

## Small organic molecules targeting PCAF bromodomain as potent inhibitors of HIV-1 replication

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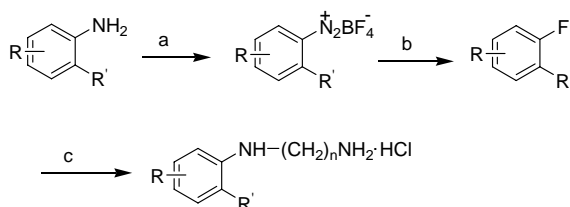
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### Chemistry

Melting points were recorded on an XT-4 micro-melting point apparatus and were uncorrected. Both <sup>1</sup>H and <sup>13</sup>C NMR spectra were recorded on a 300 MHz Bruker NMR spectrometer using tetramethylsilane as internal standard and the data were reported as the following: chemical shifts in ppm (δ), number of protons, multiplicity (s, singlet; d, doublet; t, triplet; m, multiplet), coupling constants in hertz. IR spectra were measured on Bruker EQUINOX55 spectrometer. Mass spectra were recorded on HRMS [LC-TOF spectrometer (micromass)] (EI/CI). All chromatographic purifications were performed with silica gel (100-200 mesh). All purchased starting materials were used without further purifications. All solvents were reagent grades.

### Synthetic routes

#### Scheme 1 <sup>a</sup>



R=H, CH<sub>3</sub>, OMe, NO<sub>2</sub>; R'=H, NO<sub>2</sub>; n=2, 3, 4

<sup>a</sup> Synthesis of (**1**, **2**, **4**, **5**, **8**, **14**, **19**, **20**), Reagents and conditions: (a) NaNO<sub>2</sub>, HBF<sub>4</sub>, 0 °C; (b) SiO<sub>2</sub>/heat; (c) (i) 1,3-diaminopropane, or 1,2-diaminoethane, or 1,4-diaminobutane, 60 °C; (ii) concentrated HCl, EtOH.

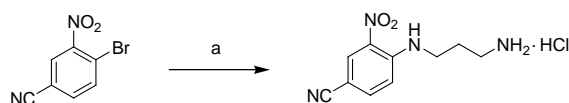
**Typical procedure for compd 1:** (a) 2-nitrobenzenamine (40 mmol, 5.52g) and 17.6 mL of fluoboric acid (48%) were stirred in a beaker (50 mL) for 30min, then the system was cool to 0°C. The solution of NaNO<sub>2</sub> (40 mmol, 2.76 g) in 5.6 mL of H<sub>2</sub>O was slowly added to the reaction system. After 15 min, the mixture was filtered and the solid was collected and washed by alcohol and diethyl ether, dried carefully under infrared lamp. The fluoroborate diazonium salt was obtained. (b) Fluoroborate diazonium salt and SiO<sub>2</sub> (100-200 mesh, 50 g) were mixed and heated by alcohol burner in a round-bottom flask. Once the solid decomposed, withdrawing the alcohol burner. Repeated the procedure to enable the fully decompose of the fluoroborate diazonium salt.

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The reaction system was extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product 1-fluoro-2-nitrobenzene was purified by chromatography (petroleum ether : ethyl acetate = 10 : 1) (29%, two steps). (c) (i) 1-fluoro-2-nitrobenzene (5 mmol, 705 mg) and 1,3-diamine (15 mmol, 1.1 g) in 5 mL of DMF were heated at 60 °C for 4h. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, pure N1-(2-nitrophenyl)propane-1,3-diamine could be obtained by eluent chloroform: methanol = 3 : 1 (78%). (ii) N1-(2-nitrophenyl)propane-1,3-diamine was dissolved in ethanol, a few drops of concentrated hydrochloric acid were added under shake. The solid was collected and washed by acetone, dried to give the pure product as yellow solid.

Similar procedure was employed to synthesize cmpds **2**, **4**, **5**, **8**, **14**, **19**, **20**.

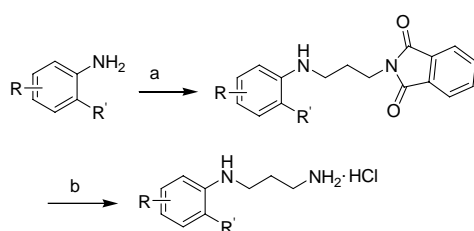
### Scheme 2<sup>a</sup>



<sup>a</sup> Synthesis of (**6**). Reagents and conditions: (a) (i) 1,3-diaminopropane, DMF, 60 °C, 3h. (ii) concentrated HCl, EtOH.

**Typical procedure for cmpd 6:** (a) (i) 4-bromo-3-nitrobenzonitrile (5 mmol, 1.14 g) and 1,3-diamine (15 mmol, 1.1 g) were heated at 60 °C in 5 mL of DMF for 3h. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, 4-(3-aminopropylamino)-3-nitrobenzonitrile could be obtained by eluent chloroform: methanol = 3 : 1 (63%). (ii) 4-(3-aminopropylamino)-3-nitrobenzonitrile was dissolved in ethanol, a few drops of concentrated hydrochloric acid were added under shake. The yellow solid was collected and washed by acetone, dried to give the product cmpd **6**.

### Scheme 3<sup>a</sup>



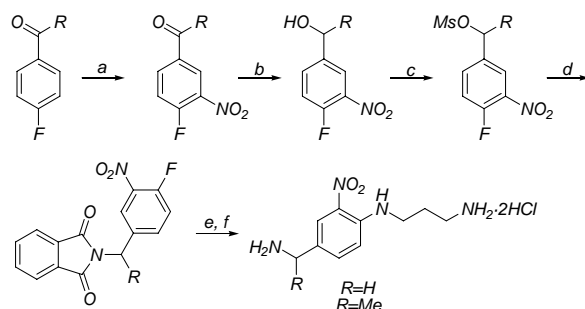
R=C<sub>2</sub>H<sub>5</sub>, NO<sub>2</sub>; R'=NO<sub>2</sub>, CH<sub>3</sub>.

<sup>a</sup> Synthesis of (**3**) and (**7**). Reagents and conditions: (a) N-(3-bromopropyl)phthalimide, (Et)<sub>3</sub>N, 120°C; (b) (i) NH<sub>2</sub>NH<sub>2</sub>·H<sub>2</sub>O, EtOH, reflux, 6 h; (ii) concentrated HCl, EtOH.

**Typical procedure for cmpd 3:** (a) 4-ethyl-2-nitrobenzenamine (10 mmol, 1.66 g) and N-(3-bromopropyl)phthalimide (15 mmol, 4.03 g) were heated at 120°C in (Et)<sub>3</sub>N (20 mL) for 10h. Evaporating the solvent and the residue was extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product 2-(3-(4-ethyl-2-nitrophenylamino)propyl)isoindoline-1,3-dione was purified as yellow solids by

chromatography (petroleum ether: ethyl acetate = 4 : 1) (66%). (b) (i) 2-(3-(4-ethyl-2-nitrophenylamino)propyl)isoindoline-1,3-dione (5 mmol, 1.77 g) was dissolved in a mixture of 85%  $\text{NH}_2\text{NH}_2\cdot\text{H}_2\text{O}$  (3 mL) and EtOH (20 mL). The reaction system was refluxed for 6h. Evaporating the solvent under vacuum to remove the ethanol and extracted by chloroform, dried by anhydrous sodium sulfate and purified by chromatography (chloroform: methanol = 3 : 1) to give pure N1-(4-ethyl-2-nitrophenyl)propane-1,3-diamine (73%). (ii) N1-(4-ethyl-2-nitrophenyl)propane-1,3-diamine was dissolved in ethanol, a few drops of concentrated hydrochloric acid were added under shake. The yellow solid was collected and washed by acetone, dried to give the pure product **3**. Similar procedure was employed to synthesize **7**.

