109] George, O. Principle of Polymerization, 4th ed., Canada: Wiley & Sons, 2004,

[110] McCaffrey, W.C., Kamal, M.R. and Cooper, D.G., Thermolysis of polyethylene. Polym. Degrad. and Stab. 47(1995): 133.

[111] Songip, A.R., Test to screen catalysts for reforming heavy oil from waste plastics. Appl. Catal. B. 2(1993): 153.

[112] Serrano, D.P., Performance of a continuous screw kiln reactor for the thermal and catalytic conversion of polyethylene-lubricating oil base mixtures. Appl. Catal. B. 44(2003): 95.

[113] Park, D.W., Catalytic degradation of polystyrene over solid acid catalysts. Polym. Degrad. Stab. 65(1999): 193.

[114] Aguado, J. Catalytic conversion of low-density polyethylene using a continuous screw kiln reactor. Catal. Today, 75(2002): 257.

[115] Hwang, E.Y., Performance of acid treated natural zeolites in catalytic degradation of polypropylene. J. Anal. Appl. Pyrolysis, 62(2002): 351.

[116] Kim, J.R., Yoon, J.H. and Park, D.W. Catalytic recycling of the mixture of polypropylene and polystyrene. Polym. Degrad. Stab, 76(2002): 61.

[117] Beltrame, P.L., Catalytic degradation of polymers: Part II—Degradation of polyethylene. Polym. Degrad. Stab. 26(1989): 209.

[118] Sakata, Y., Uddin, M.A. and Muto, A. Degradation of polyethylene and polypropylene into fuel oil by using solid acid and non-acid catalysts. J.Anal. Appl. Pyrolysis 51(1999): 135.

[119] Seo, Y.H., Lee, K.H. and Shin, D.H. Investigation of catalytic degradation of high-density polyethylene by hydrocarbon group type analysis. J.Anal. Appl. Pyrolysis 70(2003): 383.

[120] Ohkita, H. Acid properties of silica-alumina catalysts and catalytic degradation of polyethylene. Industrial & Engineering Chemistry Research. 32(1993): 3112.

[121] Scherzer, J. Octane-enhancing, zeolitic FCC catalyst: scientific and technical aspect. Catal. Rev.-Sci. Eng. 31(1989): 83.

[122] Greensfflder, B.S., Voge, H.H. and Good, G.M. Catalytic and thermal cracking of pure hydrocarbons. Industrial and engineering *chemistry* 41 (1949): 2573.

[123] Thomas, C.L. Chemistry of cracking catalysts. Industrial and engineering chemistry 41(1949): 2564.

[124] Sie, S.T. Acid-catalyzed cracking of paraffinics Part2. Evidence for the protonnated cyclopropane mechanism from catalytic cracking experiments. Indian Eng. Chem. 32(1993): 397.

[125] Williams, B.A., Babitz, S.M., Miller, J.T., Snurr, R.Q., and Kung, H.H. The role of acid strength and pore diffusion in the enhanced cracking activity of steamed zeolites Y. Appl. Catal. *A*. 32(1999): 161.

[126] Cumming, K.A. and Wojciechowski, B.W. Hydrogen transfer, coke formation and catalyst decay and their role in the chain mechanism of catalytic cracking. Catal. Rev. Sci. Eng. 38(1996): 101.

[127] Wojciechowski, B.W. and Abbot, J. The mechanism of catalytic cracking of n-alkanes on ZSM-5 zeolite. J. Chem. Eng. 63 (1985): 462.

[128] Makkee, M., Wissink, M. and Moulijin, J.A. Gasoline conversion: reactivity towards cracking with equilibrated FCC and ZSM-5 catalysts. Appl. Catal. A. 223 (2002): 85.

[129] Ishihara, Y., Nanbu, H., Saido, K., Ikemura, T. and Takesue, T. Mechanism for gas formation in polyethylene catalytic decomposition. Polymer 33(1992): 3482

[130] Ishihara, Y., Nanbu, H., Saido, K., Ikemura, T., Takesue, T. and Kuroki, T. Mechanism for gas formation in catalytic decomposition of polypropylene. Fuel 72(1993): 1115.

[132] Serrano, D.P., Aguado, J., Escola, J.M. and Rodriguez, J.M. Influence of nanocrystalline HZSM-5 external surface on the catalytic cracking of polyolefins. J. Anal. Appl. Pyrolytic 74(2005): 353.

