Supporting information for:

Eco-Friendly and Sustainable Basil Seed Hydrogel-Loaded Copper Hydroxide-Based Catalyst for the Synthesis of Propargylamines and Tetrazoles

Effat Samiee Paghaleh[a], Eskandar Kolvari[a,*] , Farzad Seidi[d], Kheibar Dashtian[c]

[a] *Department of Chemistry, Semnan University, P.O. Box 35131-19111, Semnan, Iran*

[b] *Jiangsu Co-Innovation Center of Efficient Processing and Utilization of Forest Resources and International Innovation Center for Forest Chemicals and Materials, Nanjing Forestry University, Nanjing 210037, China*

[c] *Department of Chemistry, Iran University of Science and Technology, Tehran, 16846-13114, Iran*

* *Corresponding author, E-mail addresses:* kolvari@semnan.ac.ir (E. Kolvari)

S1. Spectral data of propargylamines derivatives

2-(1-morpholino-3-phenylprop-2-yn-1-yl)phenol:
IR (KBr, cm^{-1}): 3388, 2956, 2925, 2854, 2497, 1718, 1637, 1600, 1485, 1452, 1396, 1276, 1174, 1114, 1070, 1010, 871, 848, 825, 757, 713, 690, 547, 437, 414.

4-(3-phenyl-1-(p-tolyl)prop-2-yn-1-yl)morpholine:
IR (KBr, cm^{-1}): 2956, 2923, 2856, 1728, 1685, 1610, 1577, 1527, 1456, 1421, 1346, 1288, 1178, 1118, 1072, 945, 756, 719, 690, 609, 543, 470.

4-(1-(4-bromophenyl)-3-phenylprop-2-yn-1-yl)morpholine:
IR (KBr, cm^{-1}): 3411, 3058, 2956, 2923, 2854, 1716, 1645, 1589 1487, 1450, 1317, 1276, 1174, 1116, 1070, 1010, 848, 756, 711, 690, 549. ^{1}HNMR (400 MHz, CDCl3): δH (ppm) 7.50-7.47 (m, 6H),7.34-7.33 (m, 3H), 4.73 (s, 1H), 3.76-3.67 (m. 4H), 2.61-2.59 (m, 4H). 13CNMR (100 MHz, CDCl3): δC (ppm) 137.0, 131.8, 131.3, 130.2, 128.4, 128.3, 122.7, 121.7, 88.9, 84.2, 67.1, 61.4, 49.8.

