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APPENDICES

APPENDIX A

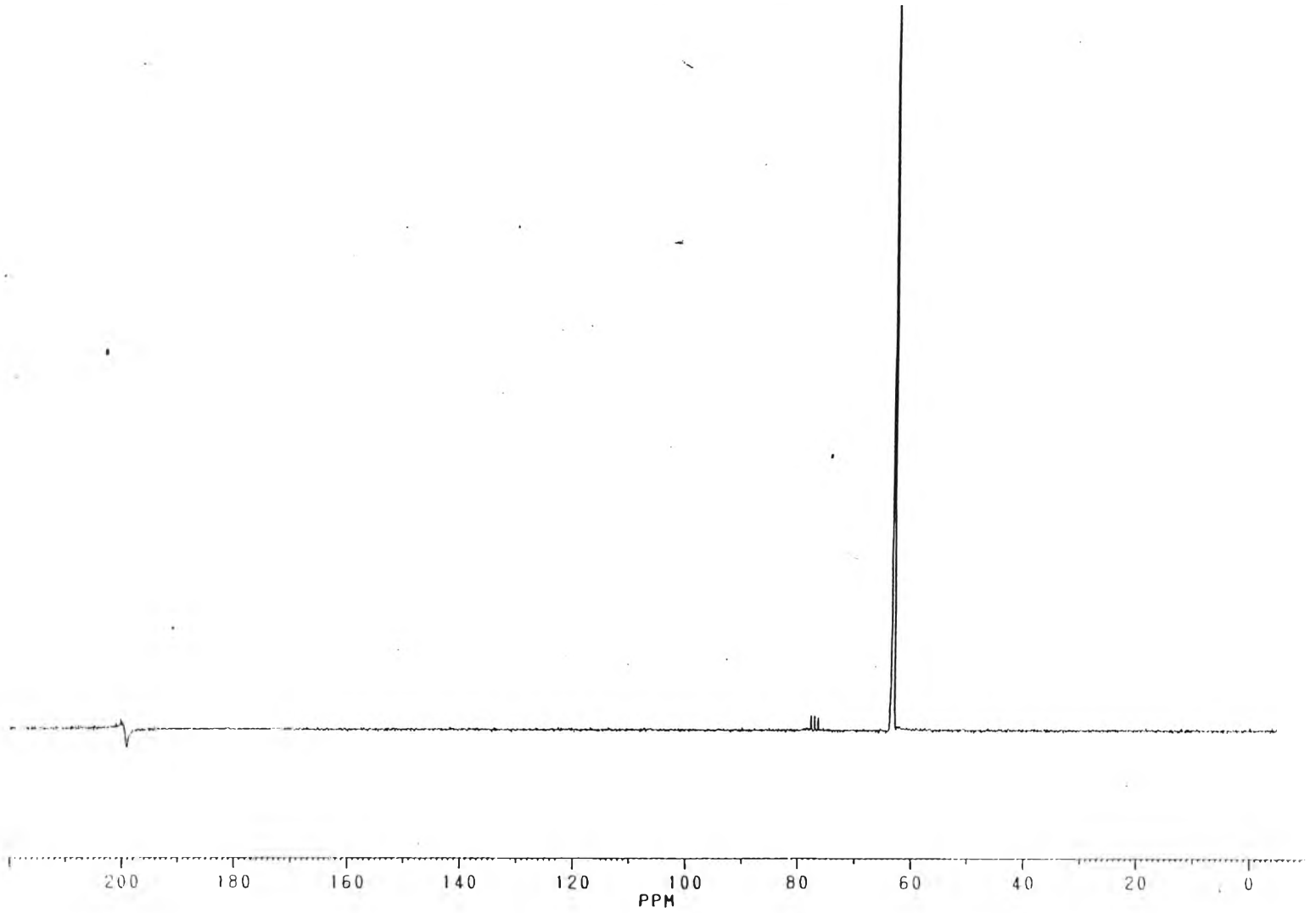

Figure A1 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-ethanediol

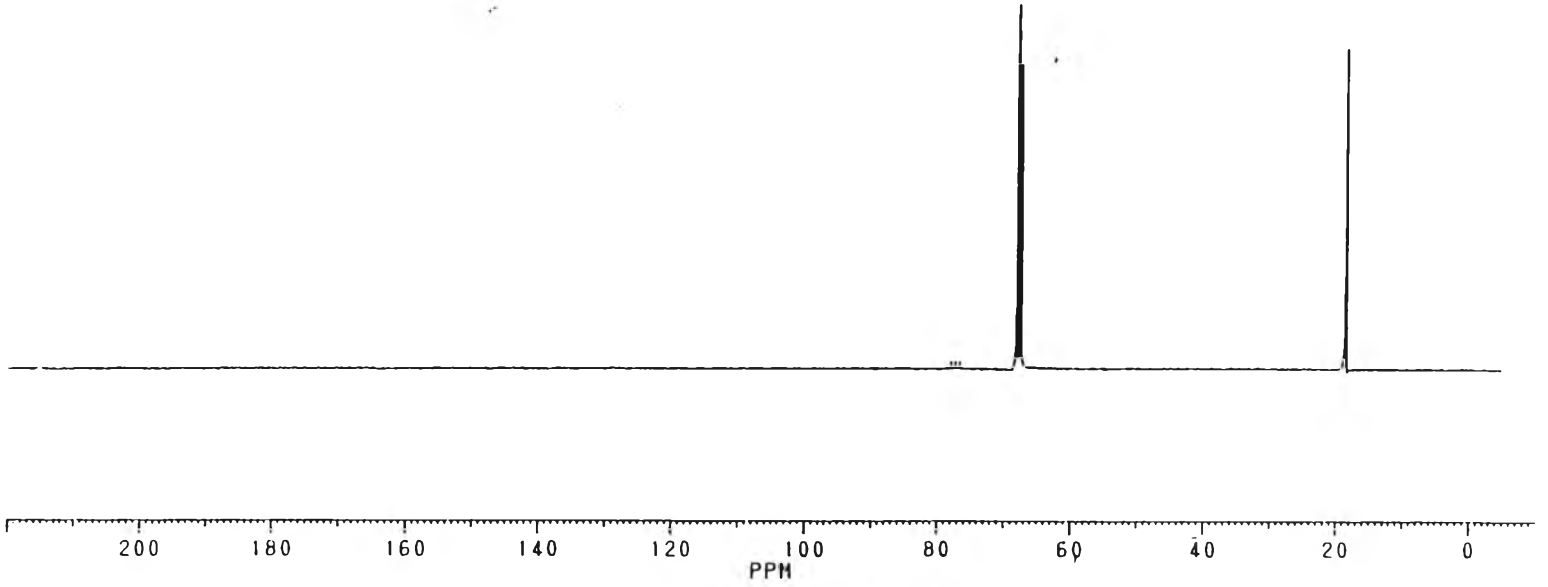

Figure A2 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-propanediol

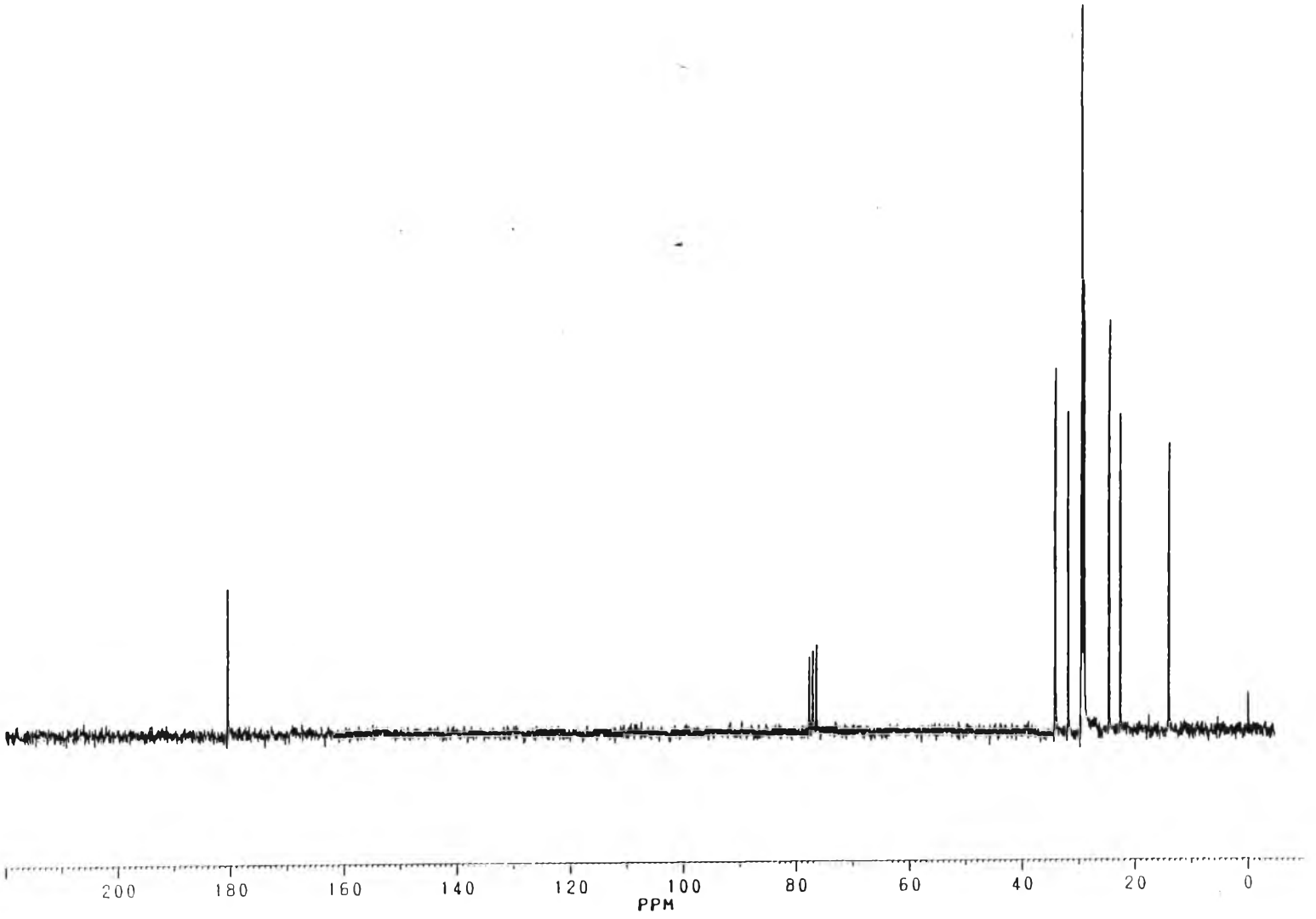

Figure A3 ^{13}C NMR ($CDCl_3$) spectrum of lauric acid

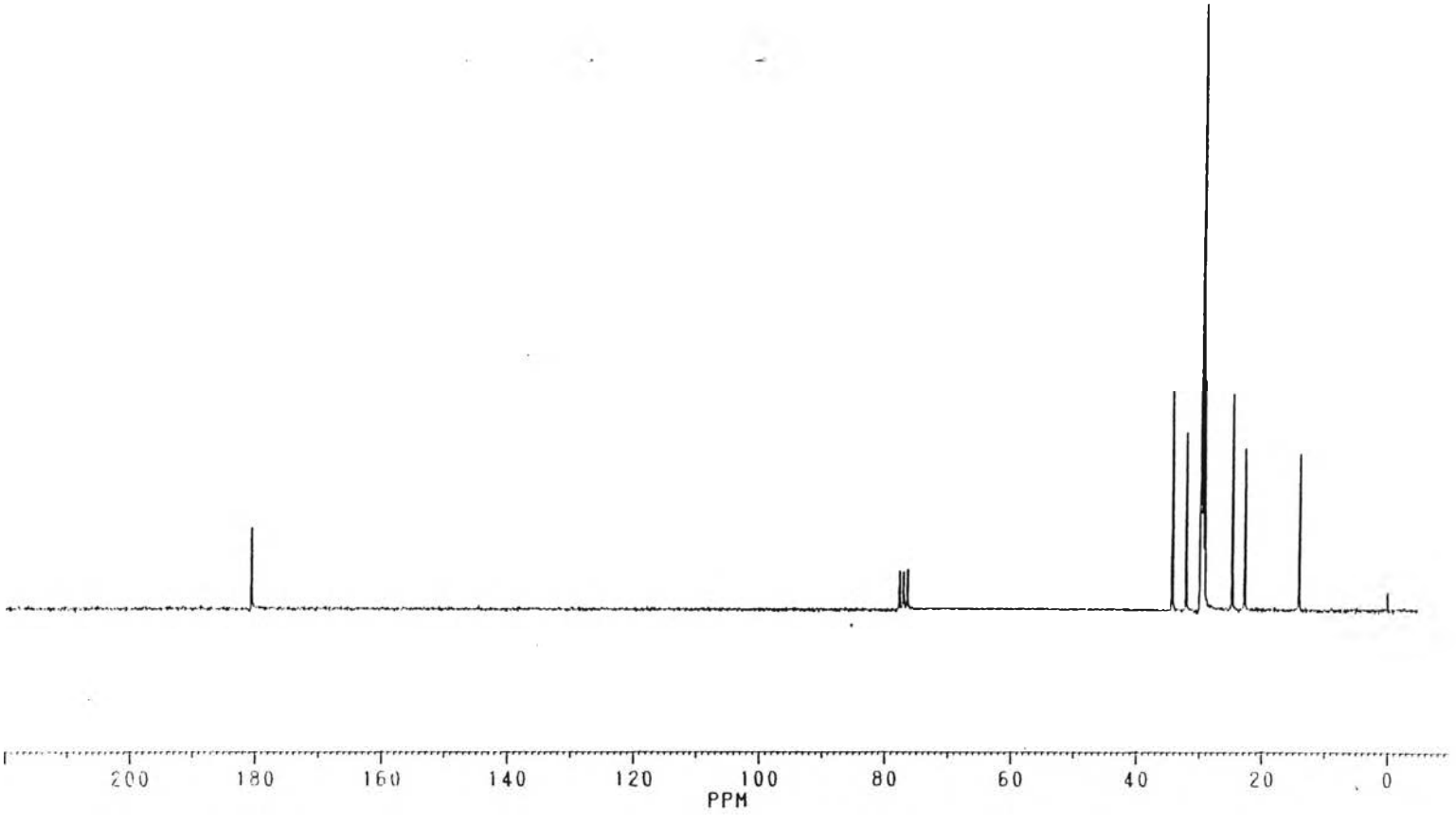

Figure A4 ^{13}C NMR ($CDCl_3$) spectrum of myristic acid

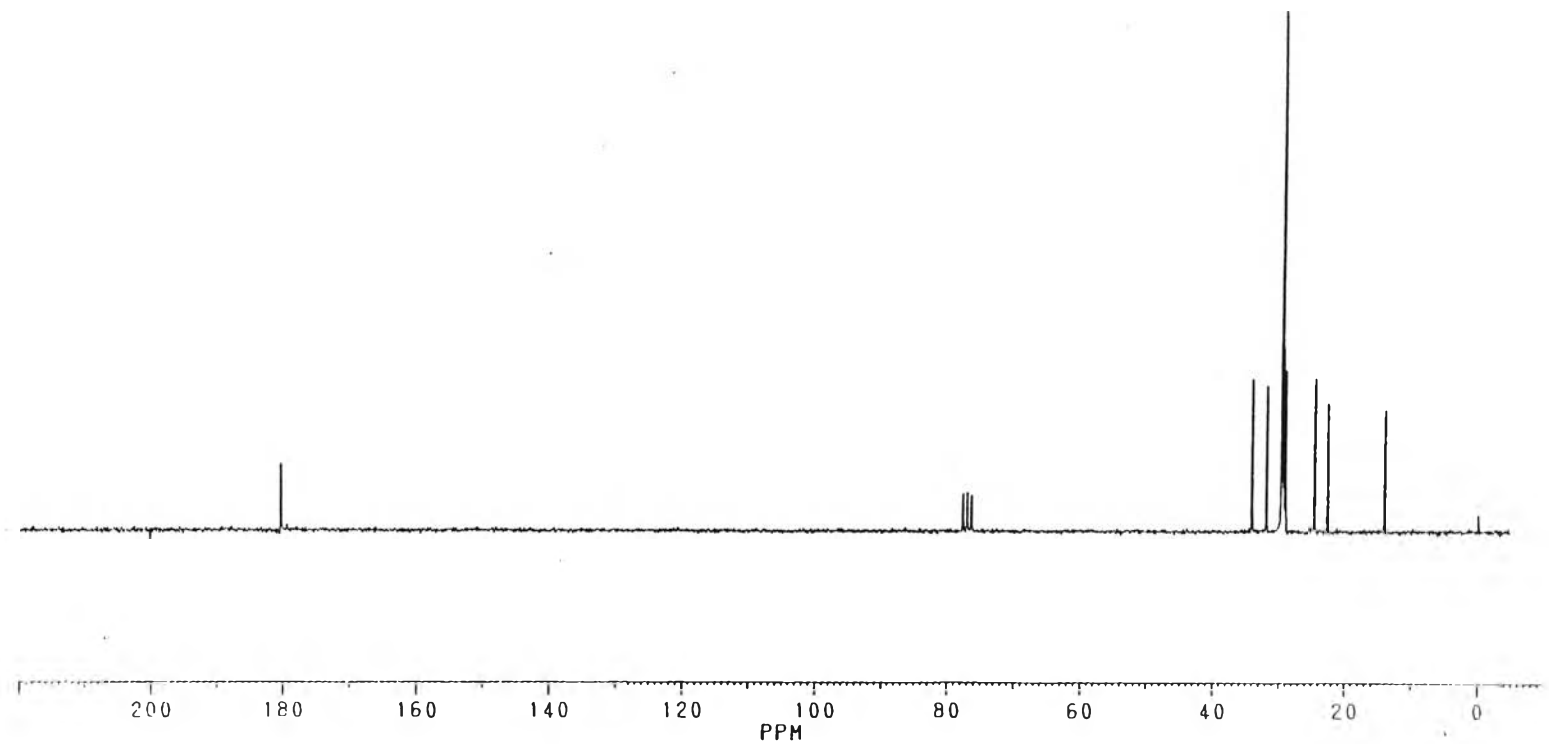

Figure A5 ^{13}C NMR ($CDCl_3$) spectrum of palmitic acid