[133] Torres, J.C. and Cardoso, D. The influence of gel alkalinity in the synthesis and physicochemical properties of the zeolite [Ti,Al]-Beta. Micropor. Mesopor. Mater. 113(2008): 204.

[134] Sakthivel, A., Iida, A., Komura, K., Sugi, Y. and Chary, K.V.R. Nanosized β-zeolites with tunable particle sizes: Synthesis by dry gel conversion (DGC) method in the presence of surfactants, characterization and catalytic properties. Micropor. Mesopor. Mater. 119(2009): 322.

APPENDIX

Appendix

A-1 Calculation of Selectivity to Other Hydrocarbons

% Selectivity of gas fraction and liquid fraction

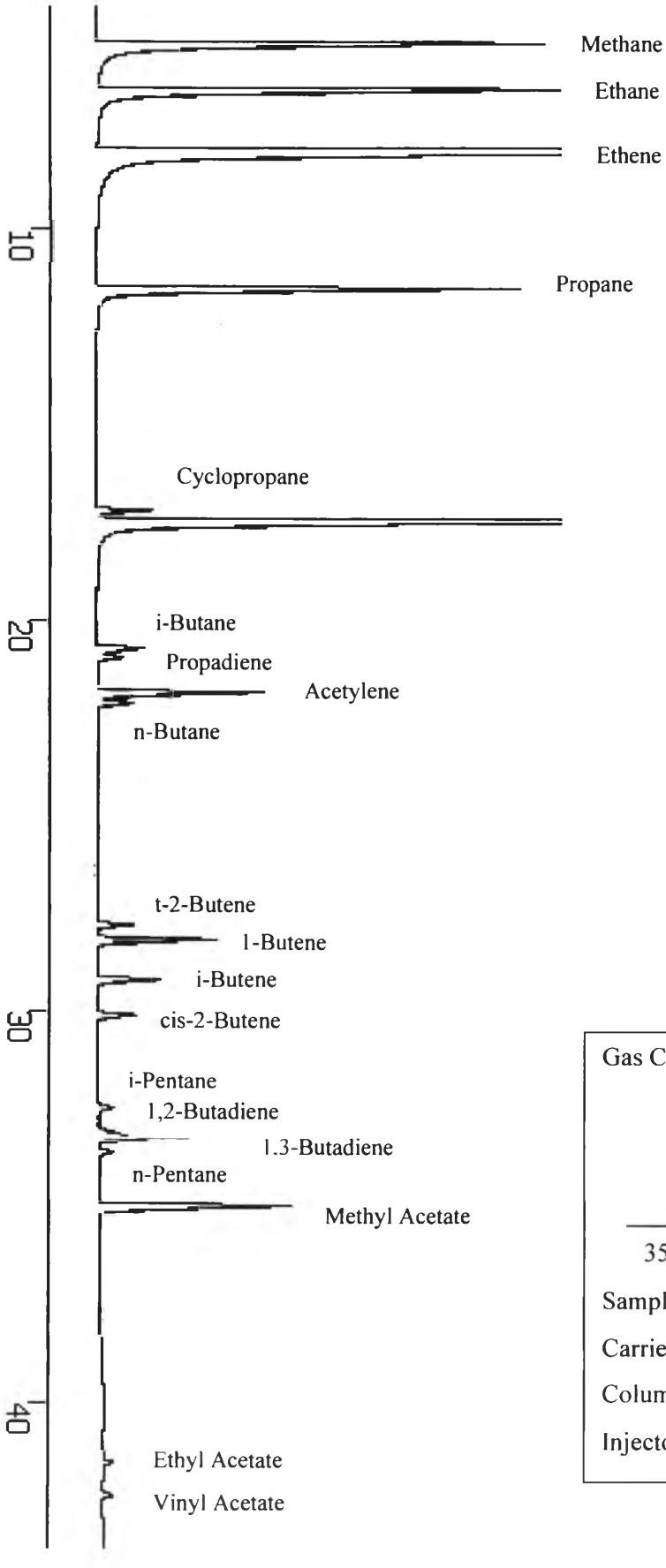
$$\% \text{ Selectivity of X} = \frac{\text{concentration of X} \times 100}{\text{total concentration of fractions}}$$

