APÉNDICES

APÉNDICE A

HOJA TECNICA RESINA EPÓXICA EPON 828

HEXION
Specialty Chemicals

Technical Data Sheet

Re-issued September 2005

EPON™ Resin 828

Product Description

EPON™ Resin 828 is an undiluted clear difunctional bisphenol A/epichlorohydrin derived liquid epoxy resin. When cross-linked or hardened with appropriate curing agents, very good mechanical, adhesive, dielectric and chemical resistance properties are obtained. Because of this versatility, EPON Resin 828 has become a standard epoxy resin used in formulation, fabrication and fusion technology.

Benefits

- Fiber reinforced pipes, tanks and composites
- Tooling, casting and molding compounds
- Construction, electrical and aerospace adhesives
- High solids/low VOC maintenance and marine coatings
- Electrical encapsulations and laminates
- Chemical resistant tank linings, flooring and grouts
- Base resin for epoxy fusion technology

Sales Specification

Property	Units	Value	Test Method/Standard
Weight per Epoxide	g/eq	185 – 192	ASTM D1652
Viscosity at 25°C	P	110 – 150	ASTM D445
Color	Gardner	1 max.	ASTM D1544

Typical Properties

Property	Units	Value	Test Method/Standard
Density at 25°C	lb/gal	9.7	ASTM D1475
Denisty at 25°C	g/ml	1.16	
Vapor pressure @ 25°C (77° F)	mm Hg	0.03	
Refractive index @ 25°C (77° F)		1.573	
Specific heat	BTU/lb/°F	0.5	

Processing/How to use

General Information

The low viscosity and cure properties of EPON Resin 828 allow its use under various application and fabrication techniques including:

• Spraying and brushing	• Pultrusion
• Filament winding	• Casting
• Pressure laminating	• Molding
• Vacuum bag laminating	• Toweling

Curing Agents

EPON Resin 828 can be cured or cross-linked with a variety of curing agents depending on properties desired in the finished product and the processing conditions employed. Some commonly used curing agents, recommended concentrations, typical cure schedules employed in major end-use applications, plus sources for these curing agents are displayed in Table 1.

Performance Properties

Perfomance Characteristics of Cured EPON Resin 828

Mechanical Properties

High performance, high strength materials are obtained when this resin is cured with a variety of curing agents. Unfilled systems in common use have tensile values greater than 10,000 psi (69 MPa) with modulus values greater than 400,000 psi (2750 MPa). Such systems are normally very rigid. If greater flexibility is needed systems can be formulated to provide up to 300% elongation.

Adhesive Properties

One of the most widely recognized properties of cured EPON Resin 828 is strong adhesion to a broad range of substrates. Such systems exhibit shear strength of up to 6,000 psi (41 Mpa). One factor which contributes to this property is the low shrinkage shown by these systems during cure. Compared to other polymers, epoxy resins have low internal stresses resulting in strong and durable finished products.

Electrical Properties

EPON Resin 828 cured systems have very good electrical insulating characteristics and dielectric properties. For example, systems can be obtained with anhydride and amine curing agents having volume resistivities up to 1 x 1016 ohm-cm, dielectric constants of 3-5 and dissipation factors of 0.002 to 0.020 at ambient conditions. Electrical encapsulations, laminates and molding compounds are frequently based on EPON Resin 828.

Chemical Resistance

Cured EPON Resin 828 is highly resistant to a broad range of chemicals, including caustic, acids, fuels and solvents. Chemically resistant reinforced structures and linings or coatings over metal can be formulated with EPON Resin 828.

Formulating Techniques

The primary components of a thermosetting resin formula are the epoxy resin and the hardener or curing agent. However, in practice other materials are normally incorporated to achieve special properties. For example, inert fillers such as silicas, talcs, calcium silicates, micas, clays and calcium carbonate can be added to further reduce shrinkage and improve dimensional stability. Also, reactive diluents can be added to EPON Resin 828 to reduce viscosity. The effect on viscosity by adding such materials is shown in Figure 1.

Table 1 / Curing Agents for EPON™ 828

Curing Agent [1]	Physical State	Recommended Concentration Range, phr [2]	Typical Cure Schedule Time °C (°F)	Deflection Temperature °C (°F)	Applications [3]	Suppliers [3]
Aliphatic Amines						
EPIKURE™ 3223 (DETA)	Liquid	12	7d, 25 (77)	120(250)	ABCDEFHI	5
EPIKURE 3234 (TETA)	Liquid	13	7d, 25 (77)	120(250)	ABCDEFHI	5
EPIKURE 3200 (AEP)	Liquid	22	24h, 25 (77) & 1h, 150 (300)	120(250)	BCEFGH	5
EPIKURE 3270	Liquid	75	14d, 25 (77)	56(133)	ABCDEFHI	5
EPIKURE 3271	Liquid	18	14d, 25 (77)	66(151)	ABCDEFHI	5
EPIKURE 3274	Liquid	40	14d, 25 (77)	—	ABCDEFHI	5
EPIKURE 3230	Liquid	35	7d, 25 (77)	68(155)	ABCDEFHI	1
D-400 Type PEA	Liquid	55	30 min, 115(240)	31(88)	ABCEFH	1
Cycloaliphatic Amines						
EPIKURE 3370	Liquid	38	7d, 25 (77)	56(133)	ABCDEFHI	5
EPIKURE 3382	Liquid	63	7d, 25 (77)	63(145)	ABCDEFHI	5
EPIKURE 3383	Liquid	60	24h, 25 (77) & 2h, 100 (212)	54(129)	ABCDEFHI	5

Polyamides						
EPIKURE 3115	Liquid	120	1h, 100 (212)	85(185)	AB	5
EPIKURE 3125	Liquid	90	7d, 25 (77)	90(195)	ABCEFH	5
EPIKURE 3140	Liquid	75	7d, 25 (77)	115(240)	ABCEFH	5
Amindoamines						
EPIKURE 3015	Liquid	50	16h, 25 (77) & 2h, 93 (200)	—	ABCDEFHI	5
EPIKURE 3055	Liquid	50	16h, 25 (77) & 2h, 93 (200)	67(153)	ABCDEFHI	5
EPIKURE 3072	Liquid	35	14d, 25 (77)	59(138)	ABCDEFHI	5
Aromatic Amines						
EPIKURE W	Liquid					5
Metaphenylenediamine (MPDA)	Solid	14	2h, 80 (175) & 2h, 150 (300)	150(300)	BCDGHI	3
Methylene dianiline (MDA)	Solid	27	2h, 80 (175) & 2h, 150 (300)	160(320)	BCDEGHI	13
Diaminodiphenyl Sulfone (DADS)	Solid	25	5h, 125 (257) & 1h, 200 (392)	170(350)	BCDGHI	2, 13

Table 1 / Curing Agents for EPON™ 828, cont.

Curing Agent [1]	Physical State	Recommended Concentration Range, phr [2]	Typical Cure Schedule Time °C (°F)	Deflection Temperature [3] °C (°F)	Applications [4]	Suppliers [5]
Anhydrides						
Methyl tetrahydrophthalic Anhydride (MTHPA)	Liquid	80	2h, 120 (250) & 2h, 150 (300)	130(266)	BCDGHI	9, 11, 14
NADIC Methyl Anhydride (NMA)	Liquid	90	1h, 120 (250) & 2-24h, 260(500)	180(356)	BCDGHI	9, 14
Hexahydrophthalic Anhydride (HHPA)	Solid	80	1h, 80 (175) & 2h, 150 (300)	130(265)	BCDGHI	8, 12, 14
Catalysts and Miscellaneous						
2-Ethyl- 4-Methyl Imidazole (EMI-24)	Metastable Liquid	3	4h, 50 (122) & 2h, 170 (340)	170(340)	BCDGHI	15, 16
BF3-Monoethylamine (BF3-MEA)	Liquid	3	1h, 120 (250) & 2h, 170 (340)	170(340)	BCDGHI	17
Diethylaminopropylamine [6]	Solid	6	30 min, 115(240)	100(212)	ABC	6
Dicyandiamide	Solid	4	1h, 177 (350)	150(300)	BCDGHI	18, 19

[1] Cures can be effected with these curing agents over a wide range of temperatures. Higher temperatures yield shorter cure times and highest Tg.

[2] Parts of curing agent per 100 parts of resin.

[3] Systems cured at room temperature were post cured at elevated temperature to achieve deflection values.

[4] Application codes: A - Coatings; B - Adhesives; C - Castings; D - Moldings; E - Flooring; F - Paving; G - Electrical Laminates; H - Structural Laminates; I-Filament Winding.

