

**Supplementary Material: Is it the appropriate syringe filter? The loss of PPCPs during filtration by syringe filter**

**Supplementary Table 1. Therapeutic classes, and physical, chemical properties of investigated compounds**

| <b>Compounds</b>    | <b>Abbreviation</b> | <b>Molar mass</b> | <b>Log <math>K_{ow}</math> <sup>a, b</sup></b> | <b>pKa <sup>a, b</sup></b> | <b>Water solubility (mg/L) <sup>a, b</sup></b> |
|---------------------|---------------------|-------------------|--|----------------------------|--|
| Macrolides (MAs)    |                     |                   |  |                            |  |
| Azithromycin        | ATM                 | 749.99            | 4.02   | 8.74                       | 2.37 (25°C)                                    |
| Clarithromycin      | CTM                 | 747.96            | 3.16   | 8.99                       | 1.693 (25°C)                                   |
| Anhydroerythromycin | ETM                 | 715.92            |  |                            |  |
| A                   |                     |                   |  |                            |  |
| Leucomycin          | LEM                 | 786               |  |                            |  |
| Roxithromycin       | RTM                 | 837.05            | 2.75   |                            |  |
| Tylosin             | TYL                 | 916.1             | 1.63   | 7.73                       | 5E + 03 (25°C)                                 |
| Quinolones (QLs)    |                     |                   |  |                            |  |
| Flumequine          | FQ                  | 261.25            | 1.6  | 6.5                        | 2.19E+03 (25°C)                                |
| Oxolinic Acid       | OA                  | 261.23            | 0.94   | 6.87                       |  |
| Clinafloxacin       | CLX                 | 365.79            |  |                            |  |
| Ciprofloxacin       | CPX                 | 392.40            | 0.28   | 6.09, 8.74                 | 3E + 04  |
| Cinoxacin           | CIX                 | 262.22            | 1.396  | 4.7                        | 36.7   |
| Difloxacin          | DIX                 | 357.4             |  |                            |  |
| Enrofloxacin        | EFX                 | 399.39            | 0.89   |                            |  |
| Lomefloxacin        | LFX                 | 359.4             | 0.7  |                            |  |
| Marbofloxacin       | MAX                 | 351.4             | -0.3   |                            |  |
| Norfloxacin         | NFX                 | 362.36            | 0.46   | 6.34, 8.75                 | 280 (25°C)                                     |
| Pefloxacin          | PFX                 | 361.4             | -0.39  |                            |  |
| Sarafloxacin        | SFX                 | 333.4             | 0.27   | 5.6, 8.2                   | 1.14E + 03 (25°C)                              |

