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The many fold aromatic ketones **2a-d** are versatile compounds for the synthesis of the many fold 1,2,3-selenadiazole aromatic derivatives **5a-d**. The preparation starts with the reaction between the many fold bromomethylene benzene derivatives **1a-d** and 4-hydroxyacetophenone, which are transformed through the reaction with semicarbazide hydrochloride or ethylhydrazine carboxylate into the corresponding semicarbazones derivatives **3a-d** or hydrazones **4a-d**. The reaction with selenium dioxide leads to regiospecific ring closure of semicarbazones or hydrazones to give the many fold 1,2,3-selenadiazole aromatic derivatives in high yield.

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Heterocyclic systems with multi-arm 1,2,3-thiadiazoles were recently prepared from the corresponding multi-arm ketones using the Hurd and Mori method by Meier *et. al* [1-2], however heterocyclic systems containing two 1,2,3-selenadiazole rings were also recently prepared through reacting the corresponding multiple diazoketones with Lawesson reagent by Reddy *et. al* [3-4]. But multi-arm 1,2,3-selenadiazoles are still unknown. Therefore depending on a previous knowledge of the principal investigator in synthesizing multi-arm 1,2,3-thiadiazoles, the analogous multi-arm selenadiazoles are prepared.

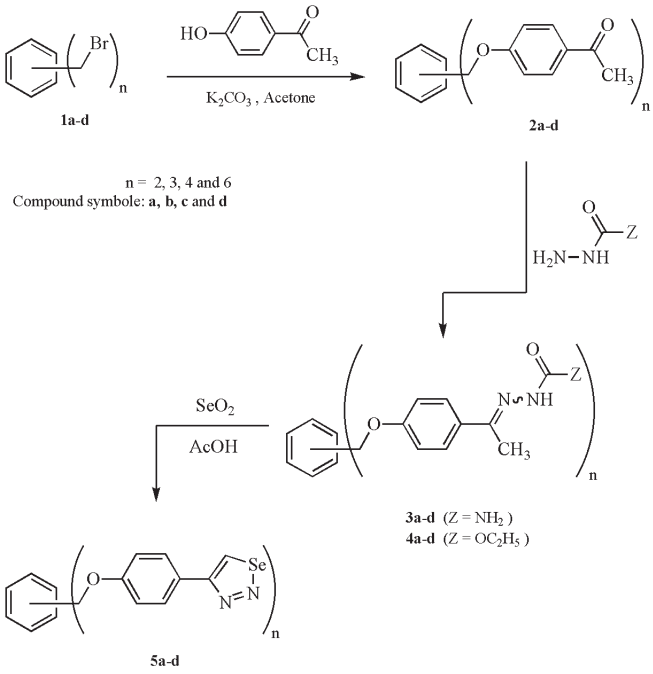
On the other hand, selenium containing heterocycles are of increasing interest because of their chemical properties specially their wide application in synthesizing other heterocyclic compounds [5-10] and biological activities as antibacterial and antifangi [11-13].

Remarkable differences are known between Se- and S-containing compounds. Due to the large size of the Se-atom. Selenium compounds show an increased polarizability and therefore they are in general, less stable than the S-analogues [14-17].

We reported herein on our efforts to generate the manyfold branched benzene derivative compounds **5a, 5b, 5c** and **5d** in which the 1,2,3-selenadiazole rings are linked to the core *via* phenoxymethylene spacers.

The preparation was carried out following the method that is first reported by Lalezari *et. al* [18-20], through reacting the corresponding semicarbazones or hydrazones of α-ketomethylene functionality, which contain aminocarbonyl or ethoxycarbonyl groups as good leaving groups with selenium dioxide in the presence of acetic acid. The (*E*)-configuration around the CN double bond was found by NOE measurements in the ^{1}H-nmr to predominate largely. Irradiation at the N-H protons frequency of semicarbazones **3a-d** or hydrazones **4a-d** leads to an interaction with the CH_3-protones of the keto groups. The *E*/*Z*-isomerization of the (C=N) bond has no influence on the following ring closure process with selenium dioxide/acetic acid.

