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SUMMARY

CHAPTER: I Synthesis, characterization, optical properties, antibacterial activity and molecular docking studies on Triazolophanes.

Synthesis of the triazolophanes with various spacer units such as binol and benzophenone by click chemistry methodology is described in the chapter. The antibacterial activity reveals that all the synthesized triazolophanes exhibited comparable antibacterial activity against the gram positive and gram negative human pathogenic bacteria namely *S. aureus, B. Subtilis, S. typhimurium* and *E. Coli* and the antibacterial activity is dose independent.

CHAPTER: II p-Tert butylcalix[4]arene cored ferrocenyl dendrimers; A new class of sensor for toxic Hg^{2+} ion in presence of Zn^{2+}, Cu^{2+} and Ag^{+}

Ferrocenyl dendrimers with triazole bridging unit and calixarene core unit were successfully synthesized in high yields by convergent approach via click chemistry. All the dendrimers show excellent photophysical properties. Toxic Hg^{2+} ion can be detected through it is mixed with various other metal ions such as Zn^{2+}, Cu^{2+} and Ag^{+} at lowest concentration. The cyclic voltammetry reveal the shift of cathodic peak potential to the less positive side after the addition of Hg^{2+} ion to the ferrocenyl dendrimer. Further, NMR titration were carried out to prove that the Hg^{2+} ion is trapped at the triazole site of the dendrimers, but the dendritic wedges could not sense Hg^{2+} ion.

CHAPTER: III Synthesis and antibacterial activity of; p-Tert butylcalix[4]arene cored Glycodendrimers

p-Tert butylcalix[4]arene cored glycodendrimers were obtained in excellent yield by click chemistry. All the glycodendrimers show excellent inhibitory activity against both gram

positive and gram negative bacteria such as *S. aureus, B. Subtilis, S. typhimurium* and *E. Coli* and the second generation dendrimers should better antibacterial activity than the zeroth and first generation dendrimers due to the presence of more number triazole and glucose units in the dendritic arms.

CHAPTER: IV Synthesis, characterization, optical, electrochemical properties and antifungal, anticancer activities of ferrocenyl conjugated dendrimers

The triazole decorated ferrocenyl conjugated dendrimers were obtained in excellent yield by click chemistry. The zeroth generation ferrocenyl dendrimer showed better antifungal activity against human pathogens such as *candida albicans, candida glabrata* and *candida crusi* when compared to the first and second generation dendrimers. However, the second generation dendrimer exhibit excellent anticancer activity against the MCF-7 cells than the zeroth and first generation dendrimers due to greater number of ferrocenyl unit in the dendritic wedges.

CHAPTER: V Synthesis and antibacterial activities of *β*–hydroxyaryl ether cored glycodendrimers

The glycodendrimers with triazole briding unit and β-hydroxyarylether core unit were obtained in high yield by click chemistry via convergent approach. Antibacterial activity reveals that the second generation dendrimer exhibit excellent inhibitory activity then the zeroth and first generation dendrimers against both gram positive and gram negative bacteria such as *S. aureus, B. Subtilis, S. typhimurium* and *E. Coli.* and antibacterial activity is dose independent manner.

CHAPTER: VI Synthesis, characterization and DSSC application of triazolyl dendrimers with BODIPY as surface group

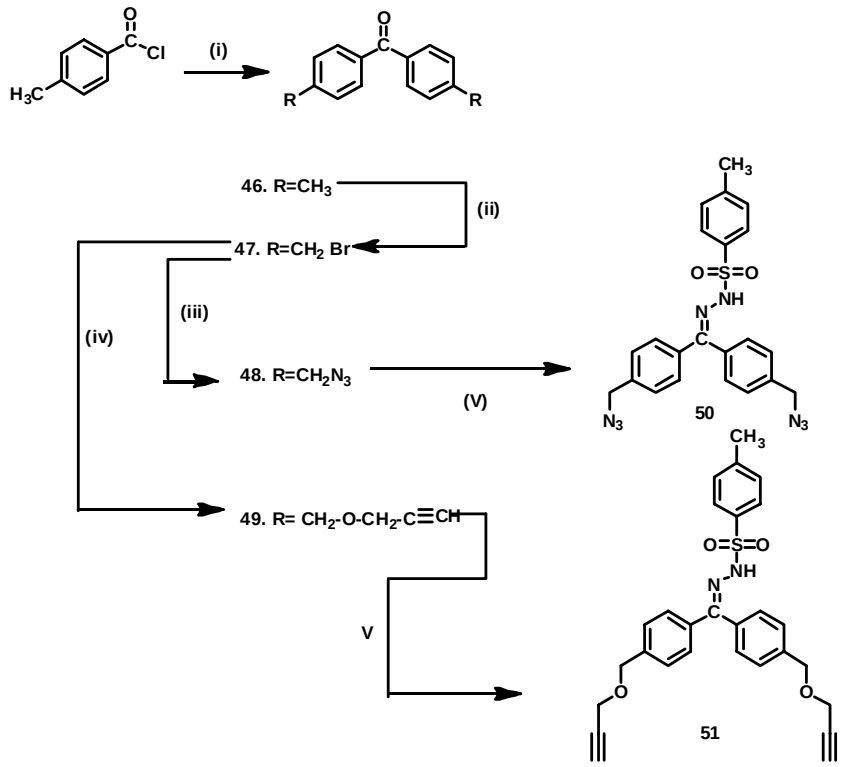
The triazole bridged BODIPY conjugated dendrimers **1**, **2** and **3** were obtained up to third generation. The UV-Vis spectra the absorption intensity linearly increases with increase in the more number of BODIPY surface group. The cyclic voltammetry studies, the current intensity increases with the increasing dendritic generation. The second generation dendrimer has higher power conversion efficiency of 2.5 % and better light harvesting ability when used as the dye material in DSSC and ranks as the efficient dye when used as the dye material.

CHAPTER: VII Synthesis and antimicrobial activity of triazolyl bridged BODIPY dendrimers

BODIPY end capped glycodendrimers were obtained in excellent yields by click chemistry via convergent approach. The fluorescence spectrum, the emission intensity was gradually increases upon increasing dendritic generation due to more number of BODIPY and triazole ring in the dendritic wedges and also multivalence effect in dendrimer chemistry. The cyclic voltammetry studies reveal that the BODIPY core unit showed quasi-reversible behavior. All the BODIPY dendrimers show excellent inhibitory activity against both gram positive and gram negative bacteria such as *S. aureus, B. Subtilis, S. typhimurium* and *E. Coli* and the first and second generation dendrimers exhibit better antibacterial activity than the other zeroth generation dendrimer. The BODIPY end capped glycodendrimers can be used as fluorescent marker in living organism near future due to their fluorescence property.