#### Scheme 4<sup>a</sup>



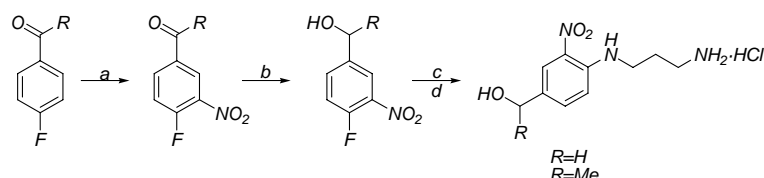
<sup>a</sup> Synthesis of (**12**) and (**15**). . Reagents and conditions:(a)  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4(\text{con.})$ ,  $-5\text{ }^\circ\text{C}$ , 4 h; (b)  $\text{NaBH}_4$ , MeOH, rt; (c)  $\text{MsCl}$ ,  $\text{CH}_2\text{Cl}_2$  (dry),  $\text{Et}_3\text{N}$  (dry),  $0\text{ }^\circ\text{C}$ , overnight; (d) potassium phthalimide, DMF,  $80\text{ }^\circ\text{C}$ , 5 h; (e) 1,3-diaminopropane,  $60\text{ }^\circ\text{C}$ , 4 h; (f) dry HCl,  $\text{CHCl}_3$ , rt.

**Typical procedure for **12**:** (a) 2 mL  $\text{HNO}_3$  (65%) and 4 mL  $\text{H}_2\text{SO}_4(\text{con.})$  were mixed at  $-5\text{ }^\circ\text{C}$ , then 4-fluorobenzaldehyde (10 mmol, 1.24 g) was added and the mixture was stirred at  $-5\text{ }^\circ\text{C}$  for 4 h. The system was poured into 20 mL of ice water. The yellow solid was collected and dried to give the product 4-fluoro-3-nitrobenzaldehyde (82%). (b) 4-fluoro-3-nitrobenzaldehyde (8 mmol, 1.35 g) was dissolved in 20 mL of methanol,  $\text{NaBH}_4$  (15 mmol, 0.57 g) was added dropwise at room temperature. And the mixture was stirred for 1h. Evaporating the solvent under vacuum and extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and purified by chromatography (petroleum ether: ethyl acetate = 2 : 1) to give the product (4-fluoro-3-nitrophenyl)methanol as yellow solid (95%). (c) and (d) (4-fluoro-3-nitrophenyl)methanol (5 mmol, 743 mg) was dissolved in 15 mL of  $\text{CH}_2\text{Cl}_2$  (dry), 0.8 mL of  $\text{Et}_3\text{N}$  (dry) was added and the reaction system was cooled to  $0\text{ }^\circ\text{C}$ .  $\text{MsCl}$  (6 mmol, 680 mg) was added slowly to the reaction system and the mixture was stirred at  $0\text{ }^\circ\text{C}$  overnight. Evaporating the solvent under vacuum, the residue was dissolved by 15 mL of DMF in a 50 mL of round-bottom flask. Potassium phthalimide (10 mmol, 1.85 g) was added to the system, and the mixture was heated at  $80\text{ }^\circ\text{C}$  under stirring for 5 h. The mixture was cool to room temperature and extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product 2-(4-fluoro-3-nitrobenzyl)isoindoline-1,3-dione was purified as yellow solid by chromatography (petroleum ether : ethyl acetate = 3 : 1) (63%). (e) 2-(4-fluoro-3-nitrobenzyl)isoindoline-1,3-dione (2 mmol, 600 mg) and 1,3-diamine (6 mmol, 445 mg) were heated at  $60\text{ }^\circ\text{C}$  in DMF (5 mL) for 4h. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, the product N1-(4-(aminomethyl)-2-nitrophenyl)propane-1,3-diamine

could be obtained by eluent chloroform: methanol = 3 : 1 (53%). (f) N1-(4-(aminomethyl)-2-nitrophenyl)propane-1,3-diamine dissolved in ethanol, a few drops of concentrated hydrochloric acid were added under shake. The yellow solid was collected and washed by acetone, dried to give the pure product **12**.

Similar procedure was employed to synthesized **15**.

### Scheme 5<sup>a</sup>

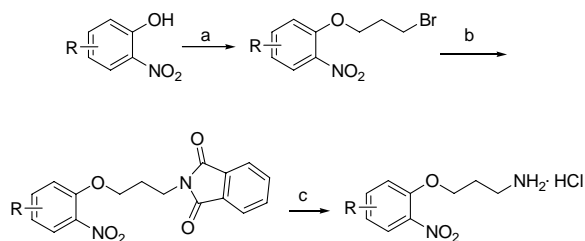


<sup>a</sup> Synthesis of (**13**) and (**16**). a) HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>(con.), -5 °C, 1 h; b) NaBH<sub>4</sub>, MeOH, rt; c) 1,3-diaminopropane, DMF, 60 °C, 4h; d) dry HCl, ethanol, rt.

**Typical procedure for **13**:** The procedure of (a) and (b) is identical to the procedure of (a) and (b) in typical procedure for **13**. (c) (4-fluoro-3-nitrophenyl)methanol (2 mmol, 297 mg) and 1,3-diamine (6 mmol, 445 mg) were heated at 60 °C in DMF (5 mL) for 4h. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, the product (4-(3-aminopropylamino)-3-nitrophenyl)methanol could be obtained by eluent chloroform: methanol = 2 : 1 (72%). (d) (4-(3-aminopropylamino)-3-nitrophenyl)methanol was dissolved in ethanol, a few drops of concentrated hydrochloric acid were added under shake. The yellow solid was collected and washed by acetone, dried to give the pure product **13**.

Similar procedure was employed to synthesize **16**.

### Scheme 6<sup>a</sup>



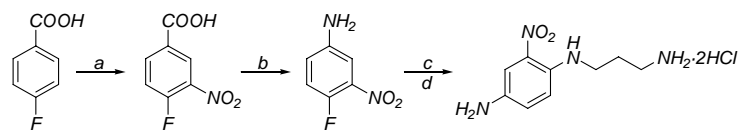
**R=H, CH<sub>3</sub>, CH<sub>3</sub>O, Cl,**

<sup>a</sup> Synthesis of (**21-27**). Reagents and conditions: (a) 1,3-dibromopropane, NaOH, H<sub>2</sub>O, reflux; (b) potassium phthalimide, DMF, 90 °C, 3 h; (c) (i) NH<sub>2</sub>NH<sub>2</sub>·H<sub>2</sub>O, EtOH, reflux, 6h, or concentrated HCl, AcOH (V/V=1:1), reflux. (ii) Concentrated HCl, EtOH.