$$\text{Concentration of X} = \frac{b \times c}{a}$$

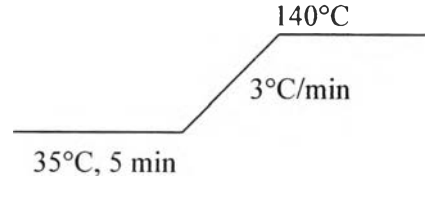
a = Peak area of X in standard gas or liquid fraction

b = % molar of X in standard gas or liquid fraction

c = Peak area of X in sample products



Gas Chromatographic condition



Sample size: 3.00 µl

Carrier gas: N_2, 3.4 cm^3/min at 26 °C

Column: Alumina PLOT 30 m

Injector temperature: 200 °C

Figure A-1 Gas chromatogram of standard mixture gas.

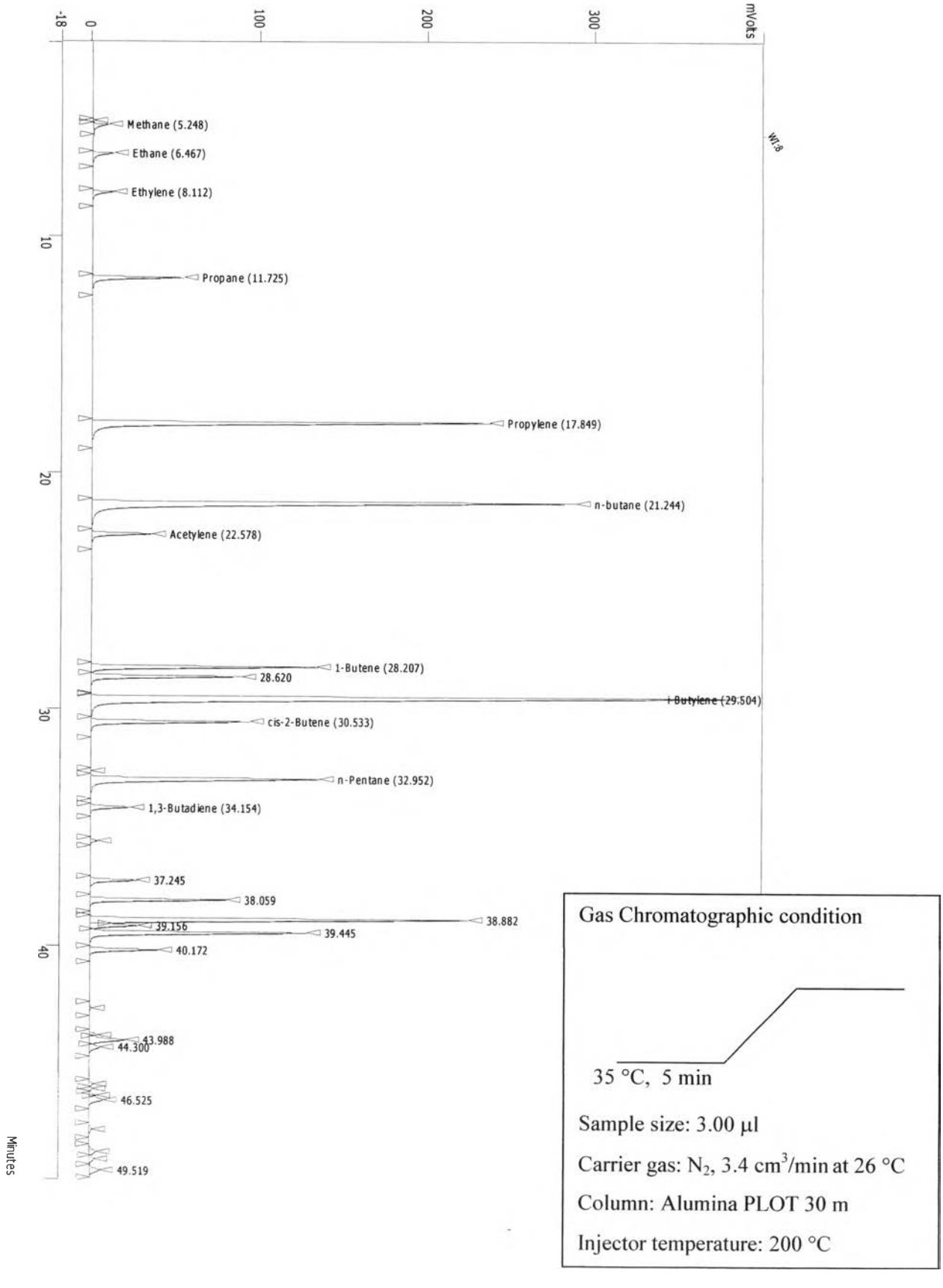


Figure A-2 Gas chromatogram of gas product obtained from catalytic cracking of PP over (Si/Al ratio = 30) at 380°C