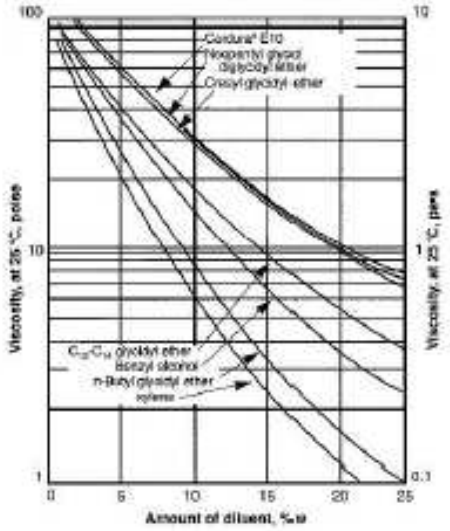
[5] Supplier Code:

1. Huntsman Chemical
2. RSA Corporation
3. E.I. DuPont de Nemours & Co., Chemicals & Pigments Dept.
4. Harshaw Chemical Company
5. Hexion Specialty Chemical

6. BASF Corporation
7. American Cyanamid - Industrial Chemical Div.
8. Milliken & Company
9. Lindau Chemicals, Inc.
10. Anhydrides and Chemicals, Inc.
11. Dixie Chemical Co., Inc.
12. Buffalo Color Corp.
13. Air Products and Chemicals, Inc.
14. Lonza
15. Interchem
16. Polyorganix
17. Atotech
18. SKW Trotsbery
19. Ashland Chemical

* Dimethylamino propylamine may be substituted at expense of slightly reduced pot life. Sources are 2 and 16.

Figure 1 / **Viscosity at 25 °C of EPON™ Resin 828 blends with various diluents**



Fusion Technology

EPON Resin 828 is the product of choice for a resin chemist using a specific fusion catalyst when processing proprietary solid epoxy resins or epoxy esters. Upon request, Hexion Specialty Chemicals can provide EPON Resin 828 exhibiting extremely low hydrolyzable and total chlorine, two end groups that may be deleterious to resin curing and long term performance in electrical uses.

FDA Status

Provisions are made in the FDA regulations for the use of EPON Resin 828, when properly formulated, applied and cured, for food contact applications under Title 21 Code of Federal Regulations 175.300. The regulations should be consulted for complete details. In particular, we direct your attention to subparagraph (b) of 21 CFR 174.5 and the general provisions applicable to indirect food additives listed there.

Identification and Classification

Chemical Abstract Service Registry Number: 25068-38-6 (EPA/TSCA inventory designation)

Generic name: Liquid Bisphenol A Epichlorohydrin based epoxy resin.

Chemical designation: Phenol, 4,4O - (1-methylethylidene) bis-polymer with (chloromethyl) oxirane.

Figure 2 / Viscosity - temperature profile for EPON™ Resin 828

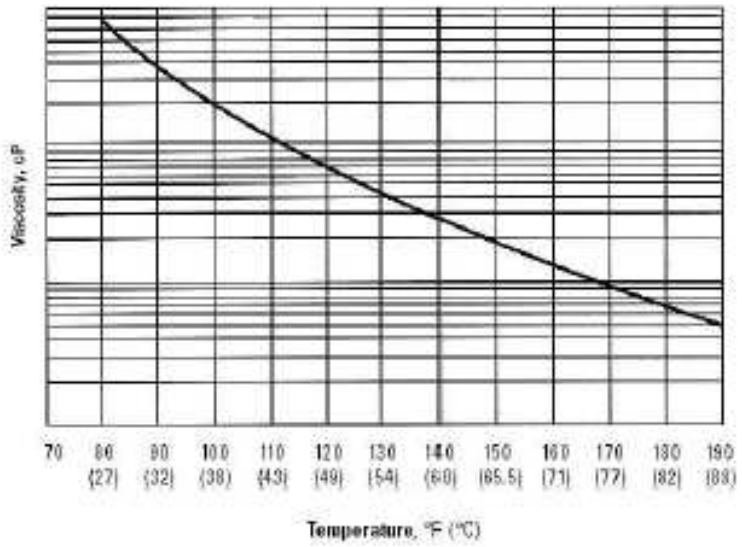
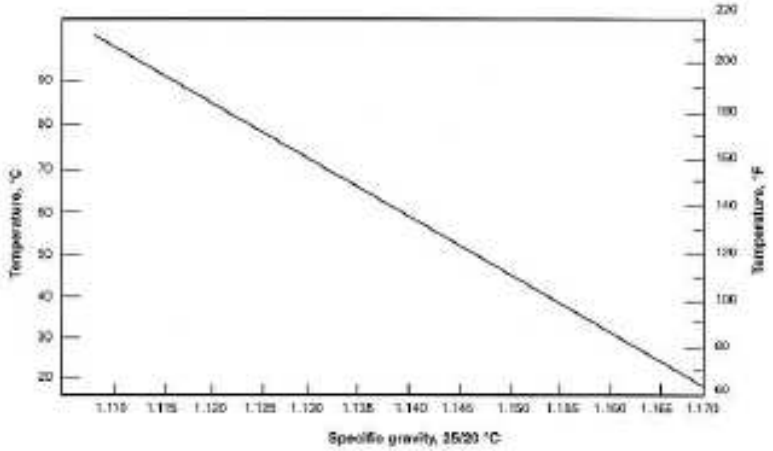


Figure 3 / Specific gravity - temperature profile for EPON™ Resin 828

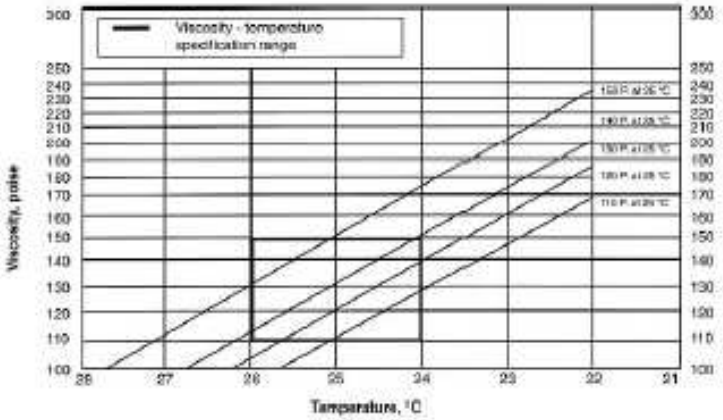


Formulation and Application Information

For additional performance characteristics information covering adhesives, laminating, casting and

applications, consult bulletin SC:67, entitled "EPON Resin Structural Reference Manual." For epoxy resin amine-cured coatings, consult bulletin SC:193, entitled "Formulating Amine-Cured Coatings with EPON Resin."

Figure 4 / Viscosity - temperature profile (for 5 samples of EPON™ Resin 828 ranging in viscosity from 110-150 poise)



Safety, Storage & Handling

Please refer to the MSDS for the most current Safety and Handling information.

Please refer to the Hexion web site for Shelf Life and recommended Storage information.

EPON Resin 828 is an undiluted liquid epoxy resin that is available in tank cars, tank trucks and 500 pound net closed head drums. EPON Resin 828 is normally shipped in bulk from 150 °F (66 °C) to 180 °F (82 °C) and can be stored at 120-140 °F (49-60 °C) for ease of handling. The viscosity/temperature profile and the specific gravity/temperature profile for EPON Resin 828 are displayed in Figures 2 and 3 respectively for your guidance.

NOTE OF CAUTION: When checking viscosity of EPON Resin 828 incoming samples, we caution you to make certain that the product is maintained at 25 +/- 0.01 °C before testing. You will note in Figure 4 that EPON Resin 828 can vary in viscosity by 10-15 poise for each degree in temperature the product varies from 25 °C.

Exposure to these materials should be minimized and avoided, if feasible, through the observance of proper precautions, use of appropriate engineering controls and proper personal protective clothing and equipment, and adherence to proper handling procedures. **None of these materials should be used, stored, or transported until the handling precautions and recommendations as stated in the Material Safety Data Sheet (MSDS) for these and all other products being used are understood by all persons who will work with them.** Questions and requests for information on Hexion Specialty Chemicals, Inc. ("Hexion") products should be directed to your Hexion sales representative, or the nearest Hexion sales office. Information and MSDSs on non-Hexion products should be obtained from the respective manufacturer.

Packaging

Available in bulk and drum quantities.

Contact Information
For product prices, availability, or order placement, call our toll-free customer service number at:
1-877-859-2800

For literature and technical assistance, visit our website at: www.hexion.com

® and ™ Licensed trademarks of Hexion Specialty Chemicals, Inc.

DISCLAIMER
The information provided herein was believed by Hexion Specialty Chemicals to be accurate at the time of preparation or prepared from sources believed to be reliable, but it is the responsibility of the user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use. **HEXION SPECIALTY CHEMICALS MAKES NO WARRANTY, EXPRESS OR IMPLIED, CONCERNING ANY PRODUCT OR THE MERCHANTABILITY OR FITNESS THEREOF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HEXION SPECIALTY CHEMICALS**, except that the product shall conform to contracted specifications, and that the product does not infringe any valid United States patent.