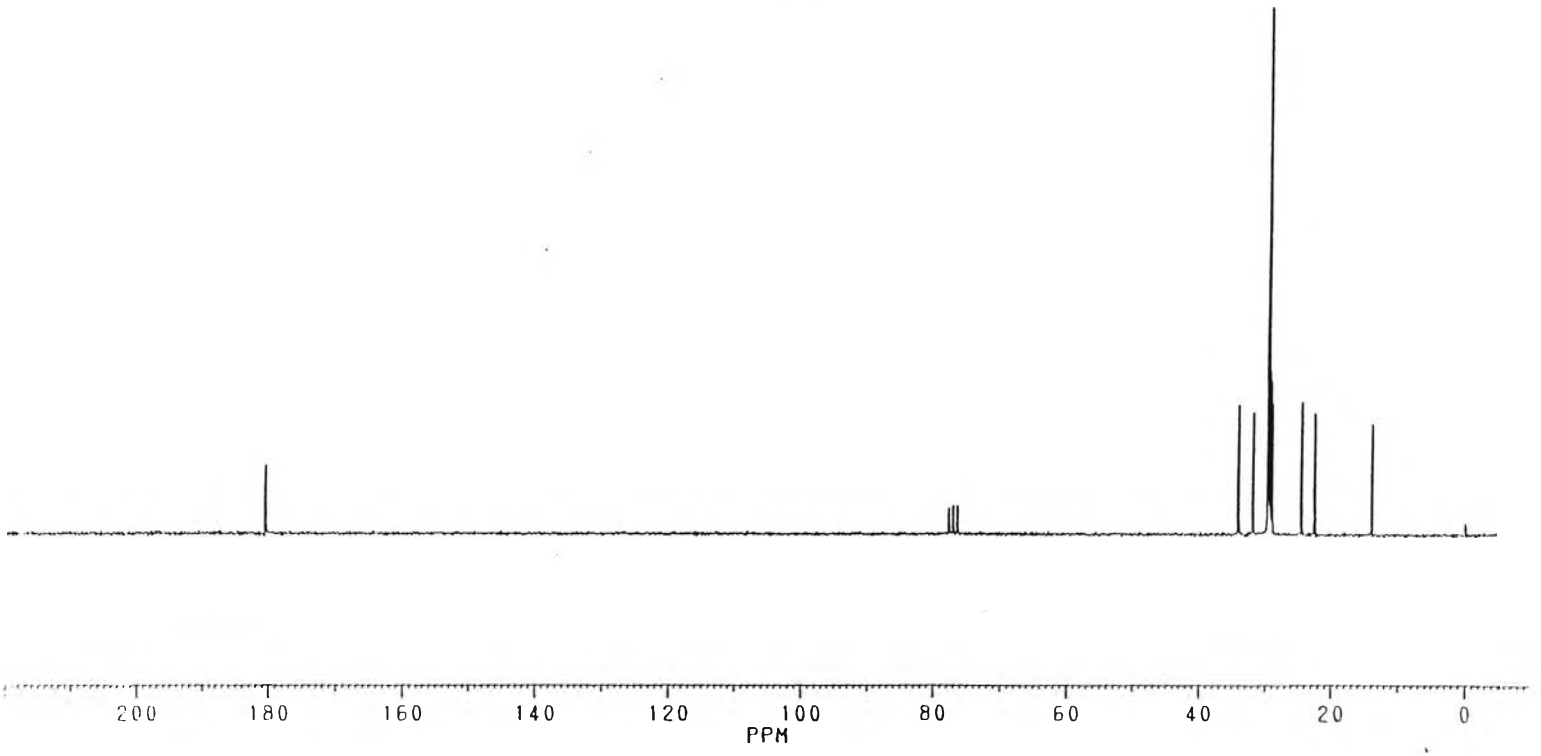

Figure A6 ^{13}C NMR ($CDCl_3$) spectrum of stearic acid

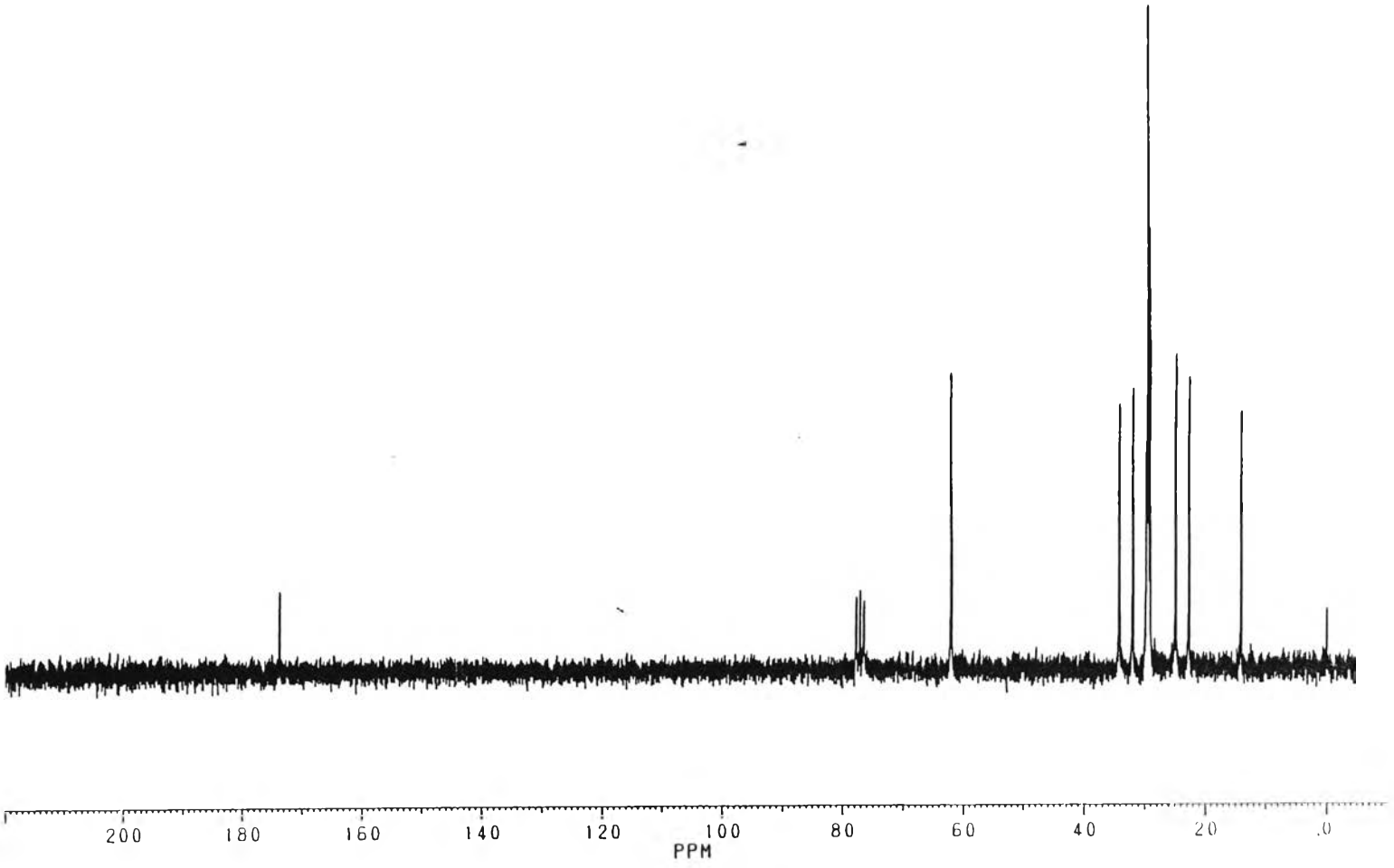

Figure A7 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-ethanedilaurate

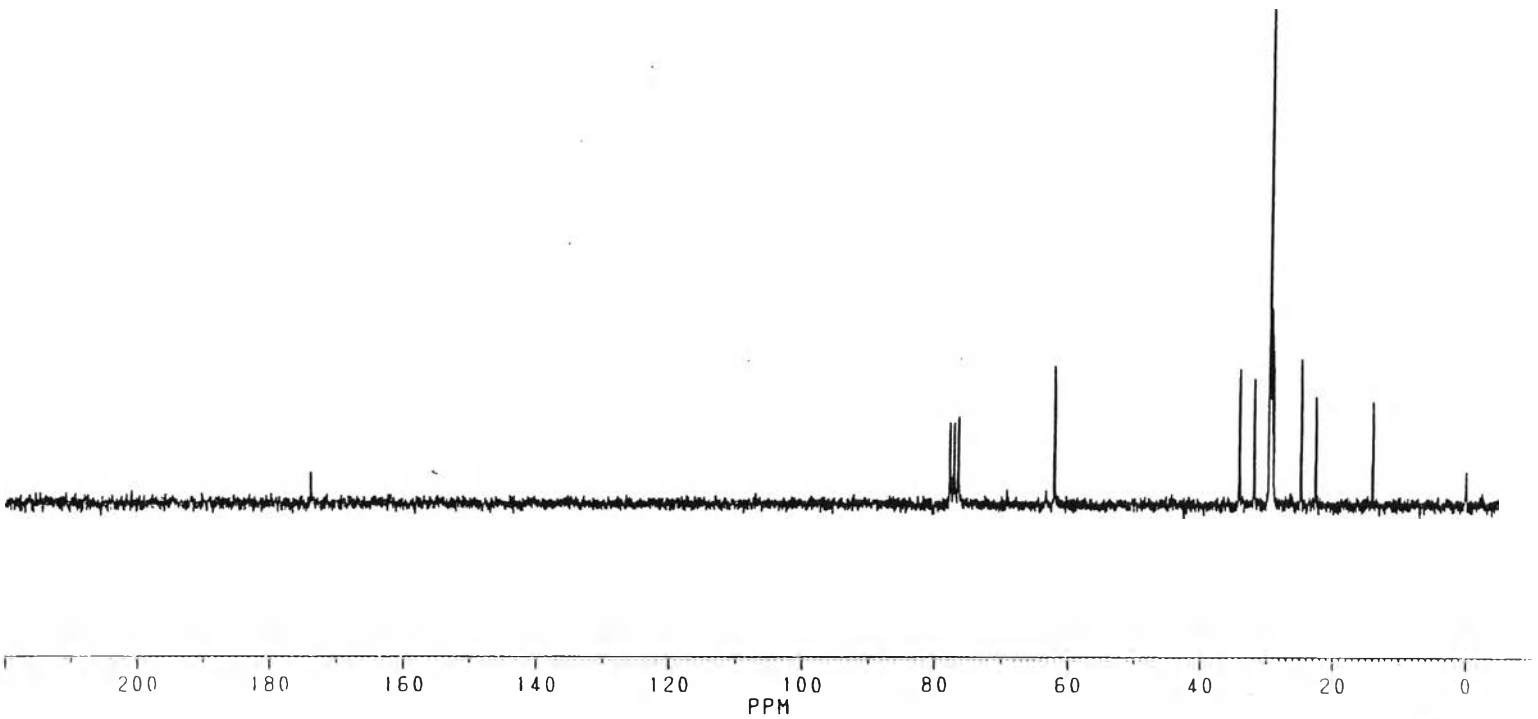

Figure A8 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-ethanedimyristate

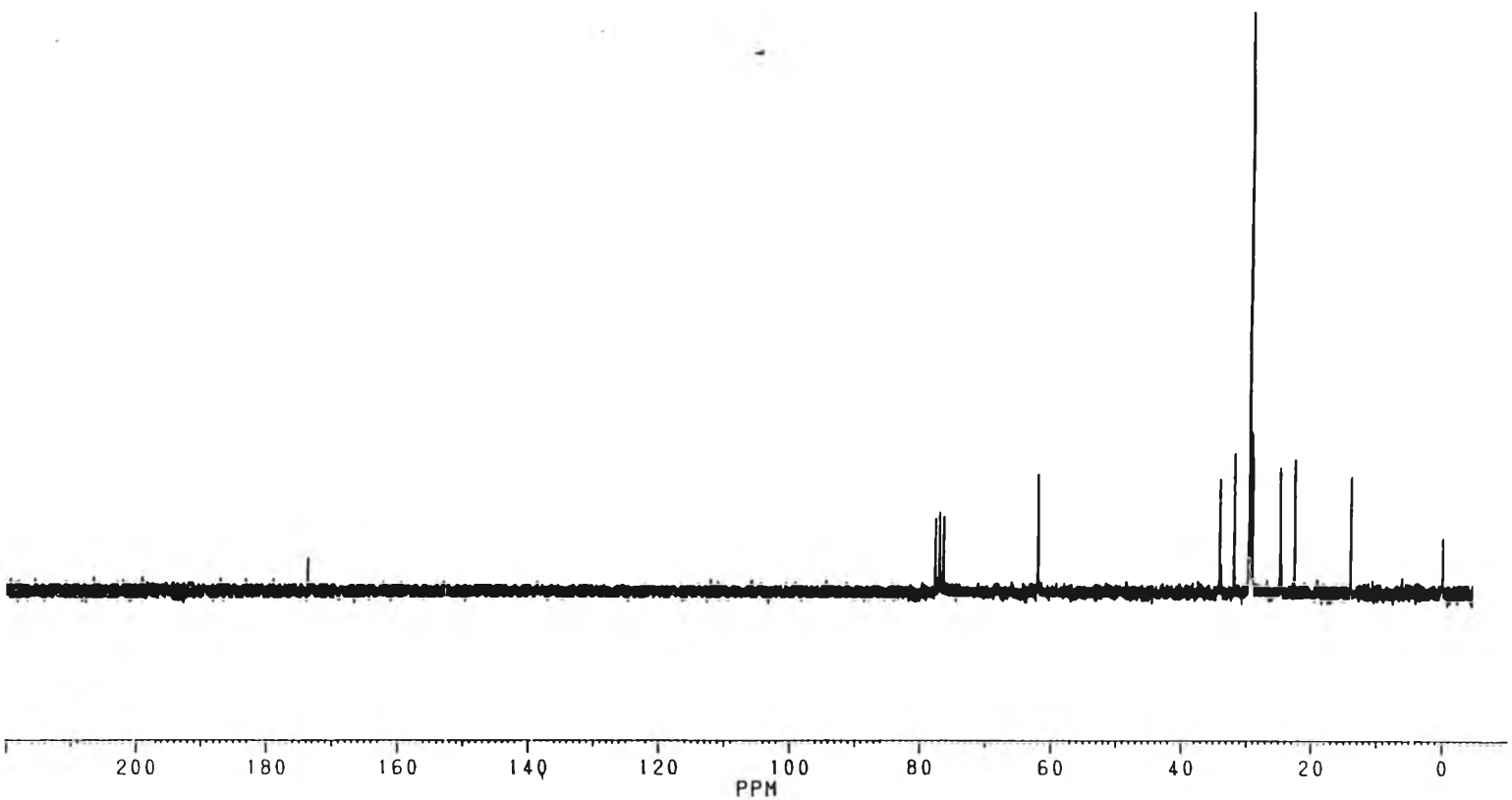

Figure A9 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-ethanedipalmitate

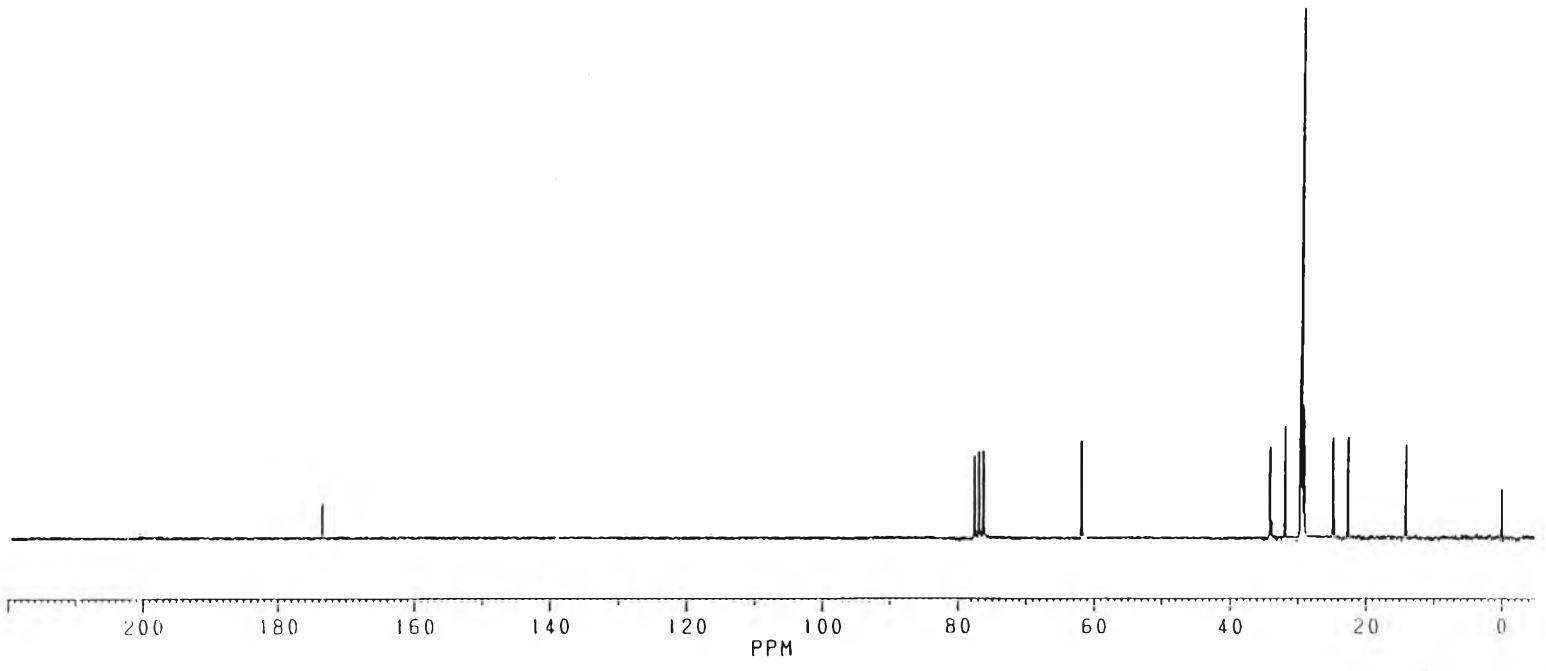

Figure A10 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-ethanedistearate