**Typical procedure for **21**:** (a) Nitrophenol (10 mmol, 1.39 g) and 50 mg of tetrabutyl ammonium bromide were dissolved in 20 mL of H<sub>2</sub>O in a 100 mL round-bottom flask, NaOH (10 mmol, 0.4 g) was dissolved in 10 mL water and the solution was added into the flask. The mixture was refluxed for 8h under stirring and cooled to room temperature. The system was extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product 1-(3-bromopropoxy)-2-nitrobenzene was purified as yellow solid by chromatography (petroleum ether : ethyl acetate = 20 : 1) (62%). (b) 1-(3-bromopropoxy)-2-nitrobenzene (5 mmol, 1.3 g) and Potassium phthalimide (8 mmol, 1.48 g) were dissolved in 10 mL of dry DMF, the mixture was heated at 90 °C for 3 h and cooled to room temperature. The mixture was extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and

the product 2-(3-(2-nitrophenoxy)propyl)isoindoline-1,3-dione was purified by chromatography (petroleum ether : ethyl acetate = 3 : 1) (73%). (c) (i) 2-(3-(2-nitrophenoxy)propyl)isoindoline-1,3-dione (2 mmol, 652 mg) was dissolved in a solution of 85%  $\text{NH}_2\text{NH}_2\cdot\text{H}_2\text{O}$  (1 mL) and EtOH (6 mL). The system was refluxed under stirring for 6h. Evaporating the solvent under vacuum to remove the ethanol and extracted by chloroform, dried by anhydrous sodium sulfate and the product 3-(2-nitrophenoxy)propan-1-amine was purified by chromatography ( $\text{CHCl}_3$  : MeOH = 5 : 1) (76%). (ii) 3-(2-nitrophenoxy)propan-1-amine was dissolved in ethanol, a few drops of concentrated hydrochloric acid were added under shake. The yellow solid was collected and washed by acetone, dried to give the pure product **21**. Similar procedure was employed to synthesize **22-27**.

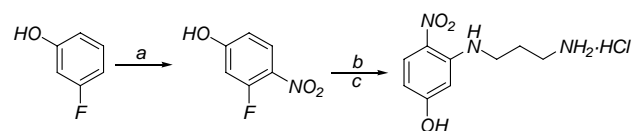
**Scheme 7<sup>a</sup>**



<sup>a</sup> Synthesis of (**10**). (a)  $\text{HNO}_3$ ,  $\text{H}_2\text{SO}_4(\text{con.})$ ,  $-5\text{ }^\circ\text{C}$ , 1 h. (b)  $\text{H}_2\text{SO}_4(\text{con.})$ ,  $\text{NaN}_3$ ,  $50\text{ }^\circ\text{C}$ . (c) 1,3-diaminopropane, DMF, rt, 6 h. (d) dry HCl, EtOH, rt.

**Typical procedure:** (a) 2.5 mL  $\text{HNO}_3$  (65%) and 5mL  $\text{H}_2\text{SO}_4(\text{con.})$  were mixed at  $-5\text{ }^\circ\text{C}$ , then 4-fluorobenzoic acid (10 mmol, 1.4g) was added and the mixture was stirred at  $-5\text{ }^\circ\text{C}$  for 1 h. The system was poured into 20 mL of ice water. The yellow solid was collected and dried to give the product 4-fluoro-3-nitrobenzoic acid (63%). (b) To a solution of 4-fluoro-3-nitrobenzoic acid (10 mmol, 1.85 g) in 30 mL  $\text{H}_2\text{SO}_4(\text{con.})$  at  $50\text{ }^\circ\text{C}$ , sodium azide (12 mmol, 780 mg) was added. The reaction system was maintained at  $50\text{ }^\circ\text{C}$  for 10h. The mixture was cooled to room temperature and poured into 150 mL of ice water, the solution was basified by 2N NaOH solution. The mixture was extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product 4-fluoro-3-nitrobenzenamine was purified as yellow solid by chromatography (petroleum ether : ethyl acetate = 5 : 1) (77%). (c) 4-fluoro-3-nitrobenzenamine (4 mmol, 624 mg) and 1,3-diamine (12 mmol, 888 mg) were in 10 mL of DMF was stirred at room temperature for 6h. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, the product N1-(3-aminopropyl)-2-nitrobenzene-1,4-diamine could be obtained by eluent chloroform: methanol = 3:1 (79%). (d) N1-(3-aminopropyl)-2-nitrobenzene-1,4-diamine was dissolved in ethanol at room temperature, a few drops of concentrated hydrochloric acid were added under shake. The solid was collected and washed by acetone, dried to give the pure product **10**.

**Scheme 8<sup>a</sup>**

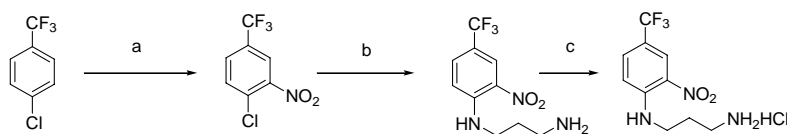


<sup>a</sup> Synthesis of (**11**). (a)  $\text{HNO}_3$ , DCE,  $0-15\text{ }^\circ\text{C}$ , 1.5 h. (b) 1,3-diaminopropane, DMF, rt, 6 h. (c) dry HCl, EtOH, rt.

**Typical procedure:** (a) 2 mL of  $\text{HNO}_3$  (65%) and 20 mL of DCE were mixed at  $0\text{ }^\circ\text{C}$ , then 3-fluorophenol (10 mmol, 1.12 g) was added and the mixture was stirred at  $15\text{ }^\circ\text{C}$  for 1.5 h. The system was poured into 20 mL of ice water, the pH of the system was adjusted to 6 by aqueous

Na<sub>2</sub>CO<sub>3</sub>. The mixture was extracted by CH<sub>2</sub>Cl<sub>2</sub>, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product 3-fluoro-4-nitrophenol was purified as yellow solid by chromatography (petroleum ether : ethyl acetate = 10 : 1) (30%). (b) 3-fluoro-4-nitrophenol (5 mmol, 785 mg) and 1,3-diamine (15 mmol, 1.1 g) in 10 mL of DMF was stirred at room temperature for 6h. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, the product 3-(3-aminopropylamino)-4-nitrophenol could be obtained by eluent chloroform: methanol = 2:1 (65%). (c) 3-(3-aminopropylamino)-4-nitrophenol was dissolved in ethanol at room temperature, a few drops of concentrated hydrochloric acid were added under shake. The yellow solid was collected and washed by acetone, dried to give the pure product **11**.

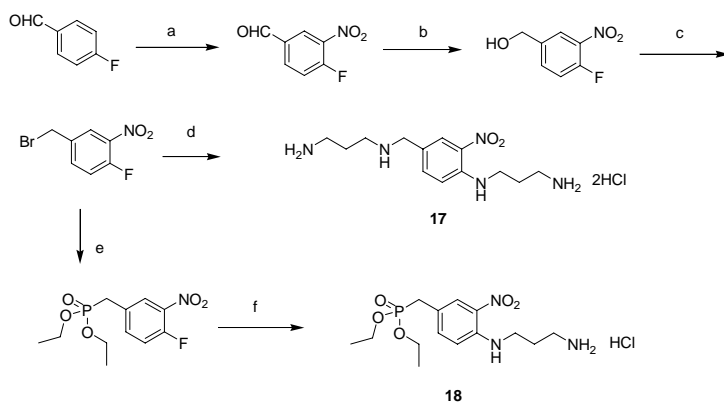
**Scheme 9<sup>a</sup>**



<sup>a</sup> Synthesis of (**9**). (a) H<sub>2</sub>SO<sub>4</sub>, HNO<sub>3</sub>, rt. (b) H<sub>2</sub>N(CH<sub>2</sub>)<sub>3</sub>NH<sub>2</sub>, DMF, 0 °C to rt, overnight. (c) CHCl<sub>3</sub>, HCl, 10 °C.

