Improving Glass Transition Temperature and Toughness of epoxy adhesives by a complex room temperature curing system by changing the stoichiometry

Supplementary Information

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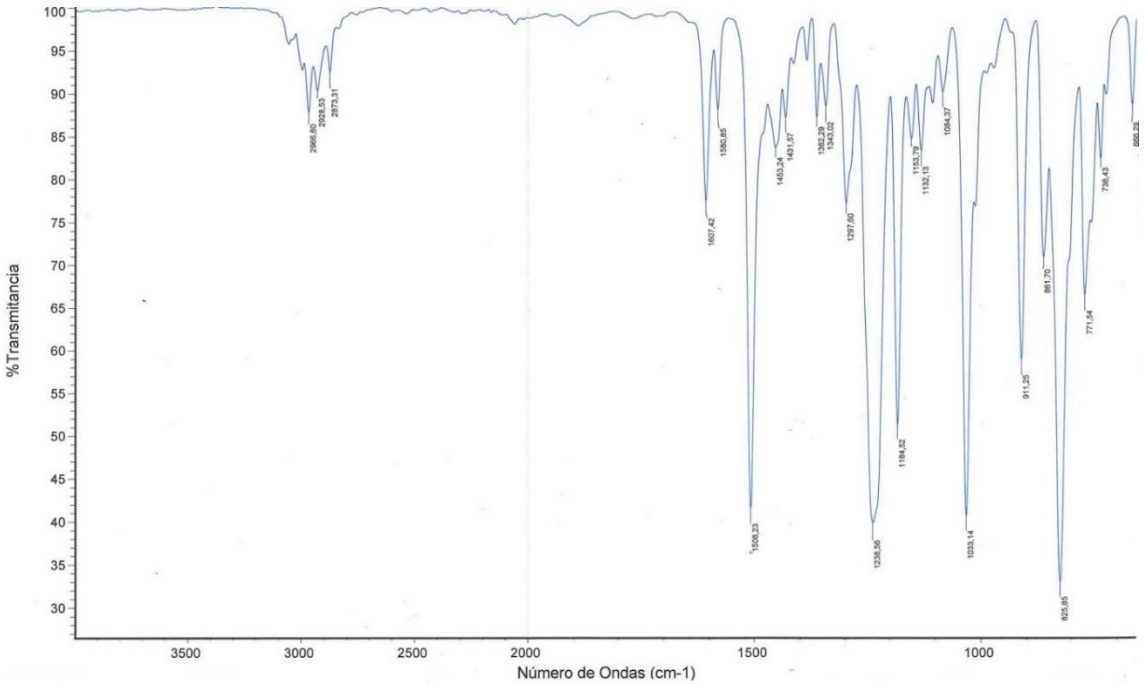
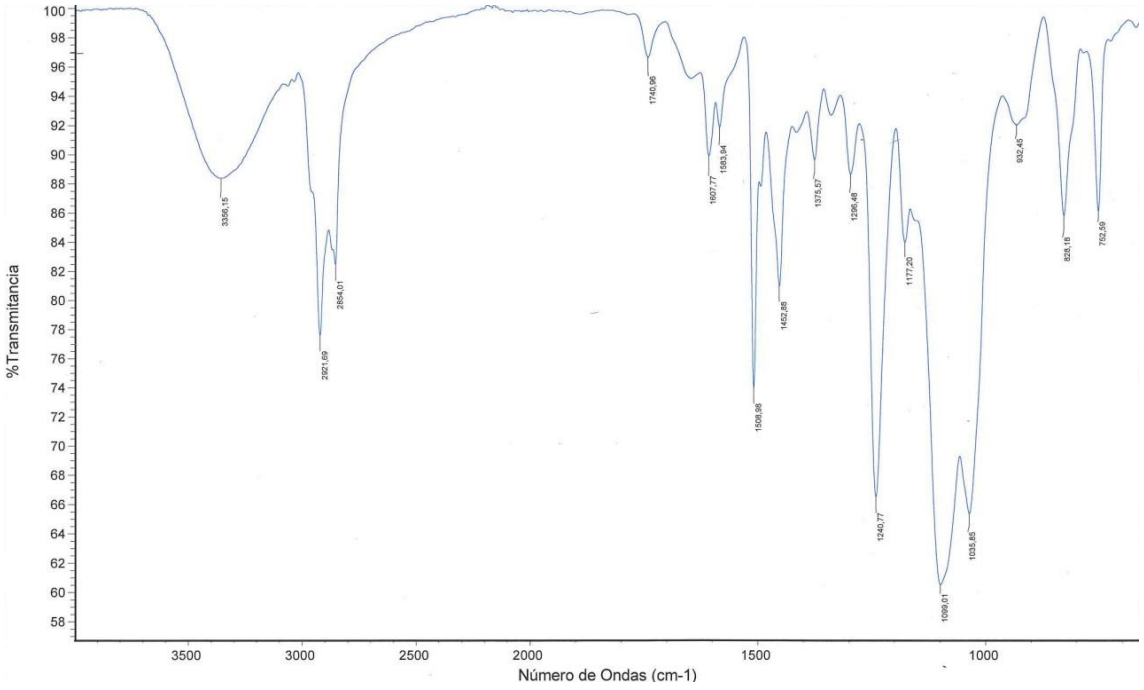
Figure S1. Epoxy resin FTIR-ATR spectra