Scheme 1



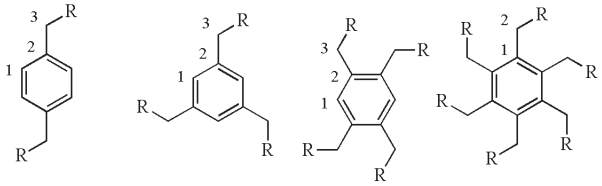
Synthesis of the Compounds **5a-d**.

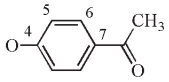
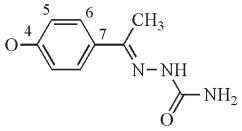
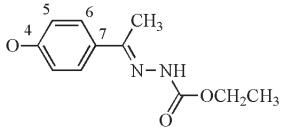
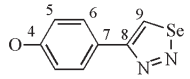
Our synthetic procedure started from the manyfold bromomethylbenzene derivatives **1a-d**. The multiple ketones **2a-d** were prepared by reacting derivatives **1a-d** with 4-hydroxyacetophenone in acetone in the presence of K_2CO_3. Condensation of **2a-d** with semicarbazide in absolute ethanol or with ethoxyhydrazine in chloroform forms the corresponding semicarbazones **3a-d** or the ethoxycarbonyl hydrazones **4a-d**, respectively. Treatment of **3a-d** or **4a-d** with selenium dioxide in acetic acid using Lalezari procedure provided compounds **5a-d** in high chemical yield.

Conclusion.

New multi-arm benzene derivatives **5a-d** containing two, three, four and six 1,2,3-selenadiazole rings were

Table 1
Chemical Percentage Yield of Compounds **2-**, **3-**, **4-** and **5a-d**



R	Cpd*	Yield [%]	Cpd	Yield[%]	Cpd	Yield [%]	Cpd	Yield [%]
Br	**1a**	—	**1b**	—	**1c**	—	**1d**	—
	**2a**	89	**2b**	95	**2c**	90	**4d**	87
	**3a**	98	**3b**	96	**3c**	81	**3d**	91
	**4a**	91	**4b**	85	**4c**	87	**4d**	92
	**5a**	60	**5b**	87	**5c**	92	**5d**	96
Total Chemical Yield		85		90		87		91

[Cpd*] is compound

synthesized and characterized. The synthesis of the compounds **5a-d** was carried out in a multi-step procedure starting from the corresponding multi-arm ketones and applying the Lalezari method. All the compounds **5a-d** were obtained in a high chemical yield. Since the compounds **5a-d** are solids it was found that the mp of the compound decreases by increasing the number of the 1,2,3-selenadiazole rings.

EXPERIMENTAL

The solvents were purified by standard procedures. The melting points (mp) were determined on electrothermal digital melting point apparatus and are uncorrected. Infrared (ir) spectra were recorded using a NICOLET 410 FT-IR spectrometer (ν in cm^{-1}). The ir spectra of pure substances were measured as KBr-pellets. The ^{1}H and ^{13}C nmr spectra were recorded on Bruker AM400 and AC200 spectrometers in deuteriochloroform or DMSO-d_6 with TMS as internal standard. The spectral data were reported in delta (δ) units relative to TMS reference line. Mass spectra were acquired by using the instrument MAT95 of the Finnigan Company (FD: 5 kV Ionizing energy, field desorption). The signals were given as m/z with the relative intensity between brackets. The Elemental analyses were performed in the analytical laboratory of the institute of organic chemistry of university of Mainz, Germany. Bromo compounds (Di-, Tri-, Tetra- and hexa-bromomethylbenzene), ethylhydrazine carboxylate, semicarbazide hydrochloride and sodium acetate were obtained from Aldrich.

General Procedure for the Preparation of Multiple Ketones **(3a-d)**[1].

A mixture of 4-hydroxyacetophenone (4.10 g, 30.10 mmol) and (3.56 g, 13.55 mmol) of 1,4-di(bromomethyl)benzene **1a** or (3.23 g, 9.03 mmol) of 1,3,5-tris(bromomethyl)benzene **1b** or (2.85 g, 6.32 mmol) of 1,2,4,5-tetrakis(bromomethyl)benzene **1c** or (2.64 g, 4.20 mmol) of 1,2,3,4,5,6-hexakis(bromomethyl)benzene **1d**, respectively, potassium carbonate (4.17 g, 30.10 mmol) and the same equivalent amount of potassium iodide as the bromo compound with few drops of Aliquat 336 in dry acetone (100 mL) were refluxed for 48 hours. Reaction progress was followed by TLC with chloroform as the mobile phase until

completion. After cooling, the reaction mixture was diluted with water (50 mL) and extracted with dichloromethane (3 × 40 mL). The combined organic layers were dried over magnesium sulphate. The solvent was evaporated under vacuum and the residual solid was washed with diethyl ether. When necessary, a recrystalization from acetone or chloroform was performed.