|                     |     |        |       |               |                      |
|---------------------|-----|--------|-------|---------------|----------------------|
| Sparfloxacin        | SPX | 385.4  | 1.07  |               |                      |
| Sulfonamides (SAs)  |     |        |       |               |                      |
| Sulfaclozina        | SC  | 284.73 |       |               |                      |
| Sulfadiazine        | SD  | 250.3  | -0.09 | 6.36          |                      |
| Sulfadimethoxine    | SDM | 310.3  | 1.63  |               |                      |
| Sulfameter          | SF  | 280.31 | 0.41  |               |                      |
| Sulfaguanidine      | SG  | 214.24 | -1.22 | 11.25         |                      |
| Sulfisomidine       | SIM | 300.34 | 1.68  |               |                      |
| Sulfisoxazole       | SIX | 278.33 | -0.33 | 5             | 300 (37°C)           |
| Sulfamerazine       | SMR | 280.3  | 0.32  | 6.7           |                      |
| Sulfamethazine      | SMT | 264.3  | 0.14  | 7.59          | 1.5E + 03<br>(29°C)  |
| Sulfamethoxazole    | SMX | 278.3  | 0.89  | 7.59          |                      |
| Sulfamethizole      | SMZ | 253.3  | 0.89  |               | 105 (37°C)           |
| Sulfaphenazole      | SPZ | 270.34 | 0.54  |               |                      |
| Sulfathiazole       | STZ | 255.3  | 0.05  | 7.2           | 373 (25°C)           |
| Tetracyclines (TCs) |     |        |       |               |                      |
| Chlortetracycline   | CTC | 478.9  | -0.62 | 3.3           |                      |
| Demeclocycline      | DMC | 464.86 | -1.14 |               | 1.52E + 03<br>(21°C) |
| Doxycycline         | DTC | 444.4  | -0.02 | 3.09          |                      |
| Oxytetracycline     | OTC | 460.4  | -0.9  | 3.27          | 313 (25°C)           |
| Tetracycline        | TC  | 444.4  | -1.37 | 3.3           | 231 (25°C)           |
| Non-antibiotics     |     |        |       |               |                      |
| Salbutamol          | SAL | 239.31 | 0.64  | 10.3          | 1.43E + 04           |
| Albendazole         | ABZ | 265.33 | 3.14  | 6.9           | 41 (25°C)            |
| Fenbendazole        | FBZ | 299.35 | 3.85  |               |                      |
| Gliclazide          | GLI | 494.01 | 4.79  | 4.07,<br>1.38 |                      |
| Glyburide           | GLY | 323.41 | 2.12  | 2.06          |                      |
| Tolbutamide         | TOL | 270.35 | 2.34  | 5.16          | 109 (37°C)           |
| Atenolol            | ATE | 266.34 | 0.16  | 9.67,         | 1.33E + 04           |

|                              |      |        |       |      |                      |
|------------------------------|------|--------|-------|------|----------------------|
|                              |      |        |       | 14.1 | (25°C)               |
| Bezafibrate                  | BF   | 361.82 | 4.25  |      |                      |
| Gemfibrozil                  | GF   | 250.34 | 4.77  | 4.5  | 11 (25°C)            |
| Cimetidine                   | CIM  | 252.34 | 0.4   | 6.8  | 9.38E + 03<br>(25°C) |
| Carbamazepine                | CBZ  | 236.28 | 2.45  | 13.9 | 18 (25°C)            |
| Warfarin                     | WAR  | 308.33 | 2.70  | 5.87 | 17 (25°C)            |
| Theophylline                 | THP  | 180.17 | -0.02 | 8.81 | 7.36E + 03           |
| Fluoxetine                   | FLU  | 309.33 | 4.6   | 10.1 |                      |
| Sulpiride                    | SP   | 341.43 | 0.57  | 9.12 | 2.28E + 03           |
| N, N-diethyl-m-<br>toluamide | DEET | 191.27 | 2.18  |      | 9.12E + 02           |
| Acetaminophen                | ACE  | 151.16 | 0.46  | 9.38 | 1.0E + 05            |
| Diclofenac                   | DF   | 296.16 | 4.51  | 4.15 | 2.37 (25°C)          |
| Caffeine                     | CF   | 194.19 | -0.07 | 10.4 | 2.16E + 04           |
| Crotamiton                   | CRO  | 203.28 | 2.73  |      | 17.7                 |

<sup>a</sup>From databases of PubChem compound. Available from:

<https://pubchem.ncbi.nlm.nih.gov/> [Last accessed on 30 Mar 2022]

<sup>b</sup>From databases of University of Hertfordshire pesticide properties.

