Table 1. Physical and chemical characteristics of soils used in this study (n = 3)

| **Parameters** | **Coal gas plant soil (G)** | **Coal plant soil (C)** |
| --- | --- | --- |
| pH | 7.41±0.13 | 7.57±0.16 |
| TOC / % | 0.27±0.05 | 2.29±0.56 |
| Depth of soil | 20-25 cm | 20-25 cm |
| Texture classification | Loam | Sandy loam |
| NAP / mg·kg−1 | 16.9±9.6 | 16.4±3.96 |
| ANY / mg·kg−1 | 15.2±2.1 | 14.69±8.8 |
| ANE / mg·kg−1 | 39.6±5.5 | 101.98±6.8 |
| FLE / mg·kg−1 | 26.3±5.5 | 75.2±6.49 |
| PHE / mg·kg−1 | 28.1±5.4 | 51.1±16.7 |
| ANT / mg·kg−1 | 18.2±6.0 | 29.18±7.76 |
| FLA / mg·kg−1 | 18.5±6.9 | 34.29±12.6 |
| PYR / mg·kg−1 | 15.3±3.6 | 17.29±3.7 |
| BaA / mg·kg−1 | 12.7±5.5 | 11.1±1.58 |
| CHR / mg·kg−1 | 15.0±6.6 | 9.2±1.1 |
| BbF / mg·kg−1 | 10.8±4.0 | 9.37±1.1 |
| BkF / mg·kg−1 | 9.7±2.6 | 6.4±3.1 |
| BaP / mg·kg−1 | 12.0±3.0 | 5.8±2.9 |
| I(cd)P / mg·kg−1 | 7.7±4.0 | 1.3±0.3 |
| D(ah)A / mg·kg−1 | 7.5±3.1 | 1.0±0.3 |
| B(ghi)P / mg·kg−1 | 10.1±8.8 | 0.9±0.1 |
| Σ16 PAHs / mg·kg−1 | 263.6±73.3 | 385.2±39.6 |

Table 2. Removal efficiency of coal gas plant soil (G) of PAHs for different chemical oxidants (%)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Fenton-CK | Fenton-Nutrition | M-Fenton-CK | M-Fenton-Nutrition | KMnO4-CK | KMnO4-Nutrition | A-PS-CK | A-PS- Nutrition |
| NAP | 51.0±5.6 | 94.9±3.7 | 83.6±4.5 | 99.6±0.6 | 87.6±2.5 | 90.1±2.7 | 89.0±2.6 | 97.7±3.7 |
| ANY | 49.7±2.0 | 93.0±4.2 | 79.0±4.1 | 97.0±4.4 | 86.1±2.5 | 87.8±2.6 | 97.2±2.1 | 97.1±5.0 |
| ANE | 55.7±1.8 | 85.5±1.4 | 80.7±2.3 | 89.4±1.8 | 85.9±1.2 | 88.7±1.8 | 97.4±2.1 | 97.4±4.1 |
| FLE | 55.3±4.5 | 77.5±2.3 | 81.3±3.2 | 90.1±1.0 | 85.8±1.2 | 88.1±1.2 | 91.8±2.2 | 94.6±1.7 |
| PHE | 65.3±5.4 | 69.0±8.6 | 73.2±1.9 | 93.6±2.9 | 88.1±7.2 | 84.5±6.3 | 91.1±2.3 | 95.4±0.6 |
| ANT | 78.1±5.3 | 93.8±5.8 | 84.9±3.0 | 89.3±4.2 | 93.8±3.6 | 93.7±3.6 | 85.4±3.0 | 93.0±2.1 |
| FLA | 74.3±3.9 | 81.7±3.9 | 76.6±4.2 | 92.4±1.6 | 96.6±1.0 | 95.7±0.6 | 92.8±3.0 | 95.3±1.5 |
| PYR | 73.4±3.0 | 77.7±5.8 | 86.1±1.1 | 96.6±2.6 | 95.0±2.8 | 95.0±2.2 | 87.3±4.0 | 94.5±2.2 |
| BaA | 58.5±5.4 | 58.9±6.3 | 81.8±3.3 | 95.2±3.6 | 96.7±1.6 | 94.4±2.6 | 84.1±4.4 | 89.0±0.5 |
| CHR | 59.0±5.8 | 46.5±11.3 | 75.0±5.5 | 90.9±6.5 | 93.0±1.5 | 92.5±2.5 | 85.3±4.5 | 87.1±3.7 |
| BbF | 63.7±4.3 | 65.0±11.8 | 79.0±2.0 | 93.5±5.2 | 91.9±0.9 | 92.9±1.4 | 88.6±4.2 | 86.2±2.2 |
| BkF | 74.7±2.5 | 64.4±11.1 | 83.56±2.0 | 88.0±7.5 | 94.1±0.9 | 96.5±0.3 | 90.06±4.0 | 84.0±2.6 |
| BaP | 67.5±4.2 | 65.9±1.6 | 76.9±2.4 | 82.8±3.9 | 95.4±0.5 | 95.6±1.0 | 88.1±3.7 | 89.9±1.8 |
| I(cd)P | 75.8±2.7 | 69.4±3.0 | 77.5±2.7 | 85.8±0.4 | 93.9±2.0 | 96.9±0.2 | 87.1±3.6 | 86.4±0.2 |
| D(ah)A | 79.6±3.8 | 70.8±2.0 | 85.3±1.9 | 85.2±3.8 | 97.1±2.3 | 98.3±1.3 | 90.0±3.5 | 94.0±2.1 |
| B(ghi)P | 85.5±3.0 | 83.9±0.5 | 91.3±2.2 | 87.2±2.2 | 99.3±0.7 | 99.6±0.3 | 98.5±3.7 | 99.7±0.2 |