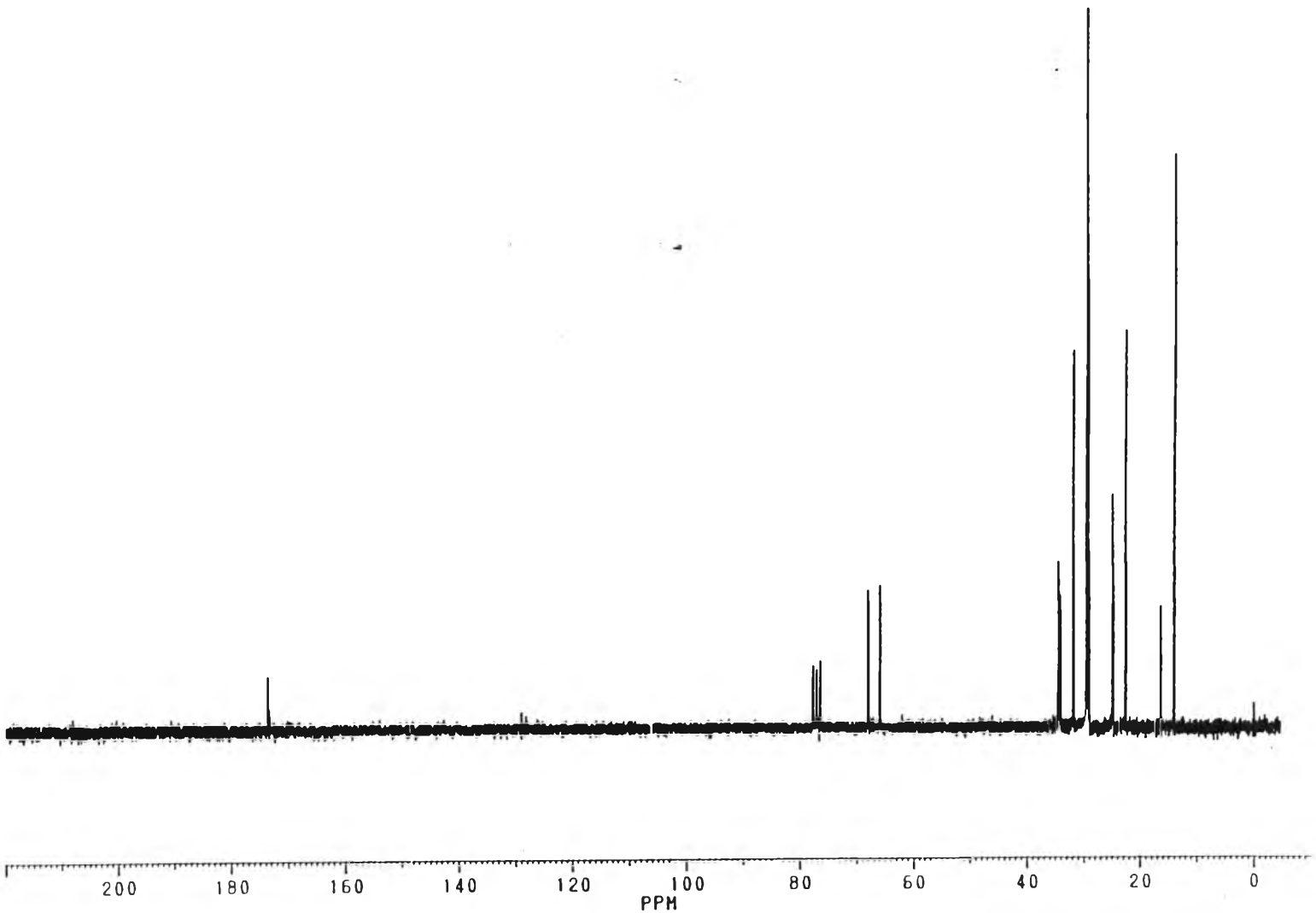

Figure A11 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-propanedilaurate

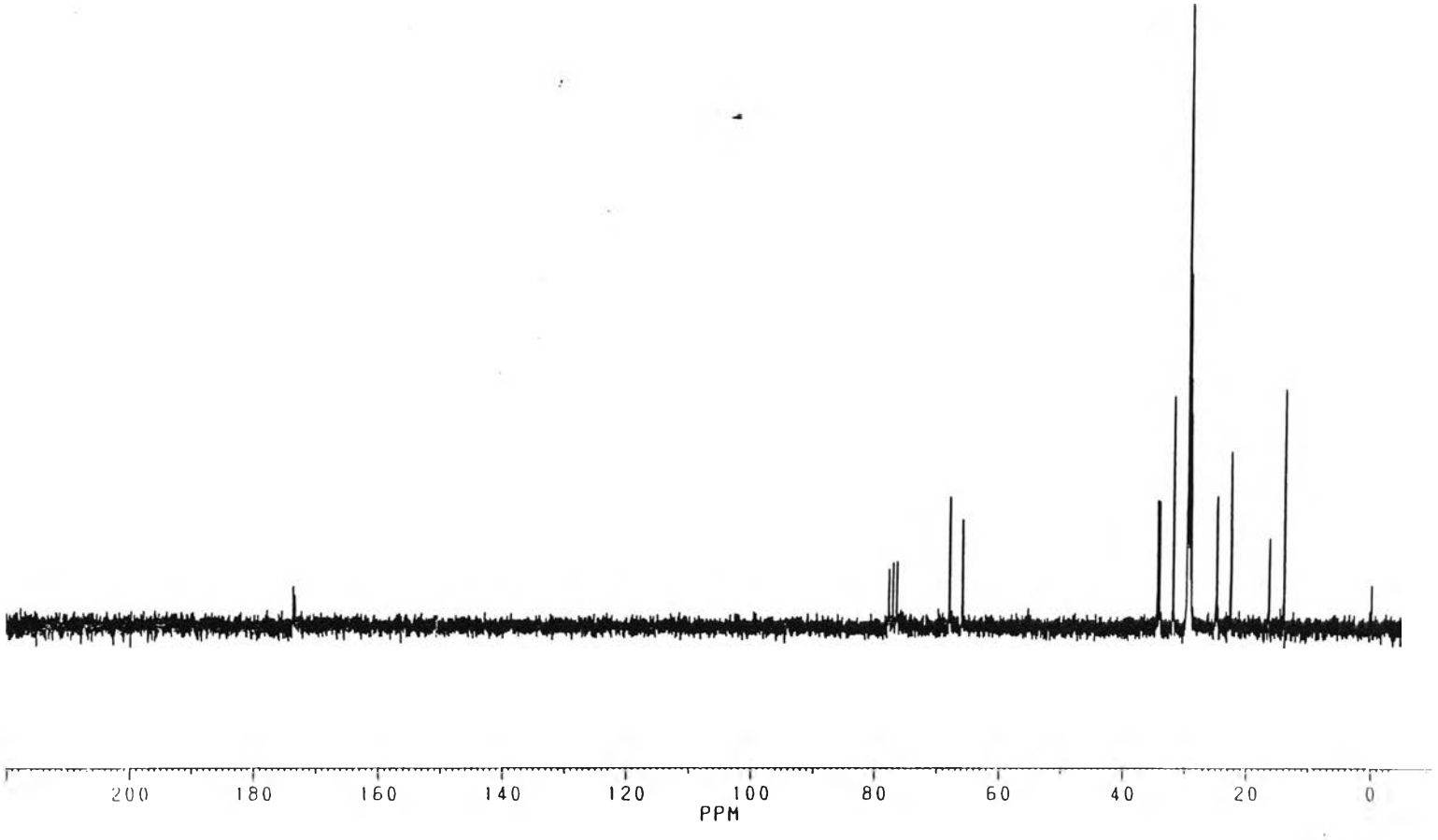

Figure A12 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-propanedimyristate

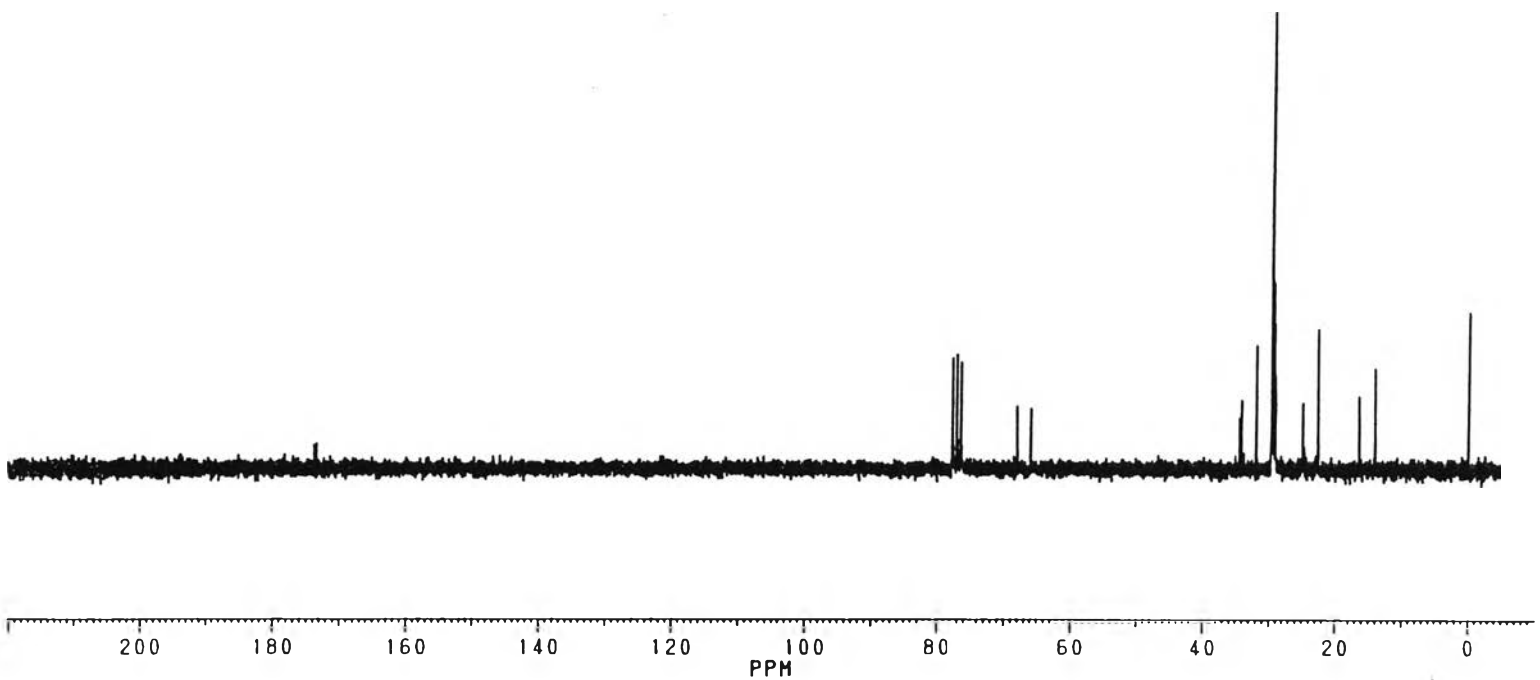

Figure A13 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-propanedipalmitate