Available from: <http://sitem.herts.ac.uk/aeru/ppdb/en/index.htm> [Last accessed on 30 Mar 2022]

### Supplementary Table 2. MS parameters of investigated compounds and internal standard (IS)

| Compounds | ISTD Group | m/z (1) | m/z (2)    | Retention Time (min) | Ref.(1) m/z (1) | Ref.(1) m/z (2) |
|-----------|------------|---------|------------|----------------------|-----------------|-----------------|
| OFX-6D    | 1          | 365.1   | 321.2      | 3.06                 | 365.1           | 261.1           |
| MAX       | 1          | 363.1   | 72.1       | 2.988                | 363.1           | 345.1           |
| PFX       | 1          | 334.1   | 316.1<br>5 | 3.08                 | 334.1           | 290.15          |
| SPX       | 1          | 393.1   | 352.1      | 3.171                | 393.1           | 265.1           |
| LFX       | 1          | 352.1   | 265.1      | 3.168                | 352.1           | 334.1           |

| <b>Compounds</b> | <b>ISTD Group</b> | <b>m/z (1)</b> | <b>m/z (2)</b> | <b>Retention Time (min)</b> | <b>Ref.(1) m/z (1)</b> | <b>Ref.(1) m/z (2)</b> |
|------------------|-------------------|----------------|----------------|-----------------------------|------------------------|------------------------|
|                  |                   |                | 5              |                             |                        |                        |
| EFX              | 1                 | 360.1          | 316.2          | 3.218                       | 360.1                  | 342.15                 |
| DIX              | 1                 | 400.0          | 382.0          | 3.42                        | 400.05                 | 356.1                  |
|                  |                   | 5              | 5              |                             |                        |                        |
| CIP-13C          | 2                 | 336.1          | 235            | 3.094                       | 336.1                  | 235                    |
| CPX              | 2                 | 332.0          | 231.1          | 3.094                       | 332.05                 | 231.1                  |
|                  |                   | 5              |                |                             |                        |                        |
| NFX              | 2                 | 320.1          | 302.1          | 3.048                       | 320.1                  | 231                    |
| CLX              | 2                 | 366.0          | 305.0          | 3.327                       | 366.05                 | 348.1                  |
|                  |                   | 5              | 5              |                             |                        |                        |
| SFX              | 2                 | 386.1          | 368.0          | 3.386                       | 386.1                  | 299.1                  |
|                  |                   |                | 5              |                             |                        |                        |
| TC-6D            | 3                 | 451.1          | 416.1          | 3.187                       | 451.1                  | 433.1                  |
|                  |                   |                | 5              |                             |                        |                        |
| TC               | 3                 | 445.1          | 410.1          | 3.201                       | 445.1                  | 154.15                 |
| OTC              | 3                 | 461.0          | 426.1          | 3.07                        | 461.05                 | 443.1                  |
|                  |                   | 5              |                |                             |                        |                        |
| DTC              | 3                 | 445.1          | 410.0          | 3.196                       | 445.1                  | 154.1                  |
|                  |                   |                | 5              |                             |                        |                        |
| DMC              | 3                 | 465            | 448            | 3.376                       | 465                    | 430                    |
| CTC              | 3                 | 479            | 444            | 3.577                       | 479                    | 154                    |
| OA               | 3                 | 262            | 244.0          | 4.218                       | 262                    | 216.05                 |
|                  |                   |                | 5              |                             |                        |                        |
| CIX              | 3                 | 262.9          | 245.0          | 4.216                       | 262.95                 | 217.1                  |
|                  |                   | 5              | 5              |                             |                        |                        |
| FQ               | 3                 | 262            | 244.0          | 4.838                       | 262                    | 202.05                 |
|                  |                   |                | 5              |                             |                        |                        |
| SMN-13C          | 4                 | 285.0          | 186.0          | 3.478                       | 285.05                 | 98.05                  |
|                  |                   | 5              | 5              |                             |                        |                        |
| SG               | 4                 | 215            | 92             | 1.2                         | 215                    | 156                    |
| SIM              | 4                 | 279.0          | 124.1          | 2.568                       | 279.05                 | 186.05                 |