**Typical procedure:** (a) 2 mL HNO<sub>3</sub> (65%) and 3 mL H<sub>2</sub>SO<sub>4</sub> (con.) were mixed at 0 °C, then 1-chloro-4-(trifluoromethyl)benzene (10 mmol, 1.8 g) was added and the mixture was stirred at room temperature for 4h. The system was poured into 20 mL of ice water. The yellow solid was collected and dried to give the product 1-chloro-2-nitro-4-(trifluoromethyl)benzene (77%). (b) 1-chloro-2-nitro-4-(trifluoromethyl)benzene (5 mmol, 1.32 g) and 1,3-diamine (15 mmol, 1.1 g) in 10 mL of DMF was stirred at 0 °C overnight. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, the product N1-(2-nitro-4-(trifluoromethyl)phenyl)propane-1,3-diamine could be obtained by eluent chloroform: methanol = 3:1 (64%). (c) N1-(2-nitro-4-(trifluoromethyl)phenyl)propane-1,3-diamine was dissolved in chloroform at 10 °C, a few drops of concentrated hydrochloric acid were added under shake. The yellow solid was collected and washed by acetone, dried to give the pure product **9**.

**Scheme 10<sup>a</sup>**



<sup>a</sup> Synthesis of (**17**, **18**). a) HNO<sub>3</sub>, H<sub>2</sub>SO<sub>4</sub>(con.), -5 °C, 4 h; b) NaBH<sub>4</sub>, MeOH, rt; c) PBr<sub>3</sub>, DMF, 0 °C, 30min; d) (i) 1,3-diaminopropane, DMF, rt, 3 h; (ii) Dry HCl, EtOH, rt; e) Triethyl phosphate,

toluene, reflux, overnight; f) (i) 1,3-diaminopropane, toluene, rt, 5 h; (ii) Dry HCl, EtOH, rt;

**Typical procedure:** (a) 2 mL HNO<sub>3</sub> (65%) and 4 mL H<sub>2</sub>SO<sub>4</sub>(con.) were mixed at -5 °C, then 4-fluorobenzaldehyde (10 mmol, 1.24 g) was added and the mixture was stirred at -5 °C for 4 h. The system was poured into 20 mL of ice water. The yellow solid was collected and dried to give the product 4-fluoro-3-nitrobenzaldehyde (82%). (b) 4-fluoro-3-nitrobenzaldehyde (8 mmol, 1.35 g) was dissolved in 20 mL of methanol, NaBH<sub>4</sub> (15 mmol, 0.57 g) was added dropwise at room temperature. And the mixture was stirred for 1h. Evaporating the solvent under vacuum and extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product (4-fluoro-3-nitrophenyl)methanol was purified as yellow solid by chromatography (petroleum ether : ethyl acetate = 2 : 1) s(95%). (c) (4-fluoro-3-nitrophenyl)methanol (7 mmol, 1.04 g) was dissolved in 20mL of dry DMF, the mixture was cooled to 0 °C. PBr<sub>3</sub> (10 mmol, 2.71 g) was added slowly and stirred for another 30min. 10 mL of water was slowly added and the system was extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product 4-(bromomethyl)-1-fluoro-2-nitrobenzene was purified as yellow solid by chromatography (petroleum: ethyl acetate = 15:1) (87%). (d) (i) 4-(bromomethyl)-1-fluoro-2-nitrobenzene (2 mmol, 464 mg) and 1,3-diamine (15 mmol, 1.1 g) were added into 5 mL of EtOH and refluxed overnight. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, the product N1-(4-(3-aminopropylamino)-3-nitrobenzyl)propane-1,3-diamine could be obtained by eluent chloroform: methanol: ammonium hydroxide/28% = 10:10:0.3 (41%). (ii) N1-(4-(3-aminopropylamino)-3-nitrobenzyl)propane-1,3-diamine was dissolved in ethanol, a few drops of concentrated hydrochloric acid were added under shake. The solid was collected and washed by acetone, dried to give the pure product **17**. (e) 4-(bromomethyl)-1-fluoro-2-nitrobenzene (2 mmol, 464 mg) and triethyl phosphate (4 mmol, 664 mg) in 5 mL toluene were refluxed overnight. The mixture was extracted by ethyl acetate, dried by anhydrous sodium sulfate. Evaporating the solvent under vacuum and the product diethyl 4-fluoro-3-nitrobenzylphosphonate was purified as yellow solid by chromatography (petroleum: ethyl acetate = 2:1) (72%). (f) (i) 4-fluoro-3-nitrobenzylphosphonate (1 mmol, 291 mg) and 1,3-diamine (3 mmol, 222 mg) in 5 mL of toluene were stirred at room temperature for 5h. Evaporating the solvent and remaining 1,3-diamine under reduced pressure. The residue was directly loaded on the chromatography, the product diethyl 4-(3-aminopropylamino)-3-nitrobenzylphosphonate could be obtained by eluent chloroform: methanol = 3 : 1 (81%). (ii) 4-(3-aminopropylamino)-3-nitrobenzylphosphonate was dissolved in ethanol, a drop of concentrated hydrochloric acid were added under shake. The solid was collected and washed by acetone, dried to give the pure product **18** as yellow solid.

## Spectrum data of the compounds

**N<sub>1</sub>-(2-nitro-phenyl)-propane-1,3-diamine monohydrochloride (1).** Yellow solid, mp 169°C(dec); <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79) δ: 7.80 (1H, m), 7.35 (1H, m), 6.76 (1H, m), 6.50 (1H, m), 3.31

(2H, t,  $J = 6.90$  Hz), 3.05 (2H, t,  $J = 7.40$  Hz), 1.96 (2H, m);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O} + \text{acetone}$ , acetone ( $\text{CH}_3$ ):30.60]  $\delta$ : 145.28, 137.35, 130.64, 126.44, 116.27, 114.44, 39.87, 37.64, 26.48; FTIR (KBr)  $\text{cm}^{-1}$ : 2988.48, 1614.95, 1592.93, 1530.24, 1499.85, 1382.35, 1347.25, 1224.06, 1154.59, 1134.19, 1004.51, 918.02, 858.90, 789.80, 747.36; HRMS calculated for  $\text{C}_9\text{H}_{13}\text{N}_3\text{O}_2$  ( $\text{M}+1$ ) 196.1086, found 196.1080.

**$\text{N}_1$ -(4-methyl-2-nitro-phenyl)-propane-1,3-diamine monohydrochloride (2).** Yellow solid, mp 184-186°C;  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79)  $\delta$ : 7.79 (1H, s), 7.36 (1H, d,  $J = 8.69$  Hz), 6.88 (1H, d,  $J = 8.67$  Hz), 3.47 (2H, t,  $J = 6.62$  Hz), 3.15 (2H, t,  $J = 7.43$  Hz), 2.21 (3H, s), 2.08 (2H, m);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O} + \text{acetone}$ , acetone ( $\text{CH}_3$ ):30.60]  $\delta$ : 144.06, 139.14, 130.62, 126.21, 125.53, 114.43, 39.81, 37.67, 26.65, 19.38; FTIR (KBr)  $\text{cm}^{-1}$ : 2964.50, 1366.57, 1566.58, 1526.08, 1398.59, 1351.62, 1229.25, 1167.67, 1059.48, 851.53, 814.01, 764.74; HRMS calculated for  $\text{C}_{10}\text{H}_{15}\text{N}_3\text{O}_2$  ( $\text{M}+1$ ) 210.1243, found 210.1251.