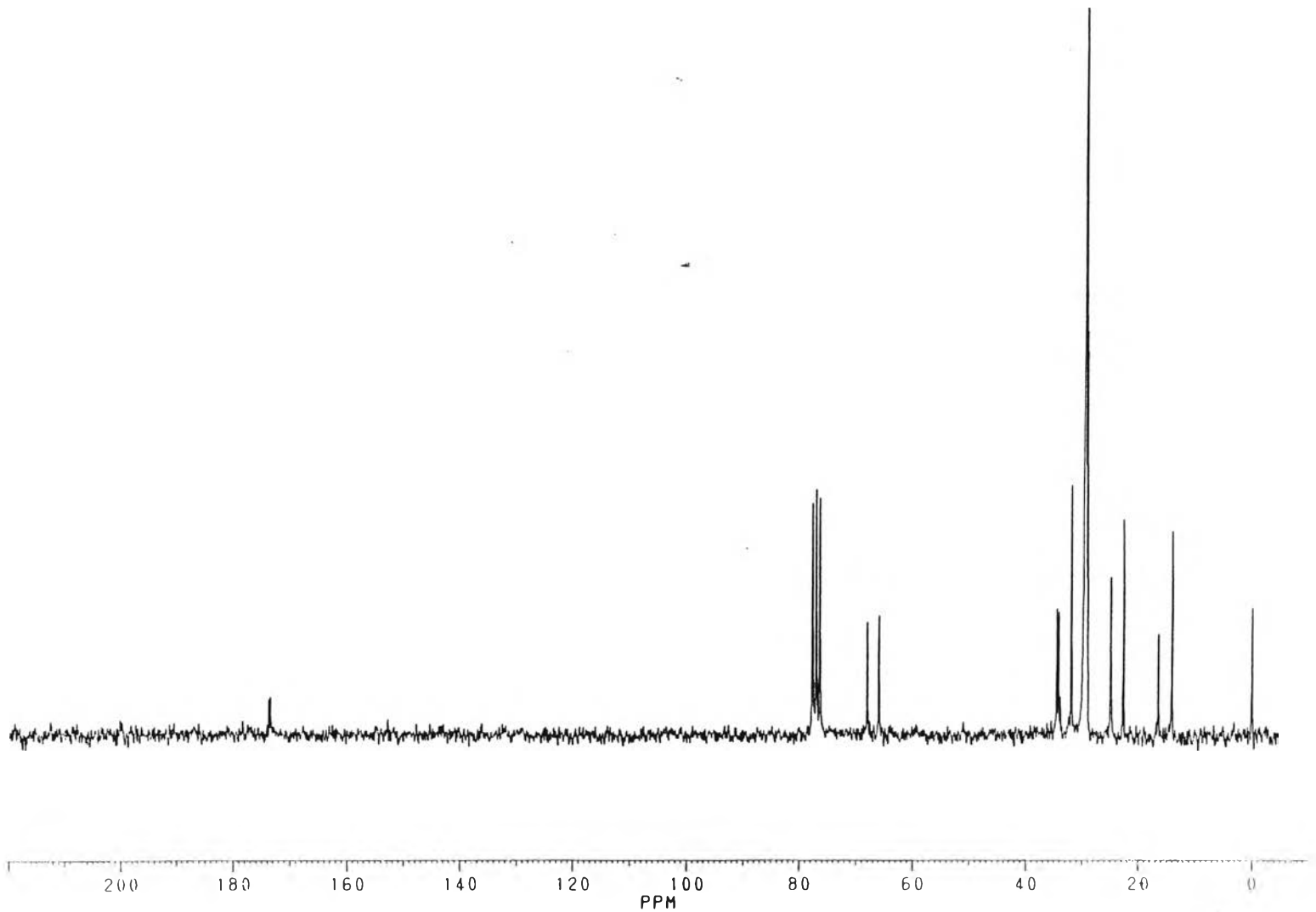

Figure A14 ^{13}C NMR ($CDCl_3$) spectrum of 1,2-propanedistearate

APPENDIX B

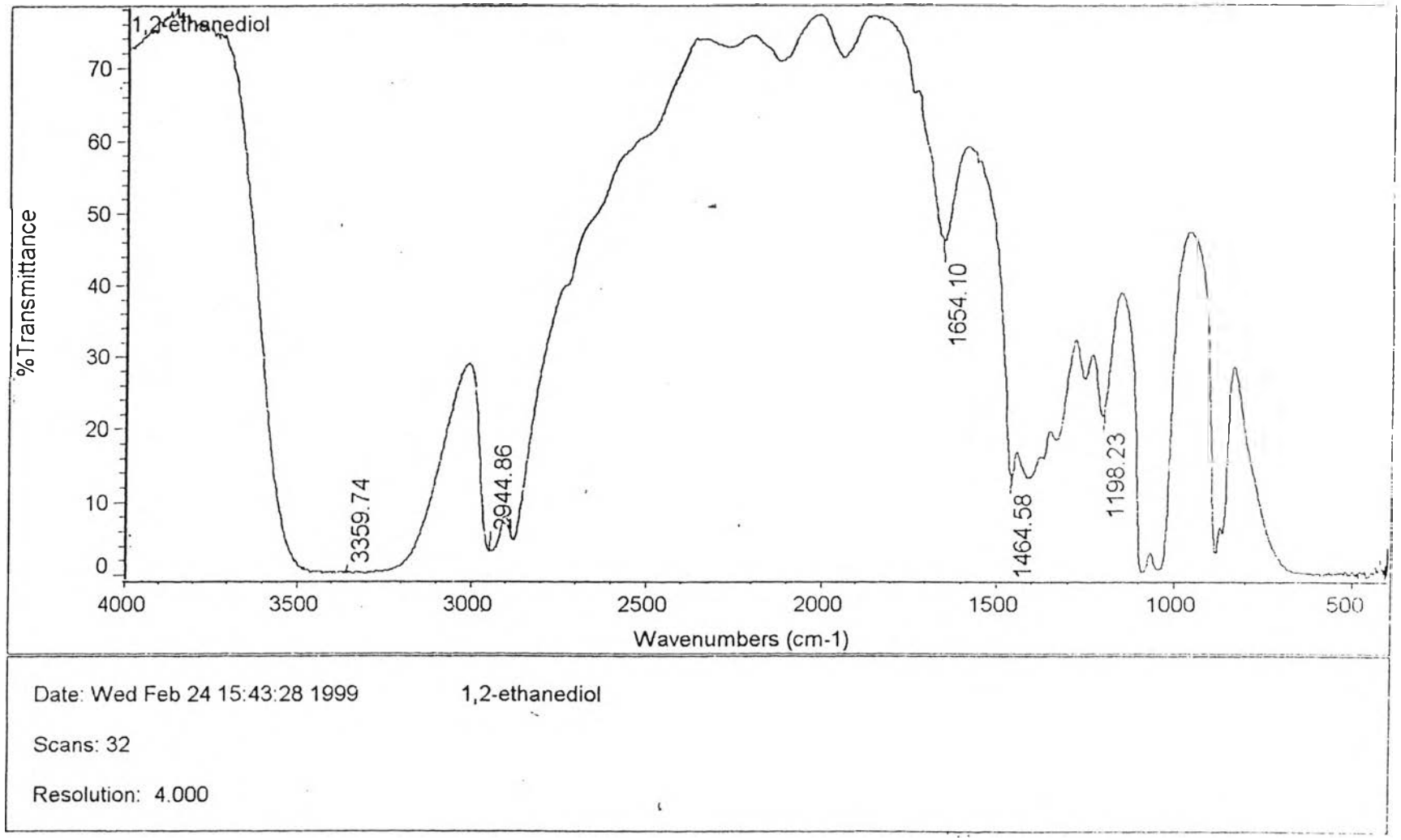

Figure B1 IR spectrum of 1,2-ethanediol

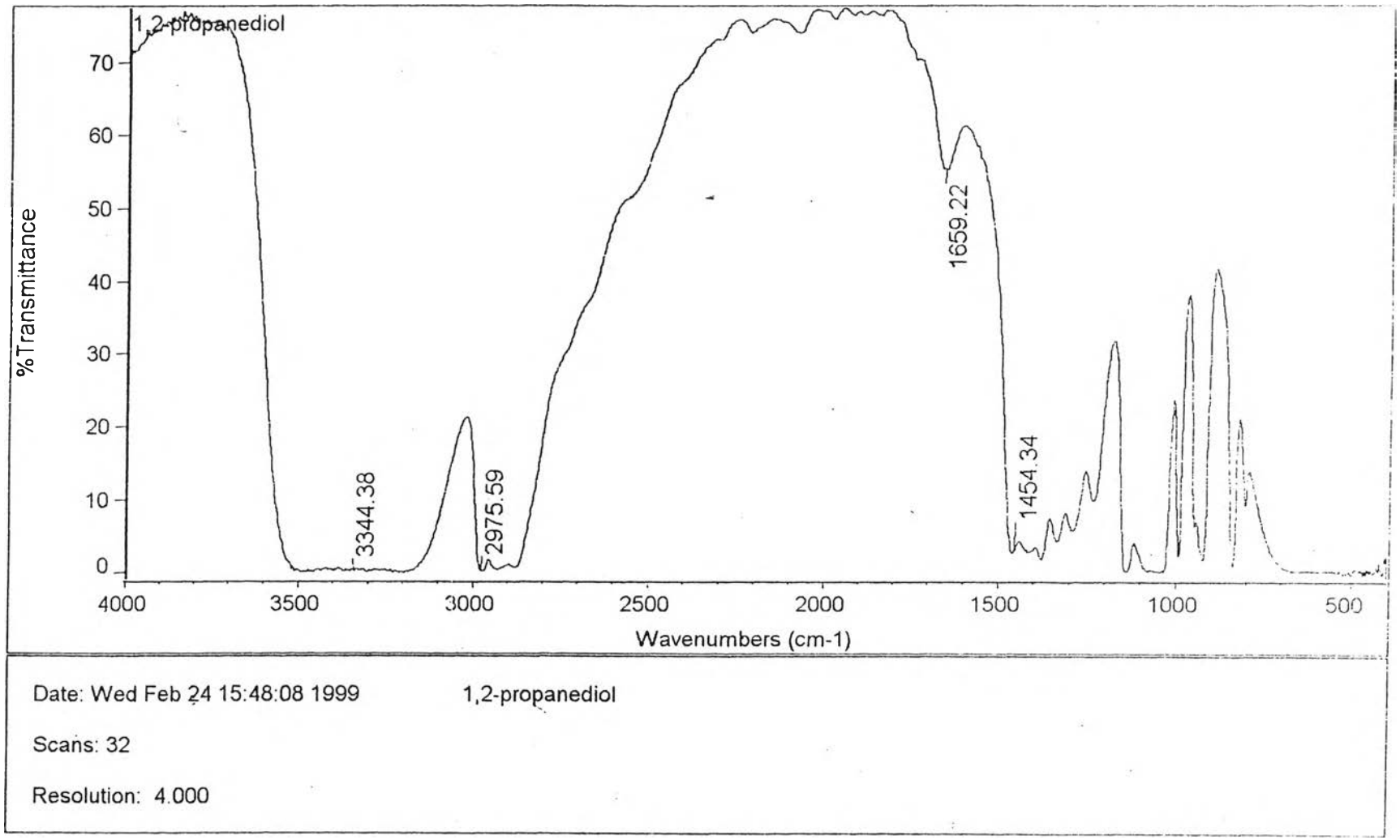

Figure B2 IR spectrum of 1,2-propanediol

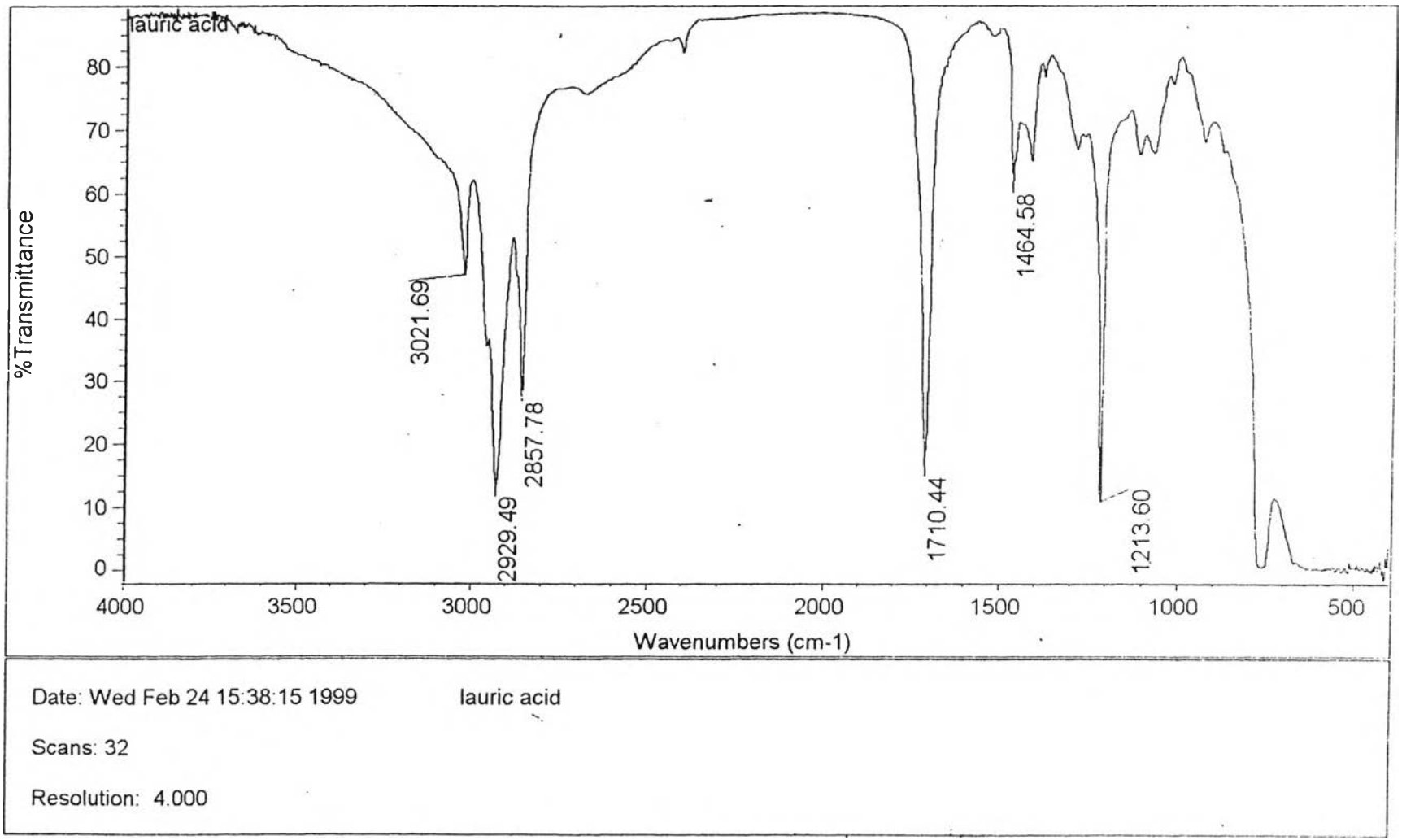

Figure B3 IR spectrum of lauric acid

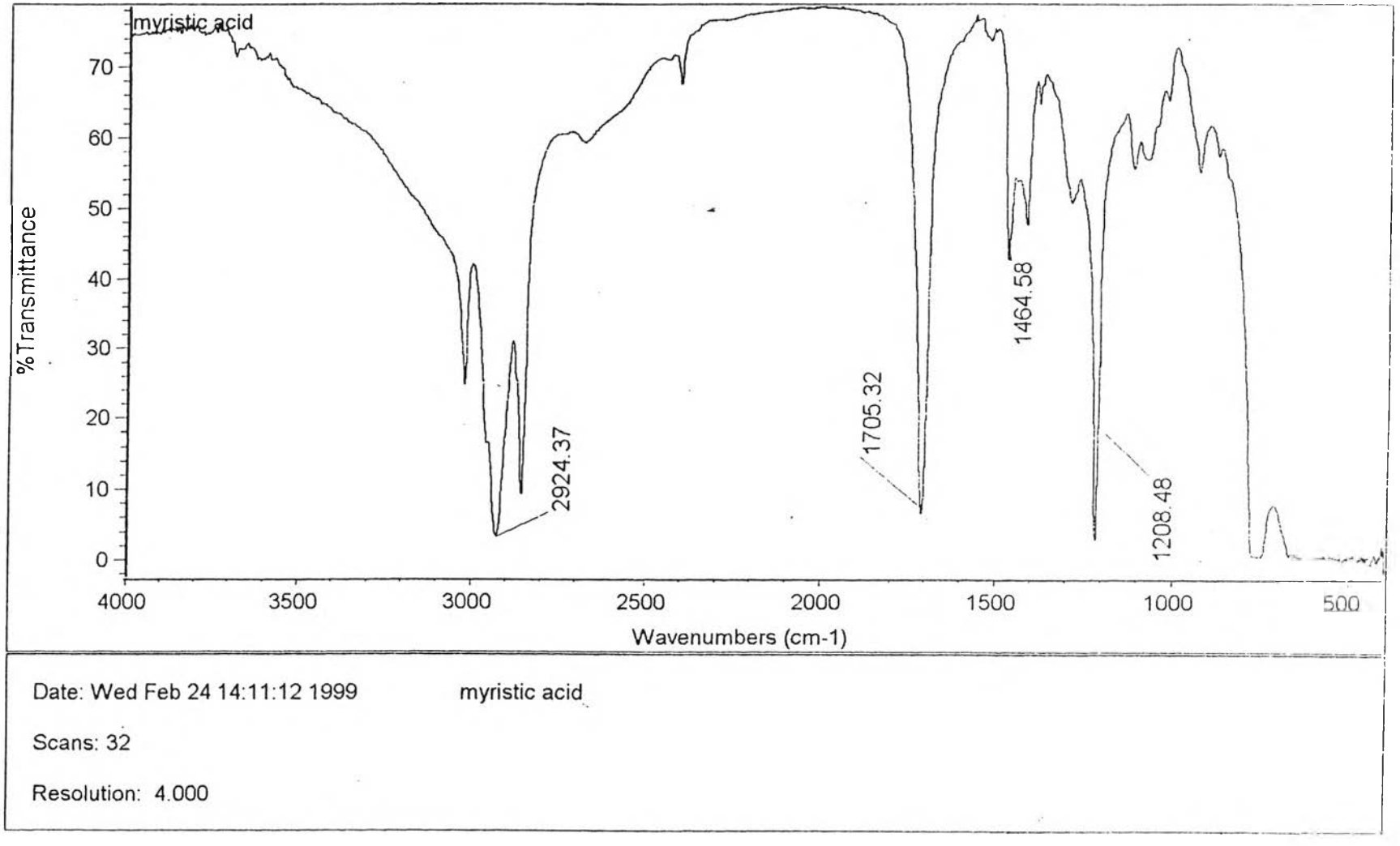

Figure B4 IR spectrum of myristic acid

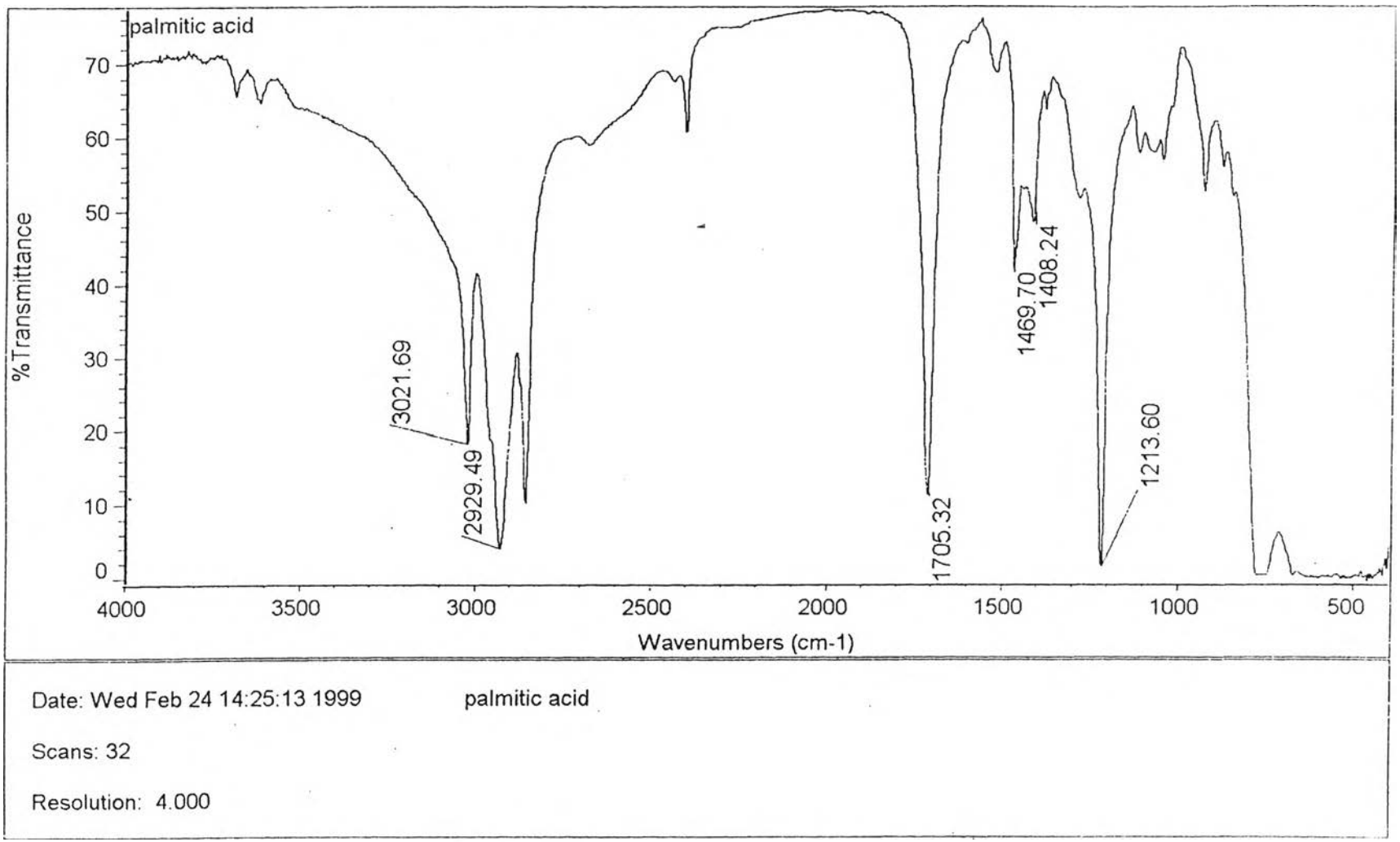

Figure B5 IR spectrum of palmitic acid

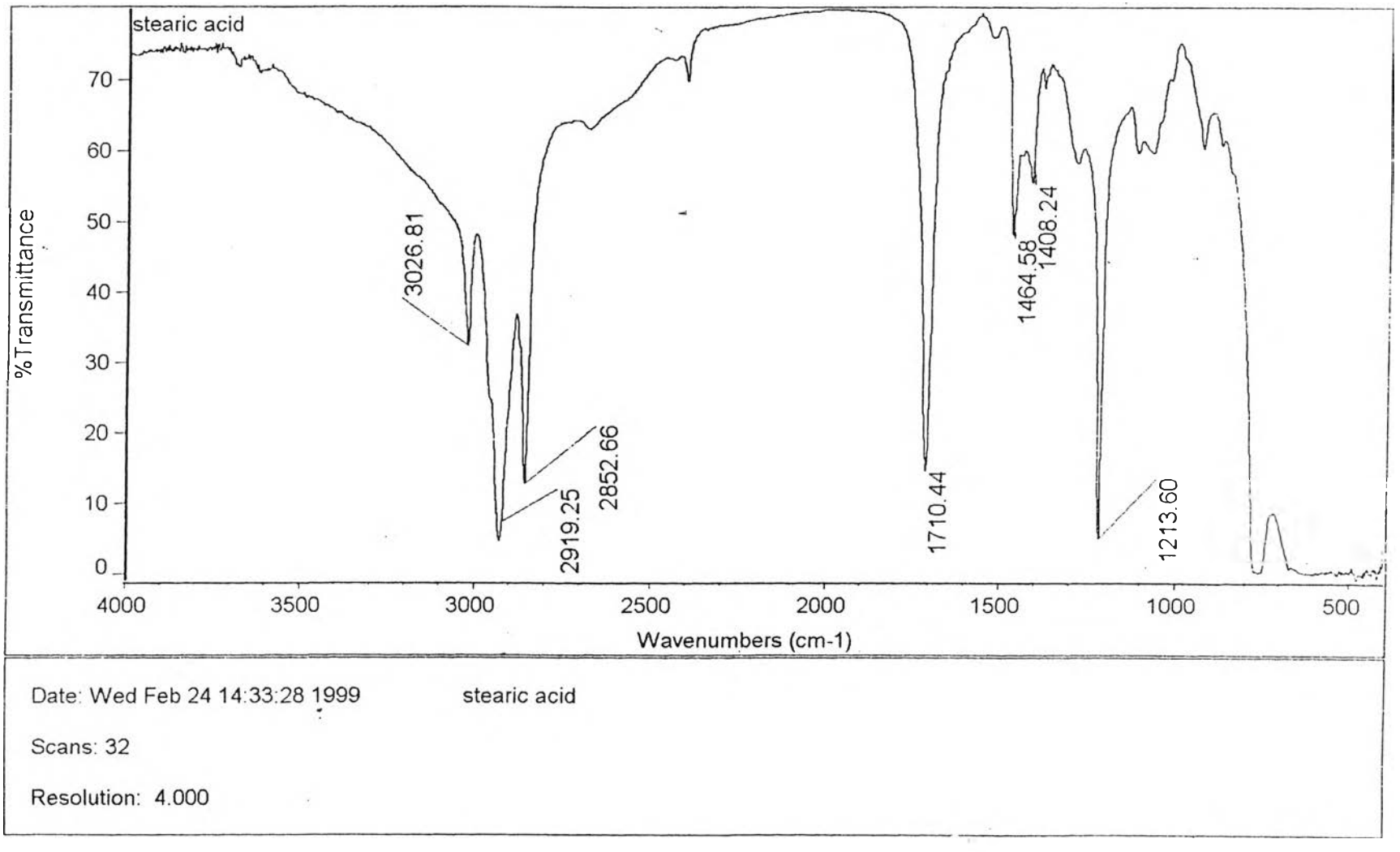

Figure B6 IR spectrum of stearic acid

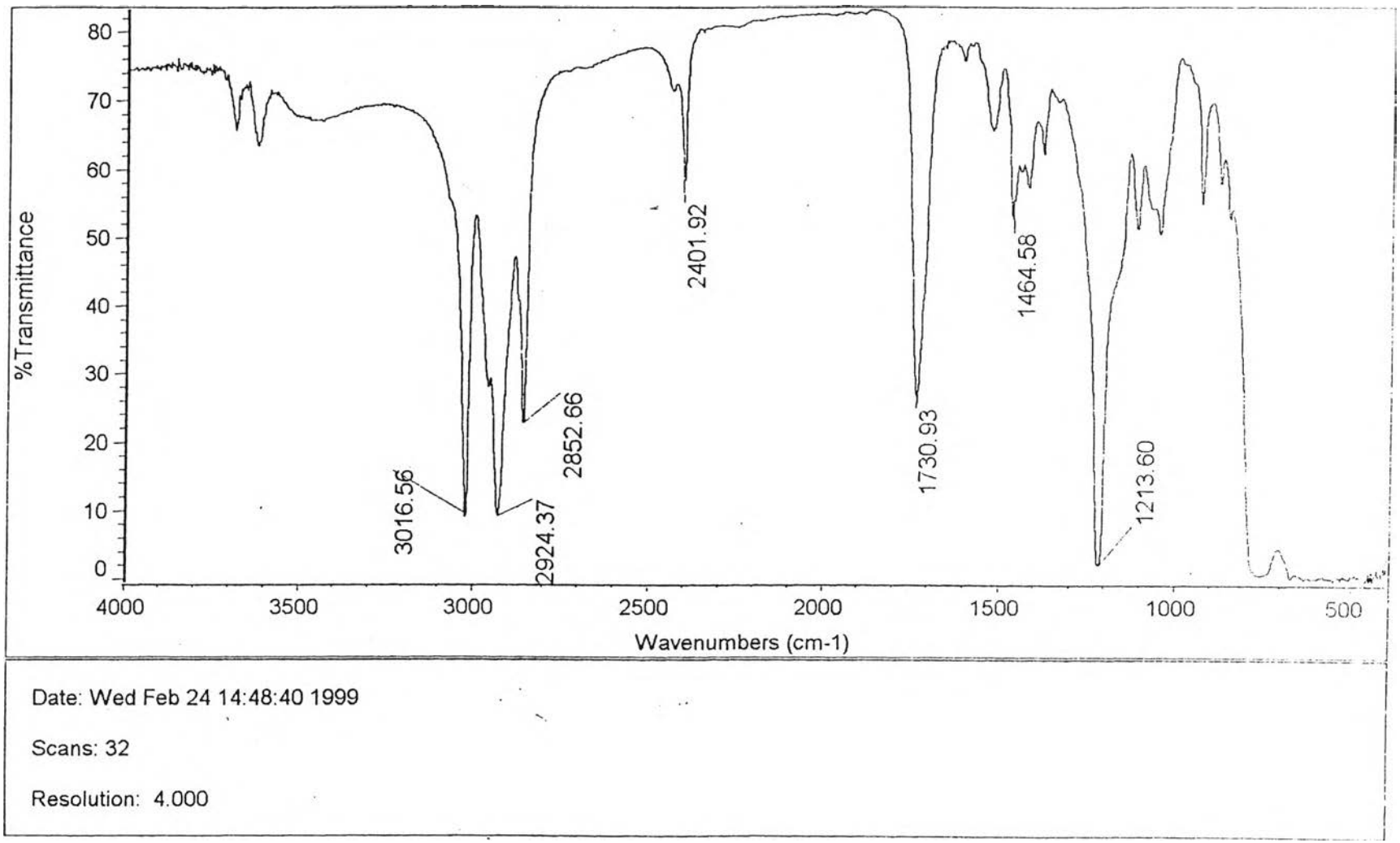

Figure B7 IR spectrum of 1,2-ethanedilaurate

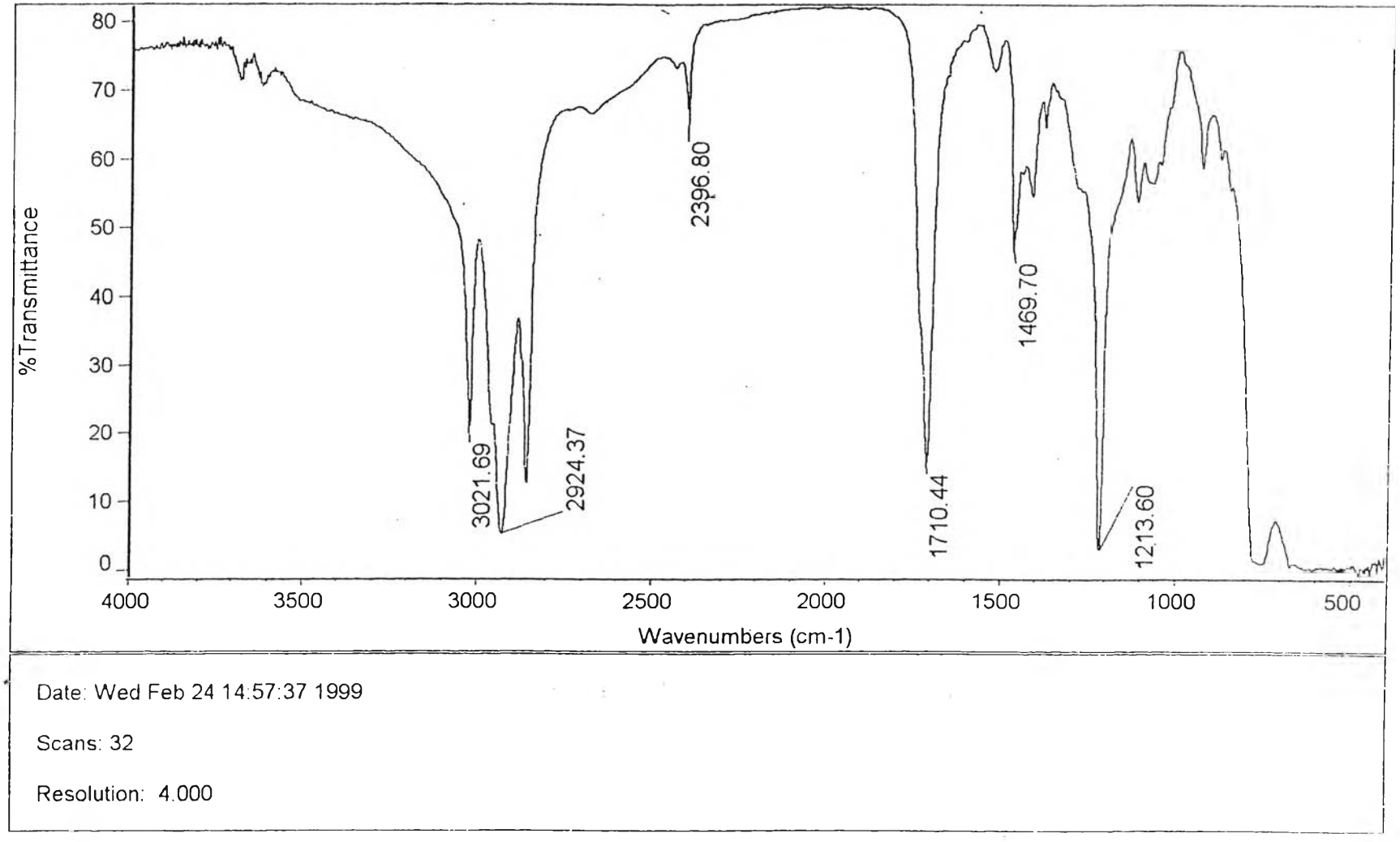

Figure B8 IR spectrum of 1,2-ethanedimyristate

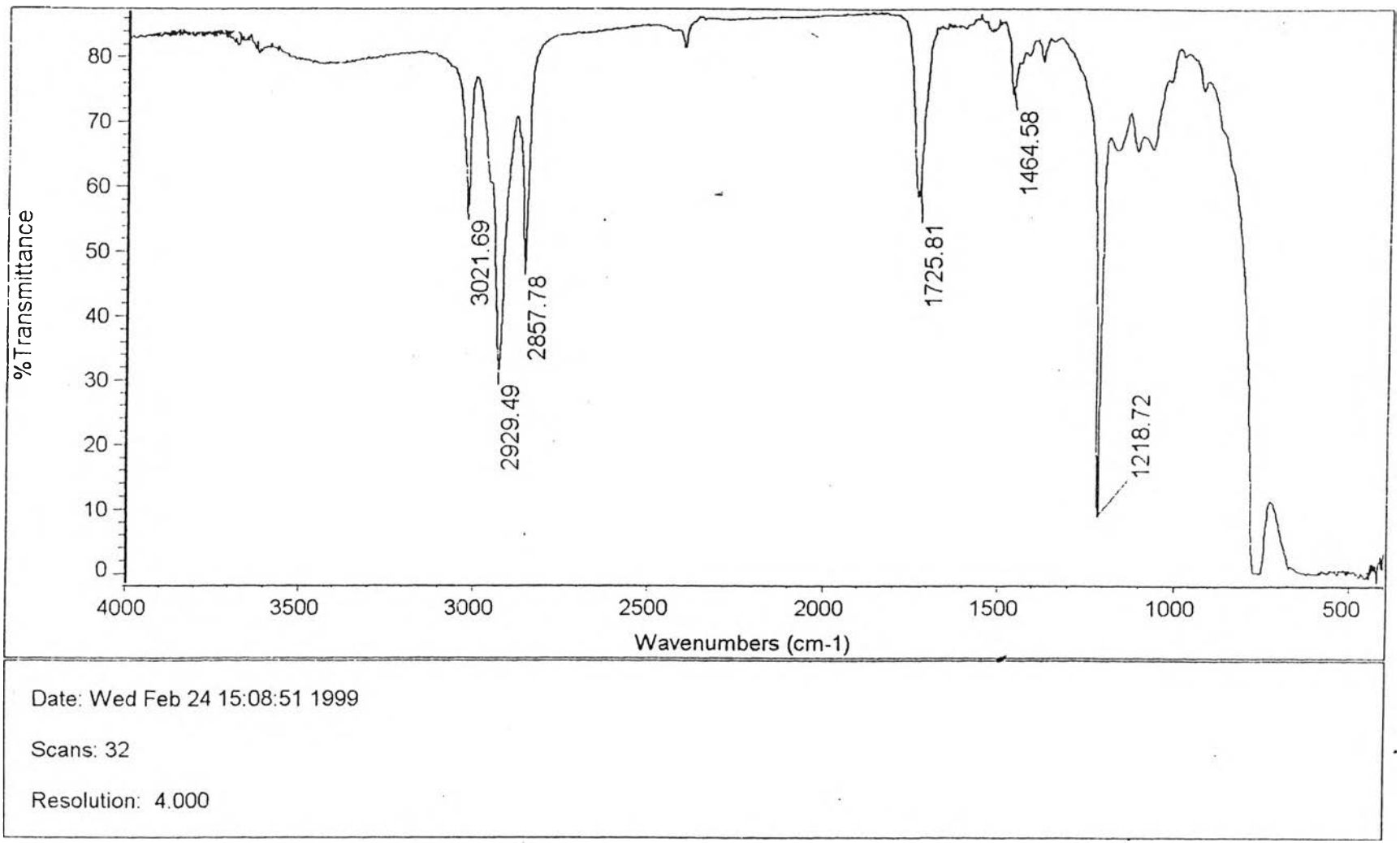

Figure B9 IR spectrum of 1,2-ethanedipalmitate

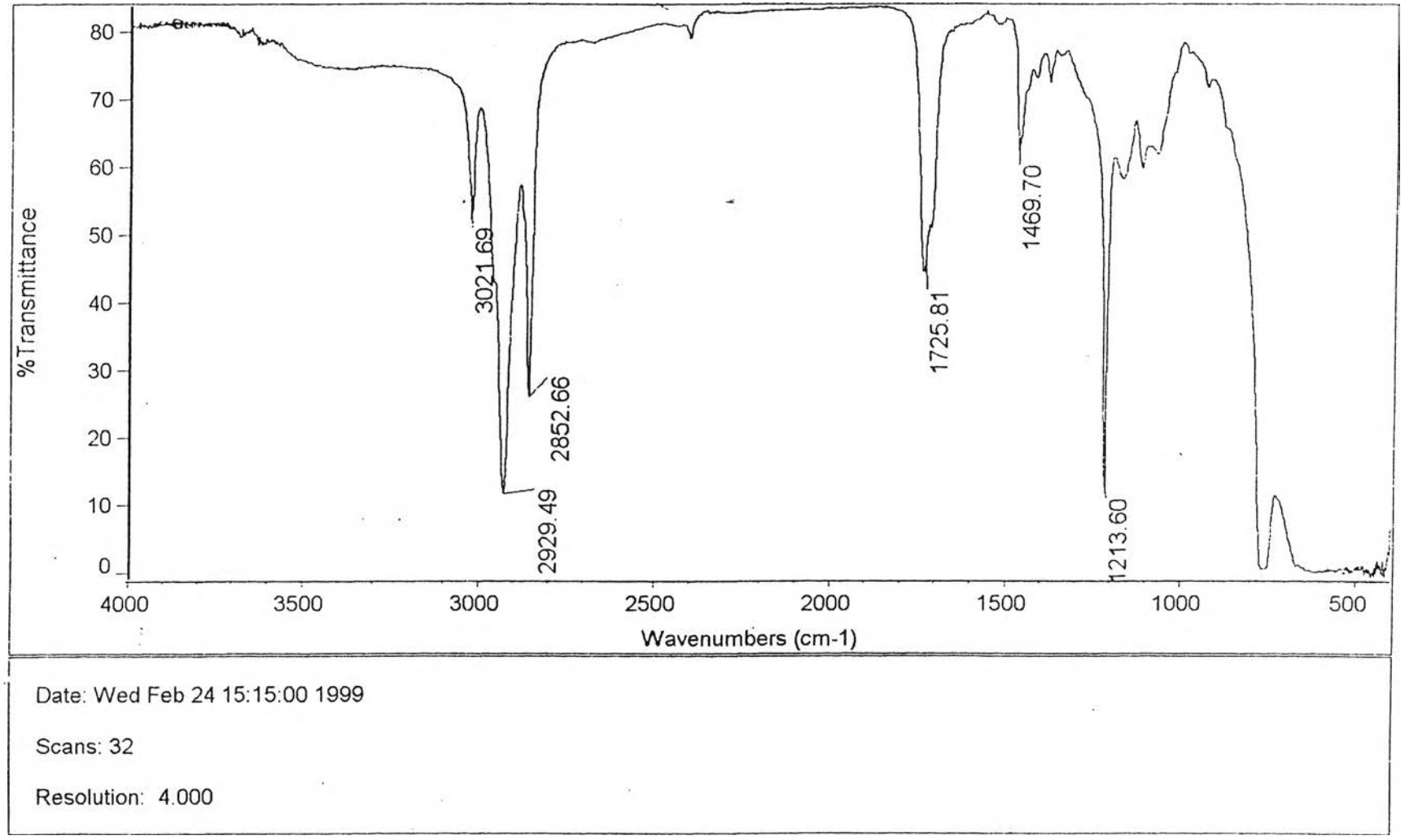

Figure B10 IR spectrum of 1,2-ethanedistearate

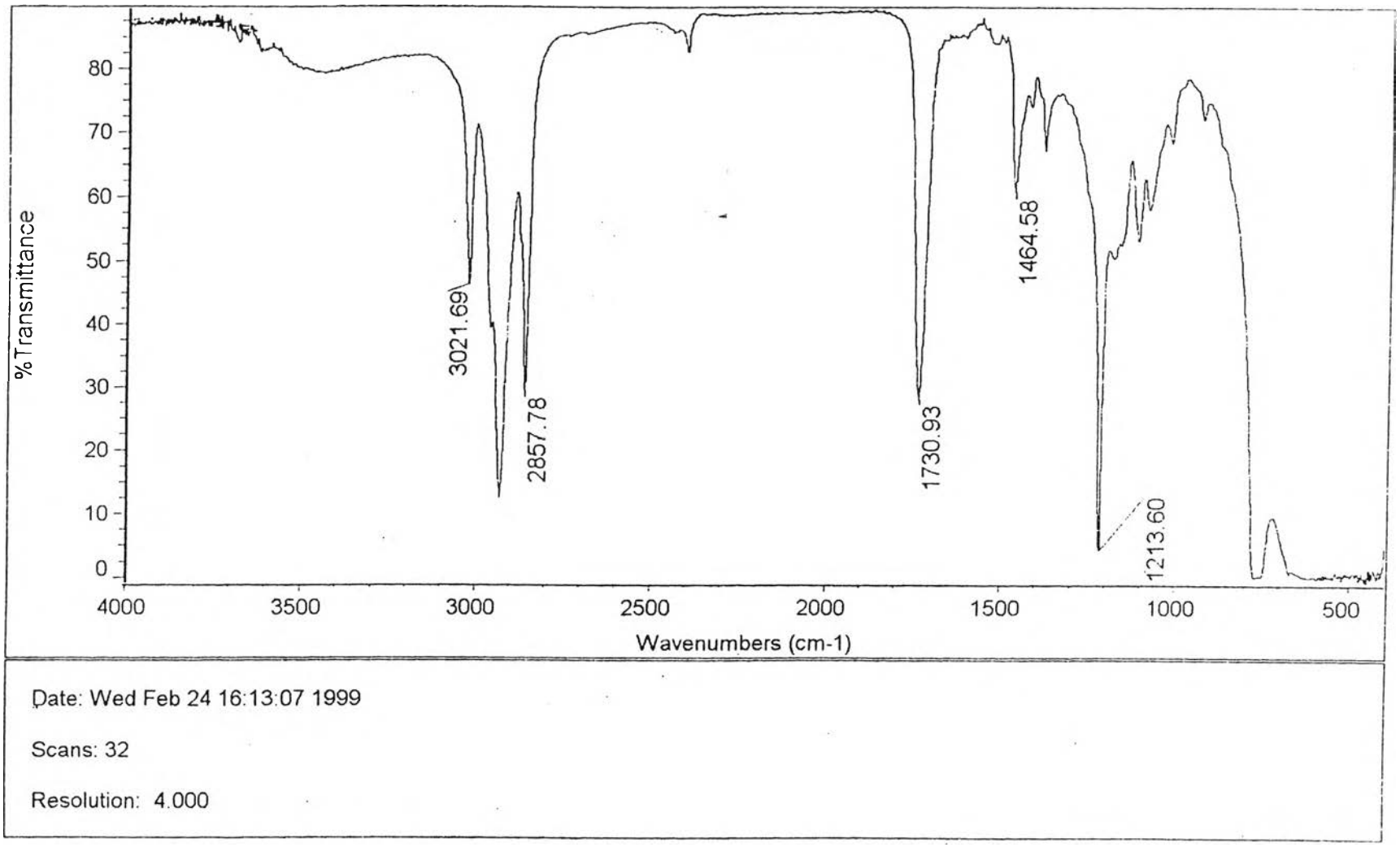

Figure B11 IR spectrum of 1,2-propanedilaurate

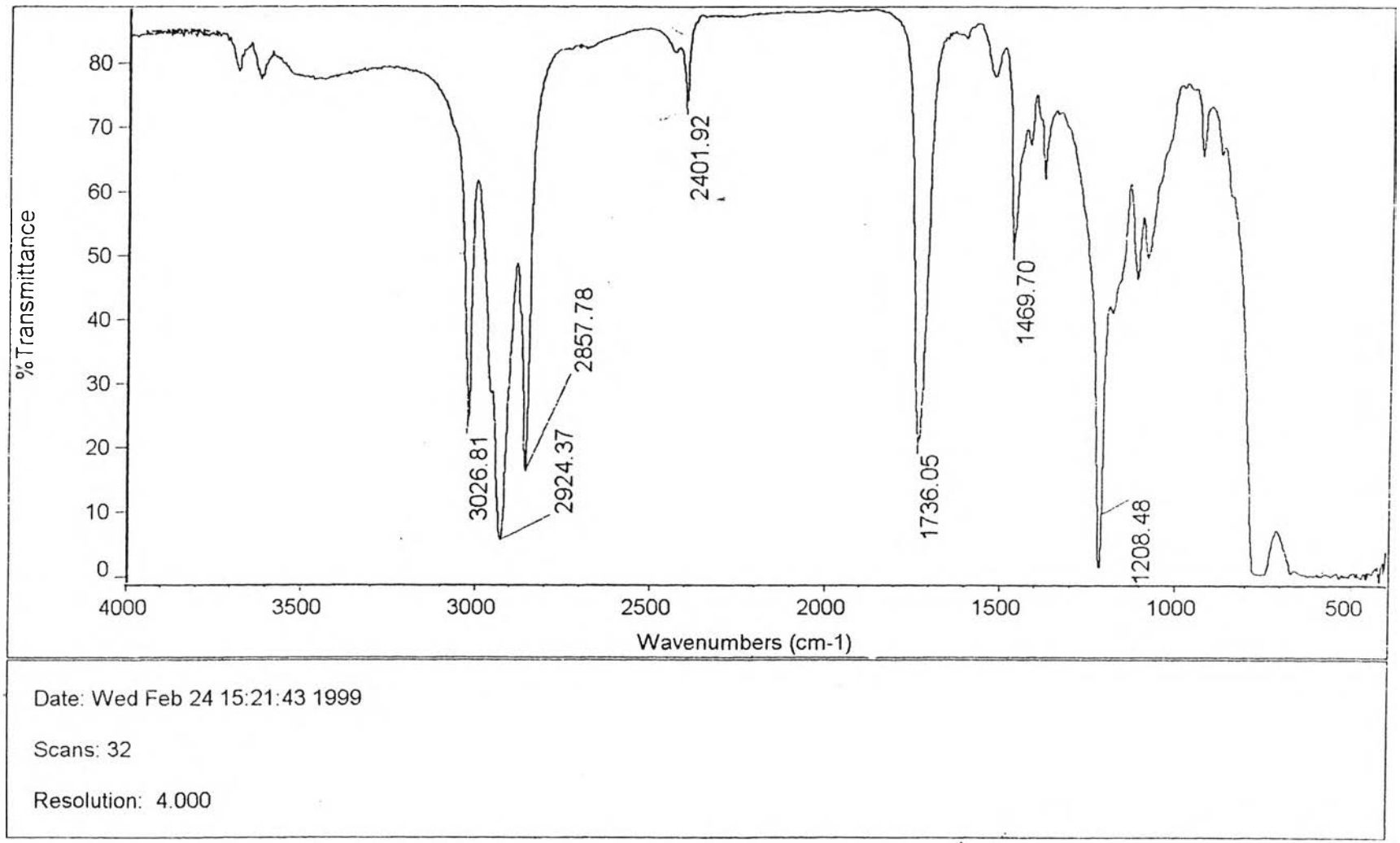

Figure B12 IR spectrum of 1,2-propanedimyristate

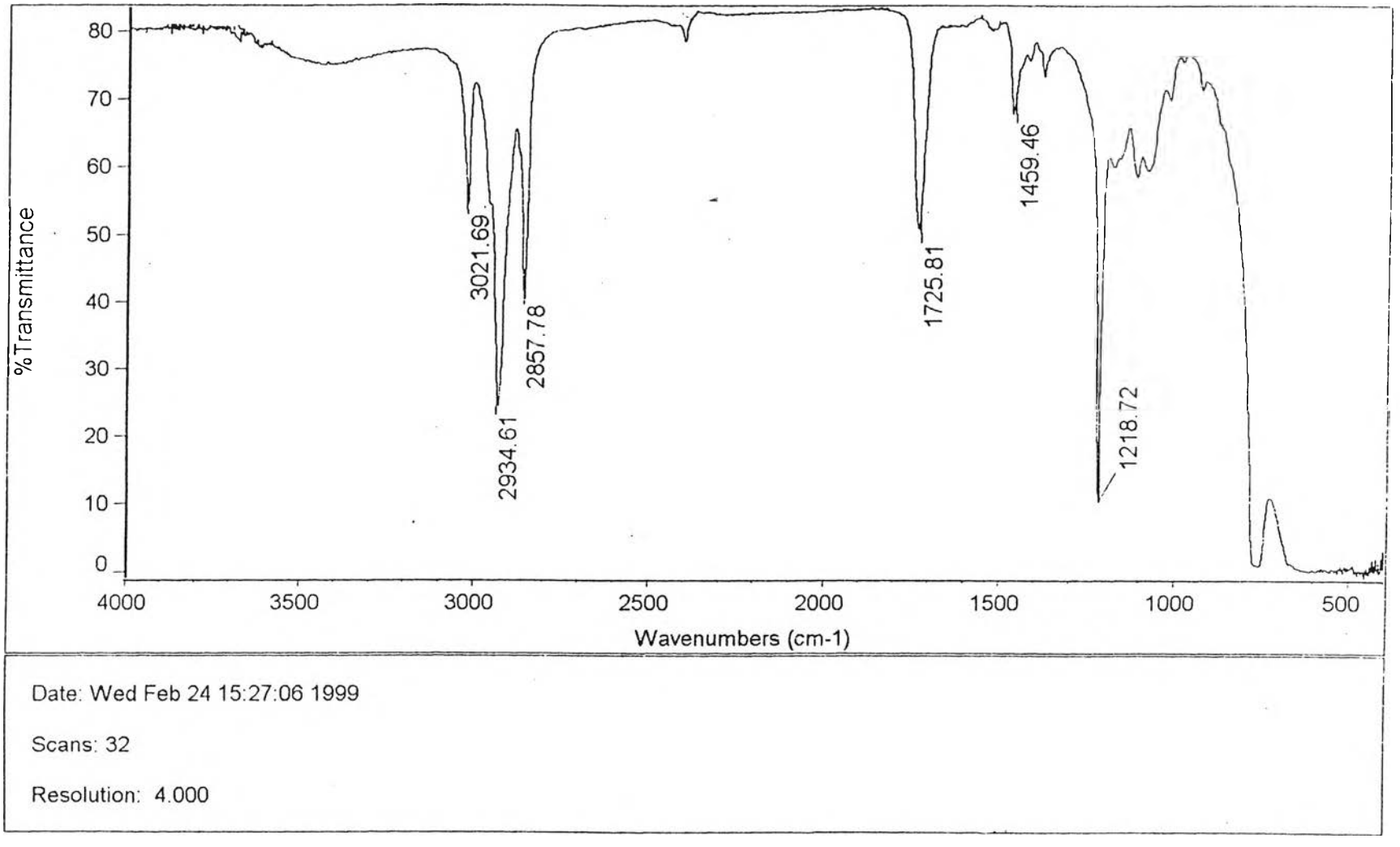

Figure B13 IR spectrum of 1,2-propanedipalmitate

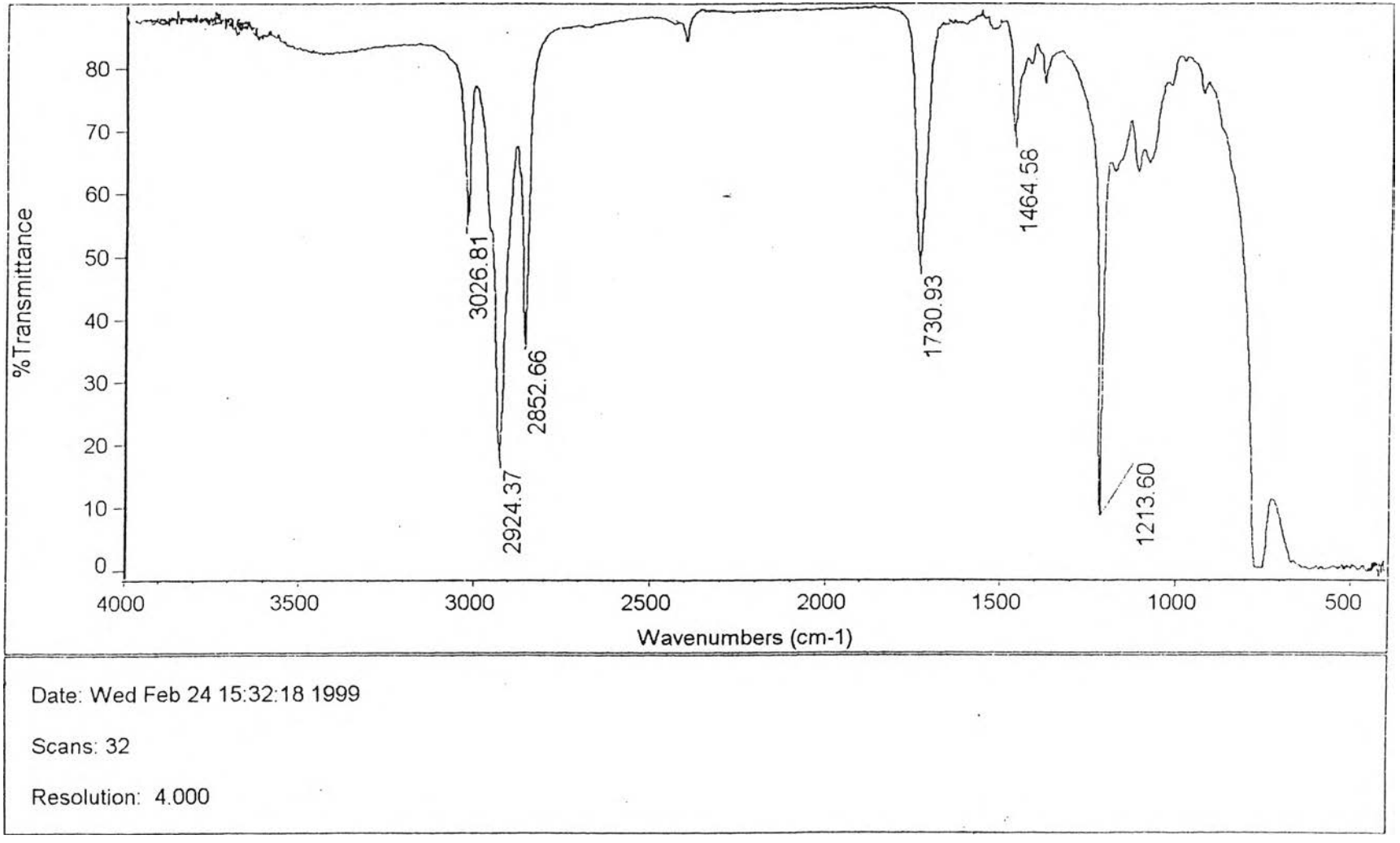

Figure B14 IR spectrum of 1,2-propanedistearate

APPENDIX C

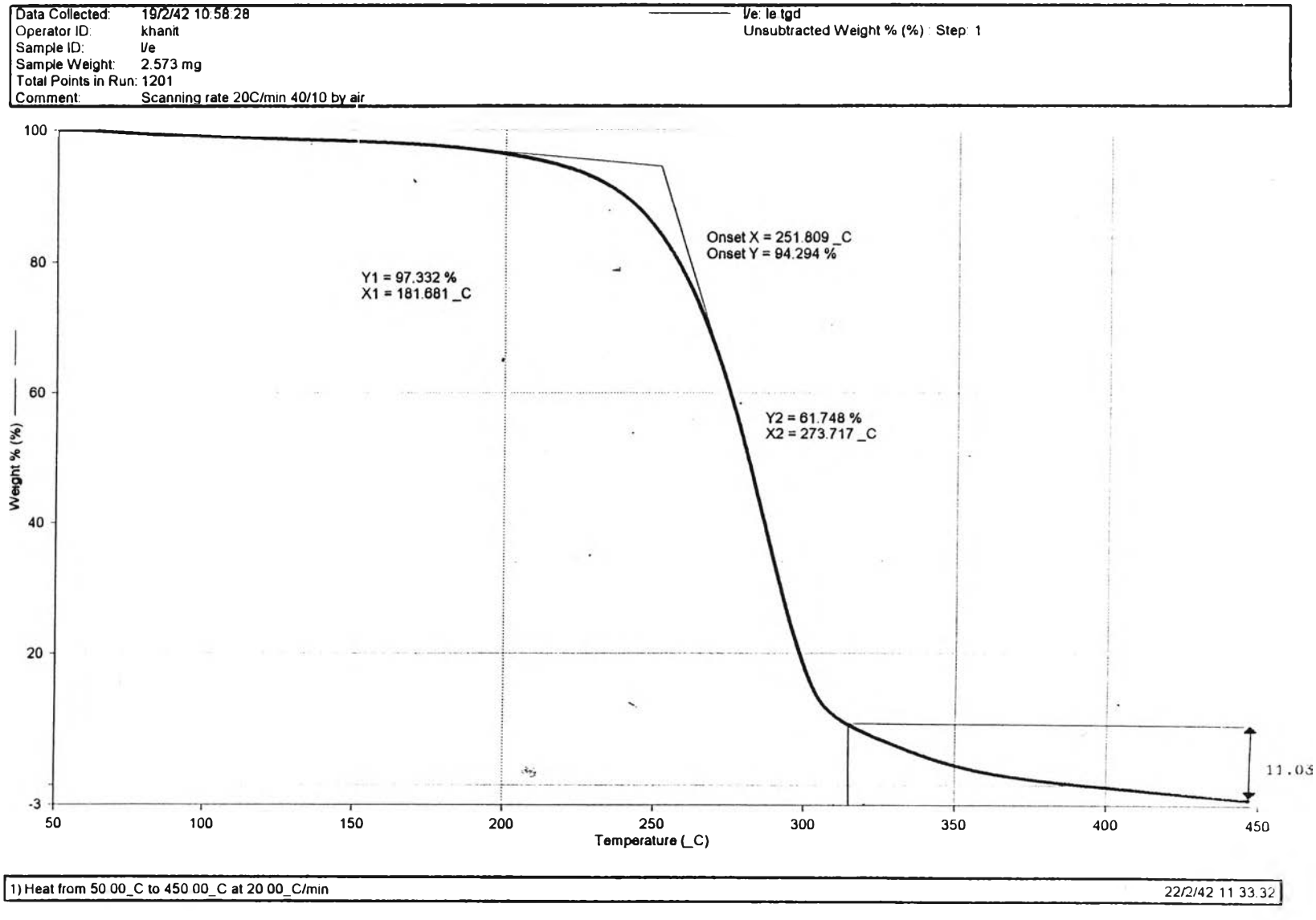

Figure C1 Thermogram of 1,2-ethanedilaurate

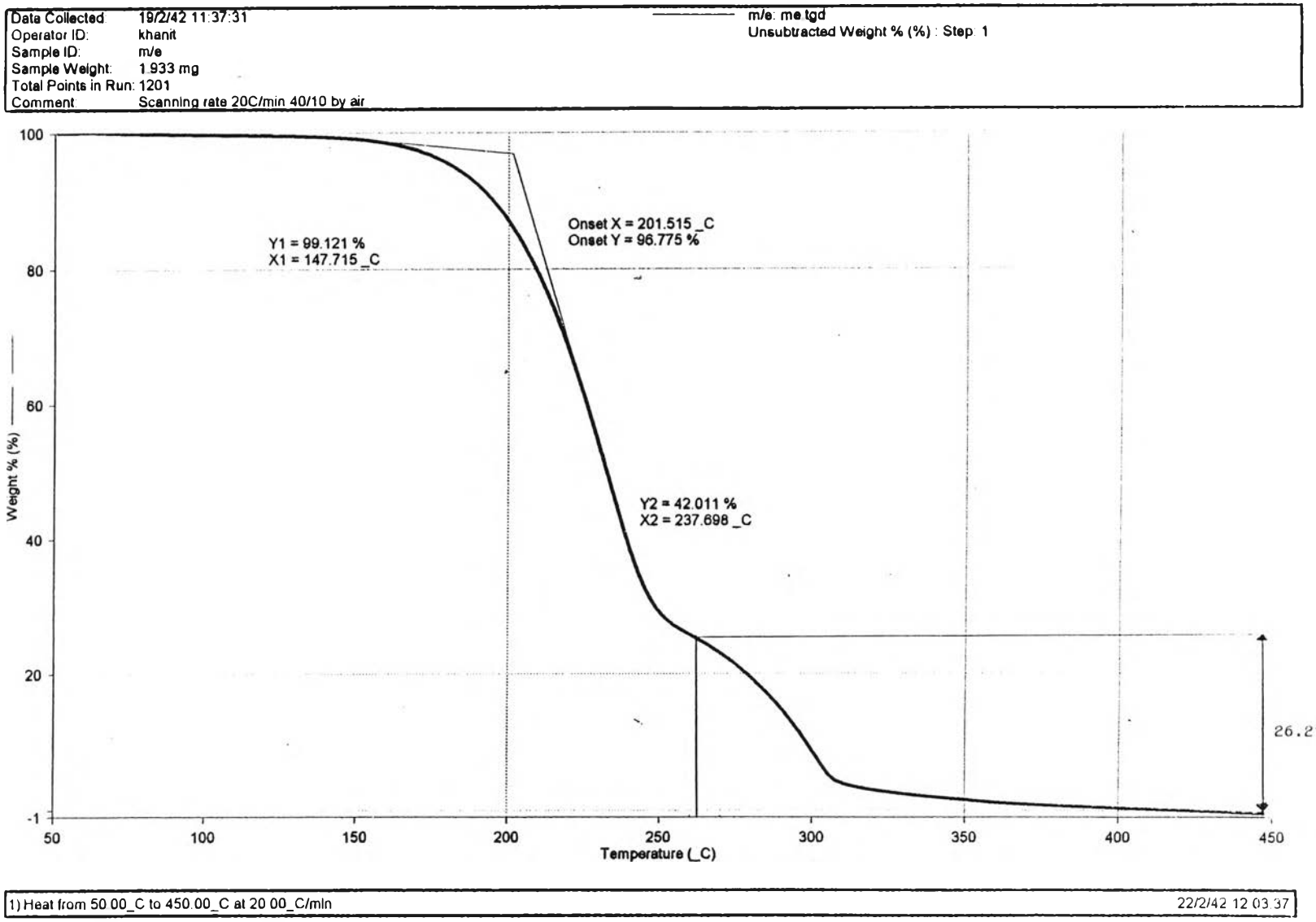

Figure C2 Thermogram of 1,2-ethanedimyristate

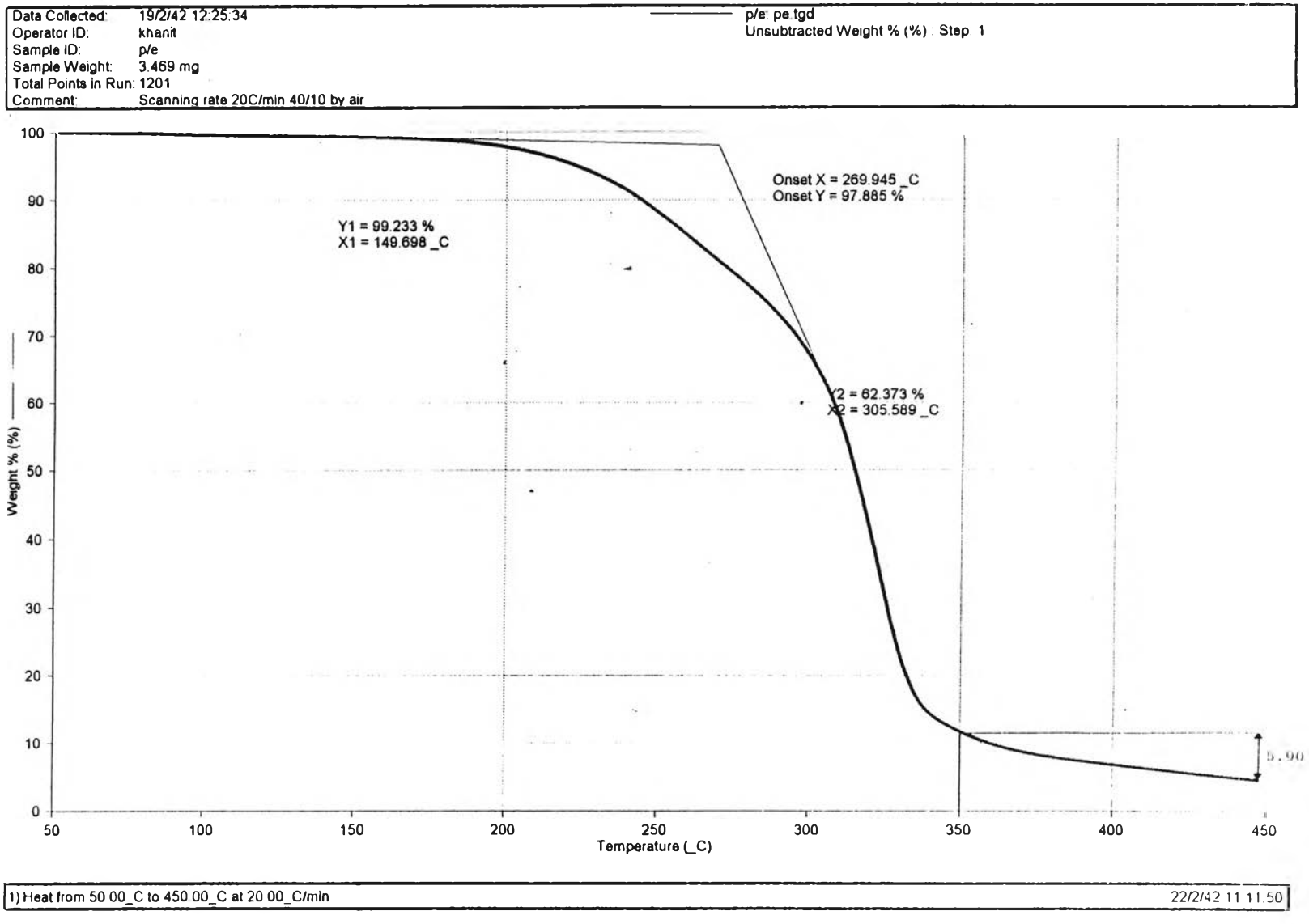

Figure C3 Thermogram of 1,2-ethanedipalmitate

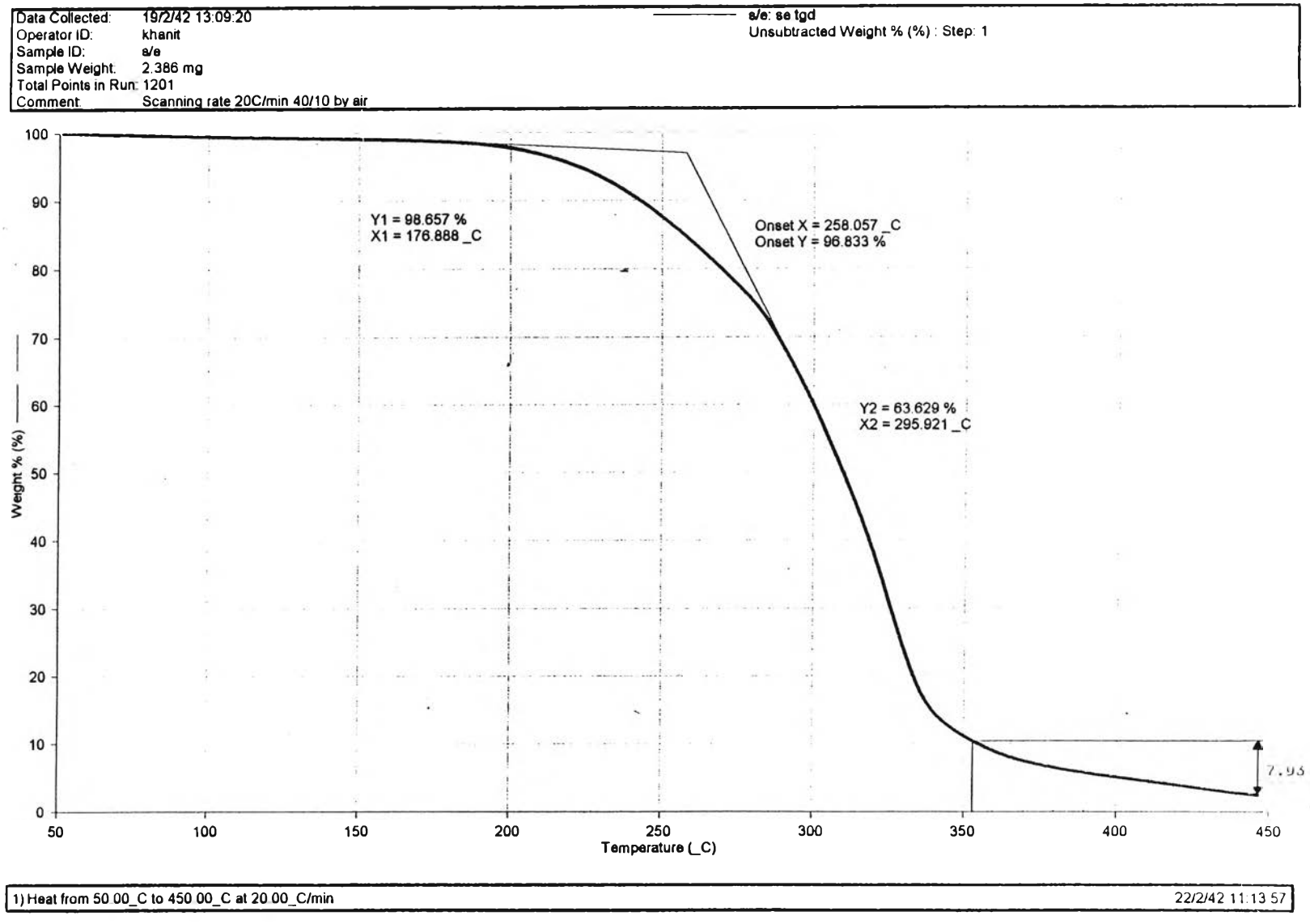

Figure C4 Thermogram of 1,2-ethanedistearate

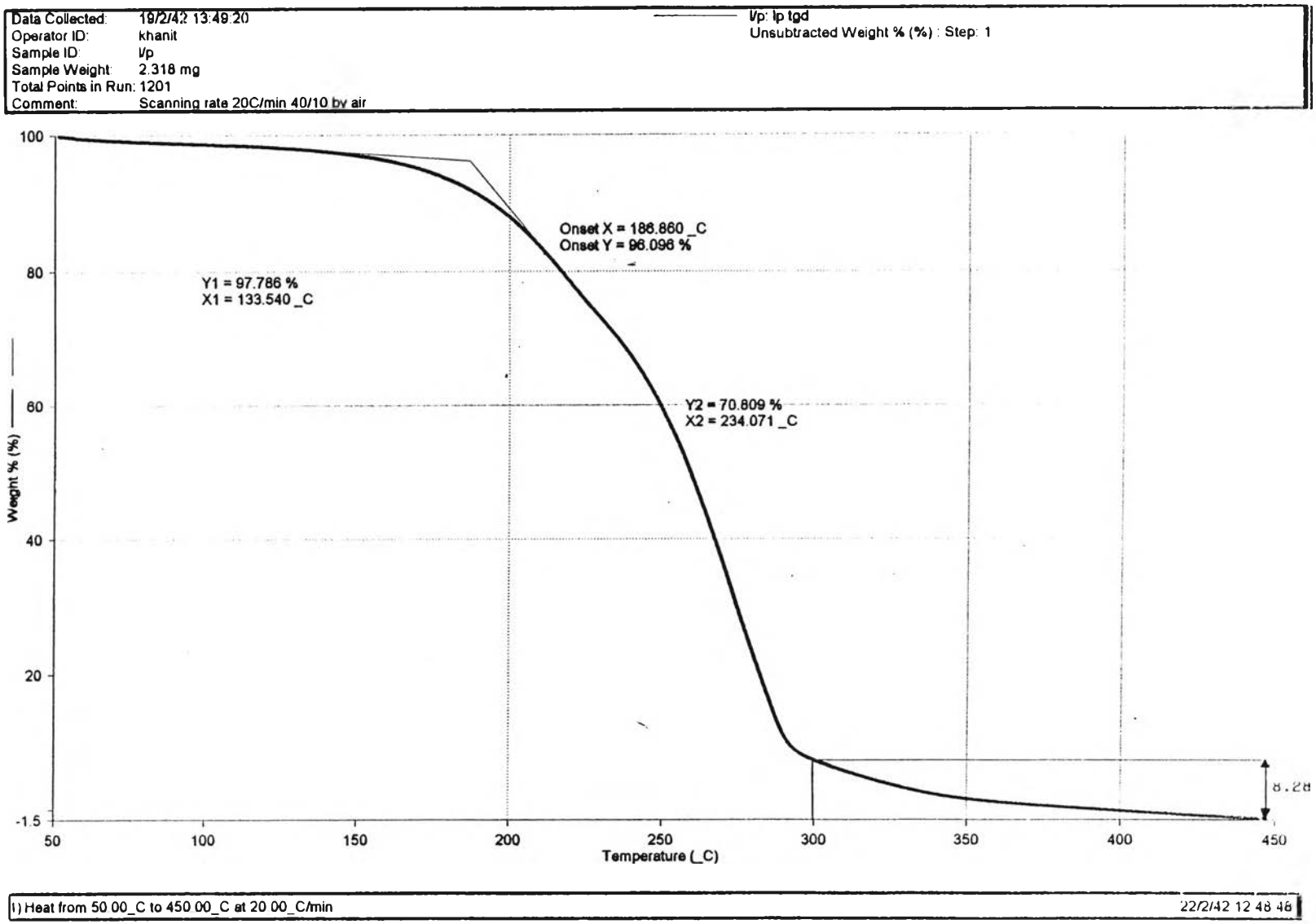

Figure C5 Thermogram of 1,2-propanedilaurate

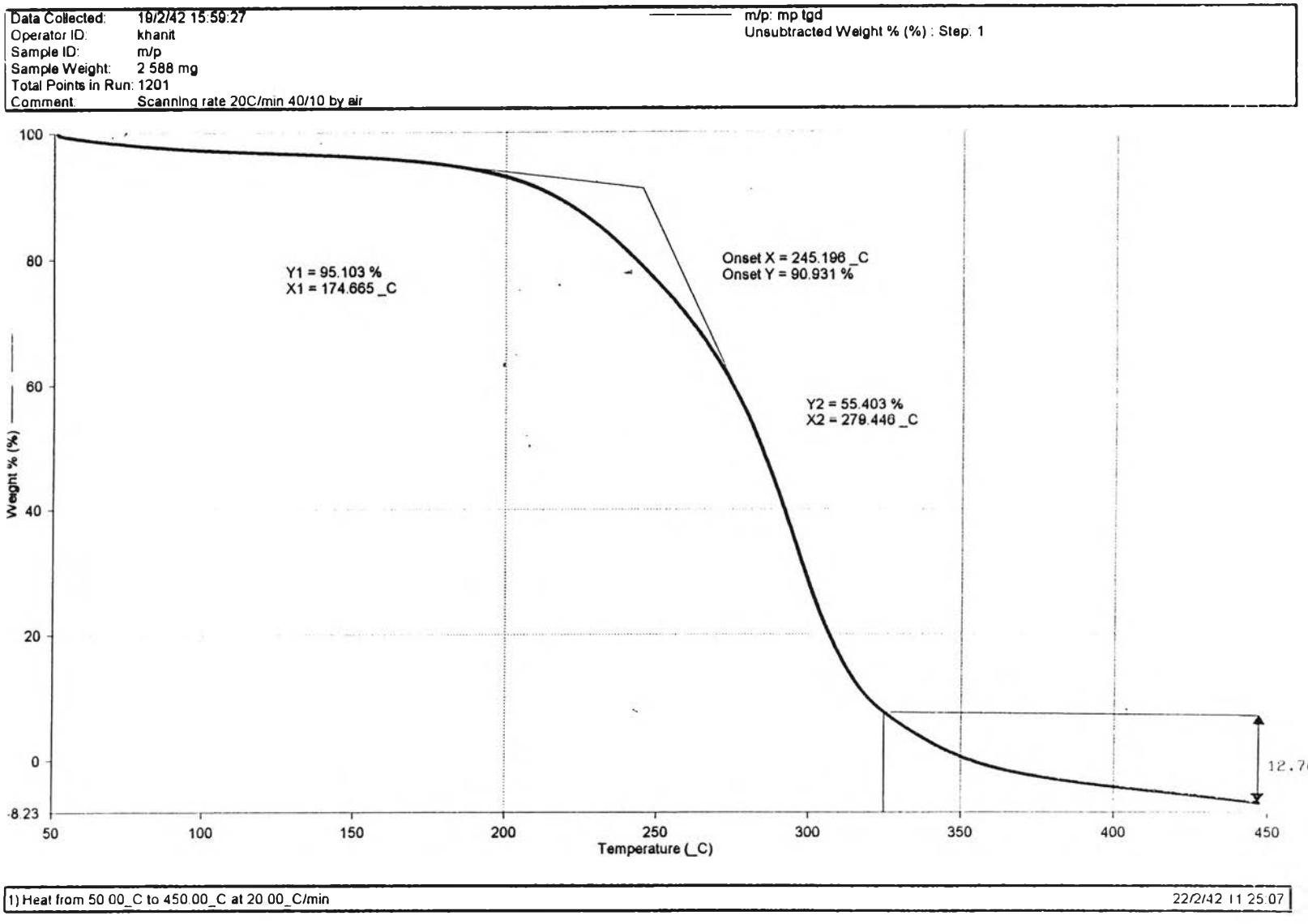

Figure C6 Thermogram of 1,2-propanedimyristate