| <b>Compounds</b> | <b>ISTD Group</b> | <b>m/z (1)</b> | <b>m/z (2)</b> | <b>Retention Time (min)</b> | <b>Ref.(1) m/z (1)</b> | <b>Ref.(1) m/z (2)</b> |
|------------------|-------------------|----------------|----------------|-----------------------------|------------------------|------------------------|
|                  |                   | 5              |                |                             |                        |                        |
| SMT              | 4                 | 279.0<br>5     | 124.1          | 2.568                       | 279.05                 | 186.05                 |
| SD               | 4                 | 251.1          | 156            | 2.895                       | 251.1                  | 92                     |
| STZ              | 4                 | 256.0<br>5     | 156.0<br>5     | 3.019                       | 256.05                 | 91.95                  |
| SMR              | 4                 | 265            | 156            | 3.245                       | 265                    | 108.05                 |
| SIX              | 4                 | 268.1          | 116.1<br>5     | 3.34                        | 268.1                  | 191.05                 |
| SMZ              | 4                 | 270.9<br>5     | 156.0<br>5     | 3.461                       | 270.95                 | 91.95                  |
| SF               | 4                 | 281            | 156.0<br>5     | 3.521                       | 281                    | 92                     |
| SMX              | 4                 | 254.0<br>5     | 91.95          | 3.982                       | 254.05                 | 156                    |
| SC               | 4                 | 284.9          | 156.0<br>5     | 3.841                       | 284.9                  | 92.05                  |
| SDM              | 4                 | 311            | 156            | 4.373                       | 311                    | 91.95                  |
| SPZ              | 4                 | 315.0<br>5     | 158.1          | 4.448                       | 315.05                 | 160.2                  |
| CP-5D            | 5                 | 326.1          | 261.1<br>5     | 4.122                       | 326.1                  | 261.15                 |
| PNT-13C          | 6                 | 181.0<br>5     | 110.0<br>5     | 4.199                       | 181.05                 | 139.15                 |
| SAL              | 6                 | 240.1          | 148.1          | 2.098                       | 240.1                  | 222.15                 |
| SP               | 6                 | 342.1          | 112.1<br>5     | 2.359                       | 342.1                  | 214.05                 |
| CF               | 6                 | 195.1          | 138.0<br>5     | 2.973                       | 195.1                  | 110.1                  |
| TOL              | 6                 | 271            | 156.0<br>5     | 3.466                       | 271                    | 92                     |

| <b>Compou<br/>nds</b> | <b>ISTD<br/>Group</b> | <b>m/z<br/>(1)</b> | <b>m/z<br/>(2)</b> | <b>Retention Time<br/>(min)</b> | <b>Ref.(1)<br/>m/z (1)</b> | <b>Ref.(1) m/z<br/>(2)</b> |
|-----------------------|-----------------------|--------------------|--------------------|---------------------------------|----------------------------|----------------------------|
| DIL                   | 6                     | 415.1              | 178.1              | 4.064                           | 415.1                      | 150.05                     |
| FLU                   | 6                     | 310.0<br>5         | 44.05              | 4.404                           | 310.05                     | 148.1                      |
| CRO                   | 6                     | 204.1              | 69.05              | 5.603                           | 204.1                      | 136.2                      |
| ROX-7D                | 7                     | 845.5              | 158.1              | 4.418                           | 845.5                      | 687.4                      |
| ATM                   | 7                     | 749.4              | 591.3              | 3.357                           | 749.4                      | 158.05                     |
| TYL                   | 7                     | 916.4<br>5         | 174                | 4.121                           | 916.45                     | 772.6                      |
| ETM                   | 7                     | 716.4              | 158.0<br>5         | 4.256                           | 716.4                      | 558.3                      |
| LEM                   | 7                     | 772.4              | 174.0<br>5         | 4.328                           | 772.4                      | 174.05                     |
| CTM                   | 7                     | 748.4              | 158.1              | 4.382                           | 748.4                      | 590.3                      |
| RTM                   | 7                     | 204.1              | 69.1               | 5.599                           | 204.1                      | 136.2                      |
| FBZ-3D                | 8                     | 304.1              | 269                | 4.968                           | 304.1                      | 160                        |
| FBZ                   | 8                     | 300                | 268                | 4.977                           | 300                        | 159.05                     |
| ABZ                   | 8                     | 266                | 234.0<br>5         | 4.364                           | 266                        | 191                        |
| ATZ-5D                | 9                     | 221.0<br>5         | 179.1              | 5.19                            | 221.05                     | 101.05                     |
| CIM                   | 9                     | 253.0<br>5         | 95                 | 2.177                           | 253.05                     | 159.1                      |
| ATE                   | 9                     | 267.1              | 145.0<br>5         | 2.168                           | 267.1                      | 190.05                     |
| ACE                   | 9                     | 152                | 110.0<br>5         | 2.441                           | 152                        | 65                         |
| THP                   | 9                     | 179.1              | 164.2              | 2.513                           | 179.1                      | 122.05                     |
| GLY                   | 9                     | 494.2              | 192.0<br>5         | 4.318                           | 494.2                      | 119                        |
| CBZ                   | 9                     | 237                | 194.1              | 4.669                           | 237                        | 192.1                      |
| GLI                   | 9                     | 324.0              | 127.1              | 5.593                           | 324.05                     | 110.1                      |