1-{4-[4-Mono(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone (2a).

This compound was obtained as colorless crystals (acetone), mp 181-182°; ir (potassium bromide): 1668 (C=O), 1591, 1239, 996, 823 cm^{-1}; ^1H nmr (deuteriochloroform): δ 2.53 (s, 6H, CH_3), 5.12 (s, 4H, CH_2O), 7.00 and 7.90 (d, d, 4H, 4H, AA'BB'), 7.44 (s, 4H, Central benzene ring protons); ^{13}C nmr (deuteriochloroform): δ 26.40 (CH_3), 69.70 (C3), 127.80 (C1), 136.20 (C2), 114.50 and 130.60 (C5 and C6), 130.60 and 162.40 (C4 and C7), 196.70 (C=O); ms: (5 kV, fd) m/z (%) 374 (100).

Anal. Calcd. for $C_{24}H_{22}O_4$: C, 76.99; H, 5.92. Found: C, 76.78; H, 5.81.

1-{4-[3,5-Di(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone **(2b)**.

This compound was obtained as pale yellow powder, mp 82-83°; ir (potassium bromide): 2910, 1670 (C=O), 1591, 1500, 1250, 1172, 836 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 2.49 (s, 9H, CH_3), 5.22 (s, 6H, CH_2O), 7.09 and 7.90 (d, d, 6H, 6H, AA'BB'), 7.53 (s, 3H, Central benzene ring protons); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 26.30 (CH_3), 69.20 (C3), 126.60 (C1), 137.20 (C2), 114.61 and 130.50 (C5 and C6), 130.10 and 162.00 (C4 and C7), 196.30 (C=O); ms: (5 kV, fd) m/z (%) 523 (100).

Anal. Calcd. for $C_{33}H_{30}O_6$: C, 75.84; H, 5.79. Found: C, 75.81; H, 5.68.

1-{4-[2,4,5-Tri(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone **(2c)**.

This compound was obtained as colorless powder, mp 224-226°; ir (potassium bromide): 1665 (C=O), 1590, 1502, 1250, 1170, 830 cm^{-1}; ^1H nmr (deuteriochloroform): δ 2.53 (s, 12H, CH_3), 5.23 (s, 8H, CH_2O), 6.94 and 7.89 (d, d, 8H, 8H, AA'BB'), 7.65 (s, 2H, Central benzene ring protons); ^{13}C nmr (deuteriochloroform): δ 26.30 (CH_3), 67.70 (C3), 129.80 (C1), 135.10 (C2), 114.41 and 130.60 (C5 and C6), 131.10 and 162.10 (C4 and C7), 196.50 (C=O); ms: (5kV, fd) m/z (%) 670 (100).

Anal. Calcd. for $C_{42}H_{38}O_8$: C, 75.21; H, 5.71. Found: C, 75.13; H, 5.59.

1-{4-[2,3,4,5,6-Penta(4-acetylphenoxymethyl)benzyloxy]-phenyl}-1-ethanone **(2d)**.

This compound was obtained as colorless powder, mp 234-235°; ir (potassium bromide): 1675 (C=O), 1604, 1508, 1239, 1002, 832 cm^{-1}; ^1H nmr (deuteriochloroform): δ 2.50 (s, 18H, CH_3), 5.26 (s, 12H, CH_2O), 6.89 and 7.83 (d, d, 12H, 12H, AA'BB'); ^{13}C nmr (deuteriochloroform): δ 26.20 (CH_3), 63.60 (C2), 137.70 (C1), 114.21 and 130.70 (C4 and C5), 131.30 and 161.80 (C3 and C6), 196.40 (C=O); ms: (5 kV, fd) m/z (%) 967(100).

Anal. Calcd. for $C_{60}H_{54}O_{12}$: C, 74.52; H, 5.63. Found: C, 74.27; H, 5.54.