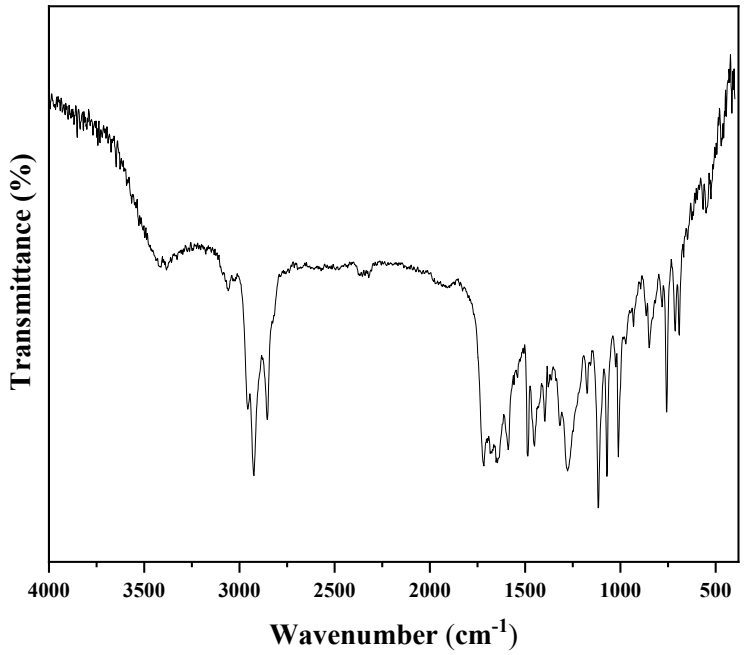

Fig. S1. spectrum of IR 4-(1-(4-bromophenyl)-3-phenylprop-2-yn-1-yl)morpholine

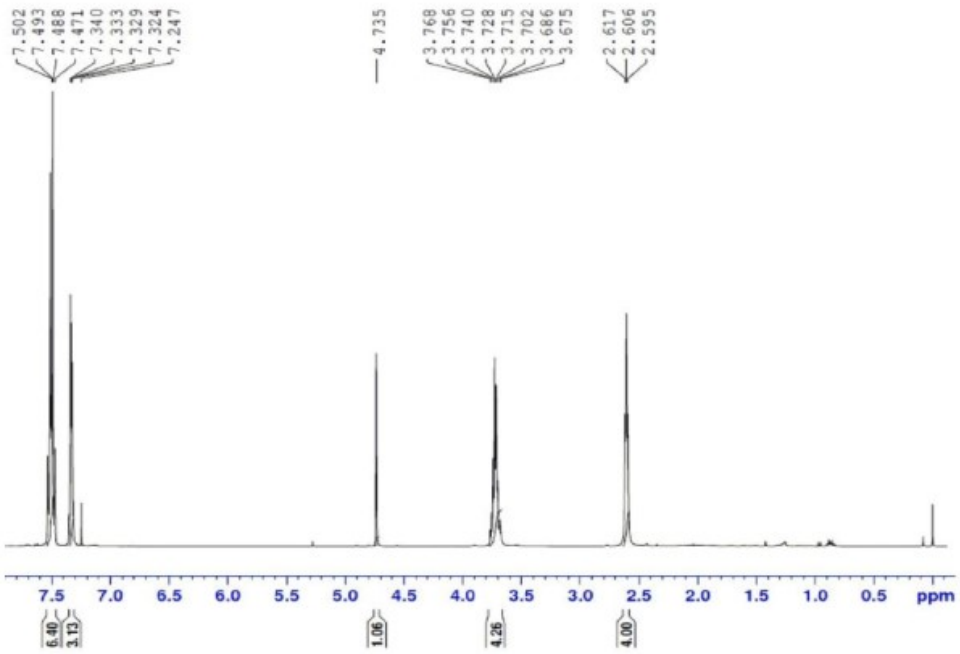

Fig. S2. spectrum of [1]HNMR 4-(1-(4-bromophenyl)-3-phenylprop-2-yn-1-yl)morpholine

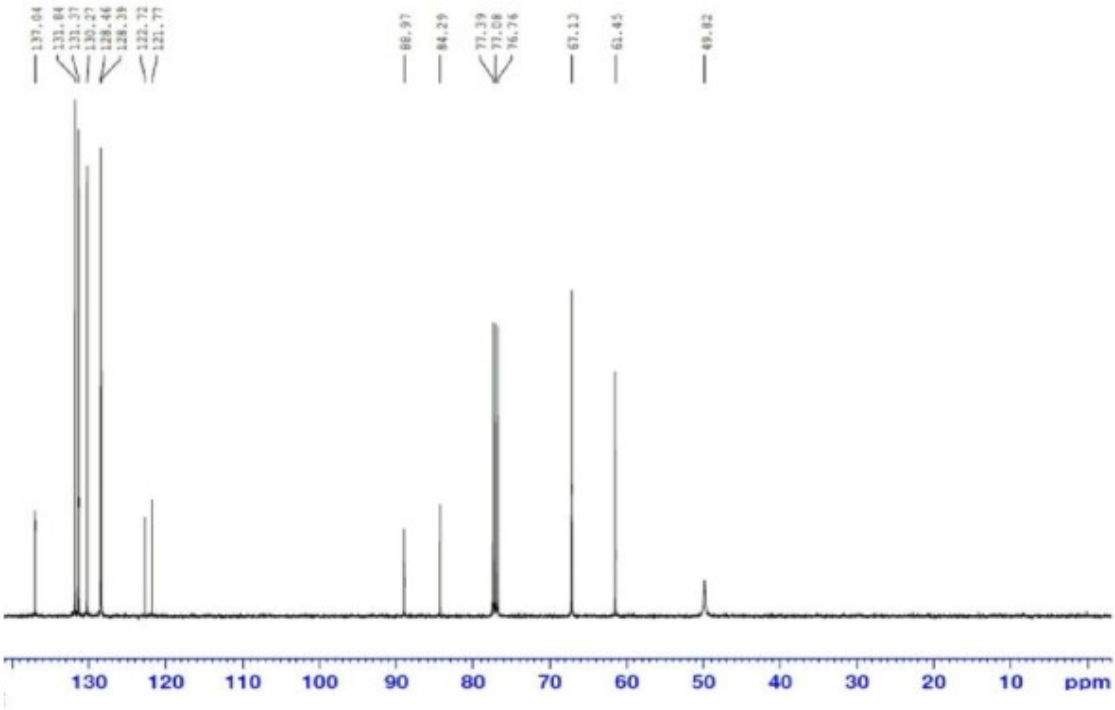

Fig. S3. spectrum of [13]C-NMR 4-(1-(4-bromophenyl)-3-phenylprop-2-yn-1-yl)morpholine

S2. Spectral data of tetrazoles derivatives

3-(3-nitrophenyl)-2-(1H-tetrazol-5-yl)acrylonitrile:
IR (KBr, cm^{-1}): 3346, 3338, 2198, 1656, 1533, 1350, 1103, 985, 811, 721.