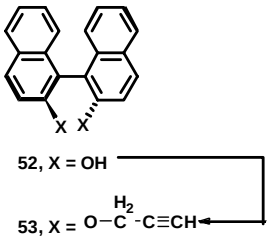
CHAPTER- I

SYNTHESIS, CHARACTERIZATION, OPTICAL PROPERTY, ANTIBACTERIAL ACTIVITY AND MOLECULAR DOCKING STUDIES ON TRIAZOLOPHANES



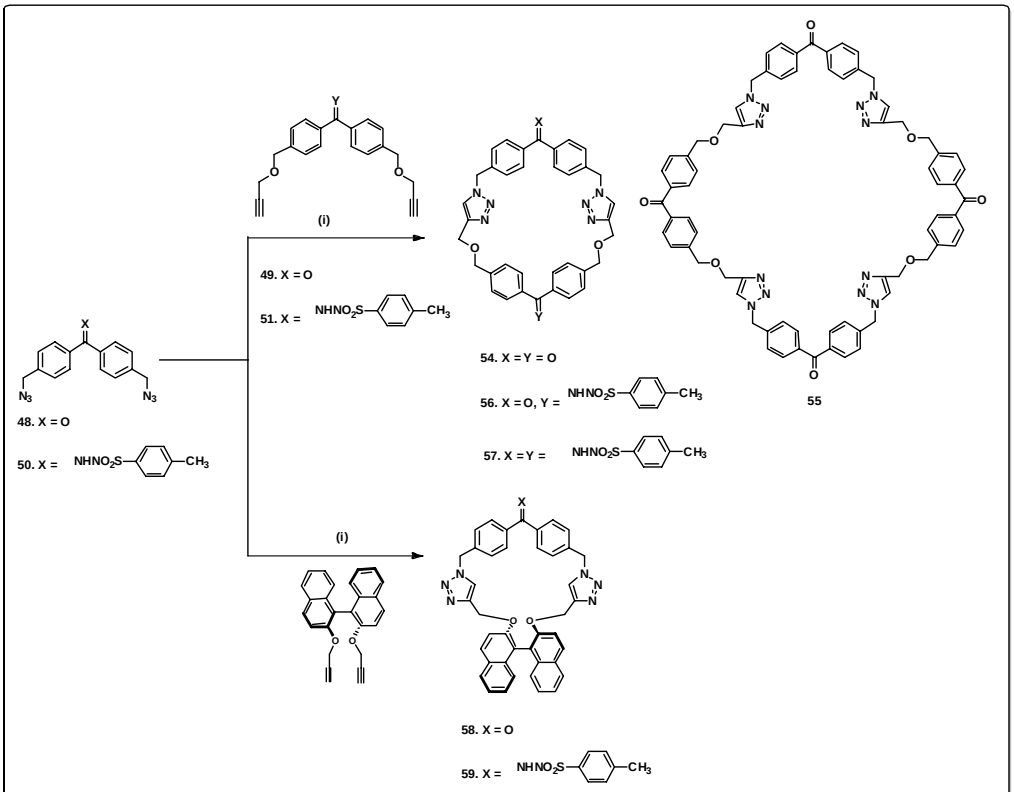
Reagents and conditions: (i) Anhydrous $AlCl_3$, DCM, 0 ºC to rt, 3 h, **46** (85%), (ii) 2.1 equiv. of NBS, dry CCl_4, BPO, reflux, 12 h, **47** (80%). (iii) 1.5 equiv. of NaN_3, acetone/H_2O, (4:1) 60 ºC, **3** h, **48** (98%). (iv) 2.1 equiv. of propargyl bromide, dry DMF, rt, 24 h. (v) P-Tosylhydrazide, (1.0 equiv.), Toluene/ethanol (2:3), rt, N_2, 24 h, **49** (72%).

CHART-1



Reagents and conditions: (i) 2.1 equiv. of propargyl bromide, dry DMF, rt , 24 h.**54** (90%).

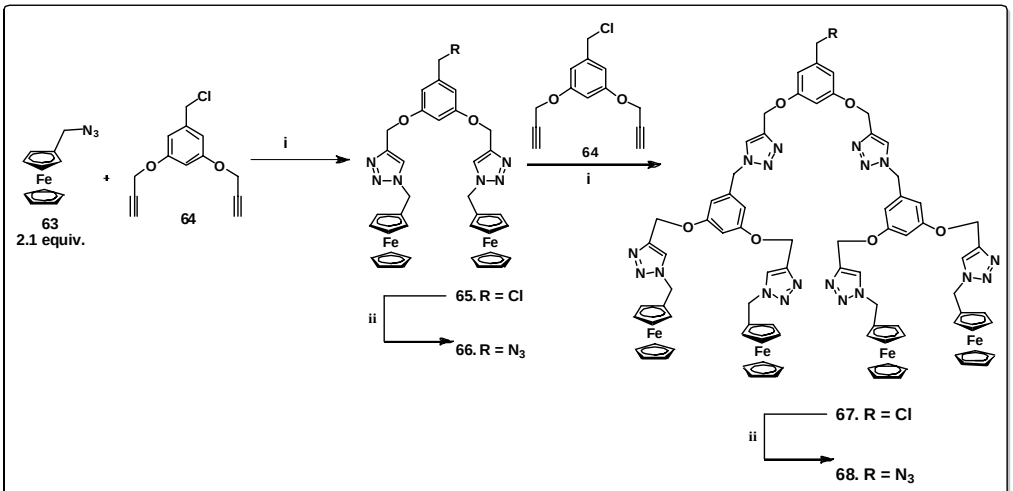
CHART-2



Reagents and conditions: (i) $CuSO_4$ (5 mol%), sodium ascorbate (10 mol%), H_2O/THF (1:1), rt, 10 h.**54** (35%), **55** (41%) , **56** (25%), **57** (61%). **58** (62%), **59** (30%).

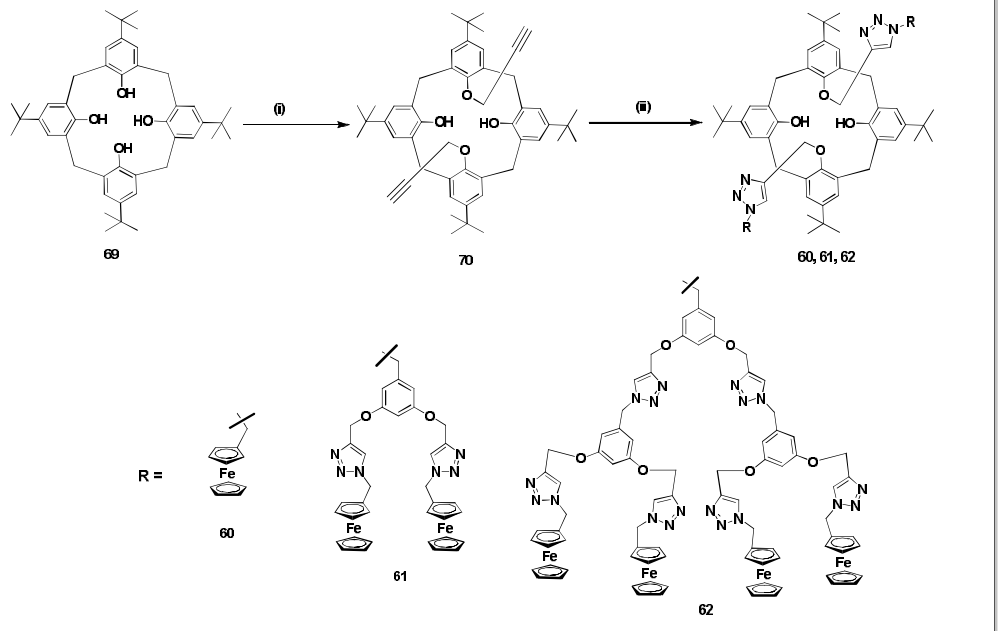
CHART-3

CHAPTER II: P-TERT BUTYLCALIX [4] ARENE CORED FERROCENYL DENDRIMERS; A NEW CLASS OF SENSOR FOR TOXIC Hg2+ ION IN PRESENCE OF Zn2+, Cu2+ AND Ag+



Reagents and conditions: (i) $CuSO_4$ (5 mol%), sodium ascorbate (10 mol%), H_2O/THF (1:1), rt, 10 h. **65** (92%), **67** (83%) (ii) 1.5 equiv. NaN_3, CH_3COCH_3/H_2O, 60 ºC, 1-3 h.**66** (96%)**, 68** (85%)**.**

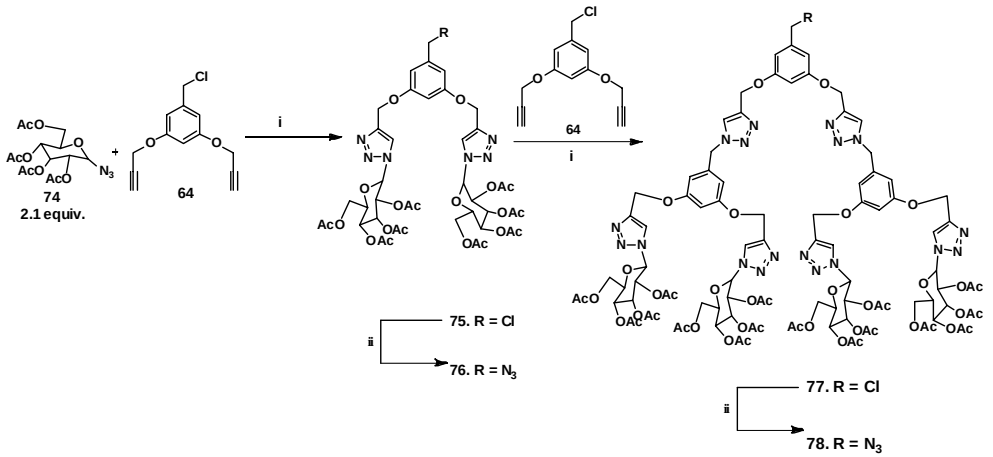
CHART-4



Reagents and conditions: (i) 2.1 equiv. of propargyl bromide, dry DMF, rt, 24 h,**70** (82%) (ii) 2.1 equiv. of each of the **63, 66** and **68**, $CuSO_4$ (5 mol%), sodium ascorbate (10 mol%), THF-H_2O (1:1), rt, 12 h.**60** (89%), **61 (**86%) and **62** (81%)**.**