General Procedure for the Preparation of Multiple Semicarbazones **(3a-d)**.

A mixture of semicarbazide hydrochloride (3.33 g, 30.00 mmol) and sodium acetate (2.5 g, 30.00 mmol) was dissolved in absolute ethanol (40 mL). The mixture was heated for 15 min under reflux. The mixture was filtered while hot to remove precipitated sodium chloride. The filtrate was mixed with ketone **2a** (5.05 g, 13.50 mmol) or ketone **2b** (4.67 g, 9.00 mmol) or ketone **2c** (4.20 g, 6.30 mmol) or ketone **2d** (4.10 g, 4.20 mmol), respectively. The reaction mixture was heated till refluxing then two drops of concentrated hydrochloric acid were added. The mixture was heated under reflux overnight with continuously removal of generated water; after which the solvent was removed under vacuum and the residue was washed with diethyl ether.

1-{4-[4-Mono(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone-*N*-aminocarbonylsemicarbazone) **(3a)**.

This compound was obtained as white powder, mp 300° (dec); ir (potassium bromide): 3417 (NH_2), 3212 (NH), 1681(C=O), 1604, 1502, 1418, 1239, 1014, 829 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 2.12 (s, 6H, CH_3), 5.20 (s, 4H, CH_2O), 5.90 (s, 4H, NH_2), 7.08 and 7.89 (d, d, 4H, 4H, AA'BB'), 7.45 (s, 4H, Central benzene ring protons), 9.21 (s, 2H, NH); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 13.30 (CH_3), 69.30 (C3), 127.80 (C1), 136.41 (C2), 114.50 and 128.00 (C5 and C6), 131.17 and 159.70 (C4 and C7), 143.00 (C=N), 158.70 (C=O); ms: (5 kV, fd) m/z (%) 488.5 (100).

Anal. Calcd. for $C_{26}H_{28}N_6O_4$: C, 63.92; H, 5.78; N, 17.20. Found: C, 63.71; H, 5.72; N, 17.15.

1-{4-[3,5-Di(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone-*N*-aminocarbonylsemi-carbazone **(3b)**.

This compound was obtained as pale yellow powder, mp 240° (dec); ir (potassium bromide): 3417 (NH_2), 3250 (NH), 1681 (C=O), 1579, 1508, 1470, 1226, 829 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 2.13 (s, 9H, CH_3), 5.15 (s, 6H, CH_2O), 6.55 (s, 6H, NH_2), 6.98 and 7.76 (d, d, 6H, 6H, AA'BB'), 7.49 (s, 3H, Central benzene ring protons), 9.25 (s, 3H, N-H); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 13.38 (CH_3), 69.15 (C3), 126.44 (C1), 137.76 (C2), 114.54 and 127.50 (C5 and C6), 131.20 and 158.73 (C4 and C7), 144.11 (C=N), 157.90 (C=O); ms: (5 kV, fd) m/z (%) 693.77 (100).

Anal. Calcd. for $C_{36}H_{39}N_9O_6$: C, 62.33; H, 5.67; N, 18.17. Found: C, 62.29; H, 5.61; N, 18.03.

1-{4-[2,4,5-Tri(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone-*N*-aminocarbonylsemicarbazone **(3c)**.

This compound was obtained as white powder, mp 250° (dec); ir (potassium bromide): 3429 (NH_2), 3180 (NH), 1670 (C=O), 1599, 1418, 1258, 836 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 2.12 (s, 12H, CH_3), 5.34 (s, 8H, CH_2O), 5.99 (s, 8H, NH_2), 7.06 and 7.86 (d, d, 8H, 8H, AA'BB'), 7.71 (s, 2H, Central benzene ring protons), 9.19 (s, 4H, NH); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 13.38 (CH_3), 67.08 (C3), 129.10 (C1), 134.80 (C2), 114.70 and 127.50 (C5 and C6), 130.50 and 159.70 (C4 and C7), 144.00 (C=N), 157.50 (C=O); ms: (5 kV, fd) m/z (%) 899 (100).

Anal. Calcd. for $C_{46}H_{50}N_{12}O_8$: C, 61.46; H, 5.61; N, 18.70. Found: C, 61.32; H, 5.51; N, 18.63.