PDS-3942- (Rev.7/4/2010 1:14:46 AM)

APÉNDICE B

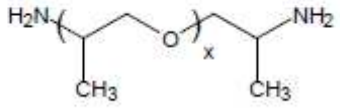
HOJA TECNICA DEL AGENTE DE CURADO JEFFAMINE D 230

HUNTSMAN
Enriching lives through innovation

Technical Bulletin

JEFFAMINE® D-230 Polyetheramine

JEFFAMINE D-230 polyetheramine is characterized by repeating oxypropylene units in the backbone. As shown by the representative structure, JEFFAMINE D-230 polyetheramine is a difunctional, primary amine with an average molecular weight of about 230. The primary amine groups are located on secondary carbon atoms at the end of the aliphatic polyether chain.



x ≈ 2.5

APPLICATIONS
- Epoxy curing agent
- Reacts with carboxylic acids to form hot melt adhesives
- Reacts quickly with isocyanates
- Salts may be formed readily for surfactant use

BENEFITS
- Low viscosity, color and vapor pressure
- Completely miscible with a wide variety of solvents, including water
- Provides tough, clear, impact resistant coatings, castings, and adhesives
- Coatings are free of surface blush prevalent with many amine curing agents

SALES SPECIFICATIONS

Property	Specifications	Test Method*
Appearance	Colorless to light yellow with slight haze permitted	ST-30.1
Color, Pt-Co	25 max.	ST-30.12
Primary amine, % of total amine	97 min.	ST-5.34
Total acetylatables, meq/g	8.3 min. – 9.1 max.	ST-31.39
Total amine, meq/g	8.1 min. – 8.7 max.	ST-5.35
Water, wt%	0.20 max.	ST-31.53, 6

*Methods of Test are available from Huntsman Corporation upon request.

ADDITIONAL INFORMATION

Regulatory Information

DOT/TDG Classification	Amines, liquids, corrosive, N.O.S. (polyoxypropylene diamine)
HMIS Code	3-1-0
CAS Number	9046-10-0
US, TSCA	Listed
Canadian WHMIS Classification	E
Canada, DSL	Listed
European Union, EINECS/ELINCS	Polymer Exempt
Australia, AICS	Listed
Japan, ENCS	Contact Huntsman Regulatory
Korea, ECL	Listed
China, IECSC	Listed

Typical Physical Properties

AHEW (Amine hydrogen equivalent wt.), g/eq	60
Equivalent wt. with isocyanates, g/eq	120
Viscosity, cSt, 25°C (77°F)	9.5
Density, g/ml (lb/gal), 25°C	0.948 (7.90)
Flash point, PMCC, °C (°F)	121 (250)
pH, 5% aqueous solution	11.7
Refractive index, n_D^{20}	1.4466
Vapor pressure, mm Hg/°C	1/100
	10/133

HUNTSMAN

Enriching lives through innovation

TOXICITY AND SAFETY

For additional information on the toxicity and safe handling of this product, consult the Material Safety Data Sheet (Safety Data Sheet in Europe) prior to use of this product.

HANDLING AND STORAGE

Materials of Construction

At temperatures of 75-100°F (34-38°C)

Tanks	Carbon steel
Lines, valves	Carbon steel
Pumps	Carbon steel
Heat exchange Surfaces	Stainless steel
Hoses	Stainless steel, polyethylene, polypropylene, and TEFLON®
Gaskets, packing	Polypropylene or TEFLON® (elastomers such as neoprene, Buna N, and VITON® should be avoided)
Atmosphere	Nitrogen or dry air

At temperatures above 100°F (38°C)

Tanks	Stainless steel or aluminum
Lines, Valves	Stainless steel
Pumps	Stainless steel or Carpenter 20 equivalent
Atmosphere	Nitrogen

[1]VITON® and TEFLON® are registered trademarks of Dupont.

JEFFAMINE® D-230 polyetheramine may be stored under air at ambient temperatures for extended periods. A nitrogen blanket is suggested for all storage, however, to reduce the effect of accidental exposure to high temperatures and to reduce the absorption of atmospheric moisture and carbon dioxide. It should be noted that pronounced discoloration is likely to occur at temperatures above 140°F (60°C), whatever the gaseous pad.

Cleanout of lines and equipment containing JEFFAMINE D-230 polyetheramine can be accomplished using warm water and steam. In the event of spillage of this product, the area may be flushed with water. The proper method for disposal of waste material is by incineration with strict observance of all federal, state, and local regulations.

AVAILABILITY

JEFFAMINE D-230 polyetheramine is available in tank cars, tank wagons, 55-gallon (208L) drums of 430 pounds (195kg) net weight, and 5-gallon (19L) cans. Samples are available in North America and Asia by contacting our sample department at 1-800-662-0924. Samples in other locations, including Europe, are available by contacting any Huntsman Corporation sales office.

Copyright © 2007, 2008 Huntsman Corporation or an affiliate thereof. All rights reserved.
JEFFAMINE® is a registered trademark of Huntsman Corporation or an affiliate thereof in one or more, but not all countries.

Huntsman Petrochemical Corporation warrants only that its products meet the specifications stated in the sales contract. Typical properties, where stated, are to be considered as representative of current production and should not be treated as specifications. While all the information presented in this document is believed to be reliable and to represent the best available data on these products, NO GUARANTEE, WARRANTY, OR REPRESENTATION IS MADE, INTENDED, OR IMPLIED AS TO THE CORRECTNESS OR SUFFICIENCY OF ANY INFORMATION, OR AS TO THE MERCHANTABILITY OR SUITABILITY, OR FITNESS OF ANY CHEMICAL COMPOUNDS FOR ANY PARTICULAR USE OR PURPOSE, OR THAT ANY CHEMICAL COMPOUNDS OR USE THEREOF ARE NOT SUBJECT TO A CLAIM BY A THIRD PARTY FOR INFRINGEMENT OF ANY PATENT OR OTHER INTELLECTUAL PROPERTY RIGHT. EACH USER SHOULD CONDUCT A SUFFICIENT INVESTIGATION TO ESTABLISH THE SUITABILITY OF ANY PRODUCT FOR ITS INTENDED USE. Liability of Huntsman Petrochemical Corporation and its affiliates for all claims is limited to the purchase price of the material. Products may be toxic and require special precautions in handling. For all products listed, user should obtain detailed information on toxicity, together with proper shipping, handling and storage procedures, and comply with all applicable safety and environmental standards.

Main Offices US: Huntsman Corporation / 10003 Woodloch Forest Drive / The Woodlands, Texas 77380 / 281-719-6000
Technical Service US: 8600 Gosling Road / The Woodlands, Texas 77381 / 281-719-7780

Main Offices Europe: Huntsman Belgium BVBA / Eventsam 45 / B-3070 Everberg, Belgium / 32-2-758-9211
Technical Service Europe: Technical Services Representative / Everberg Office / 32-2-758-9392

Main Offices Asia Pacific: Huntsman Singapore PTE / 150 Beach Road #37-00 Gateway West / Singapore 189720 / 65 6297 3363
Technical Service Asia Pacific: Huntsman Performance Products / 61 Market Road, Brooklyn, Victoria / Australia 3012 / 61 3 9603 8888

www.huntsman.com

APÉNDICE C

PROPIEDADES TÍPICAS CLOISITE Na

SOUTHERN CLAY PRODUCTS / A SUBSIDIARY OF ROCKWOOD SPECIALTIES, INC.

PRODUCT BULLETIN/Cloisite®

Southern Clay Products, Inc.
1212 Church Street
Gonzales, TX 78629
Phone: 800-324-2891
Fax: 830-672-1903
www.scprod.com

Cloisite® Na^+

Typical Physical Properties Bulletin

Description:
Cloisite® Na^+ is a natural montmorillonite.

Designed Used:
Cloisite® Na^+ is an additive for plastics to improve various plastic physical properties, such as reinforcement, HDT, CLTE and barrier.

Typical Properties:

Treatment/Properties:	Organic Modifier	Modifier Concentration	% Moisture	% Weight Loss on Ignition
Cloisite® Na^+	None	None	4-9%	7%

Typical Dry Particle Sizes: (microns, by volume)

10% less than:	50% less than:	90% less than:
2µm	6µm	13µm

Color: Off White

Density:

Loose Bulk, lbs/ft^3	Packed Bulk, lbs/ft^3	Density, g/cc
12.45	20.95	2.86

X Ray Results: d_{001} = 11.7Å

For additional information or technical assistance contact Southern Clay Products, Inc. toll free at 800-324-2891.

Disclaimer of Warranty: The information presented herein is believed to be accurate but is not to be taken as a warranty, guarantee, or representation for which we assume legal responsibility. This information does not grant permission, license, or any rights or recommendations to practice any form of proprietary intellectual property without obtaining the appropriate license or grant from the property owner. The information is offered solely for your consideration, investigation and verification, but you must determine the suitability of the product for your specific application. The purchaser assumes all risk of use of handling the material, including but not limited to transferring the material within purchaser's facilities, using the material in applications specified by the purchaser and handling any product which includes the material, whether or not in accordance with any statements made herein.

APÉNDICE D

PROPIEDADES TIPICAS NANOARCILLA CLOISITE 20A

SOUTHERN CLAY PRODUCTS / A SUBSIDIARY OF ROCKWOOD SPECIALTIES, INC.