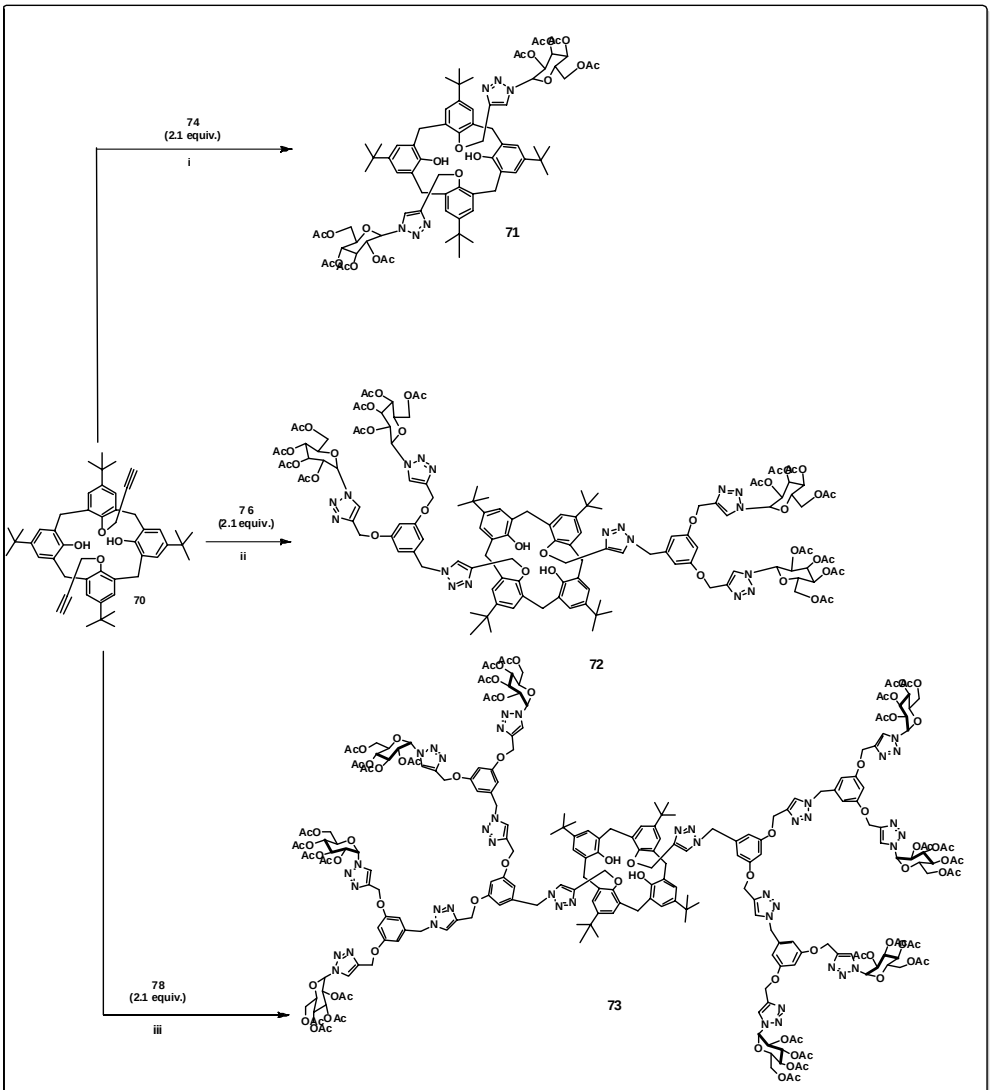
CHART-5

CHAPTER III: SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF ;P-TERT BUTYLCALIX [4] ARENE CORED GLYCODENDRIERS



Reagents and conditions: (i) $CuSO_4$ (5 mol%), sodium ascorbate (10 mol%), H_2O/THF (1:1), rt, 10 h. **75** (96%**), 77 (93%**) (ii) 1.5 equiv. NaN_3, CH_3COCH_3/H_2O, 60 ºC, 1-3 h.**76** (98%), **78** (99%).

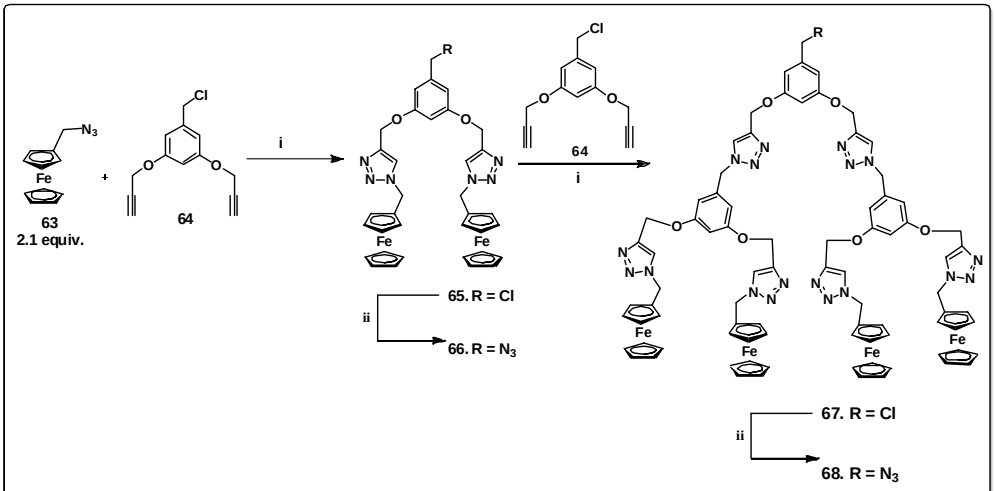
CHART-6



Reagents and conditions: (i) **74** (2.1equiv) $CuSO_4$ (5 mol %), sodium ascorbate (10 mol%), H_2O/THF (1:1, 8 mL), rt, 12 h, **71** (89%) ii) **76** (2.1equiv)$CuSO_4$ (5 mol %), sodium ascorbate (10 mol%), H_2O/THF (1:1, 8 mL), rt, 24 h, **7**2 (86%) iii) **78** (2.1equiv) $CuSO_4$ (5 mol %), sodium ascorbate (10 mol%), H_2O/THF (1:1, 8mL), rt, 36 h, **73** (81%).

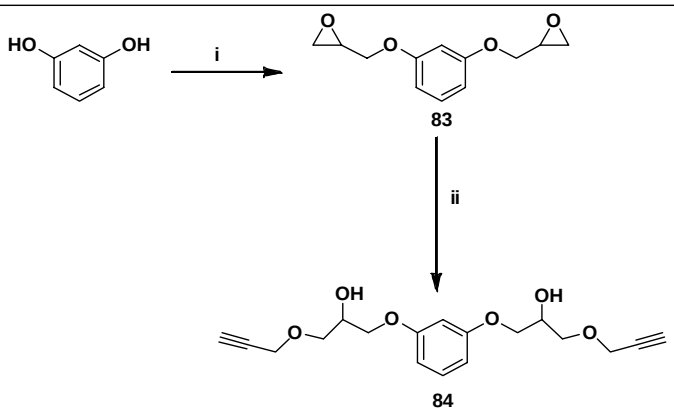
CHART-7

CHAPTER IV: SYNTHESIS, CHARACTERIZATION, OPTICAL, ELECTROCHEMICAL PROPERTIES AND ANTIFUNGAL, ANTICANCER ACTIVITIES OF FERROCENYL CONJUGATED NOVEL DENDRIMERS



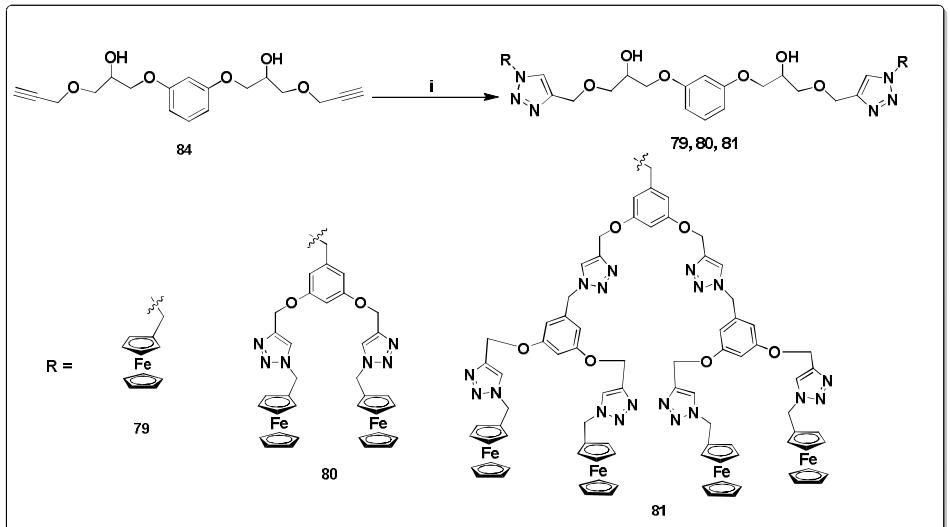
Reagents and conditions: (i) $CuSO_4$ (5 mol%), sodium ascorbate (10 mol%), H_2O/THF (1:1), rt, 10 h. **65** (92%), **67** (83%) (ii) 1.5 equiv. NaN_3, CH_3COCH_3/H_2O, 60 ºC, 1-3 h.**66** (96%)**, 68** (85%)**.**