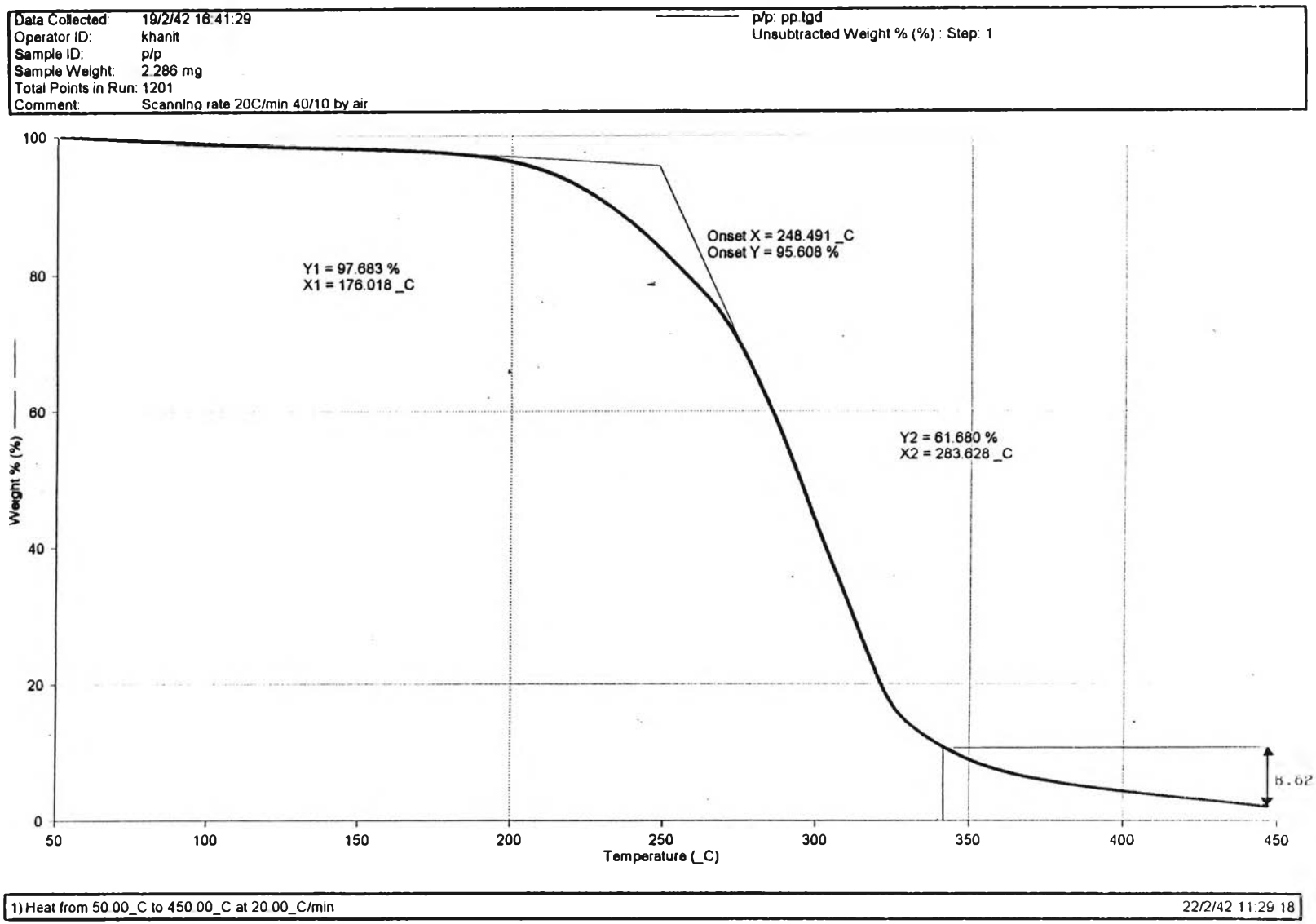

Figure C7 Thermogram of 1,2-propanedipalmitate

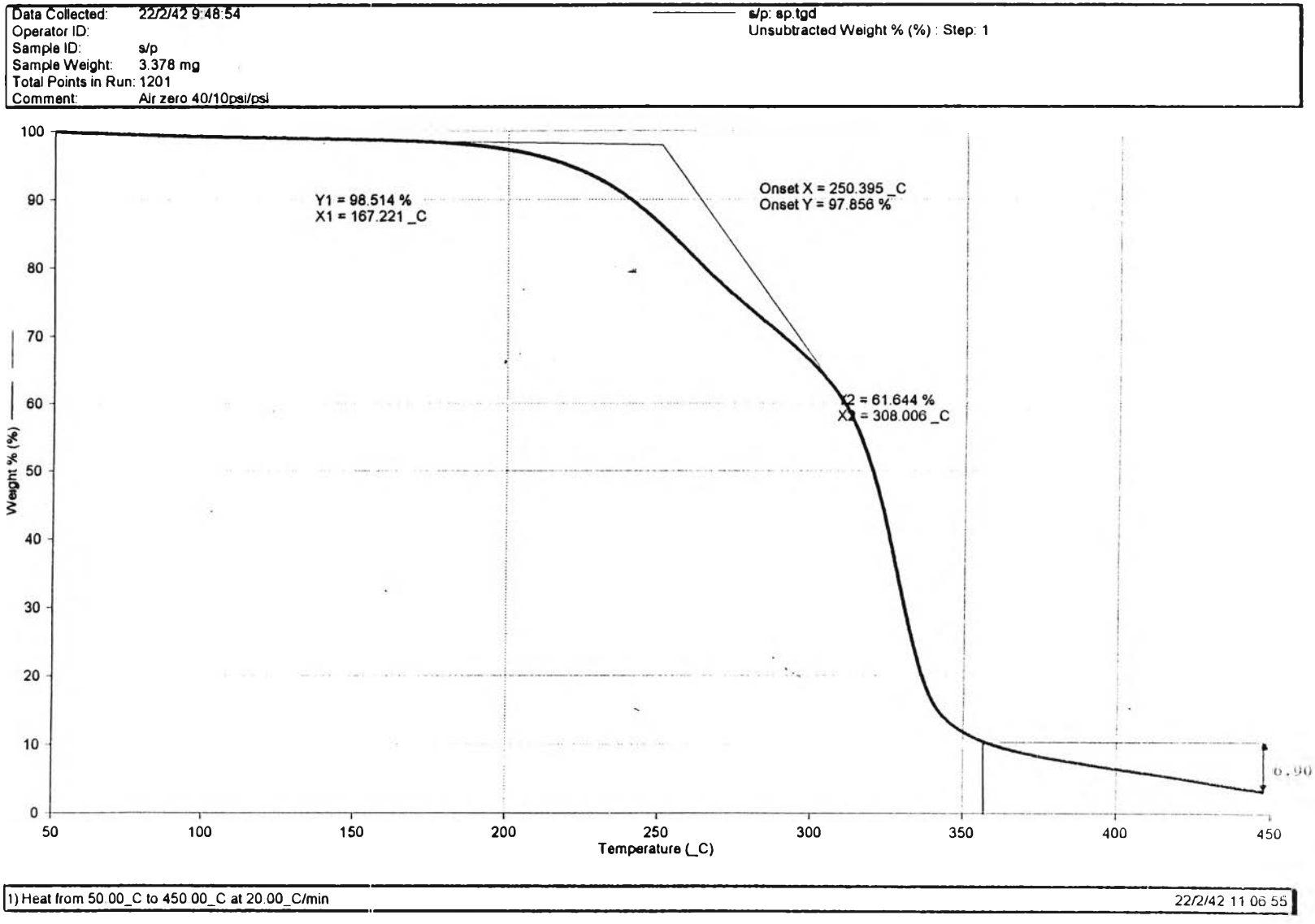

Figure C8 Thermogram of 1,2-propanedistearate

APPENDIX D

Antifoaming agent [8, 23]

Foaming, the formation of a stable dispersion of a gas in a liquid, is common occurrence in chemical industries. Which undesirable foam can be a costly problem that reduces plant capacity, causes environmental problems and safety hazards, and raw materials. Chemical additives to reduce foam problem are called antifoam agents, foam inhibitors, foam control agents, foam suppressants and air release agent. Antifoaming agents have many properties in common. Most antifoaming agents are surface - active materials, have hydrophobic - hydrophilic characteristics within the same molecule and have very limited solubility in the bulk liquid to be defoamed. Table D1 demonstrate the foam destablilizers and field of applications.

Table D1 Antifoaming agents [24]

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
Alcohols	2-Ethyl-hexanol (octyl alcohol)	Carbide and Carbon Co.	Beet sugar, paper textile printing, glue spreading	0.005-1%
	Dodecanol		Fermentation	0.8 cm^3/ft^2
	Dodecanol and tetra-decanol or hexadecanol (1:1)		Fermentation	
	Di-isobutyl carbinol (nonyl alcohol)	Carbide and Carbon Co.	Neutralization of waste H_2SO_4 with $CaCO_3$, paper, printing ink, glue wire drawing (controls the foaming of a soap solution used as a lubricant)	0.5%

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
	Polyalkylene glycols and derivatives (Ucon. 50-HB-660, 50-HB-3520, 50-HB-5100, LB-525, LB-1145)	Carbide and Carbon Co.	Antifoaming in hot aqueous solution, suspended solids, petroleum oils, and in other applications	
Fatty acids and fatty acid ester	Nopco Vegifat Y composed of a mixture of long- and short-chain fatty acids	Nopco	Fermentation, yeast manufacturing, production of penicillin	