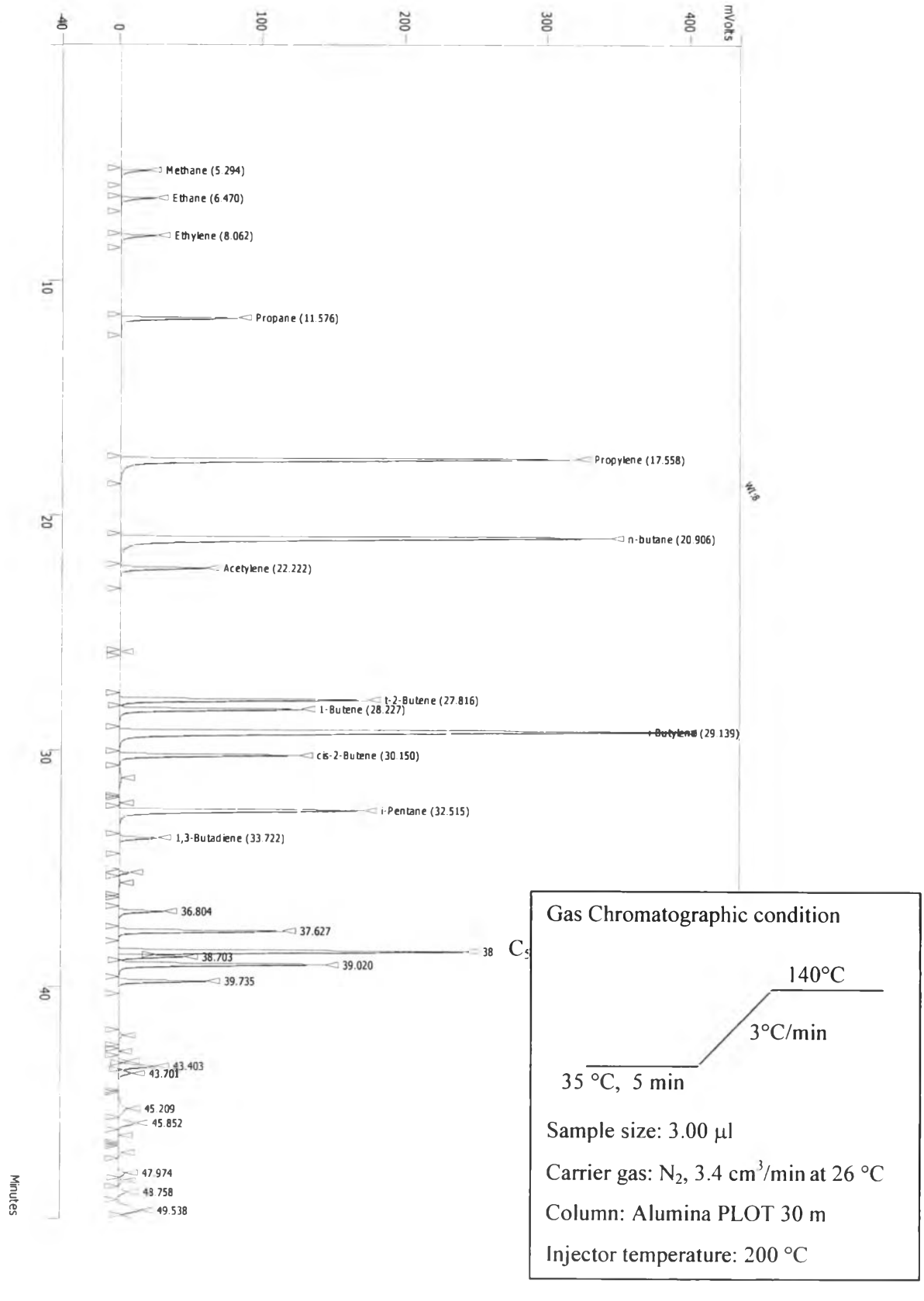


Figure A-3 Gas chromatogram of gas product obtained from catalytic cracking of HDPE over (Si/Al ratio = 60) at 400°C