1-{4-[2,3,4,5,6-Penta(4-acetylphenoxymethyl)benzyloxy]-phenyl}-1-ethanone-*N*-aminocarbonylsemicarbazone **(3d)**.

This compound was obtained as white powder, mp 300° (dec); ir (potassium bromide): 3417 (NH_2), 3212 (NH), 1687 (C=O),

1597, 1431, 1239, 1014, 829 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 2.08 (s, 18H, CH_3), 5.37 (s, 12H, CH_2O), 6.41 (s, 12H, NH_2), 6.93 and 7.70 (d, d, 12H, 12H, AA'BB'), 9.18 (s, 6H, NH); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 13.29 (CH_3), 63.90 (C2), 137.60 (C1), 114.30 and 127.50 (C4 and C5), 130.40 and 159.60 (C3 and C6), 143.90 (C=N), 157.40 (C=O); ms: (5 kV, fd) m/z (%) 1309.4 (100).

Anal. Calcd. for $C_{66}H_{72}N_{18}O_{12}$: C, 60.54; H, 5.54; N, 19.25. Found: C, 60.35; H, 5.54; N, 19.30.

General Procedure for the Preparation of Multiple Hydrazones **(4a-d)**[1].

A solution of (3.74 g, 10.00 mmol) of di- or (5.22 g, 10.00 mmol) of tri- or (6.70 g, 10.00 mmol) of tetra- or (9.67 g, 10.00 mmol) of hexa-ketone **2a-d**, a few drops of concentrated hydrochloric acid and (6.23 g, 60.00 mmol) or (9.35 g, 90.00 mmol) or (12.50 g, 120.00 mmol) or (18.70 g, 180.00 mmol) of ethylhydrazine carboxylate in dry chloroform (50 mL) was heated under reflux for overnight with continuous removal of generated water. The solution was concentrated and the residue was washed with diethyl ether and chloroform.

1-{4-[4-Mono(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone-*N*-ethoxycarbonylhydrazone **(4a)**.

This compound was obtained as white powder, mp 259-260°; ir (potassium bromide): 3205 (NH), 3035, 1705 (C=O), 1600, 1500, 1230, 822 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 1.22 (t, 6H, CH_3CH_2O), 2.15 (s, 6H, CH_3-C=N), 4.16 (q, 4H, CH_3CH_2O), 5.10 (s, 4H, CH_2O), 6.99 and 7.87 (d, d, 4H, 4H, AA'BB'), 7.43 (s, 4H, Central benzene ring protons), 9.99 (s, 2H, NH); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 13.60 (CH_3CH_2O), 14.70 (CH_3-C=N), 60.80 (CH_3CH_2O), 67.80 (C3), 127.60 (C1), 136.30 (C2), 114.50 and 127.60 (C5 and C6), 130.50, 160.10 (C4 and C7), 148.81 (C=N), 154.30 (C=O); ms: (5 kV, fd) m/z (%) 547 (100).

Anal. Calcd. for $C_{30}H_{34}N_4O_6$: C, 65.92; H, 6.27; N, 10.25. Found: C, 65.99; H, 6.18; N, 10.15.

1-{4-[3,5-Di(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone-*N*-ethoxycarbonylhydrazone **(4b)**.

This compound was obtained as pale yellow powder, mp 202-204°; ir (potassium bromide): 3200 (NH), 3035, 1705 (C=O), 1600, 1503, 1238, 1040, 830 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 1.24 (t, 9H, CH_3CH_2O), 2.17 (s, 9H, CH_3-C=N)), 4.15 (q, 6H, CH_3CH_2O), 5.18 (s, 6H, CH_2O), 7.03 and 7.67 (d, d, 6H, 6H, AA'BB'), 7.52 (s, 3H, Central benzene ring protons), 9.99 (s, 3H, NH); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 14.30 (CH_3CH_2O), 15.20 (CH_3-C=N), 60.90 (CH_3CH_2O), 69.60 (C3), 126.90 (C1), 138.06 (C2), 115.10 and 128.00 (C5 and C6), 131.60 and 159.50 (C4 and C7), 148.70 (C=N), 154.20 (C=O); ms: (5 kV, fd) m/z (%) 781 (100).

Anal. Calcd. for $C_{42}H_{48}N_6O_9$: C, 64.60; H, 6.20; N, 10.76. Found: C, 64.48; H, 6.13; N, 10.50.

