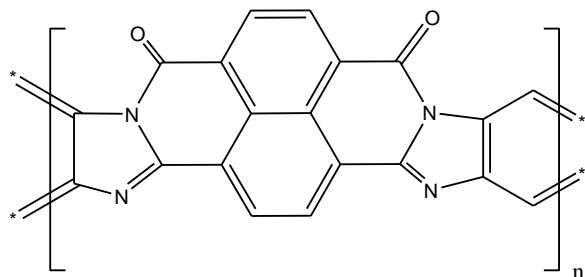


Sample Name:

Poly(benzimidazobenzophenanthroline)

Sample #: P14791-BBL

Structure:



Composition:

Solution Viscosity In H2SO4
0.516 dl/g

Synthesis Procedure:

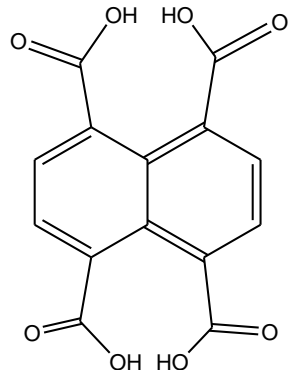
Monomer used in the synthesis of
Poly(benzimidazobenzophenanthroline)

Sample Name:

1,4,5,8-NAPHTHALENETETRACARBOXYLIC
ACID

Sample #: Naphth-4COOH Lot# P18857-
Naph4COOH

Structure:



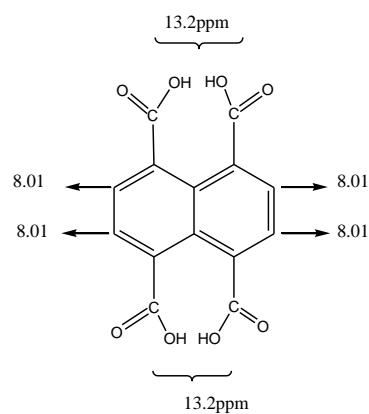
Composition: purity > 90% (from NMR)

Impurities: Naphthalene or naphthalene
anhydride

C₁₄H₈O₈

Mol. Wt.: 304.2

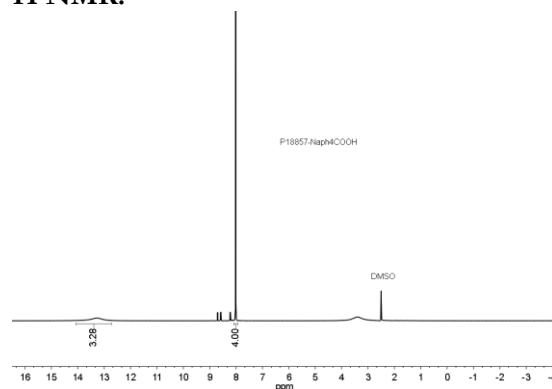
C, 55.27; H, 2.65; O, 42.07



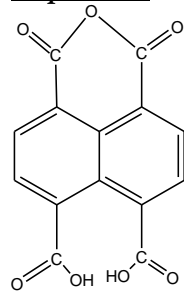
Characterization:

The product was characterized by NMR in DMSO

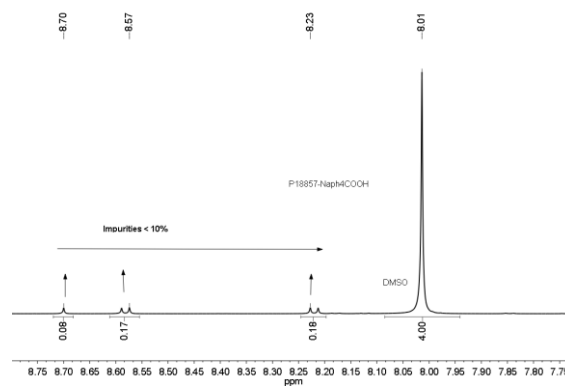
H NMR:



Impurities:



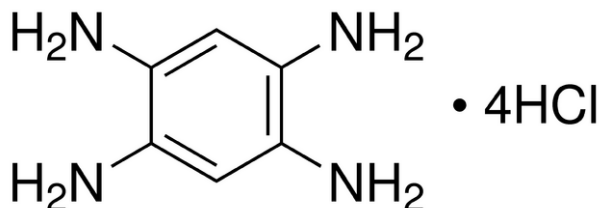
And Naphthalene



1,2,4,5-Tetraaminobenzene tetrahydrochloride

Sample #: BZ4NH2 Lot# P18892-Bz4NH2.HCl

Structure:

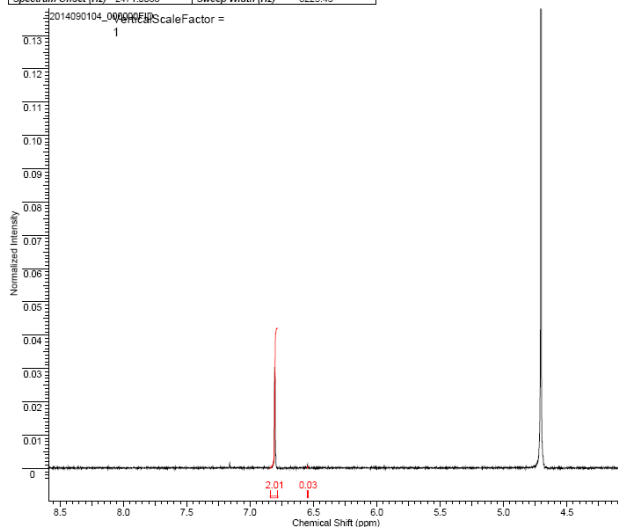


CAS: 4506-66-5

Color: purple to dark brown

Solubility in water : 25mg/ml

Acquisition Time (sec)	3.9846	Comment	20140901-4	Date	01 Sep 2014 12:48:00
Date Stamp	01 Sep 2014 12:48:00				
File Name	C:\DOCUMENTS AND SETTINGS\ADMINISTRATOR\12014090104\2014090104_000000.FID				
Frequency (MHz)	400.13	Nucleus	¹ H	Number of Transients	12
Origin	spect	Original Points Count	32768	Owner	nmr
Points Count	32768	Pulse Sequence	zg30	Receiver Gain	203.00
SW (Hz)	8423.68	Solvent	DEUTERIUM OXIDE		
Spectrum Offset (Hz)	2471.0058	Sweep Width (Hz)	6223.43		



No.	(ppm)	Value	Absolute Value	Non-Negative Value
1f6	5431	6.54003353167	1.64225660e+7	0.03353167
2f6	7809	6.84200714044	9.83022784e+8	2.00714040

Characterization:

1. Solution viscosity in H2SO4
2. Elemental analysis
3. FTIR on KBr powder

Solubility:

1mg / 1ml methane sulfonic acid clear pink color solution.

Solution Viscosity of the polymer in H2SO4:

Viscosity measurement (dL/g) of P14791 in concentrated sulfuric acid at 25 °C

Concentration (g/dL)	Inherent viscosity (dL/g)	Reduced viscosity (dL/g)
0.0998	0.502	0.516
0.149	0.400	0.406
0.198	0.335	0.346
0.297	0.328	0.340

$$\frac{\eta_{sp}}{C} = \eta_{red}$$

Reduced Viscosity =

$$\frac{\ln \eta_r}{C} = \eta_{inh}$$

Inherent Viscosity =

$$\frac{\eta_{sp}}{C} = \eta_{red}$$

Elemental Analysis:

Theoretical Values: C20H6N4O2

C	H	N	O
68.2	2.27	15.9	13.6

Values found : C20H6N4O2

Sample: P14791

C	H	N	O
59.35 %	2.15 %	11.54 %	To Follow.
S			
1.15 %			

FTIR