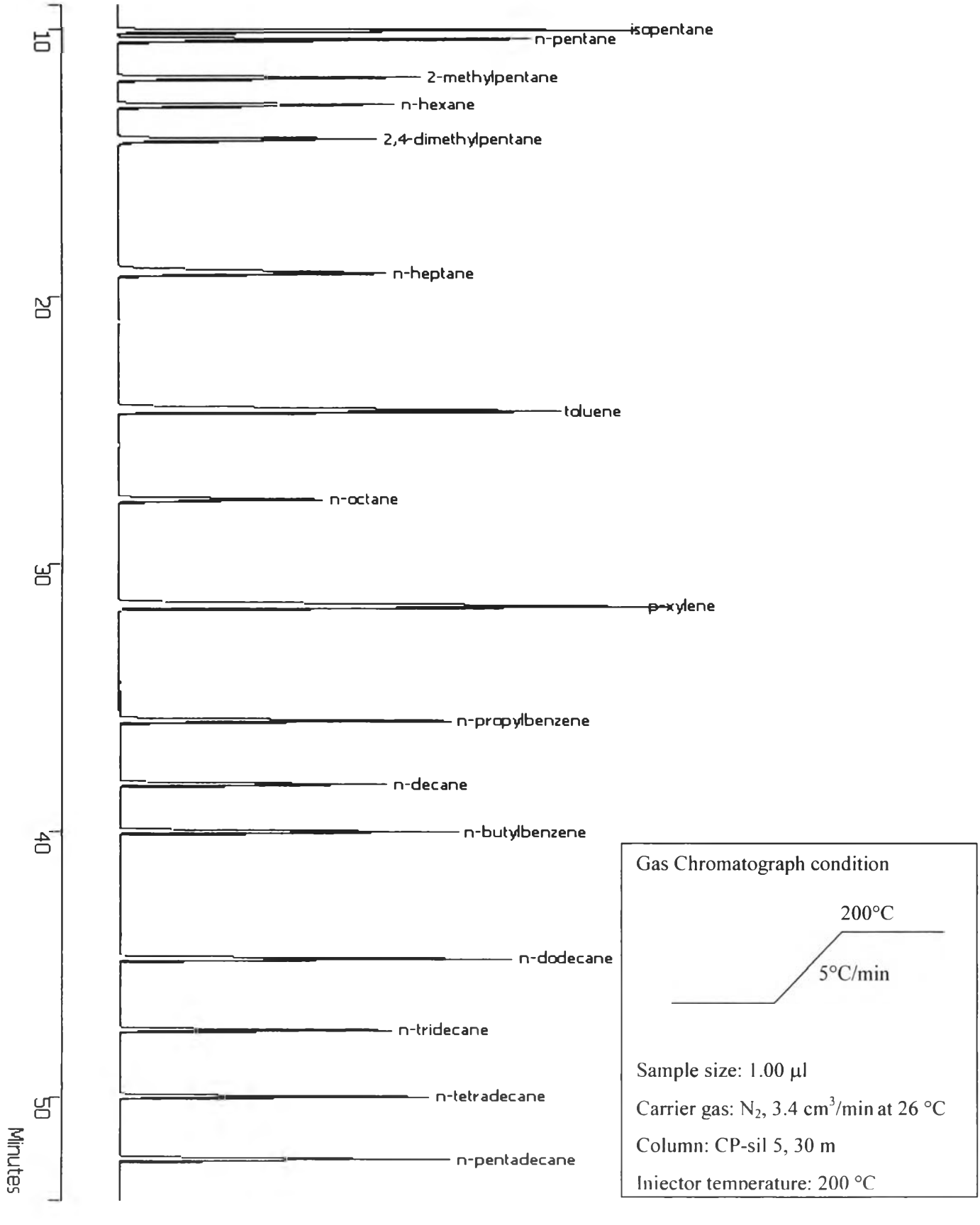


Figure A-4 Gas chromatogram of standard gasoline (SUPELCO).