PRODUCT BULLETIN/Cloisite®

Southern Clay Products, Inc.
1212 Church Street
Gonzales, TX 78629
Phone: 800-324-2891
Fax: 830-672-1903
www.scprod.com

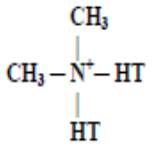
Cloisite® 20A
Typical Physical Properties Bulletin

Description:
Cloisite® 20A is a natural montmorillonite modified with a quaternary ammonium salt.

Designed Used:
Cloisite® 20A is an additive for plastics and rubber to improve various physical properties, such as reinforcement, CLTE, synergistic flame retardant and barrier.

Typical Properties:

Treatment/Properties:	Organic Modifier (1)	Modifier Concentration	% Moisture	% Weight Loss on Ignition
Cloisite® 20A	2M2HT	95 meq/100g clay	< 2%	38%



Where HT is Hydrogenated Tallow (~65% C18; ~30% C16; ~5% C14)

Anion: Chloride

(1) 2M2HT: dimethyl, dihydrogenatedtallow, quaternary ammonium

Typical Dry Particle Sizes: (microns, by volume)

10% less than:	50% less than:	90% less than:
2µ	6µ	13µ

Color: Off White

Density:

Loose Bulk, lbs/ft^3	Packed Bulk, lbs/ft^3	Density, g/cc
7.35	13.55	1.77

X Ray Results: d_{001} = 24.2Å

For additional information or technical assistance contact Southern Clay Products, Inc. toll free at 800-324-2891.

Disclaimer of Warranty: The information presented herein is believed to be accurate but is not to be taken as a warranty, guarantee, or representation for which we assume legal responsibility. This information does not grant permission, license, or any rights or recommendations to practice any form of proprietary intellectual property without obtaining the appropriate license or grant from the property owner. The information is offered solely for your consideration, investigation and verification, but you must determine the suitability of the product for your specific application. The purchaser assumes all risk of use of handling the material, including but not limited to transferring the material within purchaser's facilities, using the material in applications specified by the purchaser and handling any product which includes the material, whether or not in accordance with any statements made herein.

APÉNDICE E1

TEMPERATURA DE DEGRADACIÓN Td DE LOS DIFERENTES COMPUESTOS - CLOISITE Na, A 0.1 / 0.5 / 1 CEC CA.

	Perdida de masa (%)	T_2(°C)	Perdida de masa (%)	T_3(°C)	Perdida de masa (%)	T_4(°C)
CA			97	243		
Cloisite Na	5,14	96,94				
Cloisite Na 0,1 CEC CA	5,03	94,97	low	199-400		
Cloisite Na 0,5 CEC CA	3,44	91,24	7,89	237,15	low	300-400
Cloisite Na 1 CEC CA	2,2	85,71	8,91	242,42	15,14	373,77

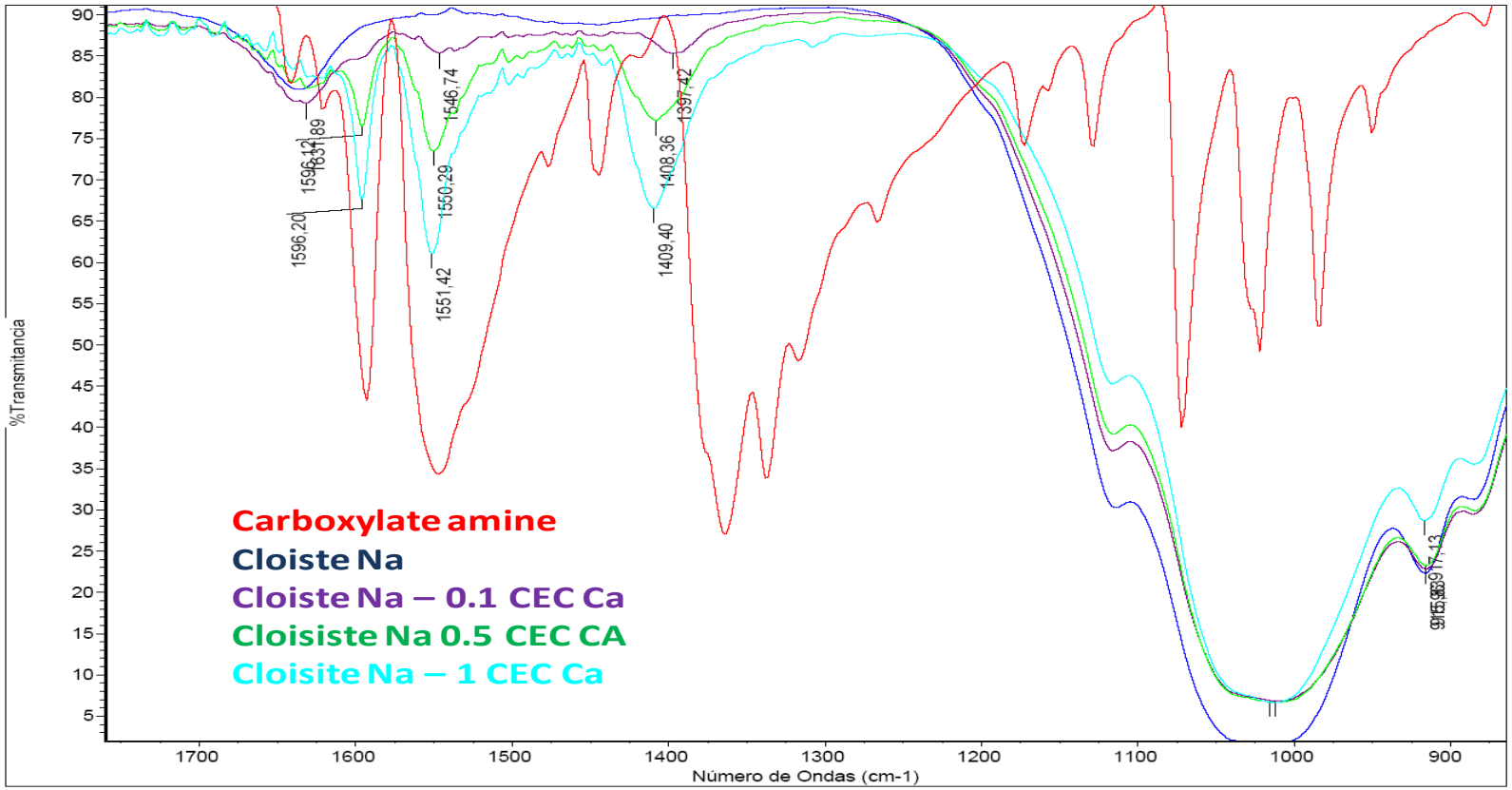
APÉNDICE E2

TEMPERATURA DE DEGRADACIÓN Td DE LOS DIFERENTES COMPUESTOS – CLOISITE 20A, A 0.1 / 0.5 / 1 CEC CA.

	Perdida de masa (%)	T_1(°C)	Perdida de masa (%)	T_2(°C)	Perdida de masa (%)	T_3(°C)
Cloisite 20A			9,60	330,43	22,57	391,43
CLoisite 20A 0,1 CEC CA	2,52	259,75	10,72	328,29	21,61	381,48
CLoisite 20A 0,5 CEC CA	6,62	250,87	15,88	327,14		
CLoisite 20A 1 CEC CA	7,64	213,67	22,24	332,79	32,77	384,48