**$\text{N}_1$ -(4-ethyl-2-nitro-phenyl)-propane-1,3-diamine monohydrochloride (3).** Yellow solid, mp 183-185°C;  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79)  $\delta$  7.76 (1H, s), 7.37 (1H, dd,  $J=7.01$ , 1.83Hz), 6.87 (1H, d,  $J=8.87$ Hz), 3.44 (2H, t,  $J=6.82$ Hz), 3.12 (2H, t,  $J=7.57$ Hz), 2.48 (2H, q,  $J=7.53$ Hz), 2.05 (2H, m), 1.14 (3H, s);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}+\text{acetone}$ , acetone ( $\text{CH}_3$ ):30.60]  $\delta$  144.21, 138.16, 132.47, 130.58, 124.08, 114.52, 39.82, 37.65, 27.04, 26.68, 14.59; FTIR(KBr)  $\bar{\nu}$   $\text{cm}^{-1}$ :2965.79, 1634.14, 1569.30, 1523.56, 1407.80, 1351.13, 1269.12, 1225.26, 1165.22, 1069.81, 817.62, 762.33; HRMS Calcd for  $\text{C}_{11}\text{H}_{17}\text{N}_3\text{O}_2$  ( $\text{M}+1$ ) 224.1399, found 224.1398.

**$\text{N}_1$ -(3-methyl-2-nitro-phenyl)-propane-1,3-diamine monohydrochloride (4).** Yellow solid, mp 180-182°C;  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79)  $\delta$ : 7.35 (1H, t,  $J = 7.88$  Hz), 6.86 (1H, d,  $J = 8.50$  Hz), 6.70 (1H, d,  $J = 7.36$  Hz), 3.38 (2H, t,  $J = 6.85$  Hz), 3.11 (2H, t,  $J = 7.41$  Hz), 2.36 (3H, s), 2.03 (2H, m);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O} + \text{acetone}$ , acetone ( $\text{CH}_3$ ):30.60]  $\delta$  141.92, 136.58, 135.56, 134.11, 121.53, 113.10, 41.22, 37.66, 26.27, 20.34; FTIR (KBr)  $\text{cm}^{-1}$ : 2972.09, 1606.43, 1576.89, 1534.85, 1501.40, 1351.61, 1250.77, 1161.47, 1064.62, 1033.92, 852.11, 796.63, 769.27; HRMS calculated for  $\text{C}_{10}\text{H}_{15}\text{N}_3\text{O}_2$  ( $\text{M}+1$ ) 210.1243, found 210.1251.



**N<sub>1</sub>-(2-methyl-5-nitro-phenyl)-propane-1,3-diamine monohydrochloride (5).** Yellow solid, mp 152°C(dec); <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79) δ 7.77 (1H, dd, *J*=2.15, 8.24Hz), 7.70 (1H, d, *J*=1.94Hz), 7.38 (1H, d, *J*=8.27Hz), 3.43 (2H, t, *J*=7.27Hz), 3.14 (2H, t, *J*=7.51Hz), 2.32 (3H, s), 2.10 (2H, m); <sup>13</sup>C NMR [D<sub>2</sub>O+acetone, acetone (CH<sub>3</sub>):30.60] δ 146.78, 137.91, 132.96, 121.03, 114.10, 45.80, 37.24, 24.59, 17.36; FTIR(KBr)  $\bar{\nu}$  cm<sup>-1</sup>: 3246.44, 2984.42, 1627.55, 1534.15, 1510.90, 1349.34, 1167.14, 1130.54, 917.28, 853.18, 737.04; HRMS calculated for C<sub>10</sub>H<sub>15</sub>N<sub>3</sub>O<sub>2</sub> (M+1) 210.1243, found 210.1238.

**N<sub>1</sub>-(4-cyano-2-nitro-phenyl)-propane-1,3-diamine monohydrochloride (6).** Yellow solid, mp 230°C(dec); <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79) δ: 8.58 (1H, d, *J*=1.54Hz), 7.73 (1H, dd, *J*=1.70, 9.13Hz), 7.12 (1H, d, *J*=9.15Hz), 3.58 (2H, t, *J*=6.91Hz), 3.13 (2H, t, *J*=8.01Hz), 2.08 (2H, m); <sup>13</sup>C NMR (d<sub>6</sub>-DMSO) δ: 146.68, 137.58, 131.90, 131.01, 118.22, 115.90, 96.29, 36.06, 29.78, 25.77; FTIR (KBr)  $\bar{\nu}$  cm<sup>-1</sup>: 3364.13, 2929.80, 2222.94, 1625.89, 1561.22, 1524.98, 1410.25, 1364.46, 1261.01, 1176.10, 921.75, 819.69; HRMS calculated for C<sub>10</sub>H<sub>12</sub>N<sub>4</sub>O<sub>2</sub> (M+1) 221.1039, found 221.1040.

**N<sub>1</sub>-(5-methyl-2-nitro-phenyl)-propane-1,3-diamine monohydrochloride (7).** Yellow solid, mp 215°C(dec); <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79) δ: 7.99 (1H, m), 6.83 (1H, s), 6.58 (1H, d, *J*= 6.76 Hz), 3.52 (2H, t, *J*= 6.64 Hz), 3.17 (2H, t, *J*= 7.60 Hz), 2.36 (3H, s), 2.10 (2H, m); <sup>13</sup>C NMR [D<sub>2</sub>O + acetone, acetone (CH<sub>3</sub>):30.60] δ: 150.00, 145.91, 129.12, 126.62, 118.14, 113.71, 39.64, 37.65, 26.59, 21.68; FTIR (KBr) cm<sup>-1</sup>: 2925.75, 1628.10, 1577.27, 1488.41, 1408.98, 1338.69, 1252.10, 1217.79, 1182.52, 1060.46, 752.22; HRMS calculated for C<sub>10</sub>H<sub>15</sub>N<sub>3</sub>O<sub>2</sub> (M+1) 210.1243, found 210.1234.

**N1-(2-nitrophenyl)butane-1,4-diamine hydrochloride (8).** Yellow solid, mp 173-176 °C, <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79, 300 MHz) δ: 8.11 (m, 1H), 7.52 (m, 1H), 7.01 (m, 1H), 6.72 (m, 1H), 3.43 (m, 2H), 3.06 (m, 2H), 1.80 (m, 4H); <sup>13</sup>C NMR [D<sub>2</sub>O+acetone, acetone (CH<sub>3</sub>): 30.60, 75 MHz] δ: 146.12, 137.56, 130.82, 126.69, 116.05, 114.65, 42.20, 39.66, 25.66, 24.84; FTIR (KBr)  $\nu$ : 3381,

2939, 1626, 1573, 1517, 1417, 1358, 1256, 1229, 1159  $\text{cm}^{-1}$ ; HRMS calcd for  $\text{C}_{10}\text{H}_{16}\text{N}_3\text{O}_2$  (M+1) 210.1243, found 210.1237.