Wave number (cm^{-1})	Assignment / Vibration type
772, 826	ArC-H δ
826, 911	Epoxy ring δ, Epoxy ring st sim
1033, 1064	ArC-O-C aliphatic t sim
1184	C-C bond tension between two phenyl groups
1239	Aliphatic ArC-O st as, C-O-C as, epoxy ring
1298	C-O-C st as
1362, 1384	CH_3 sim
1453	CH_3 δ as, CH_2 δ
1508, 1581, 1607	ArC-C
2873, 2929, 2967	C-H bending vibration on methyl groups
3057	C-H in epoxy group, ArC-H st

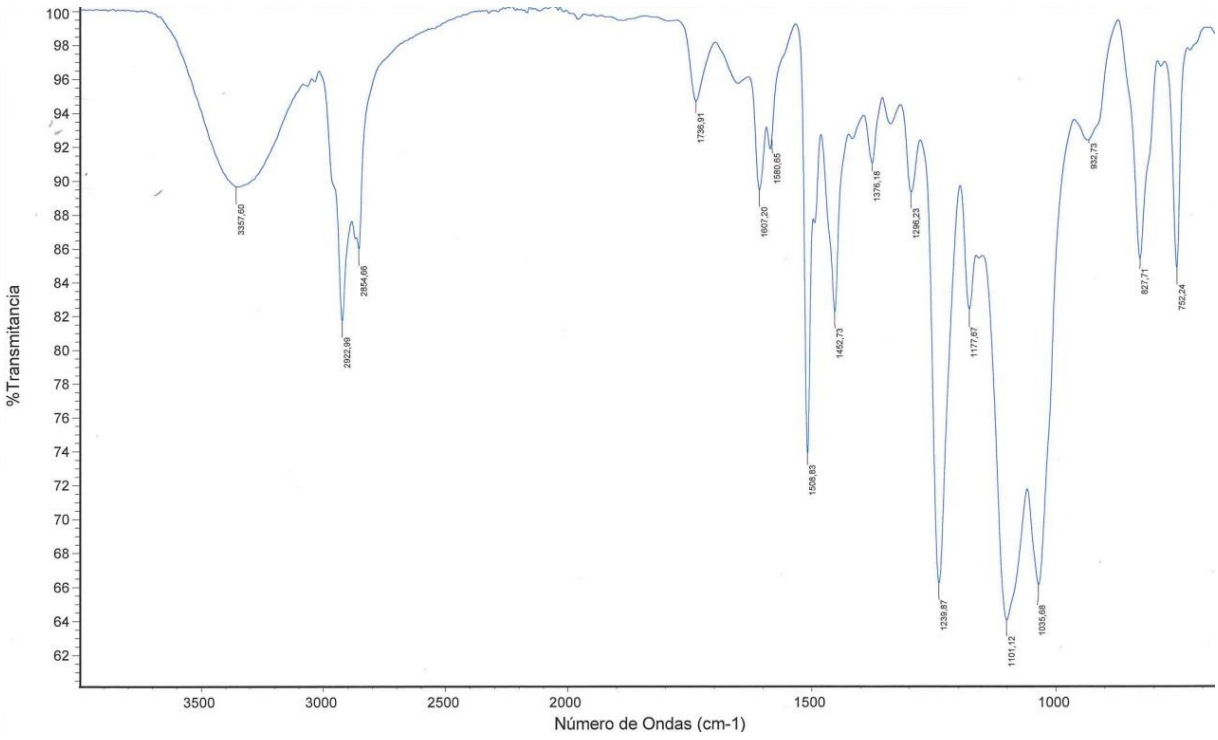
Two characteristic absorptions of the oxirane ring of epoxy are observed in the range between 3500 cm^{-1} and 700 cm^{-1}. The first one, at 911 cm^{-1}, is attributed to the C-O deformation of the oxirane group. The second band is located at 3057 cm^{-1} approximately and is attributed to the C-H tension of the methylene group in the epoxy ring, although it is also related to asymmetrical and symmetrical C-H stretch of aromatic ring. The presence of these two peaks at the spectre states that epoxy resin has not reacted yet. However, once the epoxy resin starts curing oxirane ring concentration decreases, and this is observed in the spectra as the decrease of the two characteristic absorptions bands, until all oxirane rings are depleted as it can be shown in Figures S2-S4.

