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ABSTRACT

A series of seventeen new random thermotropic liquid crystalline copolyesters have been synthesized by direct polycondensation of 2,2'-biphenyl dicarboxylic acid with diol monomers namely hydroquinone, hydroquinone bis(hydroxyethyl ether), 2-hydroxyethyl-4-hydroxybenzoate, bisphenol A, 1,4-cyclohexanediol and 1,8-dihydroxyanthraquinone. In addition diacid monomers namely 4,4'-oxybis(benzoic acid), terephthalic acid and 2,6-naphthalene dicarboxylic acid were also incorporated. The structural features of the copolyesters were investigated by FT-IR, ^1H NMR, ^{13}C NMR, DEPT-135 NMR and 2D-HSQC spectroscopy. The thermal behaviour of the copolyesters was investigated by Differential Scanning Calorimetry (DSC) and the texture analysis by Hot Stage Optical Polarizing Microscopy (HOPM). The inherent viscosities of copolyesters were determined by Ubbelohde Viscometer. Molecular weight of two typical copolyesters was determined by Gel Permeation Chromatography (GPC). The degree of crystallinity of the copolyesters was studied by Wide Angle X-ray Diffractometry (WAXD). The copolyesters have been screened for their antibacterial activity against different strains of human pathogenic bacteria by agar disc diffusion assay. The anticancer activity of some copolyesters was assessed against tumor cell lines MCF-7 and A549.

SYMBOLS AND ABBREVIATIONS

A549	-	adenocarcinomic human alveolar basal epithelial cells (human lung carcinoma)
AQ	-	1,8- dihydroxy anthraquinone
AZT	-	3'-azido-3'-deoxy thymidine
BPA	-	bisphenol A
B.Pt	-	boiling point
BUF	-	bufalin
C	-	concentration
CH	-	1,4-cyclohexanediol
COSY	-	COrrrelation SpectroscopY
CO ₂	-	carbon dioxide
C _p	-	heat capacity
¹³ C	-	carbon-13
d	-	diameter
dL ⁻¹	-	per deciliter
1D	-	one dimensional
2D	-	two dimensional
DA	-	diphenic acid
DEPT	-	Distortionless Enhancement by Polarization Transfer
DHB	-	4,4'-dihydroxy biphenyl
DHN	-	2,6-dihydroxy naphthalene
DMAc	-	N,N- dimethyl acetamide
DMF	-	N,N-dimethylformamide
DMSO	-	dimethyl sulphoxide
DMSO-d ₆	-	hexadeuteriated dimethyl sulphoxide
DNA	-	deoxyribo nucleic acid
DPCP	-	diphenylchlorophosphate
DSC	-	differential scanning calorimetry
DOX	-	doxorubicin

FBS	-	Fetal Bovine Serum
Fig	-	Figure
FM3A	-	mouse mammary carcinoma
FT- IR	-	Fourier Transform Infrared spectroscopy
GPC	-	Gel Permeation Chromatography
HB	-	2-hydroxyethyl-4- hydroxybenzoate
HE	-	hydroquinone bis (hydroxyethyl ether)
HNA	-	6-hydroxy-2-naphthoic acid
Hrs/hr	-	Hours/ hour
¹ H NMR	-	proton nuclear magnetic resonance
HMBC	-	Heteronuclear Multiple Bond Correlation
HOPM	-	Hot stage Optical Polarizing Microscopy
HSQC	-	Heteronuclear Single-Quantum Correlation spectroscopy
HQ	-	hydroquinone
IC ₅₀	-	concentration required for 50% inhibition
l	-	Kuhn segment length
LC	-	Liquid Crystalline
LCPs	-	Liquid Crystalline Polymers
m	-	medium
MCF-7	-	human breast cancer cells
MHA	-	Muller Hinton Agar medium
MIC	-	Minimum Inhibitory Concentration
M	-	viscosity average molecular weight
M _n	-	number average molecular weight
M _w	-	weight average molecular weight
mm	-	millimeter
mg	-	milligram
min	-	minutes
mL	-	milliliter
mol	-	mole
mmol	-	millimole

m.pt	-	melting point
MTT	-	3- (4,5-dimethyl-2-thiazolyl)-2,5-diphenyl-tetrazolium bromide
n	-	director
N	-	nematic phase
N*	-	chiral nematic phase
NDA	-	2,6-naphthalene dicarboxylic acid
NMR	-	Nuclear Magnetic Resonance spectroscopy
NOESY	-	Nuclear Overhauser effect Spectroscopy
OBBA	-	4,4'-oxybisbenzoic acid
P388	-	mouse leukemia
PCP	-	p-chlorophenol
pH	-	potenz hydrogen
PDI	-	polydispersity index
PEG	-	poly (ethylene glycol)
p-(HBA)	-	p-hydroxy benzoic acid
ppm	-	parts per million
PVC	-	polyvinyl chloride
Q	-	tensor order parameter
ROESY	-	Rotating- frame Overhauser Effect spectroscopy
s	-	strong
SmA	-	smectic A
SmB	-	smectic B
SmC	-	smectic C
t	-	flow time of the polymer solution
t ₀	-	flow time of pure solvent
T _m	-	melting temperature
T _i	-	isotropization temperature
T _g	-	glass transition temperature
T _{k->K}	-	crystal to crystal transition
TA	-	terephthalic acid

TCE	-	tetrachloro ethane
THF	-	tetrahydrofuran
TMS	-	tetramethylsilane
U937	-	human histiocytic lymphoma
UV	-	ultraviolet
v/v	-	volume per volume
V_R	-	retention volume
w	-	weak
WAXD	-	Wide-angle X-ray diffraction
W	-	Watt
XRD	-	X-ray diffraction
η	-	scalar parameter
η_{inh}	-	inherent viscosity
$[\eta]$	-	intrinsic viscosity
dL/g	-	deciliter per gram
μL	-	microlitre
ΔT	-	liquid crystalline range

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