CHART-8



Reagents and conditions: (i) 2.1 equiv. Epichlorohydrin, NaH, DMF, 0-25 ^{o} C, N_2, 12 h.**83** (86%). (ii) 2.1 equiv. Propargyl alcohol, Dry DMF, RT, 3 h.**84** (74%)

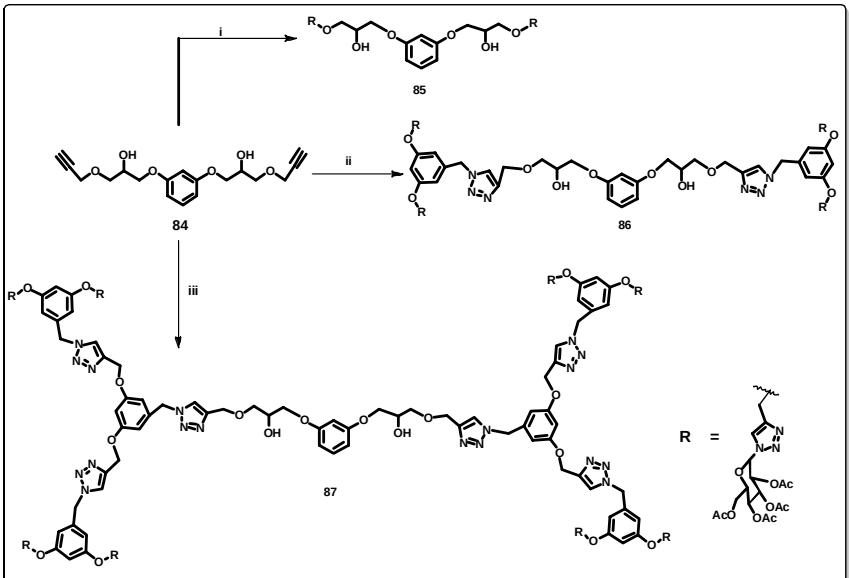
CHART-9



Reagents and conditions: (i) 2.1 equiv. of propargyl bromide, dry DMF, rt, 24 h, (ii) 2.1 equiv. of each of the **63, 66** and **68**, $CuSO_4$ (5 mol%), sodium ascorbate (10 mol%), THF-H_2O (1:1), rt, 12 h.**79** (92%), **80** (89%) and **81** (82%).

CHART- 10

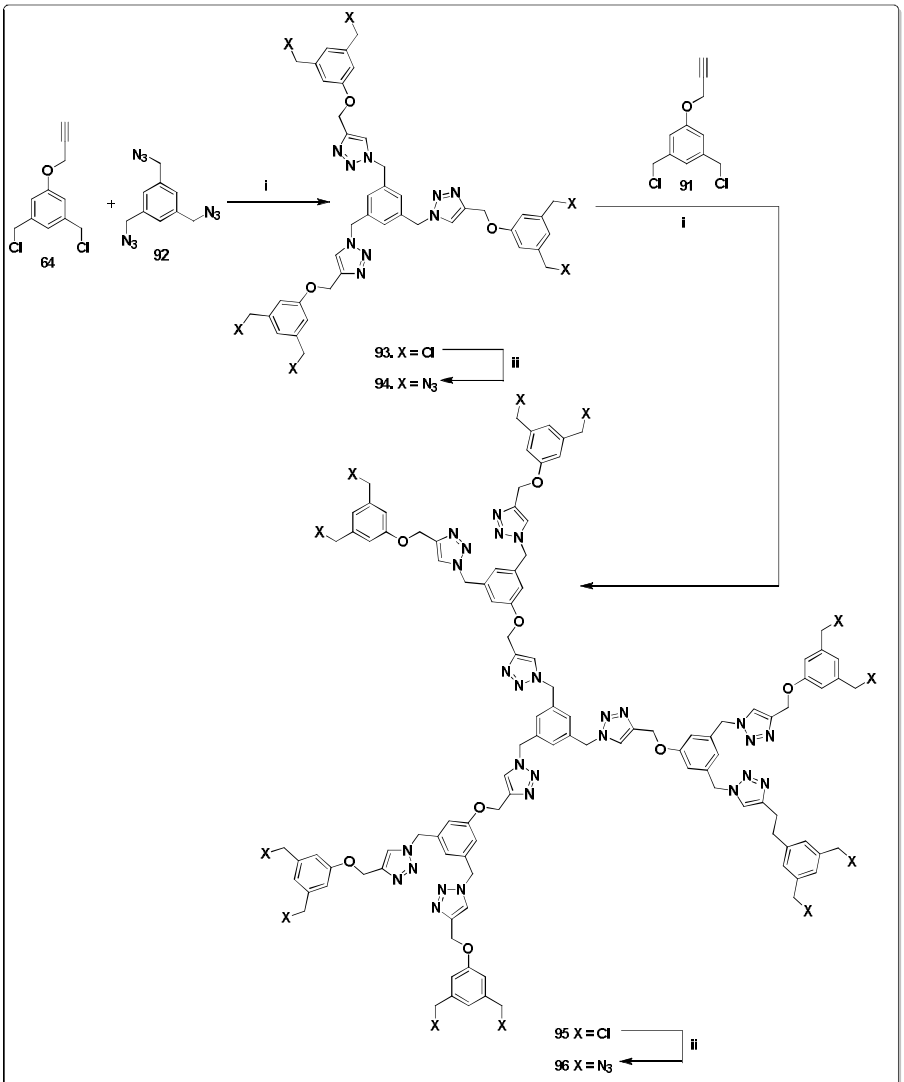
CHAPTER V: SYNTHESIS, CHARACTERIZATION, OPTICAL AND ANTIMICROBIAL PROPERTY OF GLYCODENDRIMERS



Reagents and conditions: (i) **74** (2.1equiv) $CuSO_4$ (5 mol %), sodium ascorbate (10 mol%), H_2O/THF (1:1, 8mL), rt, 12 h, **85** (89%) ii) **76** (2.1equiv) $CuSO_4$ (5 mol %), sodium ascorbate (10 mol%), H2O/THF (1:1, 8mL), rt, 24 h, **86** (86%) iii) **7**8 (2.1equiv)$CuSO_4$ (5 mol %), sodium ascorbate (10 mol%), H2O/THF (1:1, 8mL), rt, 36 h, **87** (81%).