**N1-(2-nitro-4-(trifluoromethyl)phenyl)propane-1,3-diamine hydrochloride(9).** Yellow solid, mp 197 °C,  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 300MHz)  $\delta$ =8.51(br, 1H), 8.46(s, 1H), 7.61(d,  $J$ =9.0Hz, 1H), 6.98(d,  $J$ =9.0Hz, 1H), 3.50-3.44(m, 2H), 2.92(t,  $J$ =6.6Hz, 2H), 1.93-1.85(m, 2H), 1.43(s, 2H).  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ):30.60]  $\delta$ =146.96, 132.03, 130.81, 125.48, 124.80(q,  $J$ =34.2Hz), 117.02(q,  $J$ =271.8Hz), 114.53, 41.31, 39.69, 31.95. IR (HCl salt, KBr)  $\nu$ = 3354, 3230, 3040, 2950, 2649, 2576, 1638, 1614, 1573, 1536 $\text{cm}^{-1}$ . HRMS calc.  $\text{C}_{10}\text{H}_{12}\text{F}_3\text{N}_3\text{O}_2$  (M+1) 263.0882. Found: 263.0885.

**N1-(3-aminopropyl)-2-nitrobenzene-1,4-diamine hydrochloride(10).** Yellow solid, mp >260 °C,  $^1\text{H}$  NMR ( $\text{CDCl}_3$ , 300MHz)  $\delta$ = 7.43 (s, 1 H), 7.03 (d,  $J$ = 6.3 Hz, 1 H), 6.82 (d,  $J$ = 6.3 Hz, 1 H), 3.29 (m, 2 H), 2.74-2.68 (m, 2 H), 1.81-1.74 (m, 2 H);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ):30.60]:  $\delta$  = 141.6, 138.3, 132.7, 129.1, 116.5, 111.1, 41.8, 40.4, 33.4. FTIR (KBr)  $\nu$ : 3444.87, 3345.77, 3099.80, 2976.16, 2879.98, 2616.56, 2546.29, 1596.38, 1533.36, 1488.51, 1417.13, 1278.37, 1169.86, HRMS calc.  $\text{C}_9\text{H}_{13}\text{N}_3\text{O}_3$  (M+1) 210.1117. Found: 210.1123.

**4-(3-aminopropylamino)-3-nitrophenol hydrochloride(11).** Yellow solid, mp 231 °C,  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 300 MHz, ppm):  $\delta$  = 7.62 (dd,  $J$  = 9.3, 3.9 Hz, 1 H), 5.96-5.93 (m, 1 H), 5.83 (s, 1 H), 3.18-3.14 (m, 2 H), 3.09-3.04 (m, 2 H), 2.00-1.93 (m, 2 H);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ):30.60]:  $\delta$ = 164.0, 147.9, 129.1, 124.7, 106.6, 96.5, 39.4, 37.3, 25.9. FTIR (KBr)  $\nu$ : 3357.99, 3228.94, 3060.93, 1625.36, 1571.54, 1454.86, 1246.38, 1186.33. HRMS calc.  $\text{C}_9\text{H}_{14}\text{N}_4\text{O}_2$ : 210.1117. Found: 210.1123. HRMS calc.  $\text{C}_9\text{H}_{14}\text{N}_4\text{O}_2$  (M+1) 211.0957. Found: 211.0953.

**N1-(4-(aminomethyl)-2-nitrophenyl)propane-1,3-diamine hydrochloride(12).** Yellow solid, mp >216 °C (dec).  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79, 300 MHz)  $\delta$ : 8.29 (s, 1H), 7.65 (d,  $J$ = 8.98 Hz, 1H), 7.16 (d,  $J$ = 8.98 Hz, 1H), 4.17 (s, 2H), 3.60 (t,  $J$ = 6.83 Hz, 2H), 3.19 (t,  $J$ = 7.54 Hz, 2H), 2.13 (m, 2H);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ):30.60]  $\delta$ : 148.17, 139.99, 133.27, 130.15, 122.36,

117.91, 44.69, 42.13, 39.96, 28.83; FTIR (KBr)  $\nu$ : 3353, 2965, 1644, 1572, 1533, 1509, 1280, 1250, 1170  $\text{cm}^{-1}$ ; HRMS calcd for  $\text{C}_{10}\text{H}_{17}\text{N}_4\text{O}_2$  (M+1) 225.1351, found 225.1347.

**(4-(3-aminopropylamino)-3-nitrophenyl)methanol hydrochloride(13)**. Yellow solid, mp >176 °C (dec).  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79, 300 MHz)  $\delta$ : 8.14 (s, 1H, Ar-H), 7.59 (d,  $J$  = 8.41 Hz, 1H), 7.09 (d,  $J$  = 8.41 Hz, 1H), 4.57 (s, 2H), 3.57 (t,  $J$  = 6.79 Hz, 2H), 3.17 (t,  $J$  = 7.51 Hz, 2H), 2.11 (m, 2H);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ):30.60]  $\delta$ : 145.16, 136.90, 130.68, 128.17, 125.21, 114.90, 62.83, 39.70, 37.52, 26.42; FTIR (KBr)  $\nu$ : 3430, 2922, 1634, 1569, 1529, 1410, 1281, 1260, 1239, 1175  $\text{cm}^{-1}$ ; HRMS calcd for  $\text{C}_{10}\text{H}_{16}\text{N}_3\text{O}_3$  (M+1) 226.1191, found 226.1185

**N1-(4-methoxy-2-nitrophenyl)propane-1,3-diamine hydrochloride(14)**. Red solid, mp 188-190°C.  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79, 300 MHz)  $\delta$ : 7.48 (d,  $J$  = 2.91 Hz, 1H), 7.24 (dd,  $J$  = 3.07 and 9.49 Hz, 1H), 6.97 (d,  $J$  = 9.51 Hz, 1H), 3.79 (s, 3H), 3.49 (t,  $J$  = 6.86 Hz, 2H), 3.14 (t,  $J$  = 7.52 Hz, 2H), 2.07 (m, 2H);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ): 30.60, 75 MHz]  $\delta$ : 149.13, 142.01, 130.21, 128.08, 115.99, 106.60, 55.93, 39.96, 37.63, 26.73; FTIR (KBr)  $\nu$ : 2921, 1621, 1566, 1525, 1402, 1219, 1164, 1059  $\text{cm}^{-1}$ ; HRMS calcd for  $\text{C}_{10}\text{H}_{16}\text{N}_3\text{O}_3$  (M+1) 226.1191, found 226.1189.

**N1-(4-(1-aminoethyl)-2-nitrophenyl)propane-1,3-diamine hydrochloride(15)**. Red solid, mp >260 °C,  $^1\text{H}$  NMR ( $\text{D}_3\text{OD}$ , 300 MHz, ppm):  $\delta$  = 7.93 (s, 1 H), 7.46 (d,  $J$  = 9.0 Hz, 1 H), 6.98 (d,  $J$  = 9.0 Hz, 1 H), 4.32 (q,  $J$  = 6.3 Hz, 1 H), 3.50-3.46 (m, 2 H), 3.17-3.12 (m, 2 H), 2.09-2.04 (m, 2 H), 1.37 (d,  $J$  = 6.3 Hz, 3 H);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ):30.60]  $\delta$  = 149.6, 139.2, 138.0, 134.9, 120.8, 116.7, 52.2, 44.6, 43.2, 36.1, 24.4. FTIR (KBr)  $\nu$ : 3556.84, 3384.45, 3345.68, 2922.36, 1636.43, 1592.95, 1525.09, 1356.12, 1227.72, 1158.39. HRMS calc. for  $\text{C}_{11}\text{H}_{18}\text{N}_4\text{O}_2$  (M+1) 238.1430 Found: 238.1433.