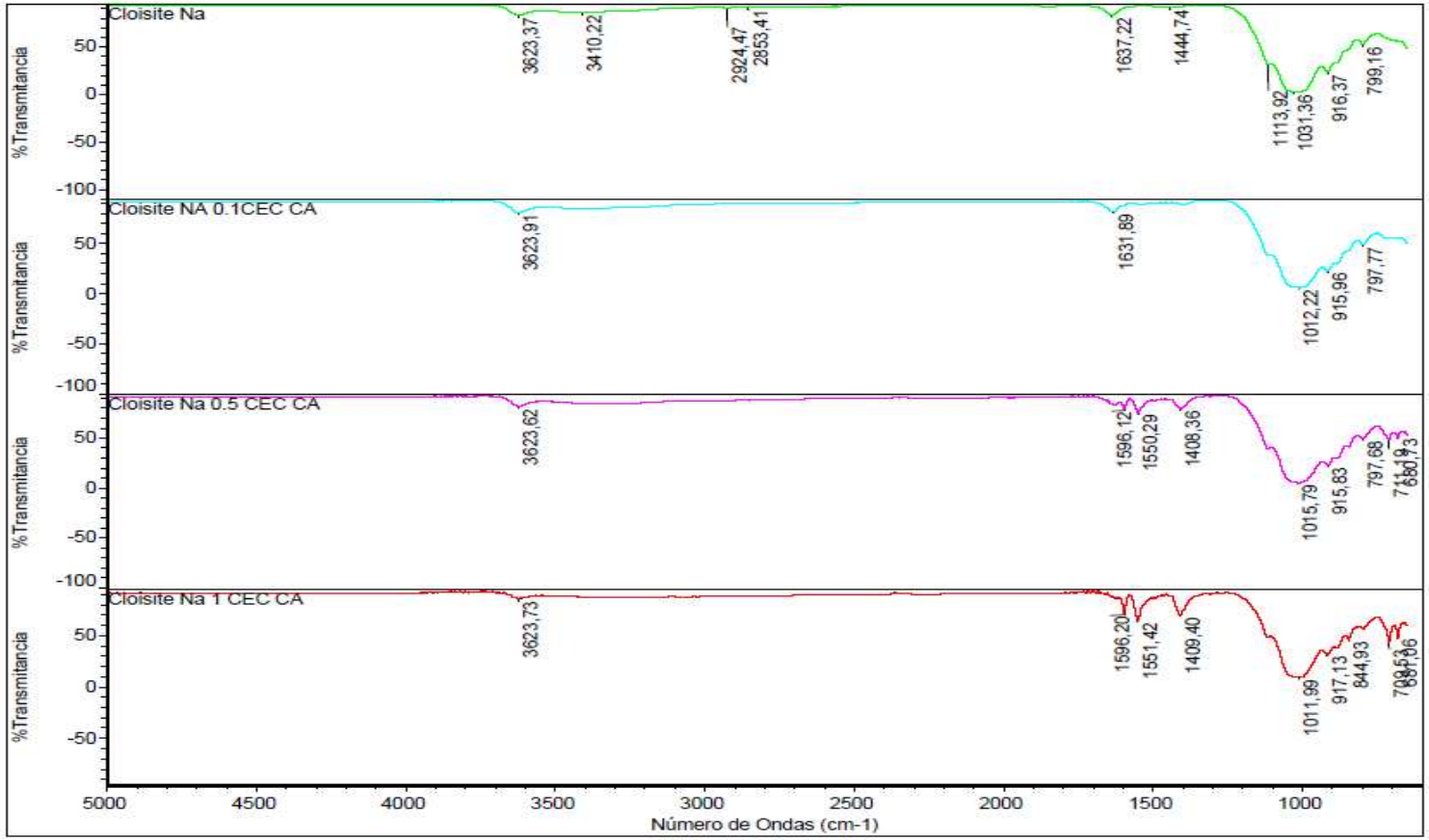
APÉNDICE E3

ESPECTROSCOPÍA FT-IR DE ARCILLA CLOISITE Na, A 0.1, 0.5, 1 CEC CA Y CON PICOS CARACTERÍSTICOS (1)



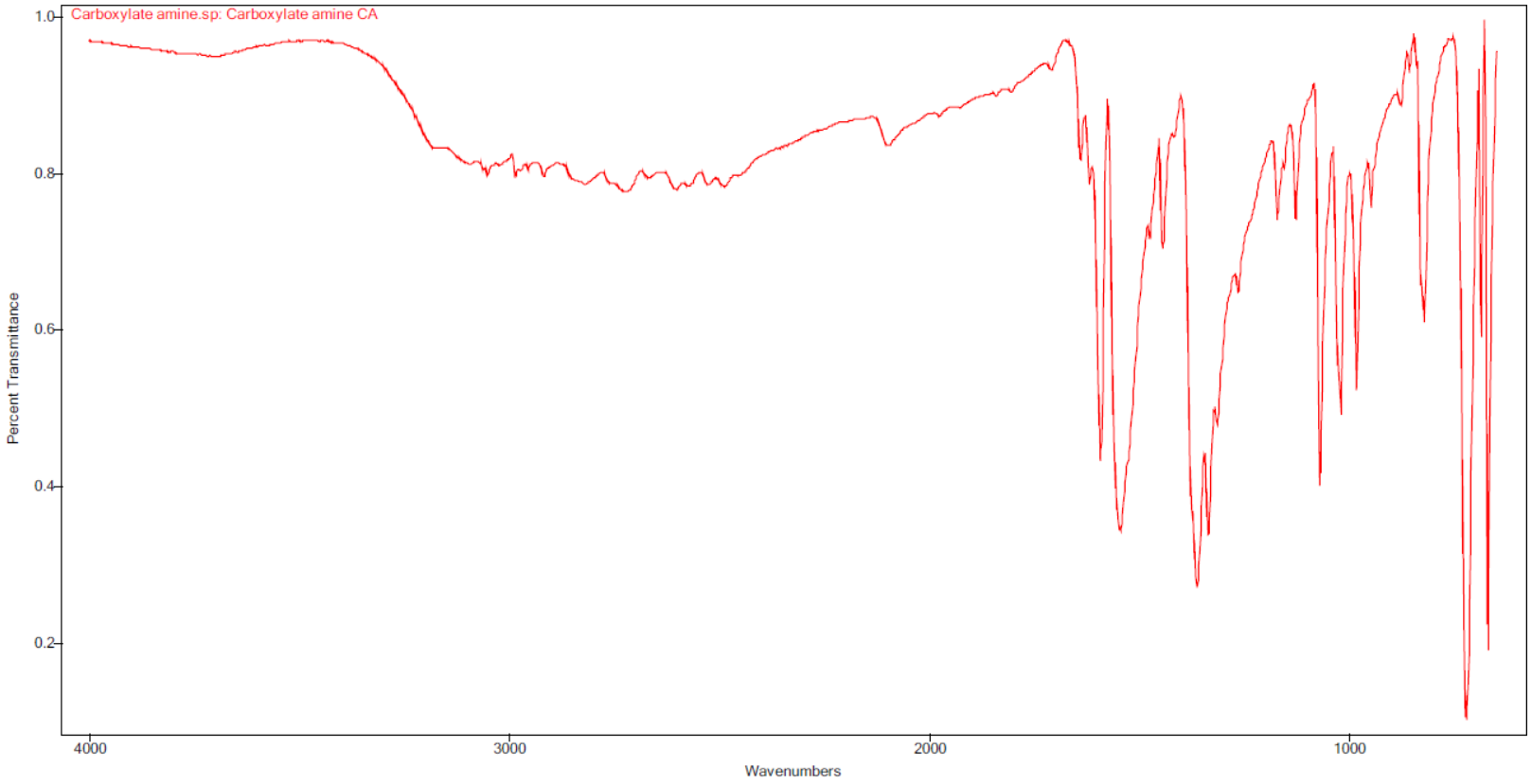
APÉNDICE E4

ESPECTROSCOPÍA FT-IR DE ARCILLA CLOISITE Na, A 0.1, 0.5, 1 CEC CA Y CON PICOS CARACTERÍSTICOS (2)