3-(4-chlorophenyl)-2-(1H-tetrazol-5-yl)acrylonitrile:
IR (KBr, cm^{-1}): 3421, 3157, 3147, 2920, 2229, 1650, 1585, 1494, 1093, 1031, 829, 702, 507.

3-(4-bromophenyl)-2-(1H-tetrazol-5-yl)acrylonitrile:

IR (KBr, cm^{-1}): 3139, 3122, 2194, 1645, 1606, 1581, 1558, 1488, 1473, 1074, 1029, 1008, 825, 503.39

3-phenyl-2-(1h-tetrazole-5-yl) acrylonitrile:
IR (KBr, cm^{-1}): 3344, 3055, 3029, 3001, 2985, 2879, 2879, 2850, 2756, 2740, 2729, 2698,2690, 2644 2619, 2559, 2227, 2198, 1652, 1612, 1596, 1571, 1552, 1452, 1290, 1215, 1195, 1195,1029, 941, 771, 763, 688, 607, 590.^{1}HNMR (DMSO-d_6), δppm: 2.5(brs, NH, overlap witH solvent), 7.59-7.62 (m, 3H , CH-Ar), 8.00-8.03 (m, 2H , CH-Ar), 8.39 (s, 1H , CH), ^{13}C-NMR (DMSO-d_6), δppm: 97.01, 115.59, 129.40, 129.54, 129.93, 132.23, 132.43, 148.53.