**1-(4-(3-aminopropylamino)-3-nitrophenyl)ethanol hydrochloride(16)**. Yellow solid, mp 131 °C,  $^1\text{H}$  NMR ( $\text{D}_3\text{OD}$ , 300 MHz, ppm):  $\delta$  = 8.08 (s, 1 H), 7.49 (d,  $J$  = 9.0 Hz, 1 H), 6.98 (d,  $J$  = 9.0 Hz, 1 H), 4.72 (q,  $J$  = 6.3 Hz, 1 H), 3.47-3.30 (m, 2 H), 2.78-2.73 (m, 2 H), 1.88-1.79 (m, 2 H), 1.40 (d,  $J$  = 6.3 Hz, 3 H);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O}$  + acetone, acetone ( $\text{CH}_3$ ):30.60]  $\delta$  = 146.8, 136.2, 135.5,

133.0, 124.8, 116.2, 70.4, 42.2, 40.8, 33.7, 25.9. FTIR (KBr)  $\nu$ : 3383.57, 3343.66, 2965.46, 2928.83, 1633.00, 1569.77, 1521.36, 1339.18, 1231.04, 1160.80. HRMS calc. for  $C_{11}H_{17}N_3O_3$  (M+1) 239.1270 Found: 239.1276.

**N1-(4-(3-aminopropylamino)-3-nitrobenzyl)propane-1,3-diamine hydrochloride (17)**

Yellow solid, mp = 179-181 °C (dec).  $^1H$  NMR ( $D_2O$ , 4.79, 300 MHz)  $\delta$ : 8.30 (s, 1H), 7.67 (d,  $J$  = 8.7 Hz, 1H), 7.17 (d,  $J$  = 8.7 Hz, 1H), 4.26 (s, 2H), 3.62-3.57 (m, 2H), 3.27-3.17 (m, 6H), 2.16-2.10 (m, 4H);  $^{13}C$  NMR [ $D_2O$ +acetone, acetone ( $CH_3$ ): 30.60, 75 MHz]  $\delta$ : 145.85, 138.00, 132.83, 128.73, 117.46, 115.38, 50.13, 43.92, 39.51, 37.33, 36.71, 26.19, 23.82; FTIR (KBr)  $\nu$ : 3429, 3374, 3002, 2800, 2062, 1635, 1567, 1534, 1415, 1278, 1178  $cm^{-1}$ ; HRMS calcd for  $C_{13}H_{23}N_5O_2$  (M+1) 281.1852, found 281.1847.

**diethyl 4-(3-aminopropylamino)-3-nitrobenzylphosphonate hydrochloride (18)**

Red solid, mp >205 °C (dec).  $^1H$  NMR ( $D_2O$ , 4.79, 300 MHz)  $\delta$ : 7.94 (s, 1H), 7.40 (d,  $J$  = 8.7 Hz, 1H), 6.97 (d,  $J$  = 8.7 Hz, 1H), 4.04-3.99 (m, 4H), 3.46-3.42 (m, 2H), 3.22 (s, 1H), 3.15 (s, 1H), 3.06-3.01 (m, 4H), 2.01-1.96 (m, 2H), 1.21-1.16 (m, 6H);  $^{13}C$  NMR [ $D_2O$ +acetone, acetone ( $CH_3$ ): 30.60, 75 MHz]  $\delta$ : 144.71, 138.58, 138.52, 130.84, 127.08, 126.98, 118.31, 118.18, 114.98, 63.97, 63.88, 39.59, 37.44, 31.31, 29.50, 26.31, 15.80, 15.72; FTIR (KBr)  $\nu$ : 3428, 3095, 1630, 1566, 1523, 1408, 1353, 1242, 1170, 1023, 970  $cm^{-1}$ ; HRMS calcd for  $C_{14}H_{24}N_3O_5P$  (M+1) 345.1454, found 345.1450.

**N1-(2-nitrophenyl)ethane-1,2-diamine hydrochloride(19)**. Yellow solid, mp >205°C (dec).  $^1H$  NMR ( $D_2O$ , 4.79, 300 MHz)  $\delta$ : 8.15 (d,  $J$  = 8.70 Hz, 1H), 7.60 (m, 1H), 7.04 (d,  $J$  = 8.72 Hz, 1H), 6.81 (m, 1H), 3.79 (t,  $J$  = 5.94 Hz, 2H), 3.34 (t,  $J$  = 5.94 Hz, 2H);  $^{13}C$  NMR [ $D_2O$ +acetone, acetone ( $CH_3$ ): 30.60, 75 MHz]  $\delta$ : 145.11, 137.68, 132.30, 127.13, 116.99, 114.21, 39.86, 38.37; FTIR (KBr)  $\nu$ : 3331, 2903, 1621, 1564, 1511, 1417, 1353, 1257, 1228, 1181, 1141  $cm^{-1}$ ; HRMS calcd for  $C_8H_{12}N_3O_2$  (M+1) 182.0930, found 182.0918.

**N1-(4-nitrophenyl)propane-1,3-diamine hydrochloride(20)**. Yellow solid, mp >167 °C (dec).  $^1H$  NMR ( $D_2O$ , 4.79, 300 MHz)  $\delta$ : 8.03 (d,  $J$  = 8.15 Hz, 2H), 6.65 (d,  $J$  = 8.10 Hz, 2H), 3.36 (t,  $J$  = 6.77 Hz, 2H), 3.14 (t,  $J$  = 7.61 Hz, 2H), 2.03 (m, 2H);  $^{13}C$  NMR [ $D_2O$ +acetone, acetone ( $CH_3$ ):

30.60, 75 MHz]  $\delta$ : 154.99, 136.27, 127.15, 111.40, 39.94, 37.75, 26.51; FTIR (KBr)  $\nu$ : 3260, 2967, 1606, 1542, 1504, 1478, 1336, 1118  $\text{cm}^{-1}$ ; HRMS calcd for  $\text{C}_9\text{H}_{13}\text{N}_3\text{O}_2$  (M+1): 196.1086, found 196.1080.

**3-(2-nitro-phenoxy)-1-propylamine monohydrochloride (21).** Yellow solid, mp 160-162°C;  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79)  $\delta$ : 8.06 (1H, d,  $J = 8.19$  Hz), 7.75 (1H, t,  $J = 8.28$  Hz), 7.34 (1H, d,  $J = 8.51$  Hz), 7.21 (1H, t,  $J = 7.99$  Hz), 4.42 (2H, t,  $J = 5.45$  Hz), 3.34 (2H, t,  $J = 6.40$  Hz), 2.30 (2H, m);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O} + \text{acetone}$ , acetone ( $\text{CH}_3$ ): 30.60]  $\delta$ : 152.26, 138.47, 136.33, 126.42, 121.41, 115.20, 68.13, 38.36, 26.47; FTIR (KBr)  $\text{cm}^{-1}$ : 2957.52, 1612.32, 1581.01, 1525.19, 1398.45, 1339.86, 1271.26, 1254.75, 1167.97, 1059.83, 854.61, 740.78; HRMS Calcd for  $\text{C}_9\text{H}_{12}\text{N}_2\text{O}_3$ : (M+1) 197.0926, found 197.0928.