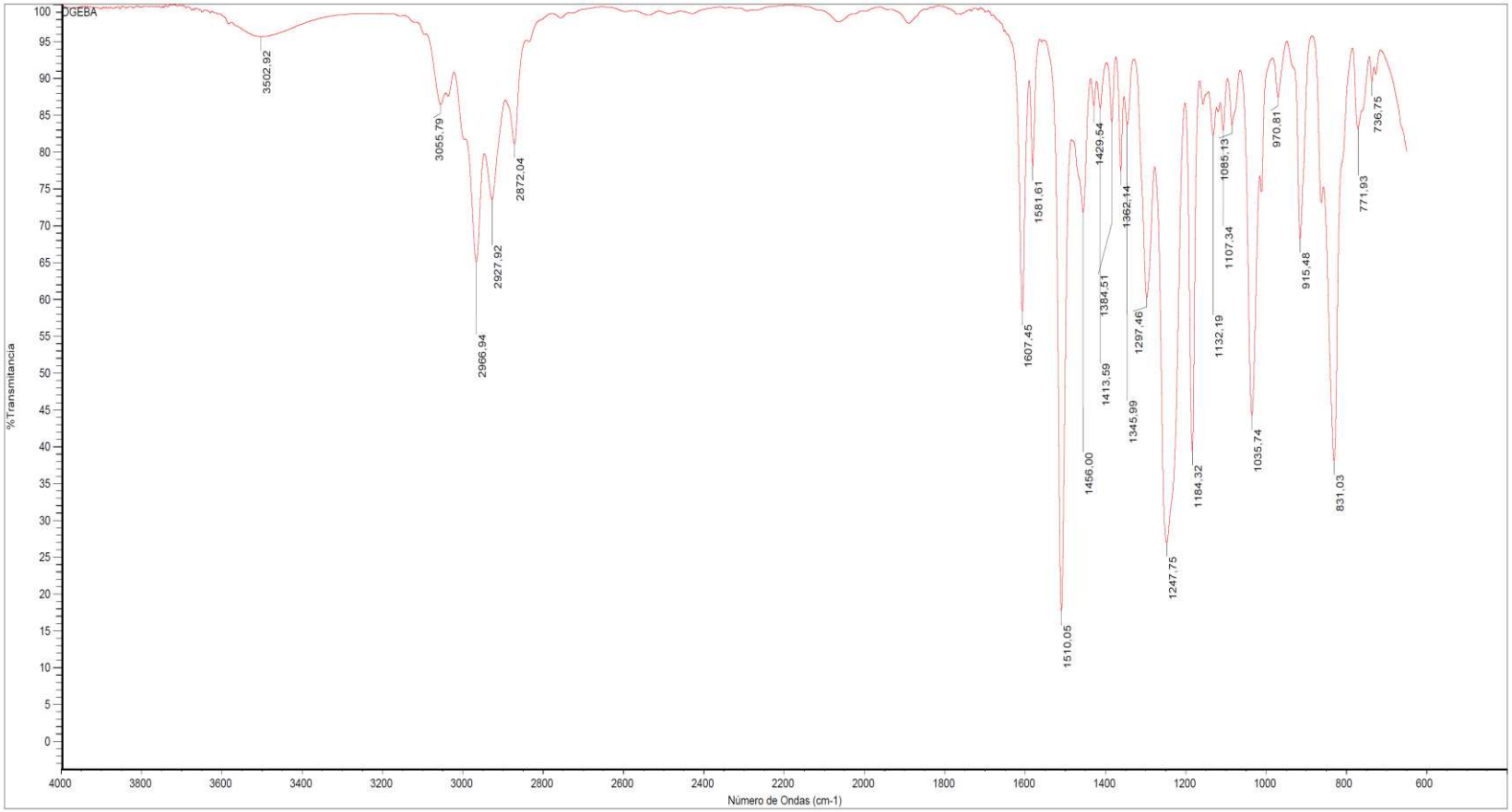
APÉNDICE E5

ESPECTROSCOPÍA FT-IR DEL SURFACTANTE CARBOXILATO DE AMINO



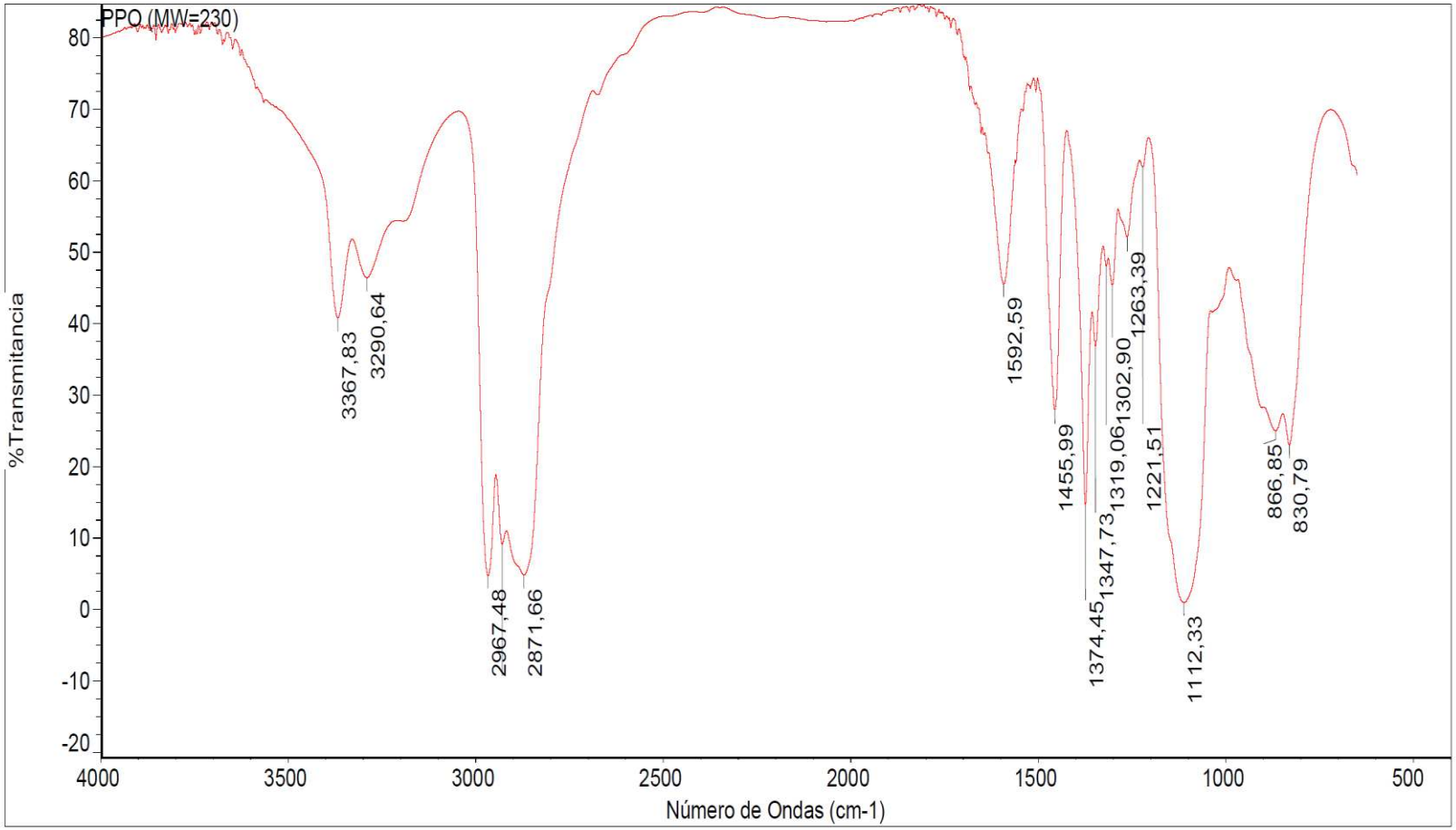
APÉNDICE E6

ESPECTROSCOPÍA FT-IR DE LA RESINA EPOXICA DGEBA - EPON 828 CON PICOS CARACTERÍSTICOS



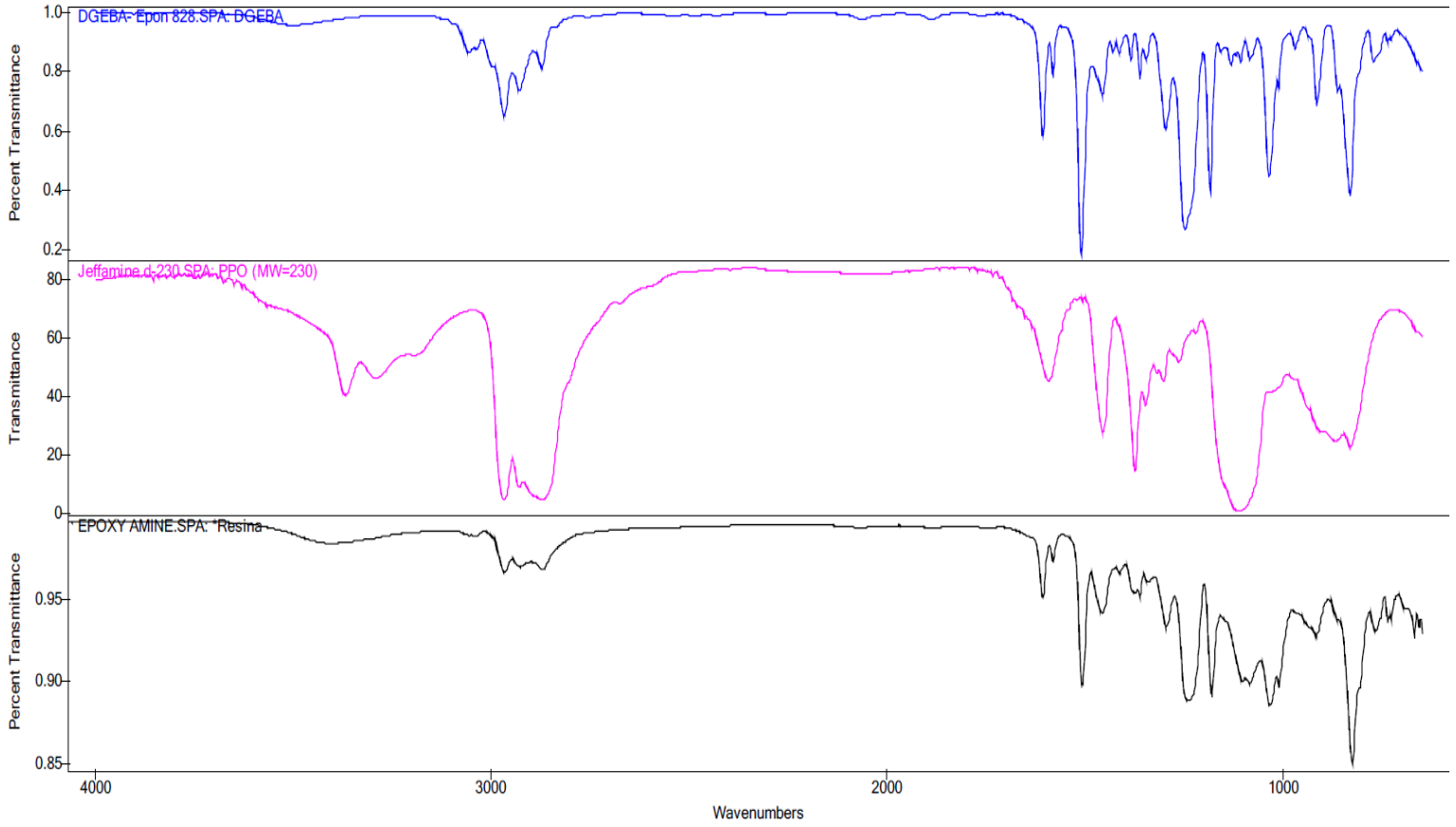
APÉNDICE E7