| Compounds | ISTD Group | m/z (1)    | m/z (2)    | Retention Time (min) | Ref.(1) m/z (1) | Ref.(1) m/z (2) |
|-----------|------------|------------|------------|----------------------|-----------------|-----------------|
|           |            | 5          | 5          |                      |                 |                 |
| WAR       | 9          | 309.0<br>5 | 163        | 5.677                | 309.05          | 251.05          |
| DEET-D7   | 10         | 199.1      | 126.1<br>5 | 5.201                | 199.1           | 98.1            |
| DEET      | 10         | 192.0<br>5 | 119.0<br>5 | 5.201                | 192.05          | 100.05          |
| MCPPP-3D  | 11         | 216.1      | 144.1      | 5.487                | 216.1           | 108.15          |
| BF        | 11         | 360.1      | 274.2      | 5.396                | 360.1           | 154.15          |
| DF        | 11         | 294        | 250.1<br>5 | 6.029                | 294             | 214.3           |

**Supplementary Table 3. Instrumental parameters adopted for UHPLC-ESI-MS/MS**

| Items              | Parameters   |
|--------------------|--|
| Column             | Shim-pack GIST UHPLC C18 column (2.1 × 100 mm, 2 μm particle size, SHIMADZU)                   |
| Column temperature | 40 °C  |
| Mobile phases      | A: 0.1% formic acid in Milli-Q water; B: 0.1% formic acid in acetonitrile (ACN)                |
| Flow rate          | 0.4 mL/min   |
| Elution gradient   | 0 min (5% B) → 0.5 min (5% B) → 7 min (95% B) → 9 min (95% B) → 9.1 min (5% B) → 12 min (5% B) |
| Injection volume   | 2 μL   |

