

|                                                 | Sample | Dye | Zero-order |        | First-order |        | Second-order |        |
|-------------------------------------------------|--------|-----|------------|--------|-------------|--------|--------------|--------|
|                                                 |        |     | $K_0$      | $R^2$  | $K_1$       | $R^2$  | $K_2$        | $R^2$  |
| Batch system                                    | CNG    | MB  | 0.0307     | 0.9923 | 0.0056      | 0.9952 | 0.0011       | 0.9895 |
|                                                 | CNGZ   |     | 0.0517     | 0.9382 | 0.0114      | 0.9775 | 0.0028       | 0.9918 |
| Self-forming photocatalytic<br>dynamic membrane | CNG    | MB  | 0.0417     | 0.9469 | 0.0087      | 0.9777 | 0.0018       | 0.9873 |
|                                                 | CNGZ   |     | 0.0671     | 0.8499 | 0.0187      | 0.8987 | 0.0065       | 0.9552 |
| Batch system                                    | CNG    | CR  | 0.0404     | 0.9857 | 0.0091      | 0.9915 | 0.0022       | 0.9881 |
|                                                 | CNGZ   |     | 0.0604     | 0.9128 | 0.0165      | 0.9559 | 0.0051       | 0.9887 |
| Self-forming photocatalytic<br>dynamic membrane | CNG    | CR  | 0.0699     | 0.8507 | 0.0234      | 0.8914 | 0.0101       | 0.9435 |
|                                                 | CNGZ   |     | 0.1309     | 0.8658 | 0.0679      | 0.9105 | 0.0791       | 0.9827 |

| membrane                                        | Dye               | Dye concentration<br>(mg/L) | Rejection | Ref.       |
|-------------------------------------------------|-------------------|-----------------------------|-----------|------------|
| Chitosan/Organoclay/PVDF membrane               | MB                | 1                           | 80-95%    | [47]       |
| LA/Co <sup>2+</sup> -ZnO@SSM composite membrane | MB                | 10                          | 90%       | [48]       |
| PES/POM-TiO <sub>2</sub> mixed matrix membrane  | MB                | 5                           | ~73%      | [49]       |
| PVDF@rGO/TiO <sub>2</sub>                       | MB                | 10                          | 92%       | [50]       |
| PVDF@GO-MWCNTs/TiO <sub>2</sub>                 |                   |                             | 86.69%    |            |
| ZIF-67/PVDF membrane                            | CR                | 25                          | 99.5%     | [51]       |
| ZIF-8/ Polyacrylonitrile composite membrane     | CR                | 25                          | 89%       | [52]       |
| MoS <sub>2</sub> : PTCA/PES                     | CR                | 10                          | ~80%      | [53]       |
| Photocatalytic dynamic membrane including       | MB (self-forming) | 10                          | 89%       | This Study |
| CNGZ nanocomposite                              | CR (self-forming) | 10                          | 100%      | This Study |
|                                                 | MB (pre-coated)z  | 10                          | 98.6%     | This Study |