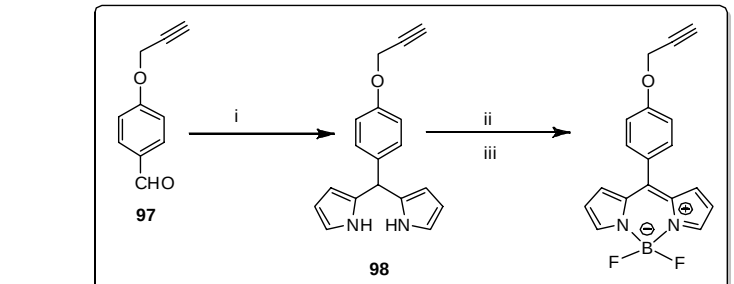
CHART-11

CHAPTER VI: SYNTHESIS, CHARACTERIZATION AND DSSC APPLICATION OF TRIAZOLYL BRIDGED BODIPY DENDRIMERS



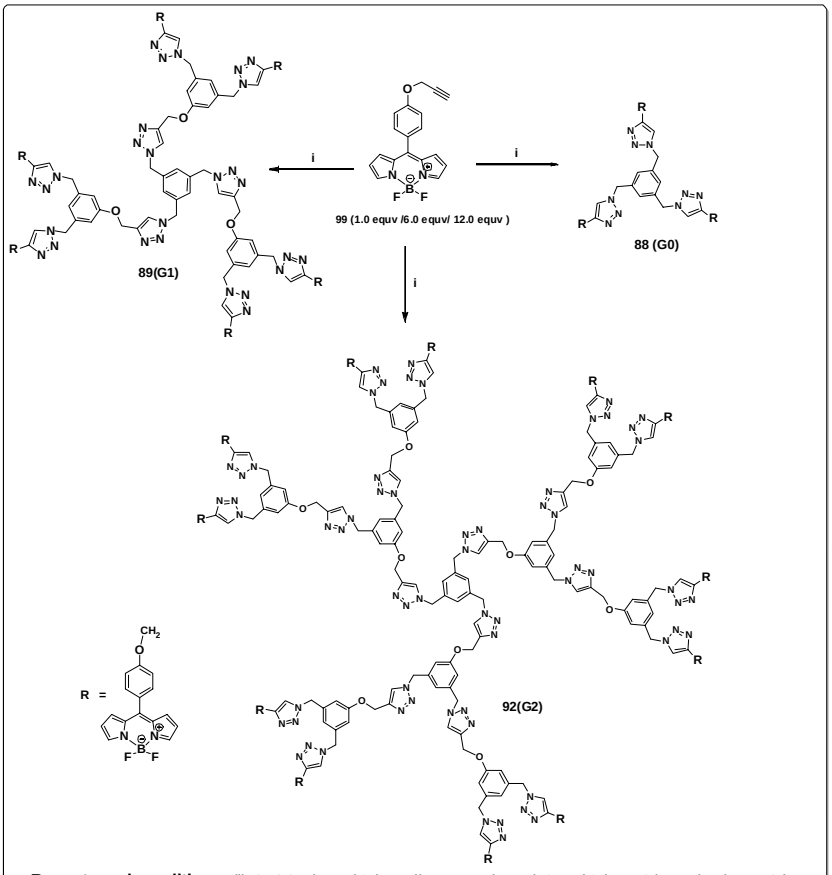
Reagents and conditions: (i) $CuSO_4$ (5 mol %), sodium ascorbate (10 mol %), H_2O-THF (1:1); rt., 12 h. (ii) 9.0/ 18 equiv. NaN_3, DMSO, 90 °C, 3 h.

CHART-12



Reagents and conditions: (i) 3.0 equiv. Pyrrole, 0.1 ml TFA, Dry DCM, rt, 8 h. **98** (87 %) (ii) 10 ml TEA, DDQ in Dry DCM, rt, 1.5 h. (iii) 10 mL $BF3.OEt_3$ in Dry DCM at 0 °C, 3 h.**99** (74 %).

CHART-13



Ragents and conditions: (i) $CuSO_4$ (5 mol %), sodium ascorbate (10 mol %), H_2O/THF (1:1), rt, 12 h.

CHART-14

CHAPTER VII: SYNTHESIS AND ANTIMICROBIAL ACTIVITY OF TRIAZOLYL BRIDGED GLYCODENDRIMERS WITH BODIPY CORE

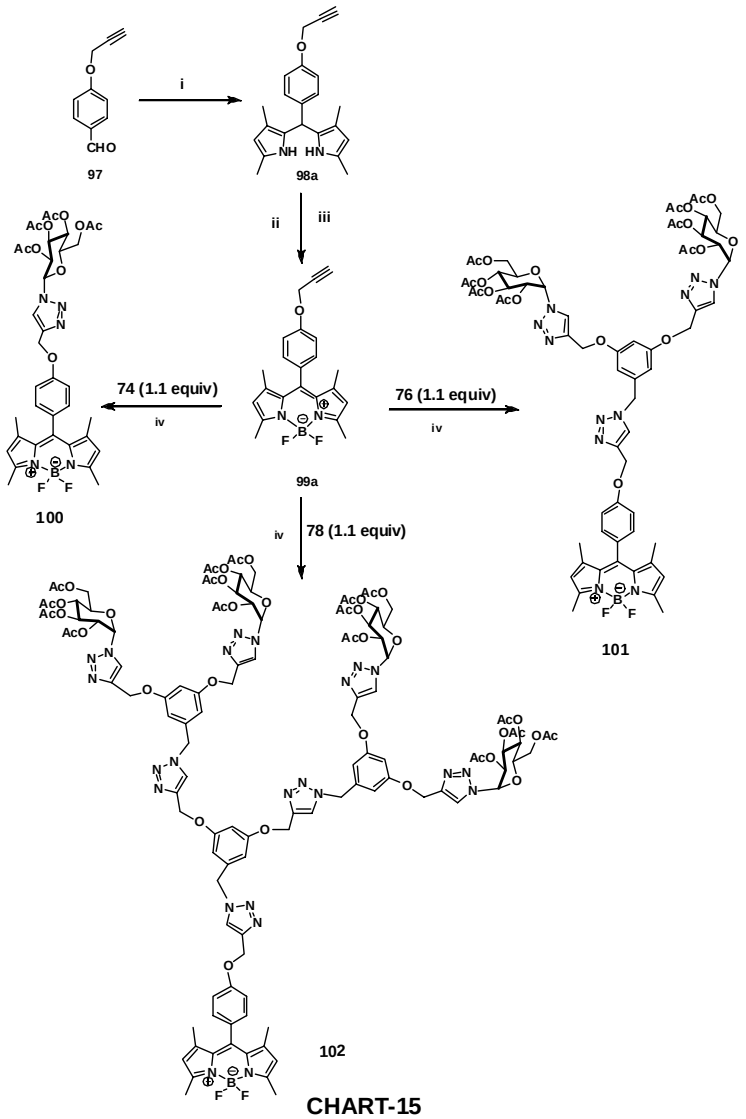
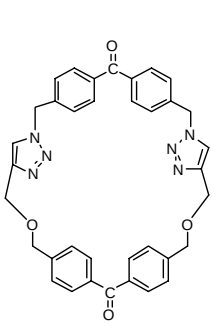


CHART-15

Reagents and conditions: (i) 2.1 equiv. of dimethylPyrrole, TFA (0.1 mL), dry DCM, rt, 8 h, 98a (87 %), (ii) TEA (10 ml), DDQ dry DCM, rt, 1.5 h; (iii) 10 ml $BF_3.OEt_2$ in dry DCM at 0 ° C, 3 h, 99a (74 %). (iv) $CuSO_4.5H_2O$ (5 mol %), sodium ascorbate (10 mol %), H2O-THF (1:1); rt., 12 h. 100 (86%), 101 (83%), 102 (88%).

STRUCTURE INDEX



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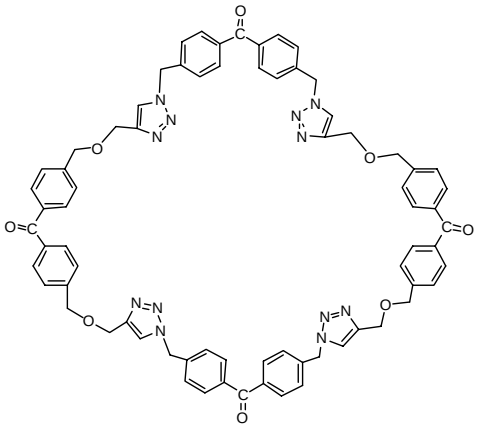

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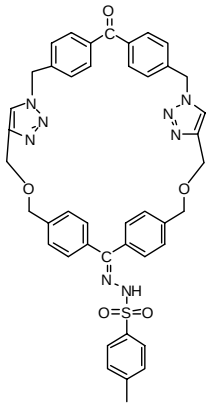

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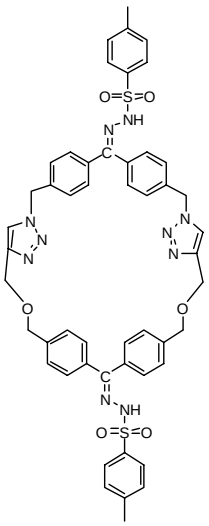

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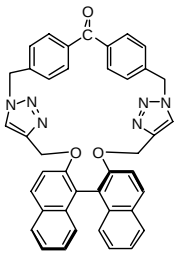

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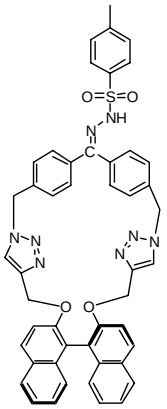

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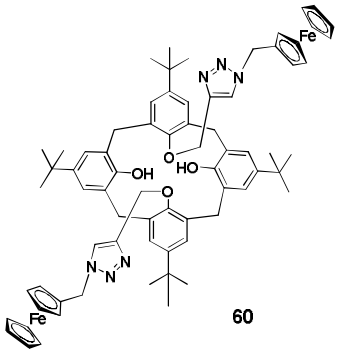

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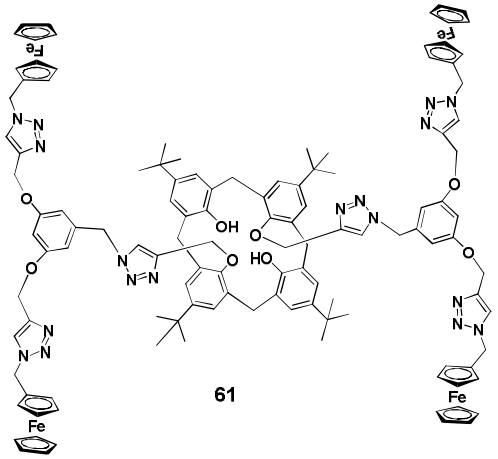