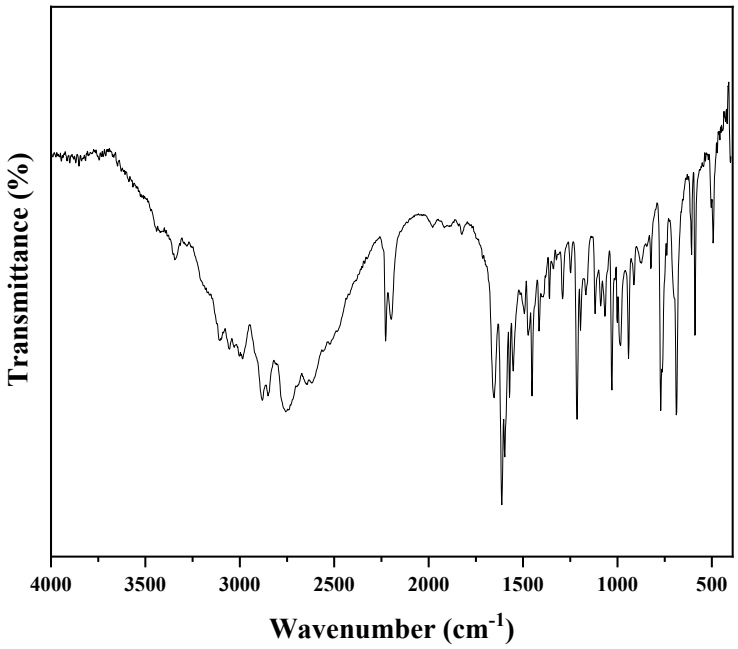

Fig. S4. spectrum of IR 3-phenyl-2-(1h-tetrazole-5-yl) acrylonitrile

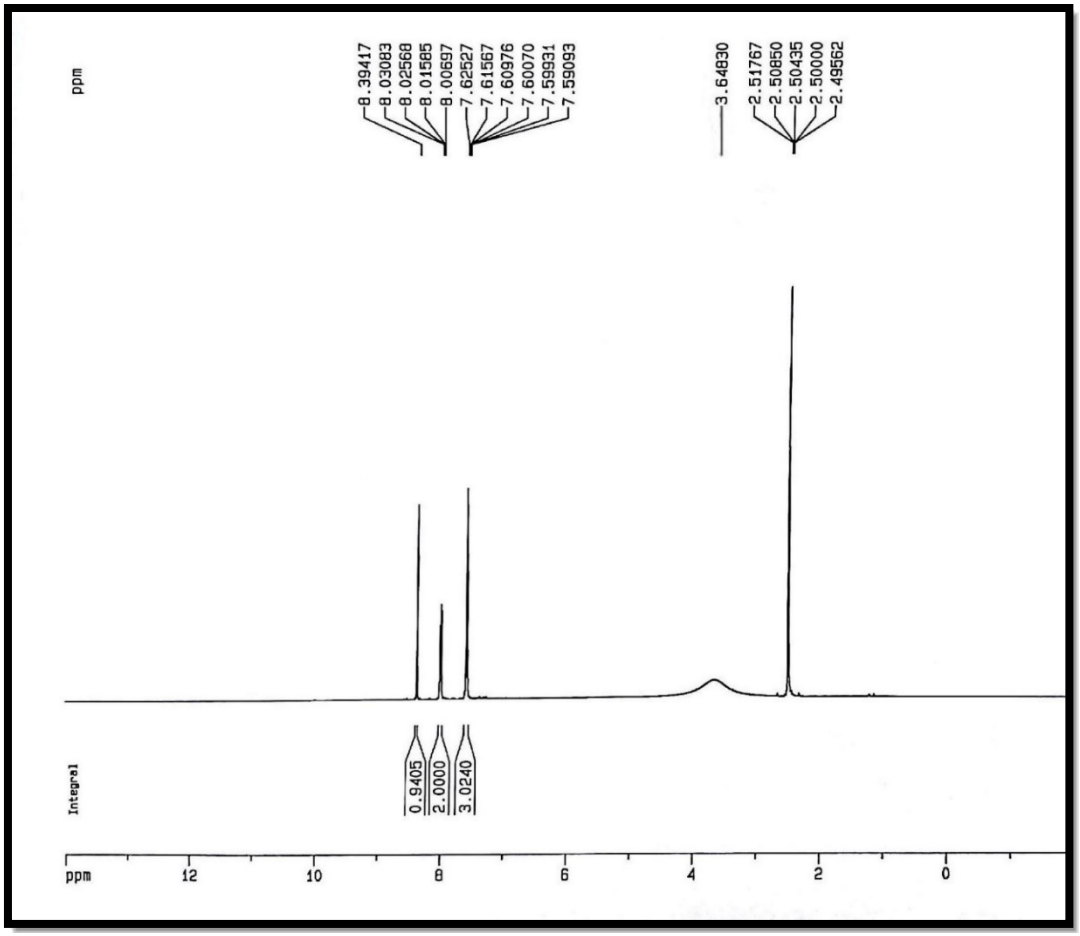

Fig. S5. spectrum of [1]HNMR 3-phenyl-2-(1h-tetrazole-5-yl) acrylonitrile

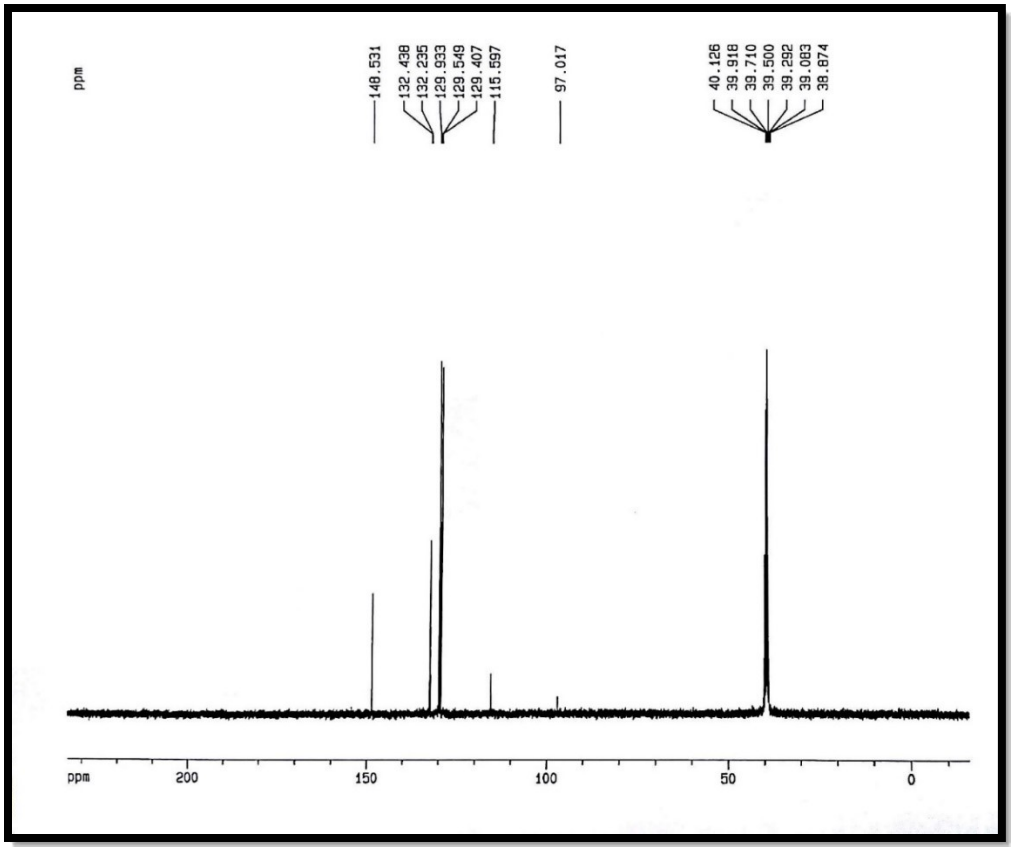

Fig. S6. spectrum of ^{13}C-NMR 3-phenyl-2-(1h-tetrazole-5-yl) acrylonitrile

2-(1H-tetrazol-5-yl)-3-(p-tolyl)acrylonitrile:

^{1}HNMR (DMSO-d_6), δppm: 2.5(brs, NH, overlap witH solvent), 2.39 (s, 3H ,CH), 7.40-7.42(d, 2H ,CH-Ar), 7.91-7.93(d, 2H ,CH-Ar), 8.33(s, 1H, CH). ^{13}C-NMR (DMSO-d_6), δppm: 21.34, 95.48, 115.77, 129.53, 130.03, 130.06, 143.17, 148.54