	Span 20 (sorbitan monoluarate)	Atlas Powder Co.	Phosphoric acid production	20-40 cm3 in 1300 lb of acid
	Span 20 (sorbitan monoluarate)	Atlas Powder Co.	Evaporation of aqueous milk sugar solution	0.05%
			Speed up the drying of egg white	0.1%

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
			Evaporation step in the concentration of molasses	0.002%
	Span 85 (sorbitan trioleate)	Atlas Powder Co.	Yeast manufacture	1 pint of Span 85 in 1000 gal of yeast slurry
			Cooking of soybean casein	5 ppm
			Cooking, evaporation of glue	0.0025%
	Tween 20 (polyoxy-ethylene-sorbitan monolaurate)	Atlas Powder Co.	Food manufacture	
	Nopco KF[27] (a mixture of wax and partial glycerides)	Nopco	Paper, textile	0.1% (on dry weight of the wood pulp)

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
	Nopco 1907	Nopco	Animal glue	
	Isoamyl stearate and diglycol laurate	Glyco Product Co.	Gas cutting during the drilling of deep wells Reduce the stability of bubbles	0.05-2%
	Fatty acid esters of glycols and polymerized glycols	National	Glue solution paper, Fermentation, starch pastes	
	Alkyl ester of sulfonated ricinoleic acid	Mid-Continent Petroleum Co.	Lubricating oils	0.05-0.1%
Amines	Diamylamine	Dearborn	Aqueous solution of wetting agents such as Gardinol W.A. (a mixture of alkyl sulfates of aliphatic alcohols C_{12} - C_{18})	0.02%

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
	Di-and trialkyl amines (C_8 in each alkyl group)	Dearborn	Dye bath, dye pastes, discharge pastes, textiles	1-2%
Amides	Palmitylamino-octadecyl-caproamide and palmitylaminohexadecyl-P-aminophenylacetamide	Imperial	Boiler frothing	<1 g/gal
	Distearoylethylene-diamide: $C_{17}H_{35}CONH-CH_2-NHCOC_{17}H_{35}$	Dearborn	Boiler water	
	Anti-foam Nos. 666 and 659 (polyamides)	Dearborn	Power plant boiler application	