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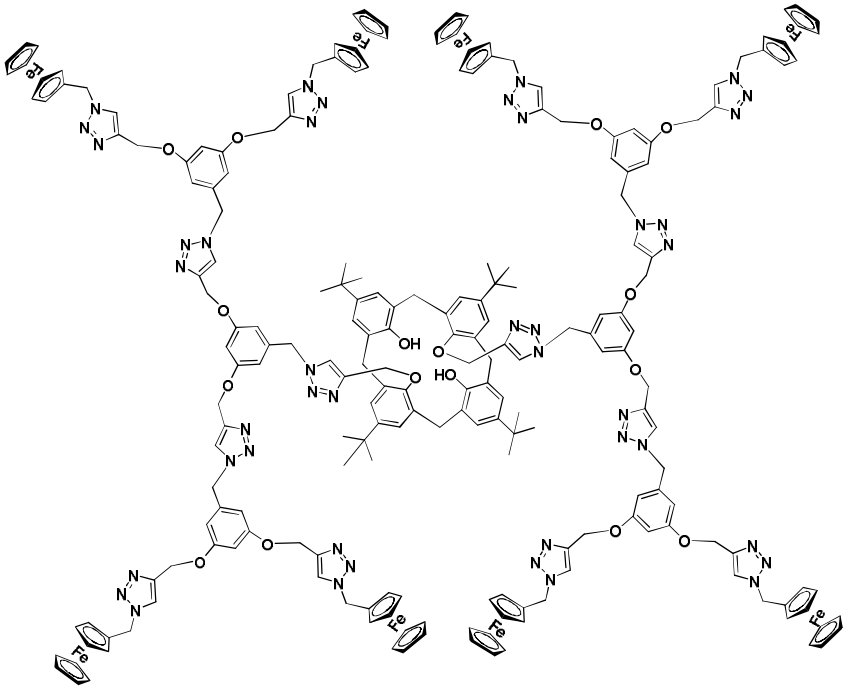

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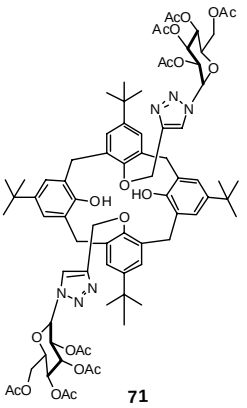

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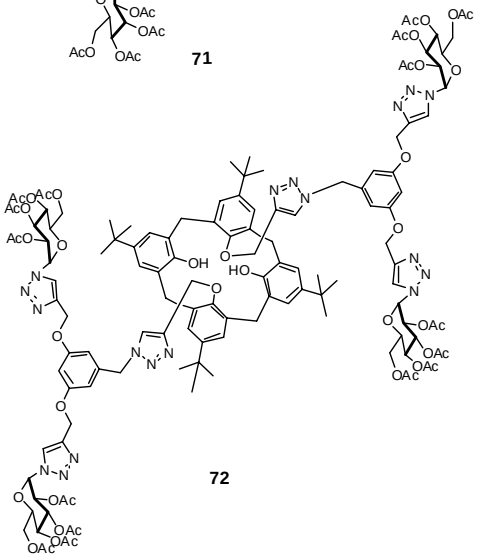

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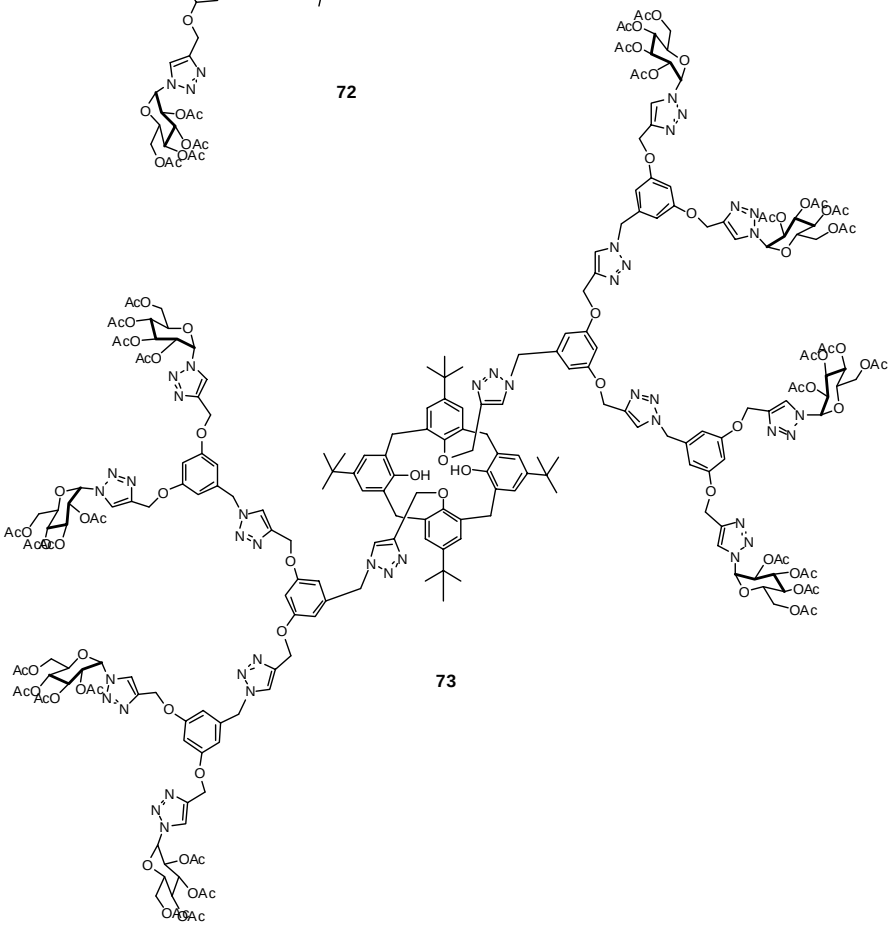

