## Appendix A. Supplementary Material

**Optimization of removal of anionic and cationic dyestuffs from aqueous solution with Cinnamon bark as low-cost and eco-friendly adsorbent**

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Table A.1. Properties of used dyestuffs

|  |  |  |
| --- | --- | --- |
| Trade name | Indigo Carmine (IC) | Malachite Green (MG) |
| IUPAC name | 5,5-indigosulfonic acid sodium salt | 4-[(4-dimethylamino phenyl) phenyl-methyl]-N,N Dimethylaniline |
| Molecular Structure |  | basic green 4 molecular ile ilgili gÃ¶rsel sonucu |
| Molecular Formula | C16H8N2O8S2Na2 | C23H25ClN2 |
| Molecular Weight (g/mol) | 466.4 | 364.9 |
| *λ*max (nm) | 608 | 616 |

Table A.2. CCD design matrix and the selected factors for (a) IC and (b) MG adsorption onto Cinnamon bark

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Factors |  | (a) |  | (b) |
|  | Levels of factors |  | Levels of factors |
|  | -α (-1.414) | -1 | 0 | +1 | +α (+1.414) |  | -α(-1.414) | -1 | 0 | +1 | +α (+1.414) |
| *X*1: initial dyestuff concentration (mg/L) |  | 20 | 32 | 60 | 88 | 100 |  | 20 | 32 | 60 | 88 | 100 |
| *X*2: adsorbent amount (g) |  | 0.20 | 0.46 | 1.10 | 1.74 | 2.00 |  | 0.01 | 0.08 | 0.26 | 0.43 | 0.50 |
| Run |  | Coded levels |  | Actual levels |  | Actual levels |
|  | *X*1 | *X*2 |  | Co (mg/L) | m (g) |  | Co (mg/L) | m (g) |
| 1 |  | -1 | -1 |  | 32 | 0.46 |  | 32 | 0.08 |
| 2 |  | 1 | -1 |  | 88 | 0.46 |  | 88 | 0.08 |
| 3 |  | -1 | 1 |  | 32 | 1.74 |  | 32 | 0.43 |
| 4 |  | 1 | 1 |  | 88 | 1.74 |  | 88 | 0.43 |
| 5 |  | -1.414 | 0 |  | 20 | 1.10 |  | 20 | 0.26 |
| 6 |  | 1.414 | 0 |  | 100 | 1.10 |  | 100 | 0.26 |
| 7 |  | 0 | -1.414 |  | 60 | 0.20 |  | 60 | 0.01 |
| 8 |  | 0 | 1.414 |  | 60 | 2.00 |  | 60 | 0.50 |
| 9-13 |  | 0 | 0 |  | 60 | 1.10 |  | 60 | 0.26 |



Figure A.1. Absorbance spectra obtained for IC and MG dyestuffs



Figure A.2. pHpzc for Cinnamon bark

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |

Figure A.3. Fitting curves of (a,b) pseudo-second-order model for IC and MG adsorption

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