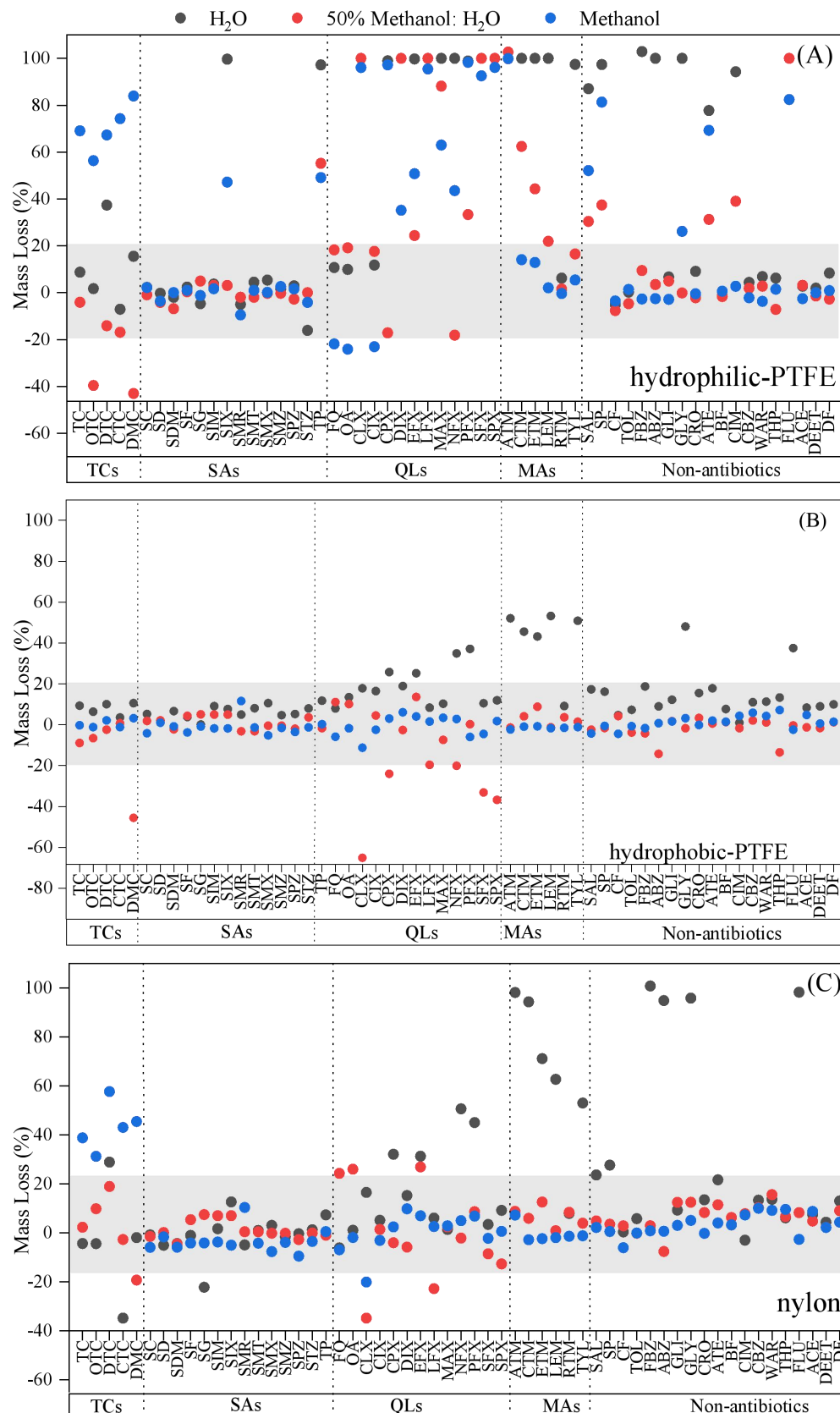
**Supplementary Table 4. Limit of detection (LOD) and limit of quantity (LOQ) of investigated compounds**

| Compounds        | Abbreviation | LOD (μg/L) | LOQ (μg/L) |
|------------------|--------------|------------|------------|
| Macrolides (MAs) |              |            |            |