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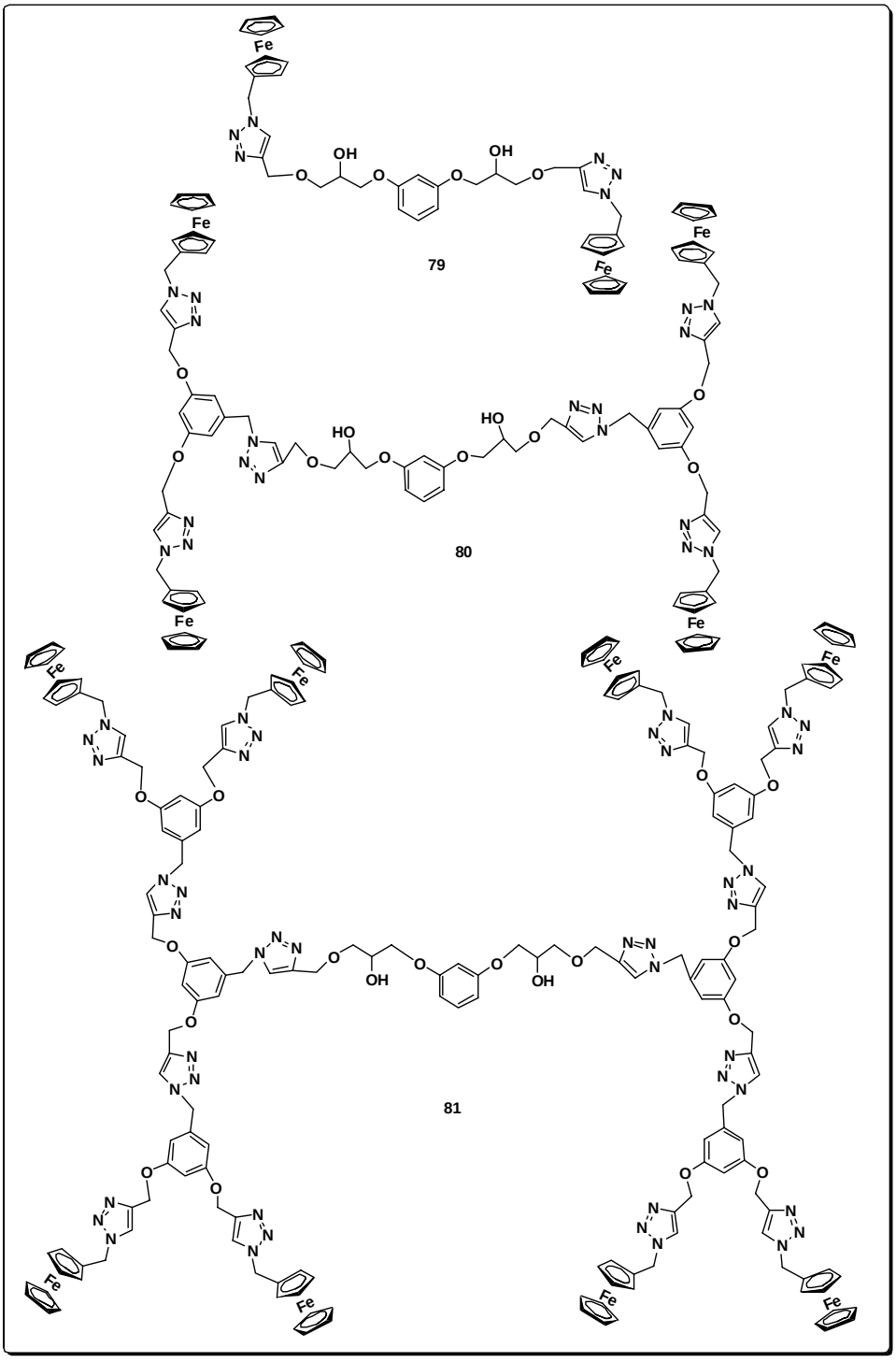
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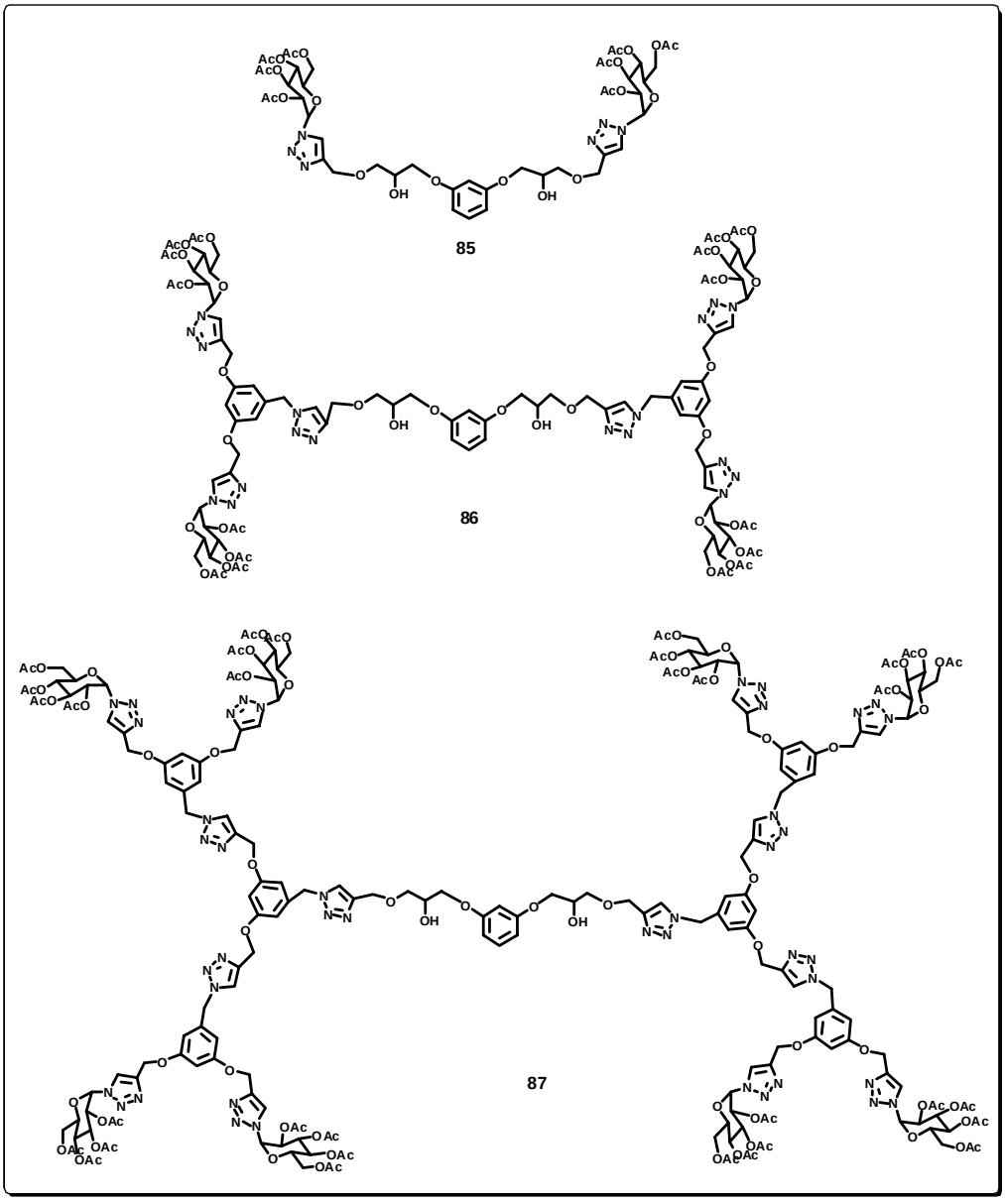
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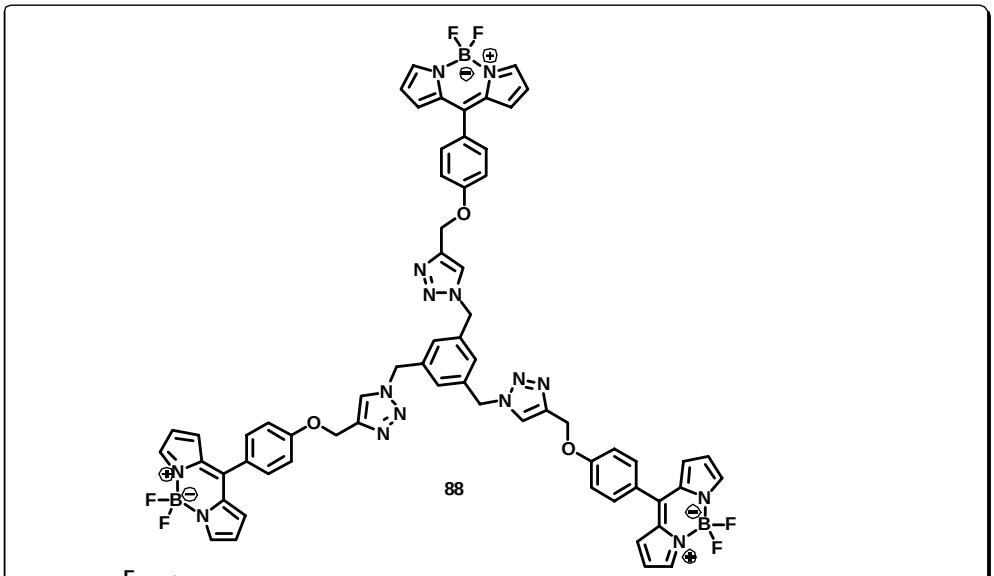

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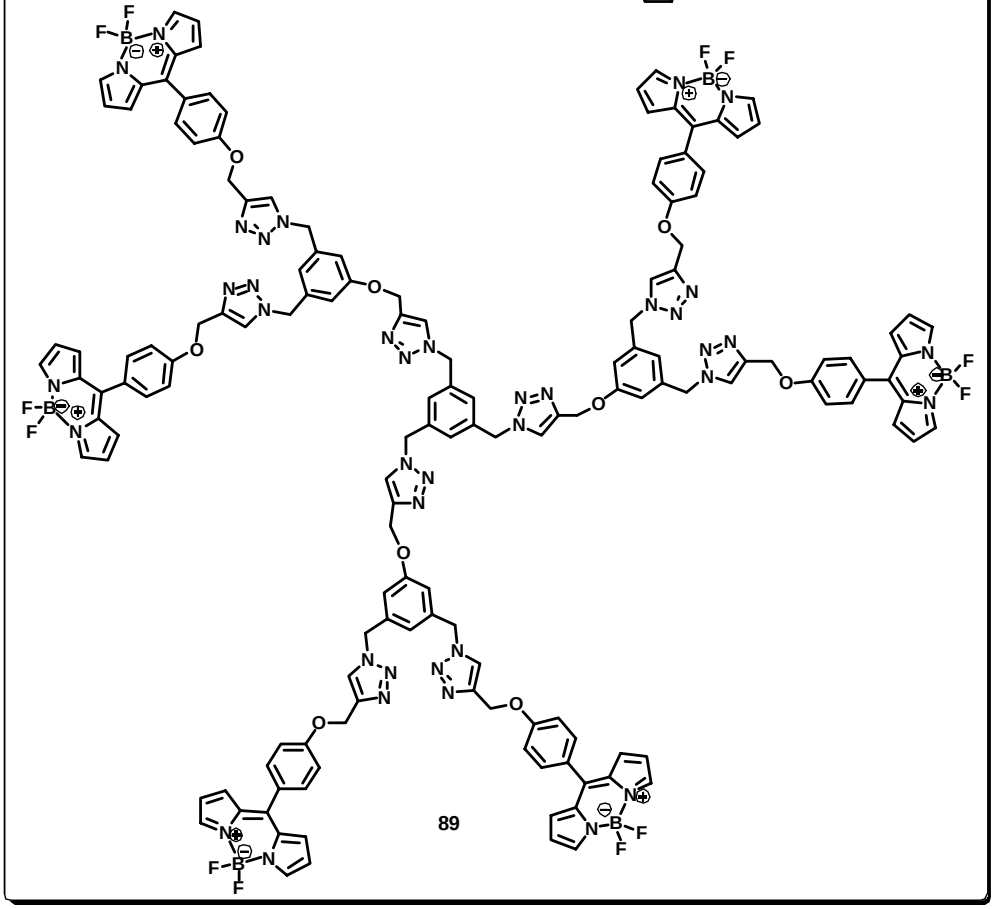