	Formula No. 662 (low melting point polyamide)	Dearborn	Textile, paper detergency applications, automotive cooling	

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
	Cationic surface-active agents: Oleic acid with diethylene triamine Oleic acid with ethylene diamine Rice oil with di-ethylene triamine Soybean oil with diethylene triamine	Nation	Antifoaming agents	
Ethers	Foamicide L, Foamicide A (ditertiary amyl-phenoxyethanol) in two preparations	Wyandotte	Washing or cleaning machines, textile plants, mercerization baths, sizing, kier boiling and dyeing operations, pulp and paper plants, glue and casein plants, chemical and dyestuff	0.025% starting amount

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
			plants, paper coating mills, power plant boilers, cannery wastes, tanneries, sewage disposal plants	
	Polymerized triethanolamine	Petrolite Co	Aqueous hypochlorite bleaching solution	25 cm^3/8000 gal
			Contaminated diesel fuel	10 gal/ 1000 barrel tank
	Alkaterge O (oxazoline, from oleic acid and 2-amino-2-methyl-1,3-pentanediol)	Commercial Solvents Co.	Fermentation	
	Alkaterge C (substituted oxazoline)		Fermentation	Mixture of 5 gal each of Alkaterge C and a white mineral oil, inject this mixture into

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
				a 10,000-gal tank
Phosphate esters	Tributyl phosphate	Commercial Solvents Co.	Manufacture and use of adhesives, paper, casein solutions, ink, rubber latex, textiles	100-1000 ppm
	Trioctyl phosphate (Flexol plasticizer ToF)	Carbide and Carbon Co.	Alkaline cleaning baths of bottle washers	
	Sodium octyl phosphate	Victor	Industrial cleaners	
	Dimethylaniline	Gulf Oil Co.	Mineral oils	0.01-0.04% in a highly viscous, refined Pennsylvania oil
	Potassium trioctylethylene diphosphate	Gulf Oil Co.	Lubricating oil	
	Sterox	Monsanto Chemical Co.	Automatic washing machine	