1-{4-[2,4,5-Tri(4-acetylphenoxymethyl)benzyloxy]phenyl}-1-ethanone-N-ethoxycarbonylhydrazone **(4c)**.

This compound was obtained as white powder, mp 211-213°; ir (potassium bromide): 3200 (NH), 3045, 1700 (C=O), 1596, 1492, 1235, 1040, 828 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 1.24 (t, 12H, CH_3CH_2O), 2.16 (s, 12H, CH_3-C=N)), 4.16 (q, 8H, CH_3CH_2O), 5.27 (s, 8H, CH_2O), 7.03, 7.65 (d, d, 8H, 8H, AA'BB'), 7.71 (s, 2H, Central benzene ring protons), 9.98 (s, 4H, NH); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 14.28 (CH_3CH_2O), 15.19 (CH_3-C=N), 60.98 (CH_3CH_2O), 67.40 (C3), 129.37 (C1), 135.43 (C2), 115.08 and 128.00 (C5 and C6), 131.76 and 159.33 (C4 and C7), 148.70 (C=N), 154.80 (C=O); ms: (5 kV, fd) m/z (%) 1015 (100).

Anal. Calcd. for $C_{54}H_{62}N_8O_{12}$: C, 63.89; H, 6.16; N, 11.04. Found: C, 63.58; H, 6.09; N, 10.97.

1-{4-[2,3,4,5,6-Penta(4-acetylphenoxymethyl)benzyloxy]-phenyl}-1-ethanone-*N*-ethoxycarbonylhydrazone **(4d)**.

This compound was obtained as white solid powder, mp 293° (dec); ir (potassium bromide): 3231(NH), 1719 (C=O), 1610, 1502, 1233, 1047, 829 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 1.23 (t, 18H, CH_3CH_2O), 2.12 (s, 18H, CH_3-C=N)), 4.13 (q, 12H, CH_3CH_2O), 5.29 (s, 12H, CH_2O), 6.95 and 7.58 (d, d, 12H, 12H, AA'BB'), 9.96 (s, 6H, NH); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 14.23 (CH_3CH_2O), 15.01 (CH_3-C=N), 60.95 (CH_3CH_2O), 64.36 (C2), 138.09 (C1), 114.86 and 127.94 (C4 and C5), 131.93 and 159.41 (C3 and C6), 149.25 (C=N), 154.76 (C=O); ms: (5 kV, fd) m/z (%) 1484 (100).

Anal. Calcd. for $C_{78}H_{90}N_{12}O_{18}$: C, 63.15; H, 6.11; N, 11.33. Found: C, 62.79; H, 6.27; N, 11.44.

General Procedure for Preparation of Multiple 1,2,3-Selenadiazoles **5a-d**.

Hydrazones **4a** (0.15 g, 0.27 mmol) or hydrazone **4b** (0.7 g, 0.9 mmol) or hydrazone **4c** (0.60 g, 0.59 mmol) or hydrazone **4d** (0.70 g, 0.47 mmol) was dissolved in glacial acetic acid (30 mL) with vigorouse stirring and gentle heating 40-45 °C. The solution was treated with selenium dioxide powder (0.09 g, 0.81 mmol) or (0.89 g, 8.1 mmol) or (0.79 g, 7.08 mmol) or (0.94 g, 8.46 mmol), respectively and the mixture was kept under gentle heating with vigorouse stirring. After 2 min, color of the mixture becomes red. TLC analysis showed that the reaction was completed in two days. The mixture was filtered and the filtrate was poured over ice water and extracted with chloroform (3 × 50 mL). The combined organic layers were washed with saturated sodium hydrogen carbonate solution, dried using magnesium sulphate. The solvent was removed under vacuum. The crude product was chromatographed using methanol or ethyl acetate as eleuent. The recrystalization was followed from chloroform/hexane.

1,4-Bis[4-(1,2,3-selenadiazole-4-yl)phenoxymethyl]benzene **(5a)**.