Figure S2. D01 formulation FTIR-ATR spectra



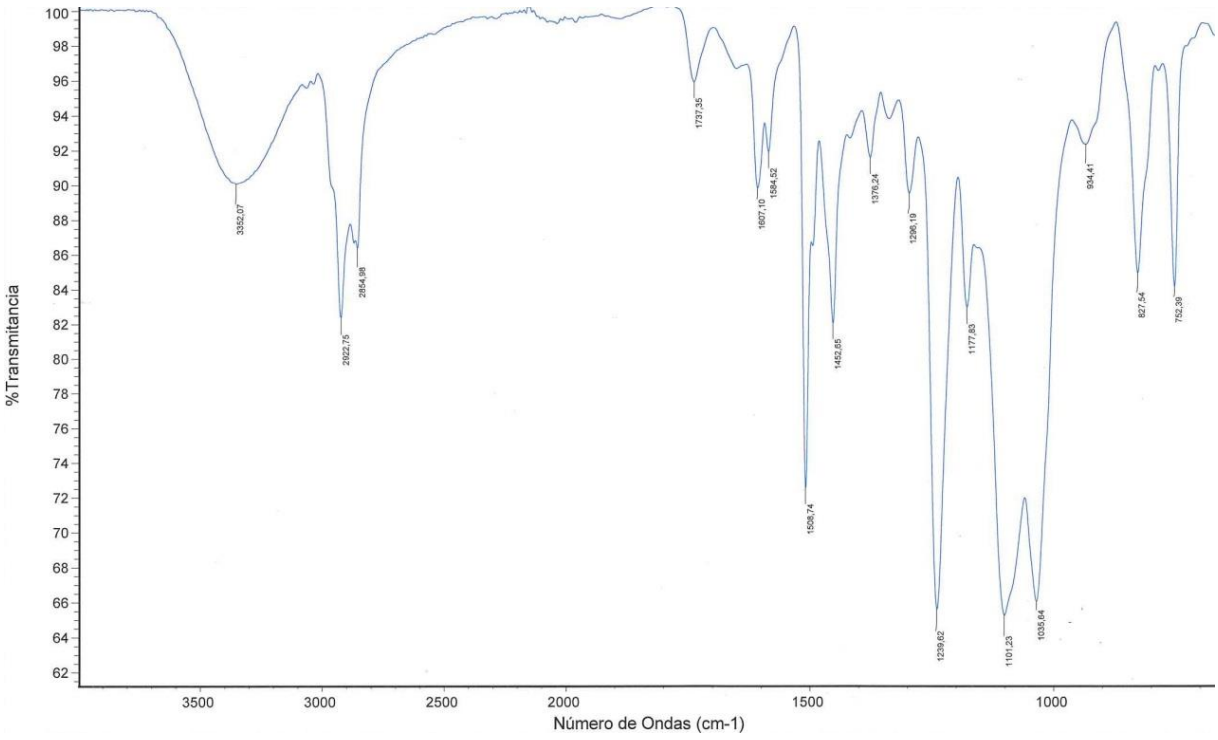
Wave number (cm^{-1})	Assignment / Vibration type
753,828	ArC-H δ
1035	ArC-O-C alifático t sim
1099	C-O-C
1177	C-C between two phenyl groups
1241	ArC-O-C aliphatic t as
1296	C-O-C st as
1376	CH_3 δ sim
1453	CH_3 δ as, CH_2 δ
1509, 1584, 1608	ArC-C
2854, 2922, 2962	C-H bending vibration on methyl groups
3035	C-H
3058	ArC-H st
3356	N-H st

Figure S3. D02 formulation FTIR-ATR spectra



Wave number (cm^{-1})	Assignment / Vibration type
752,828	ArC-H δ
1035	ArC-O-C alifático t sim
1101	C-O-C
1177	C-C between two phenyl groups
1240	ArC-O-C aliphatic t as
1296	C-O-C st as
1378	CH_3 δ sim
1453	CH_3 δ as, CH_2 δ
1509, 1581, 1607	ArC-C
2854, 2923, 2962	C-H bending vibration on methyl groups
3035	C-H
3058	ArC-H st
3358	N-H st

Figure S4. D03 formulation FTIR-ATR spectra



Wave number (cm^{-1})	Assignment / Vibration type
753,828	ArC-H δ
1035	ArC-O-C alifático t sim
1101	C-O-C
1177	C-C between two phenyl groups
1240	ArC-O-C aliphatic t as
1296	C-O-C st as
1376	CH_3 δ sim
1453	CH_3 δ as, CH_2 δ
1509, 1585, 1607	ArC-C
2854, 2922, 2962	C-H bending vibration on methyl groups
3035	C-H
3058	ArC-H st
3352	N-H st