Note: “CK” means treated with sterile water.

Table 3. Removal efficiency of coking plant soil (C) of PAHs for different chemical oxidants (%)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Fenton-CK | Fenton-Nutrition | M-Fenton-CK | M-Fenton-Nutrition | KMnO4-CK | KMnO4-Nutrition | A-PS-CK | A-PS- Nutrition |
| NAP | 48.7±6.6 | 95.2±2.5 | 65.1±1.7 | 98.3±1.6 | 90.9±4.6 | 88.8±4.1 | 98.2±5.2 | 99.6±0.1 |
| ANY | 45.0±5.5 | 90.3±5.1 | 61.5±5.1 | 90.1±2.9 | 87.8±3.4 | 88.3±2.5 | 80.9±11.0 | 93.5±3.1 |
| ANE | 56.4±2.5 | 90.5±0.6 | 65.3±6.3 | 93.8±0.9 | 90.0±3.5 | 92.4±3.4 | 80.6±7.2 | 96.6±0.7 |
| FLE | 60.4±3.0 | 89.2±0.5 | 66.0±7.6 | 93.4±1.4 | 93.6±2.8 | 96.4±1.7 | 84.2±7.4 | 96.9±1.3 |
| PHE | 60.6±4.3 | 80.1±3.1 | 74.4±5.7 | 91.5±3.2 | 97.8±3.2 | 90.3±2.5 | 84.6±4.4 | 97.1±0.5 |
| ANT | 70.0±3.8 | 60.6±2.6 | 75.8±3.0 | 91.1±3.0 | 93.7±1.2 | 95.3±0.9 | 78.0±4.3 | 95.9±1.5 |
| FLA | 65.2±2.5 | 64.4±3.2 | 61.1±1.3 | 67.1±2.4 | 91.2±2.2 | 92.9±2.5 | 88.2±3.3 | 86.4±1.0 |
| PYR | 56.9±5.7 | 55.8±4.2 | 72.8±3.5 | 69.2±10.1 | 86.2±2.4 | 87.7±2.7 | 83.3±6.1 | 85.0±3.2 |
| BaA | 59.5±3.9 | 46.0±4.8 | 71.8±5.2 | 67.9±7.3 | 85.5±1.5 | 86.2±1.1 | 83.6±5.0 | 83.8±6.7 |
| CHR | 60.7±7.2 | 76.2±4.7 | 68.4±7.2 | 65.1±1.7 | 91.5±2.1 | 91.9±2.1 | 85.6±4.7 | 87.1±1.8 |
| BbF | 63.0±4.2 | 77.7±5.1 | 79.9±2.7 | 78.1±4.4 | 91.3±1.3 | 91.9±1.5 | 91.4±2.4 | 89.7±1.7 |
| BkF | 65.0±1.3 | 65.4±3.1 | 81.9±2.4 | 84.6±4.8 | 94.4±1.0 | 94.9±1.0 | 91.8±3.5 | 90.0±4.1 |
| BaP | 74.0±5.0 | 67.5±0.5 | 76.9±3.5 | 84.8±2.9 | 95.7±0.6 | 95.9±0.7 | 93.6±1.2 | 93.0±1.9 |
| I(cd)P | 74.8±6.6 | 74.8±3.3 | 75.7±2.5 | 81.9±2.9 | 95.2±0.6 | 95.5±0.6 | 94.0±1.0 | 91.1±2.0 |
| D(ah)A | 75.7±1.7 | 75.5±3.3 | 82.4±2.5 | 82.8±7.6 | 89.0±3.9 | 90.4±4.1 | 89.5±6.8 | 91.8±3.6 |
| B(ghi)P | 84.6±2.9 | 73.6±2.4 | 84.9±5.0 | 69.3±8.3 | 98.2±0.5 | 99.1±0.3 | 98.2±1.9 | 96.3±2.3 |

Note: “CK” means treated with sterile water.