ESPECTROSCOPÍA FT-IR DEL AGENTE CURADOR JEFFAMINE D-230



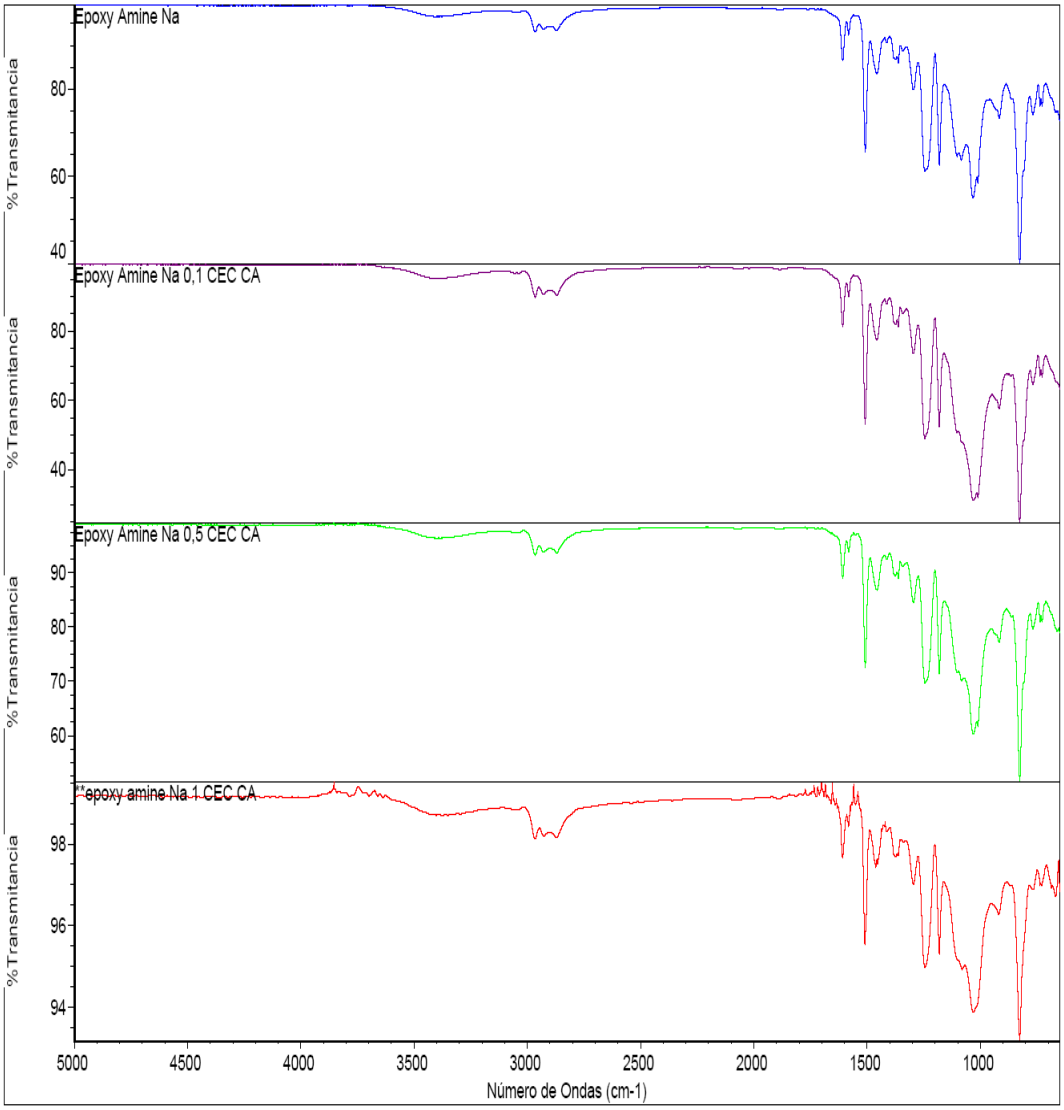
APÉNDICE E8

ESPECTROSCOPÍA FT-IR DE LA RESINA EPOXICA, EL AGENTE CURADOR Y DEL COMPUESTO EPOXI-AMINO



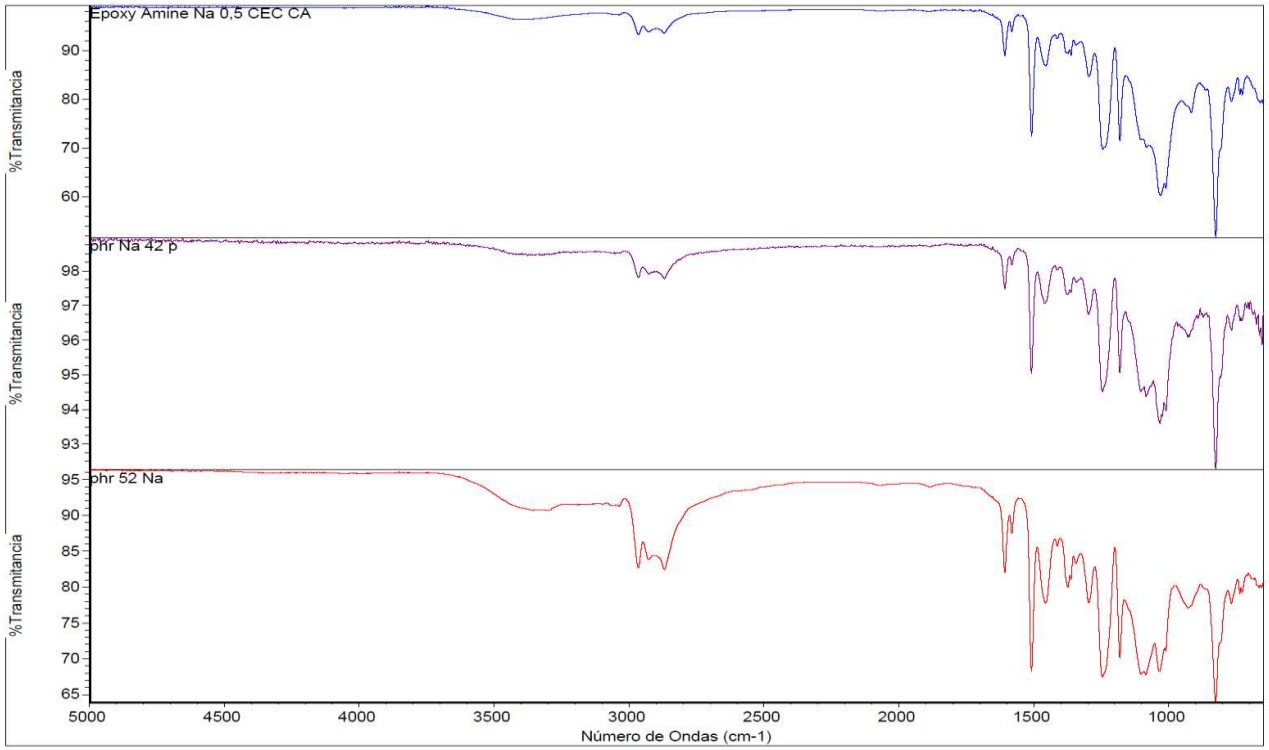
APÉNDICE E9

ESPECTROSCOPÍA FT-IR DEL COMPUESTO TRADICIONAL Y LOS NANOCOMPUESTOS CON LA CLOISITE Na.