|                     |     |      |      |
|---------------------|-----|------|------|
| Azithromycin        | ATM | 0.35 | 1.39 |
| Clarithromycin      | CTM | 0.07 | 0.28 |
| Anhydroerythromycin | ETM | 0.20 | 0.79 |
| A                   |     |      |      |
| Leucomycin          | LEM | 0.13 | 0.51 |
| Roxithromycin       | RTM | 0.06 | 0.23 |
| Tylosin             | TYL | 1.16 | 4.65 |
| Quinolones (QLs)    |     |      |      |
| Flumequine          | FQ  | 0.13 | 0.54 |
| Oxolinic Acid       | OA  | 0.10 | 0.40 |
| Clinafloxacin       | CLX | 0.29 | 1.15 |
| Ciprofloxacin       | CPX | 0.41 | 1.65 |
| Cinoxacin           | CIX | 0.36 | 1.45 |
| Difloxacin          | DIX | 0.44 | 1.74 |
| Enrofloxacin        | EFX | 0.27 | 1.10 |
| Lomefloxacin        | LFX | 0.43 | 1.73 |
| Marbofloxacin       | MAX | 0.26 | 1.03 |
| Norfloxacin         | NFX | 0.55 | 2.20 |
| Pefloxacin          | PFX | 0.39 | 1.54 |
| Sarafloxacin        | SFX | 0.82 | 3.27 |
| Sparfloxacin        | SPX | 0.23 | 0.92 |
| Sulfonamides (SAs)  |     |      |      |
| Sulfaclozina        | SC  | 0.20 | 0.81 |
| Sulfadiazine        | SD  | 0.40 | 1.61 |
| Sulfadimethoxine    | SDM | 0.14 | 0.55 |
| Sulfameter          | SF  | 0.13 | 0.51 |
| Sulfaguanidine      | SG  | 0.12 | 0.48 |
| Sulfisomidine       | SIM | 0.17 | 0.69 |
| Sulfisoxazole       | SIX | 0.12 | 0.47 |
| Sulfamerazine       | SMR | 0.29 | 1.16 |
| Sulfamethazine      | SMT | 0.11 | 0.44 |
| Sulfamethoxazole    | SMX | 0.13 | 0.52 |
| Sulfamethizole      | SMZ | 0.20 | 0.82 |



|                              |      |      |      |
|------------------------------|------|------|------|
| Sulfaphenazole               | SPZ  | 0.13 | 0.54 |
| Sulfathiazole                | STZ  | 0.32 | 1.29 |
| Tetracyclines (TCs)          |      |      |      |
| Chlortetracycline            | CTC  | 1.06 | 4.26 |
| Demeclocycline               | DMC  | 0.39 | 1.58 |
| Doxycycline                  | DTC  | 0.32 | 1.30 |
| Oxytetracycline              | OTC  | 0.31 | 1.22 |
| Tetracycline                 | TC   | 0.30 | 1.19 |
| Non-antibiotics              |      |      |      |
| Salbutamol                   | SAL  | 0.05 | 0.19 |
| Albendazole                  | ABZ  | 0.06 | 0.23 |
| Fenbendazole                 | FBZ  | 0.22 | 0.88 |
| Gliclazide                   | GLI  | 0.07 | 0.26 |
| Glyburide                    | GLY  | 0.07 | 0.27 |
| Tolbutamide                  | TOL  | 0.21 | 0.86 |
| Atenolol                     | ATE  | 0.11 | 0.44 |
| Bezafibrate                  | BF   | 0.12 | 0.46 |
| Gemfibrozil                  | GF   | 0.13 | 0.50 |
| Cimetidine                   | CIM  | 0.11 | 0.43 |
| Carbamazepine                | CBZ  | 0.10 | 0.38 |
| Warfarin                     | WAR  | 0.09 | 0.35 |
| Theophylline                 | THP  | 0.25 | 1.01 |
| Fluoxetine                   | FLU  | 0.08 | 0.32 |
| Sulpiride                    | SP   | 0.04 | 0.17 |
| N, N-diethyl-m-<br>toluamide | DEET | 0.17 | 0.67 |
| Acetaminophen                | ACE  | 0.19 | 0.78 |
| Diclofenac                   | DF   | 0.31 | 1.22 |
| Caffeine                     | CF   | 0.45 | 1.82 |
| Crotamiton                   | CRO  | 0.06 | 0.24 |



**Supplementary Figure 1.** Mass losses (%) of different PPCPs after filtration in different matrix system.