This compound was obtained as yellow-orange solid, mp 160-162°; ir (potassium bromide): 3077, 2911, 1732, 1610, 1533, 1456, 1239, 1008, 822 cm^{-1}; ^1H nmr (dimethyl sulfoxide-d_6): δ 5.15 (s, 4H, CH_2O), 7.12 and 7.21 (d, d, 4H, 4H, AA'BB'), 7.47 (s, 4H, central benzene ring protons), 9.72 (s, 2H, CHSe); ^{13}C nmr (dimethyl sulfoxide-d_6): δ 70.00 (C3), 127.89 (C1), 129.18 (C2), 116.10 and 130.00 (C5 and C6), 121.00 and 152.00 (C4 and C7), 160.00 (C8), 138.00 (C9); ms: (5 kV, fd) m/z (%) 552 (100).

Anal. Calcd. For $C_{24}H_{18}N_4O_2Se_2$: C, 52.18; H, 3.28; N, 10.14; Se, 28.60. Found: C, 52.03; H, 3.25; N, 10.20.

4-(4-{3,5-Di[4-(1,2,3-selenadiazole-4-yl)phenoxymethyl]benzyloxy}phenyl)-1,2,3-selenadiazole **(5b)**.

This compound was obtained as yellow-orange solid, mp 100-102°; ir (potassium bromide): 3096, 2917, 1738, 1610, 1534, 1450, 1239, 1046, 835 cm^{-1}; ^1H nmr (deuteriochloroform): δ 5.15 (s, 6H, CH_2O), 7.11 and 7.20 (d, d, 6H, 6H, AA'BB'), 7.49 (s, 3H, Central benzene ring protons), 9.72 (s, 3H, CHSe); ^{13}C

nmr (deuteriochloroform): δ 69.69 (C3), 126.00 (C1), 129.70 (C2), 115.99 and 130.03 (C5 and C6), 118.80 and 149.15 (C4 and C7), 160.15 (C8), 137.60 (C9); ms: (5 kV, fd) m/z (%) 789 (100).

Anal. Calcd. For $C_{33}H_{24}N_6O_3Se_3$: C, 50.21; H, 3.06; N, 10.65; Se, 30.01. Found: C, 50.10; H, 3.00; N, 10.59.

4-(4-{2,4,5-Tri[4-(1,2,3-selenadiazole-4-yl)phenoxymethyl]benzyloxy}phenyl)-1,2,3-selenadiazole **(5c)**.

This compound was obtained as yellow-orange solid, mp 87-88°; ir (potassium bromide): 3096, 2930, 1725, 1611, 1527, 1469, 1245, 1040, 822 cm^{-1}; ^1H nmr (deuteriochloroform): δ 5.25 (s, 8H, CH_2O), 7.12 and 7.22 (d, d, 8H, 8H, AA'BB'), 7.70 (s, 2H, Central benzene ring protons), 9.71 (s, 4H, CHSe); ^{13}C nmr (deuteriochloroform): δ 67.70 (C3), 124.00 (C1), 129.80 (C2), 115.89 and 130.12 (C5 and C6), 118.80 and 152.60 (C4 and C7), 159.92 (C8), 136.40 (C9); ms: (5kV, fd) m/z (%) 1026 (100).

Anal. Calcd. For $C_{42}H_{30}N_8O_4Se_4$: C, 49.13; H, 2.95; N, 10.92; Se, 30.77. Found: C, 49.10; H, 2.75; N, 10.71.

4-(4-{2,3,4,5,6-Penta[4-(1,2,3-selenadiazole-4-yl)phenoxymethyl]benzyloxy}phenyl)-1,2,3-selenadiazole **(5d)**.

This compound was obtained as yellow-orange solid, mp 77-78°; ir (potassium bromide): 3096, 2975, 1739, 1611, 1527, 1469, 1220, 989, 841 cm^{-1}; ^1H nmr (deuteriochloroform): δ 5.27 (s, 12H, CH_2O), 7.06 and 7.17 (d, d, 12H, 12H, AA'BB'), 9.68 (s, 6H, CHSe); ^{13}C nmr (deuteriochloroform): δ 63.62 (C2), 128.50 (C1), 115.36 and 130.20 (C4 and C5), 119.20 and 152.40 (C3 and C6), 159.61 (C8), 137.70 (C9); ms: (5kV, fd) m/z (%) 1500 (100).

Anal. Calcd. For $C_{60}H_{42}N_{12}O_6Se_6$: C, 48.02; H, 2.82; N, 11.20; Se, 31.57. Found: C, 47.91; H, 2.74; N, 11.11.

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