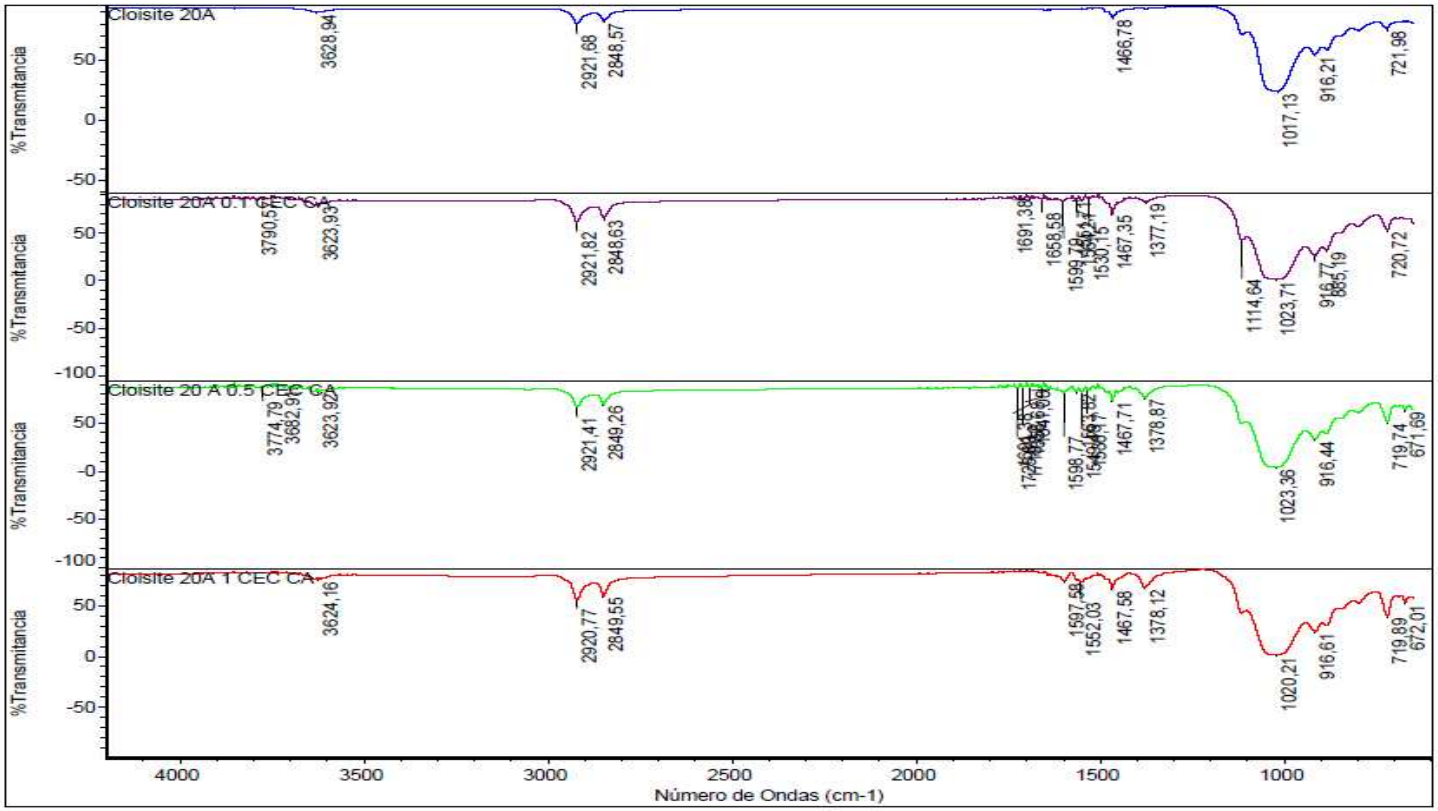
APÉNDICE E10

ESPECTROSCOPÍA FT-IR DE LOS NANOCOMPUESTOS CON LA CLOISITE Na 0.5 CEC CA, A DIFERENTE PHR.



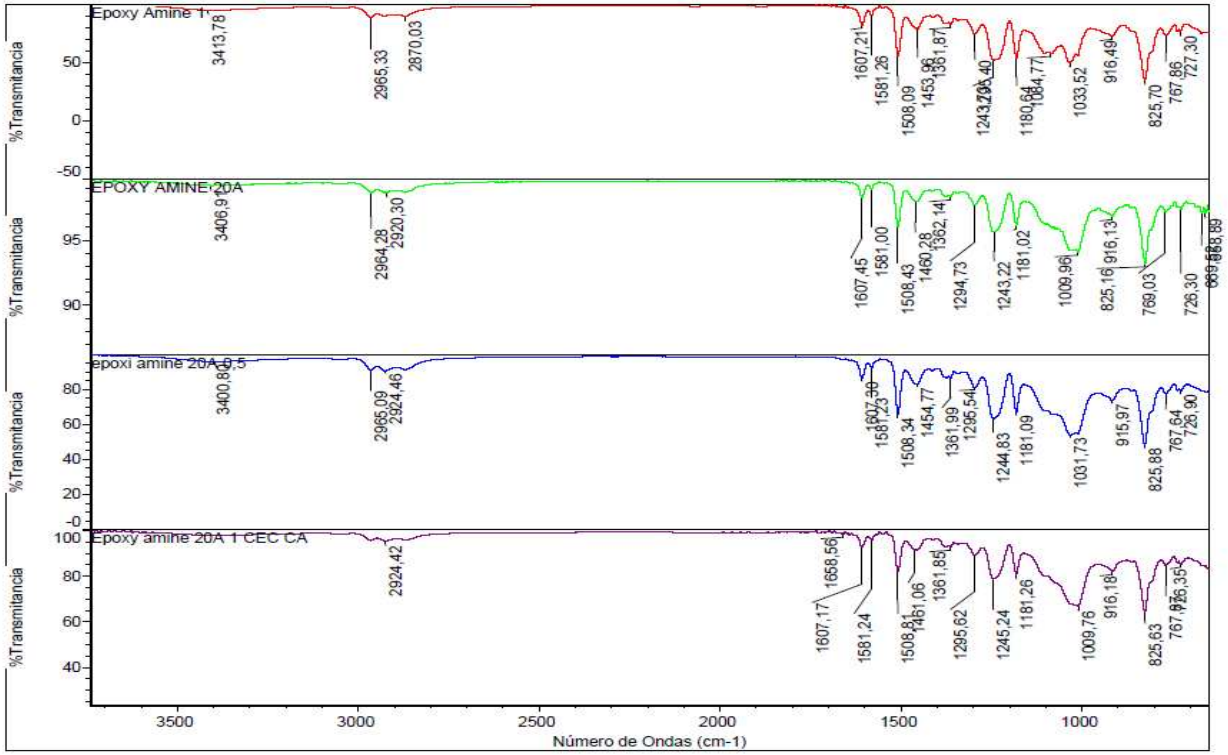
APÉNDICE E11

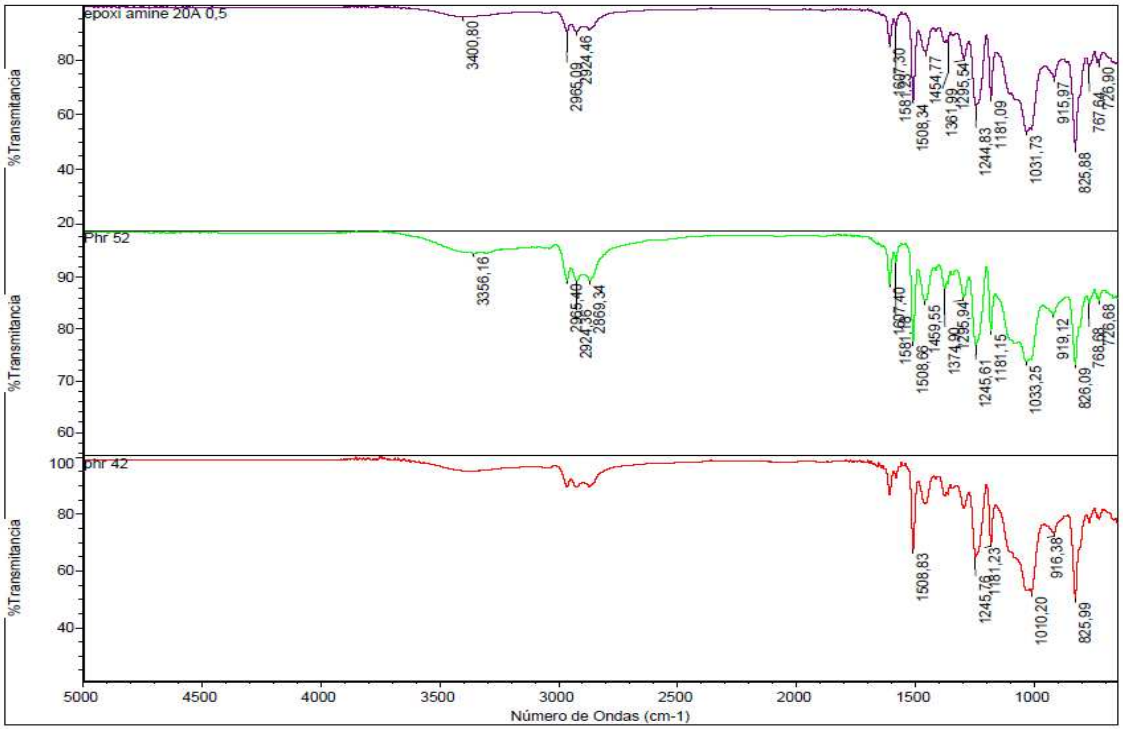
ESPECTROSCOPÍA FT-IR DE NANOARCILLA CLOISITE 20A.



APÉNDICE E12

ESPECTROSCOPÍA FT-IR DEL COMPUESTO TRADICIONAL Y LOS DIFERENTES NANOCOMPUESTOS CON LA NANOCARCILLA CLOISITE 20A Y CA.



APÉNDICE E13

ESPECTROSCOPÍA FT-IR DE LOS NANOCOMPUESTOS CON NANOARCILLA CLOISITE 20A 0.5 CEC CA CON VARIACION DE PHR Y PICOS CARACTERÍSTICOS.