**Supporting materials**

**Synergetic photocatalytic peroxymonosulfate oxidation of benzotriazole by cupper ferrite spinel: Factors and mechanism analysis**

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**Table S1**

CCD experiments and observed and predicted removal efficiencies using CuFe2O4/UV/PMS system.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Run | Independent variables | | | | Actual (Re%) | Predicted (Re%) | Residual |
| *x*1 | *x*2 | *x*3 | *x*4 |
| 1 | 0.2 | 2 | 20 | 30 | 55.97 | 57.56 | ‐1.59 |
| 2 | 0.3 | 1.5 | 30 | 50 | 57.31 | 58.04 | ‐0.73 |
| 3 | 0.2 | 2 | 40 | 30 | 55.24 | 52.56 | 2.68 |
| 4 | 0.2 | 1 | 40 | 70 | 44.11 | 43.54 | 0.56 |
| 5 | 0.3 | 1.5 | 30 | 50 | 58.06 | 58.04 | 0.022 |
| 6 | 0.4 | 2 | 40 | 30 | 72.39 | 70.38 | 2.01 |
| 7 | 0.3 | 0.5 | 30 | 50 | 52.35 | 55.83 | ‐3.48 |
| 8 | 0.4 | 1 | 40 | 30 | 59.42 | 58.63 | 0.79 |
| 9 | 0.2 | 1 | 40 | 30 | 46.42 | 42.87 | 3.54 |
| 10 | 0.3 | 1.5 | 10 | 50 | 67.67 | 67.15 | 0.52 |
| 11 | 0.5 | 1.5 | 30 | 50 | 81.96 | 83.50 | ‐1.54 |
| 12 | 0.2 | 2 | 40 | 70 | 52.74 | 54.89 | ‐2.15 |
| 13 | 0.2 | 1 | 20 | 70 | 63.27 | 64.94 | ‐1.68 |
| 14 | 0.4 | 1 | 40 | 70 | 68.54 | 66.62 | 1.93 |
| 15 | 0.3 | 1.5 | 30 | 10 | 50.99 | 56.67 | ‐5.68 |
| 16 | 0.1 | 1.5 | 30 | 50 | 50.22 | 51.51 | ‐1.29 |
| 17 | 0.3 | 2.5 | 30 | 50 | 68.51 | 67.87 | 0.64 |
| 18 | 0.3 | 1.5 | 50 | 50 | 46.30 | 49.65 | ‐3.35 |
| 19 | 0.2 | 2 | 20 | 70 | 66.95 | 65.24 | 1.7 |
| 20 | 0.4 | 2 | 20 | 30 | 68.41 | 66.48 | 1.93 |
| 21 | 0.3 | 1.5 | 30 | 50 | 57.66 | 58.04 | ‐0.38 |
| 22 | 0.3 | 1.5 | 30 | 90 | 75.17 | 72.33 | 2.84 |
| 23 | 0.4 | 2 | 20 | 70 | 78.27 | 81.47 | ‐3.21 |
| 24 | 0.4 | 1 | 20 | 30 | 68.27 | 65.78 | 2.48 |
| 25 | 0.4 | 1 | 20 | 70 | 78.93 | 79.11 | ‐0.18 |
| 26 | 0.3 | 1.5 | 30 | 50 | 58.65 | 58.04 | 0.61 |
| 27 | 0.3 | 1.5 | 30 | 50 | 58.25 | 58.04 | 0.21 |
| 28 | 0.3 | 1.5 | 30 | 50 | 58.31 | 58.04 | 0.27 |
| 29 | 0.4 | 2 | 40 | 70 | 80.18 | 80.02 | 0.16 |
| 30 | 0.2 | 1 | 20 | 30 | 61.26 | 58.92 | 2.34 |

**Table S2**

Results of ANOVA for response surface quadratic model.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Source | Sum of squares | df | Mean Square | F Value | p-value  Prob > F |
| Model | 3081.86 | 14 | 220.13 | 24.18 | < 0.0001 |
| *x1 ‒* Catalyst dosage | 1535.24 | 1 | 1535.24 | 168.65 | < 0.0001 |
| *x*2 ‒ PMS Conc. | 217.56 | 1 | 217.56 | 23.9 | 0.0002 |
| *x*3 ‒ BTA Conc. | 459.54 | 1 | 459.54 | 50.48 | <0.0001 |
| *x*4 ‒ Reaction time | 368.06 | 1 | 368.06 | 40.43 | <0.0001 |
| *x1 x*2 | 4.24 | 1 | 4.24 | 0.47 | 0.5053 |
| *x1 x*3 | 79.22 | 1 | 79.22 | 8.7 | 0.0099 |
| *x*1 *x*4 | 53.47 | 1 | 53.47 | 5.87 | 0.0285 |
| *x*2 *x*3 | 122.03 | 1 | 122.03 | 13.41 | 0.0023 |
| *x*2 *x*4 | 2.76 | 1 | 2.76 | 0.3 | 0.59 |
| *x*3 *x*4 | 28.6 | 1 | 28.6 | 3.14 | 0.0966 |
| *x*12 | 153.6 | 1 | 153.6 | 16.87 | 0.0009 |
| *x*22 | 24.88 | 1 | 24.88 | 2.73 | 0.1191 |
| *x*32 | 0.22 | 1 | 0.22 | 0.024 | 0.8778 |
| *x*42 | 71.48 | 1 | 71.48 | 7.85 | 0.0134 |
| Residual  Lack of Fit  Pure Error | 136.54  135.37  1.17 | 15  10  5 | 9.1  13.54  0.23 | 57.94 | 0.0002 |
| Correction Total | 3218.41 | 29 |  |  |  |
| Std. Dev. | 3.02 |  | R-squared | 0.9576 |  |
| Mean | 62.06 |  | Adj. R-squared | 0.918 |  |
| C.V. | 4.86 |  | Pred. R-squared | 0.7572 |  |
| Press | 781.44 |  | Adeq. Precision | 19.045 |  |

R2 = 0.9576; R2adj = 0.918; R2pred = 0.7572; adequacy precision = 19.045; C.V.% = 4.86.

**Fig. S1.** Correlation between predicted and experimental values of BTA degradation variability.



**Fig. S2.** The normal probability plot of the internally studentized residuals.

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**Fig. S3.** The experimental run number versus studentized residual data.



**Fig. S4:** HPLC chromatograms of the standard aniline as well as raw and treated solution of the BTA solution at different reaction times.

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