**3-(4-methyl-2-nitro-phenoxy)-1-propylamine monohydrochloride (22).** Yellow solid, mp 158-160°C;  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79)  $\delta$ : 7.85 (1H, t,  $J = 1.5$  Hz), 7.55 (1H, tt,  $J = 1.64, 6.33$  Hz), 7.20 (1H, d,  $J = 8.66$  Hz), 4.36 (2H, t,  $J = 5.53$  Hz), 3.34 (2H, t,  $J = 6.52$  Hz), 2.36 (3H, s), 2.28 (2H, m);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O} + \text{acetone}$ , acetone ( $\text{CH}_3$ ): 30.60]  $\delta$ : 150.21, 138.38, 136.71, 131.59, 126.03, 115.31, 68.03, 38.19, 26.65, 19.61; FTIR (KBr)  $\text{cm}^{-1}$ : 2952.95, 1628.51, 1572.03, 1533.89, 1399.08, 1340.97, 1265.53, 1249.95, 1162.89, 1060.92, 910.02809.57, 792.09; HRMS calculated for  $\text{C}_{10}\text{H}_{14}\text{N}_2\text{O}_3$ : (M+1) 211.1083, found 211.1076.

**3-(4-methoxy-2-nitro-phenoxy)-1-propylamine monohydrochloride (23).** Yellow solid, mp 154-156°C;  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79)  $\delta$ : 7.45 (1H, d,  $J = 2.94$  Hz), 7.22-7.06 (2H, m), 4.22 (2H, t,  $J = 5.58$  Hz), 3.75 (3H, s), 3.21 (2H, t,  $J = 6.39$  Hz), 2.15 (2H, m);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O} + \text{acetone}$ , acetone ( $\text{CH}_3$ ): 30.60]  $\delta$ : 152.86, 146.75, 138.38, 122.40, 116.89, 110.63, 68.59, 56.38, 38.30, 26.62; FTIR (KBr)  $\text{cm}^{-1}$ : 2950.19, 1576.28, 1342.42, 1286.70, 1265.19, 1222.72, 1157.96, 1059.63, 1040.04, 871.77, 823.40, 792.10; HRMS calculated for  $\text{C}_{10}\text{H}_{14}\text{N}_2\text{O}_4$ : (M+1) 227.1032, found 227.1027.

**3-(4-chloro-2-nitro-phenoxy)-1-propylamine monohydrochloride (24).** Yellow solid, mp 184-186°C;  $^1\text{H}$  NMR ( $\text{D}_2\text{O}$ , 4.79)  $\delta$ : 8.11 (1H, t,  $J = 2.61$  Hz), 7.76-7.71 (1H, m), 7.34-7.30 (1H, m, 6-Ar-H), 4.40 (2H, t,  $J = 5.49$  Hz), 3.32 (2H, t,  $J = 6.51$  Hz), 2.29 (2H, m);  $^{13}\text{C}$  NMR [ $\text{D}_2\text{O} +$

acetone, acetone (CH<sub>3</sub>): 30.60]  $\delta$ : 151.22, 138.67, 135.78, 125.94, 125.54, 116.83, 68.47, 38.20, 26.48; FTIR (KBr) cm<sup>-1</sup>: 2970.91, 1614.90, 1530.26, 1343.08, 1291.04, 1266.11, 1161.89, 1063.10, 883.30, 818.43; HRMS calculated for C<sub>9</sub>H<sub>11</sub>ClN<sub>2</sub>O<sub>3</sub>: (M+1) 231.0536, found 231.0528.

**3-(5-methyl-2-nitro-phenoxy)-1-propylamine monohydrochloride (25).** Yellow solid, mp 211-213°C; <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79)  $\delta$ : 7.93 (1H, d, *J* = 8.39Hz), 7.11 (1H, s), 6.96 (1H, d, *J* = 8.28 Hz), 4.34 (2H, t, *J* = 5.20 Hz), 3.30 (2H, t, *J* = 5.69 Hz), 2.41 (3H, s), 2.24 (2H, m); <sup>13</sup>C NMR [D<sub>2</sub>O + acetone, acetone (CH<sub>3</sub>): 30.60]  $\delta$ : 152.83, 149.43, 135.89, 126.90, 122.39, 115.66, 68.53, 38.83, 26.71, 21.74; FTIR (KBr) cm<sup>-1</sup>: 2954.26, 1611.32, 1589.03, 1513.38, 1341.30, 1272.89, 1182.24, 1059.49, 897.54, 817.55; HRMS Calcd for C<sub>10</sub>H<sub>14</sub>N<sub>2</sub>O<sub>3</sub>: (M+1) 211.1083, found 211.1080.

**(4-(3-aminopropoxy)-3-nitrophenyl)methanol hydrochloride (26)**

Yellow solid, mp = 169 - 171°C (dec). <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79, 300 MHz)  $\delta$ : 7.94 (s, 1H), 7.66 (d, *J* = 8.4 Hz, 1H), 7.30 (d, *J* = 8.4 Hz, 1H), 4.62 (s, 2H), 4.31-4.37 (m, 2H), 2.91-2.87 (m, 2H), 2.05-1.98 (m, 2H); <sup>13</sup>C NMR [D<sub>2</sub>O+acetone, acetone (CH<sub>3</sub>): 30.60, 75 MHz]  $\delta$ : 151.46, 137.95, 134.82, 133.45, 124.95, 115.14, 68.13, 62.35, 38.17, 26.07; FTIR (KBr)  $\nu$ : 3419, 2924, 1687, 1624, 1530, 1346, 1276, 1162, 1068 cm<sup>-1</sup>; HRMS calcd for C<sub>10</sub>H<sub>14</sub>N<sub>2</sub>O<sub>4</sub> (M+1) 226.0954, found 226.0947.

**3-(4-tert-butyl-2-nitrophenoxy)propan-1-amine hydrochloride(27)**

Yellow solid, mp = 187 - 189 °C. <sup>1</sup>H NMR (D<sub>2</sub>O, 4.79, 300 MHz)  $\delta$ : 7.76 (s, 1H), 7.65 (d, *J* = 8.7 Hz, 1H), 7.17 (d, *J* = 8.7 Hz, 1H), 4.26 (t, *J* = 5.7 Hz, 2H), 3.30 (t, *J* = 6.9 Hz, 2H), 2.27-2.23 (m, 2H), 1.16 (s, 9H); <sup>13</sup>C NMR [D<sub>2</sub>O+acetone, acetone (CH<sub>3</sub>): 30.60, 75 MHz]  $\delta$ : 150.06, 143.68, 13.62, 132.93, 122.14, 114.92, 67.68, 37.70, 33.71, 30.53, 26.35; FTIR (KBr)  $\nu$ : 3436, 2960, 1619, 1529, 1350, 1269, 1172, 899 cm<sup>-1</sup>; HRMS calcd for C<sub>13</sub>H<sub>20</sub>N<sub>2</sub>O<sub>3</sub> (M+1) 252.1474, found 252.1469.