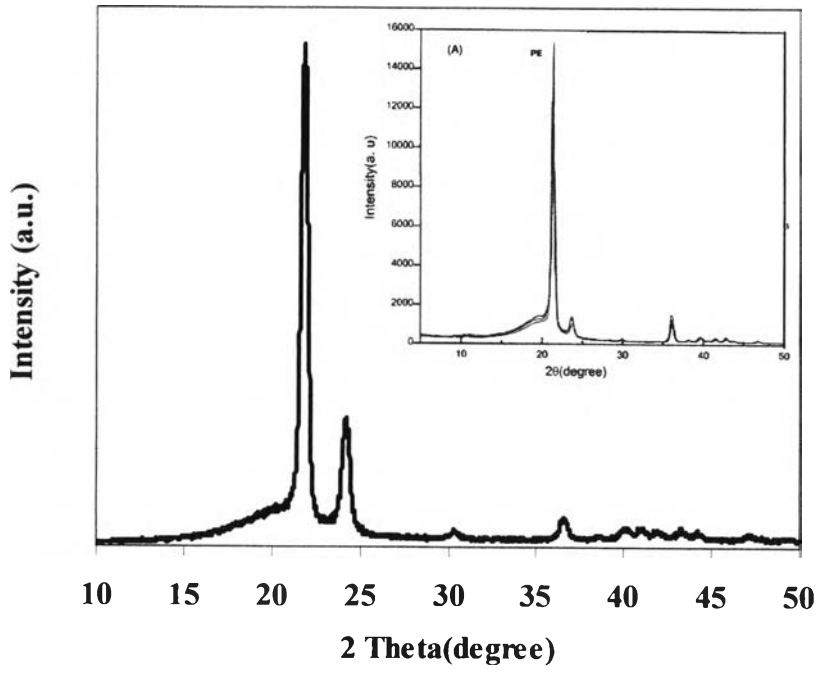


Figure A-5 XRD patternk of plastic waste. Insert shows the XRD patterns for HDPE.

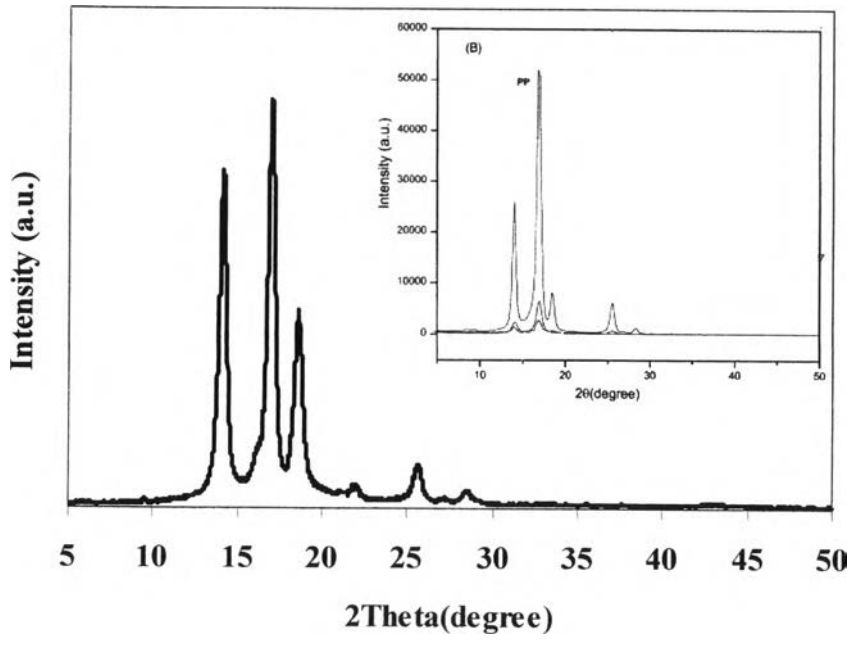


Figure A-6 XRD pattern of plastic waste. Insert shows the XRD patterns for PP.

VITA

Miss Khanitha Wanchai was born on May 9, 1975 in Angthong, Thailand. She graduated with Bachelor's Degree in Chemistry from Faculty of Science, Rajabhat Pranakorn Sri Ayutthaya Institute in 1999. She graduated with Master's Degree in Chemistry from Mahidol University in 2003. She continued her study in Chemistry, Faculty of Science, Chulalongkorn University in 2005 and completed in 2009.

Her present address is 2/22 Rojana road, T. Horrattanachai, A. Pranakorn Sri Ayutthaya, Pranakorn Sri Ayutthaya, Thailand 13000.