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
	Renex (polyoxyethylene esters of mixed fatty acid and resin)	Atlas Powder Co.	Automatic washing machine	18% of the alkyl aryl sulfonate
Metallic soaps of fatty acids	Stearates and palmitates of Al Ca, Mg, Zn	National Oil Co.	Paper making	5%
			Paper coating	1%
	A mixture of 10-20 parts of polyethylene glycol mono-ester, 100 parts of H_2O, and 40 parts of metallic soap	Nopco	Paper making, glue solution	
	Nopco 1333, Nopco 1497, Nopco 1497B, (aluminum stearate)	Nopco	Animal glue, textile warp sizing, preparation of defoamed glue stock	0.5%
	Alkali-metal soap	West Virginia Pulp and Paper Co.	Paper stock	

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
	Calcium salt of wool olein	Anglo-Saxon Petroleum Co.	Lubrication oil	0.01-0.10%
	Copper palmitate, lead palmitate		Lubricating oil in aircraft engines	
	Potassium oleate	Gulf Oil Co.	Lubricating oil	0.5%
	Soaps of alkali metals	Industrial Patents Co.	Deep frying	0.0001-0.5%
Silicones and other silicon materials	Polysilixanes	Gulf Research & Development Co.	Lubricating oils	0.5 ppm
	Polyalkoxysiloxanes	Shell Development Co.	Lubricating oils Aqueous system oil-in-water emulsions	
	Dieetyltrisiloxane			
	Dimethylpolysiloxane		Hydrocarbon oil, water-in-oil emulsions	
	Dc antifoam A	Dow-Corning Co.	Adhesives, distillation of alcohols, beet sugar, chewing gum, skim milk, soft drink tallow,	1 part in 6 millions parts of asphalt

Table D1 (Continued)

Compound Category	Chemical Compound	Manufacturer	Field of Application	Concentration
			yeast, wine, perfume solubilizers, resins, varnishes, lacquers, soaps, wetting agent, pharmaceuticals	
	Anti Foam 81066 G.E.		Solution of soaps and wetting agent	25-100 ppm
			Phenolic resins	100-500 ppm
			Paints	25-100 ppm
			Distillation, fermentation, paper, rubber latices	

VITA

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