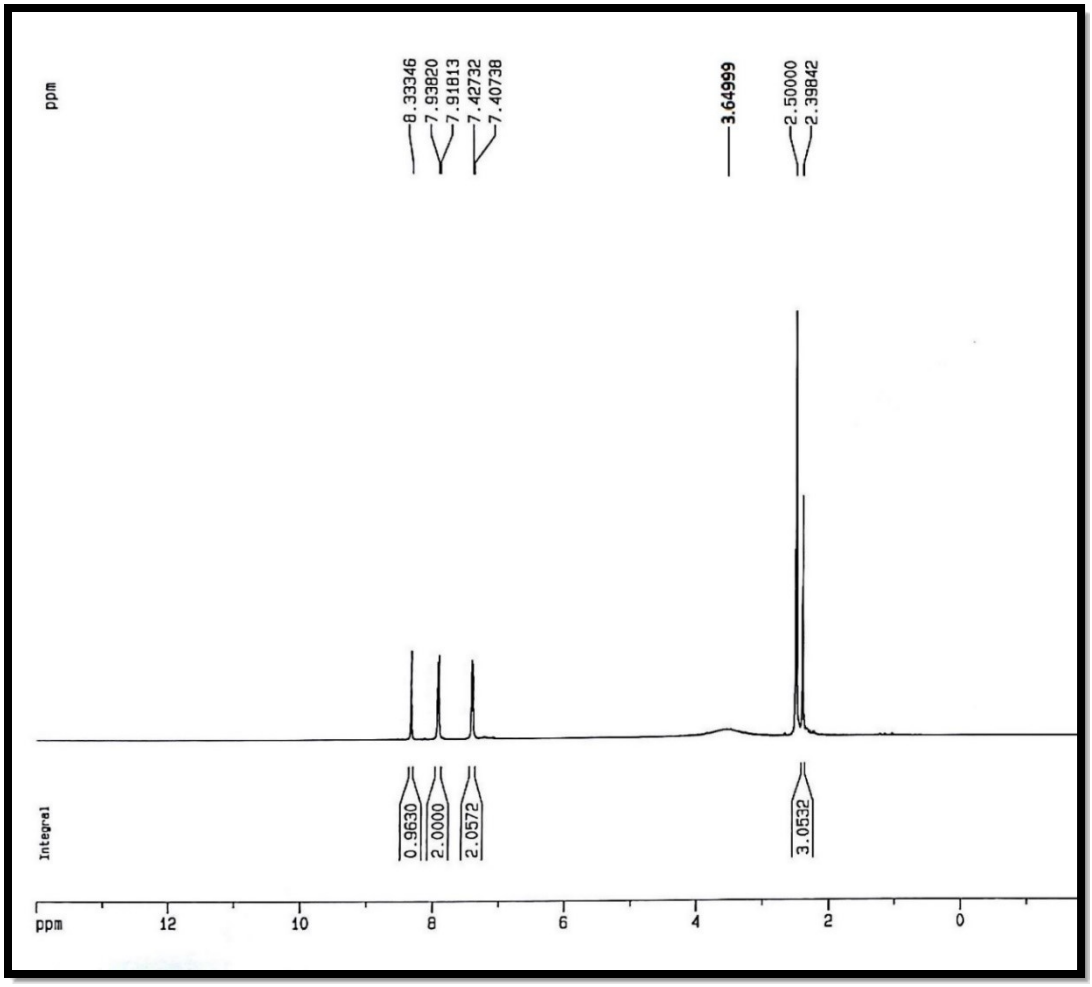

Fig. S7. spectrum of ^{1}HNMR 2-(1H-tetrazol-5-yl)-3-(p-tolyl)acrylonitrile

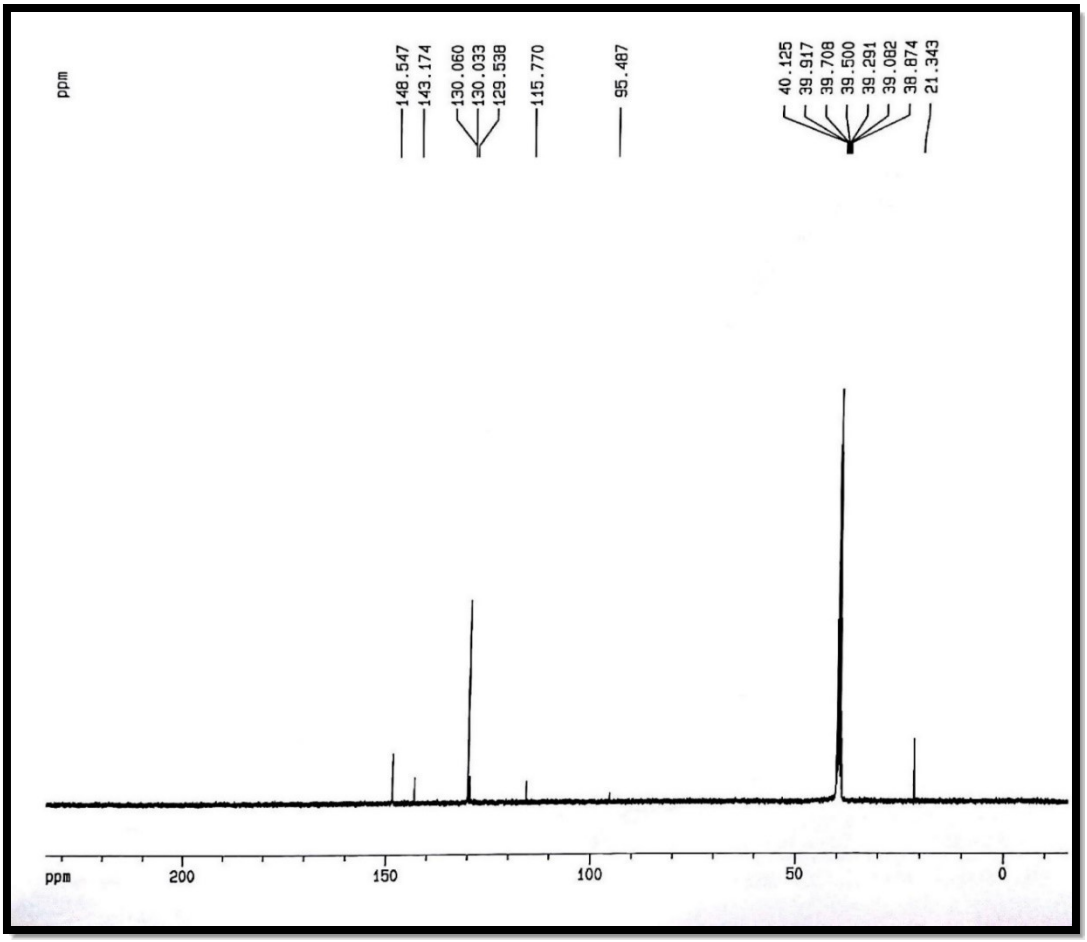

Fig. S8. spectrum of CNMR 2-(1H-tetrazol-5-yl)-3-(p-tolyl)acrylonitrile