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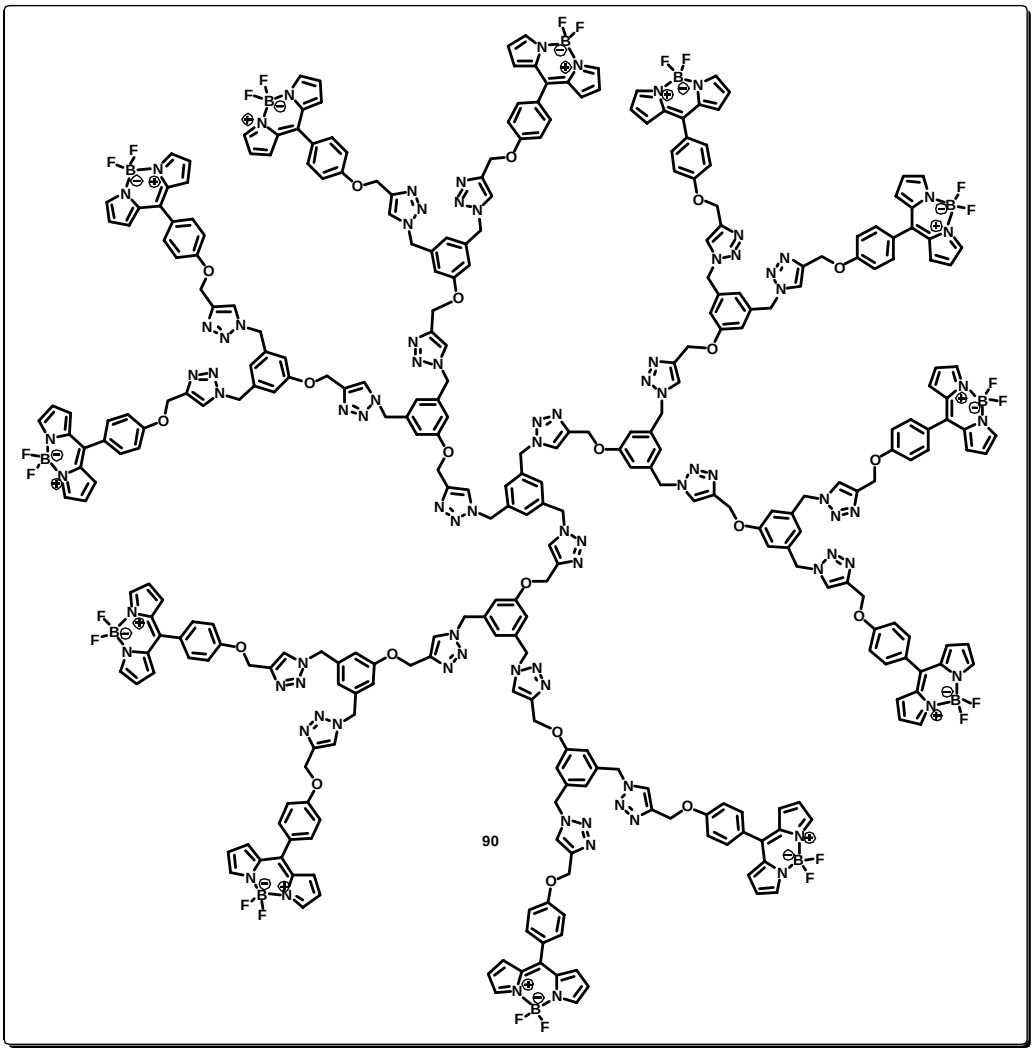

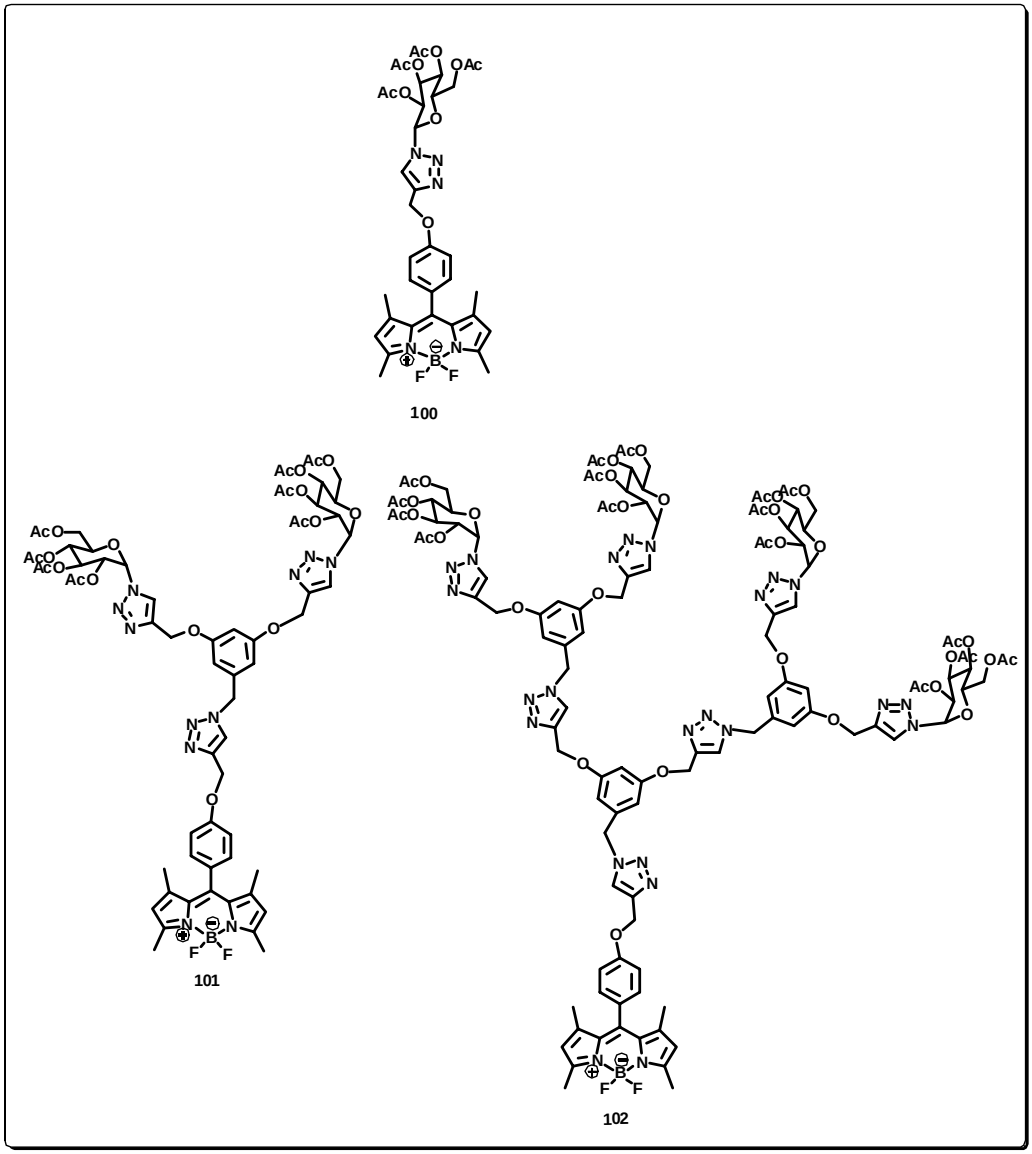
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