Article

## Investigation of metaldehyde removal by powdered activated carbon from different water samples

Journal name: RSC Environmental Science: Water Research and Technology

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To select the most appropriate concentration of working metaldehyde solutions and to validate the modified SPE loading method for low initial concentration, the recovery rates for working metaldehyde solutions (prepared using raw water from the Regent's Park lake water spiked with metaldehyde) ranged from 1 to 50  $\mu$ g L<sup>-1</sup> were determined. Since natural water was used, matrix effect on detection of metaldehyde was investigated as well. 6 mL of the matrix was extracted via SPE from 3 L of raw water collected from the Regent's Park lake without spiking metaldehyde. Then, two sets of metaldehyde calibration standards were prepared and diluted from the 500 mg L<sup>-1</sup> metaldehyde calibration stock solution, one using the matrix and the other using pure DCM. Table 1 shows two sets of recovery rates of metaldehyde solution (1 to 50  $\mu$ g L<sup>-1</sup>) calibrated using these standards. There is no significant difference (*p*>0.05) in recovery rates between the two standards. 5  $\mu$ g L<sup>-1</sup> was selected to be the study concentration of working metaldehyde solution since it gave good recovery of metaldehyde and it would allow detection of metaldehyde after adsorption by certain PAC dosage.

**Table S1** Recovery rates of raw water from Regent's Park lake water spiked with metaldehyde

 using the matrix and pure DCM

| Concentration (µg L <sup>-1</sup> ) | Recovery the matrix (%) | Recovery pure DCM (%) | <i>p</i> value |  |
|-------------------------------------|-------------------------|-----------------------|----------------|--|
| 1                                   | $79.0\pm6.4$            | 81.8 ± 6.7            |                |  |
| 2                                   | $88.0 \pm 8.7$          | 91.1 ± 9.1            | 0.65 (> 0.05)  |  |
| 5                                   | $104.6\pm0.9$           | $108.2\pm0.9$         |                |  |
| 10                                  | $108.7 \pm 4.3$         | $112.5 \pm 4.4$       |                |  |
| 20                                  | $101.5 \pm 1.7$         | $105.1 \pm 1.7$       |                |  |
| 50                                  | $110.9 \pm 5.4$         | $114.8 \pm 5.6$       |                |  |

| Water Samples            | рН   | Conductivity | TDS    | Fluoride | Chloride | Nitrate | NPOC   | Turbidity | DO     | UV <sub>254</sub>   |
|--------------------------|------|--------------|--------|----------|----------|---------|--------|-----------|--------|---------------------|
|                          |      | (µs/cm)      | (mg/L) | (mg/L)   | (mg/L)   | (mg/L)  | (mg/L) | (NTU)     | (mg/L) | (cm <sup>-1</sup> ) |
| Regent's Park            | 8.75 | 1098         | 551    | 1.594    | 89.778   | 4.496   | 6.398  | 0.866     | 11.45  | 0.162               |
| After 'pre-ozone         | 8.14 | 592          | 297    | 0.132    | 56.215   | 30.843  | 5.665  | 0.225     | 7.55   | 0.077               |
| contactors'              |      |              |        |          |          |         |        |           |        |                     |
| After 'static            | 6 32 | 617          | 310    | 0 227    | 56 826   | 30 604  | 3 816  | 0 443     | 7 26   | 0.055               |
| flocculation'            | 0.52 | 017          | 510    | 0.227    | 20.020   | 50.001  | 5.010  | 0.115     | ,.20   | 0.000               |
| After 'CoCoDAF           | 7 67 | 592          | 298    | 0 132    | 56 941   | 31 145  | 4 002  | 0 108     | 7 28   | 0.050               |
| units'                   |      |              |        |          |          |         |        |           |        |                     |
| After 'main ozone        | 7.64 | 592          | 298    | 0.140    | 56.892   | 31.208  | 3.621  | 0.084     | 7.95   | 0.039               |
| contactors'              |      |              |        |          |          |         |        |           |        |                     |
| After 'GAC adsorbers'    | 7.43 | 601          | 301    | 0.142    | 57.219   | 31.482  | 4.143  | 0.087     | 6.13   | 0.030               |
| After 'seriers of sceens | 7.39 | 9 607        | 305    | 0 130    | 58 098   | 31 568  | 2 999  | 0 103     | 6 80   | 0.028               |
| and a contact tank'      | 1.29 |              | 500    | 0.120    | 20.070   | 21.200  | 2.777  | 0.105     | 0.00   | 0.020               |

## **Table S2** Water characteristics for water samples without spiking metaldehyde

Signature peaks on the spectra of flocs at 3150 cm<sup>-1</sup> (O-H), 1643 cm<sup>-1</sup> (amide I: C=O) matched the spectra of ferric sulphate which is the added coagulant in 'static flocculation' stage.(1, 2) Spectra of PAC-SF and PAC-RP are similar due to the strong signal of carbon which suggests that other peaks could be masked by the carbon and therefore less likely to be observed. However, there are a few weak dips around 3150 cm<sup>-1</sup> and 1370 cm<sup>-1</sup> on spectra of PAS-SF which may indicate the attachment of flocs onto PAC.



**Fig. S1** ATR spectra of flocs, water from the 'static flocculation' loaded PAC, and water from Regent's Park loaded PAC.



Fig. S2 Comparison of water characteristics for the different water samples before and after PAC adsorption (A: pH value, B: conductivity, C: TDS, D: fluoride, E: chloride, F: nitrate, G: NPOC, H:  $UV_{254}$ , I: concentration of metaldehyde; RP = water collected from the Regent Park's lake; SF = water collected after 'static flocculation'; CCD = water collected after 'CoCoDAF units'; MO = water collected after 'main ozone contactors'; MWHA MWMilliQ MilliQ with 30 water; water spiked humic acid. = = ppm

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