

Correction

Correction: Kurniawan et al. Vapor-Phase Oxidant-Free Dehydrogenation of 2,3- and 1,4-Butanediol over Cu/SiO₂ Catalyst Prepared by Crown-Ether-Assisted Impregnation. *Chemistry* 2023, 5, 406–421

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1. Text Correction

In the published article “Vapor-Phase Oxidant-Free Dehydrogenation of 2,3- and 1,4-Butanediol over Cu/SiO₂ Catalyst Prepared by Crown-Ether-Assisted Impregnation” [1], we came to the realization that we made a mistake in calculating the Cu dispersion, D . Considering that the calculation of Cu surface area, SA_{Cu} , and the mean particle size of Cu, D_{Cu} , are derived from D , this mistake also affected the values of SA_{Cu} and D_{Cu} . The correct D and SA_{Cu} values should have been twice the values listed in the original publication, whereas the D_{Cu} should have been half the values listed in the original publication. It should be noted that the corrections do not change the main finding and conclusion of the research work. This correction was solely done to ensure the transparency, objectivity, and reproducibility of the research work. Following this mistake, several tables and figures need to be revised, and the revisions are as follows.

The description in Section 3.6 must also be revised since there was information related to SA_{Cu} . The corrected description of Section 3.6 is as follows:

“Figure 7c depicts the relation between SA_{Cu} and the formation rate of GBL in the dehydrogenation of 1,4-BDO at 240 °C. The GBL formation rate is proportional to the SA_{Cu} for SA_{Cu} values smaller than 30 m² g⁻¹, while the proportional relation was not observed for SA_{Cu} values higher than 30 m² g⁻¹. This phenomenon differed from the results in the dehydrogenation of 2,3-BDO to AC, in which the AC formation rate was proportional to SA_{Cu} , even for SA_{Cu} values higher than 30 m² g⁻¹. This difference can be explained by the mechanism of 1,4-BDO dehydrogenation to GBL. The dehydrogenation of 2,3-BDO to AC is a straightforward reaction, whereas 1,4-BDO dehydrogenation to GBL proceeds via a series of consecutive reactions, including (1) the dehydrogenation of 1,4-BDO to 4-hydroxybutanal, (2) the intramolecular hemiacetal-formed cyclization to 2-hydroxytetrahydrofuran, and (3) the dehydrogenation of 2-hydroxytetrahydrofuran to form GBL (Scheme 2) [41]. The cyclization via an intramolecular hemiacetal reaction was possibly catalyzed by the acid sites of the silanol group in a similar manner to the cyclization of levulinic acid to angelica lactone [71]. Similarly, acidic alumina-supported Cu was also effective for the cyclization of 4-hydroxybutanal; nevertheless, the strong acidity of alumina promoted the dehydration reaction, generating tetrahydrofuran as the side product [41]. For SA_{Cu} values below 30 m² g⁻¹, the increment of Cu content did not significantly alter the concentration of silanol sites; thus, the increment of Cu content favored the dehydrogenation of 1,4-BDO to 4-hydroxybutanal but did not hinder the consecutive cyclization of 4-hydroxybutanal to 2-hydroxytetrahydrofuran. However, when the SA_{Cu} was higher than 30 m² g⁻¹, the increment of Cu content decreased the contribution of OH to the level that it slightly hindered the cyclization of 4-hydroxybutanal to 2-hydroxytetrahydrofuran and the subsequent GBL formation. As a result, a proportional



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relation between SA_{Cu} and GBL formation rate was no longer observed for SA_{Cu} values above $30 \text{ m}^2 \text{ g}^{-1}$, as shown in Figure 7c."

2. Error in Table

The D and SA_{Cu} values are displayed in Table 1; as a result, Table 1 should be corrected as follows:

Table 1. Effect of organic additive on the catalytic performance of 2Cu/SiO₂ catalyst in the dehydrogenation of 2,3-BDO.

Entry	Organic Additive	D	SA_{Cu} / $\text{m}^2 \text{ g}^{-1}$	Conversion ^a /mol%	Selectivity ^a /mol%	
					AC	DA
1	none	0.248	2.76	19.0	99.3	0.0
2	12C4	0.632	7.06	56.4	98.8	1.0
3	15C5	0.613	6.84	43.0	99.2	0.5
4	18C6	0.521	5.81	38.9	99.3	0.4
5	CA	0.549	7.12	50.2	99.0	1.0

Reaction conditions: Reaction temperature, 200 °C; W/F, 0.18 h. ^a Average conversion and selectivity at TOS of 0–1 h.

The information of SA_{Cu} is also displayed in Table 3; thus, the revised Table 3 is shown below. In the last entry, the SA_{Cu} of the 12C4-10Cu/SiO₂ catalyst has been corrected.

Table 3. Comparison of the productivity of GBL over various reported Cu catalysts.

Catalyst	SA_{Cu} / $\text{m}^2 \text{ g}^{-1}$	Temp. / $^{\circ}\text{C}$	W/F /h	TOS ^a /h	Conv. /mol%	Select. /mol%	GBL Prod. / $\text{g g}_{\text{cat}}^{-1} \text{ h}^{-1}$	Ref.
Cu/ZnO/ZrO ₂ /Al ₂ O ₃ ^b	40.3	240	0.08	5	84	98	9.63	[41]
12Cu/SiO ₂	3.90	250	0.50	10	100	98	1.92	[17]
10Cu/La ₂ O ₃ /ZrO ₂	8.40	250	1.00	13	97	96	0.91	[43]
10Cu/SBA-15	8.68	250	1.00	17	100	98	0.95	[44]
10Cu/CeO ₂	5.60	240	0.50	1	93	98	1.78	[18]
10Cu/CeO ₂ -Al ₂ O ₃	-	240	0.50	1	100	99	1.94	[45]
12C4-10Cu/SiO ₂	26.1	260	0.27 0.054	5 5	98.8 81.4	98.5 95.7	3.44 13.8	This work

^a Time on stream in a flow system. ^b Prepared by co-precipitation; Cu content, 41.8 wt.-%.

3. Error in Figure

The values of SA_{Cu} were also displayed in Figures 5b and 7c; therefore, those figures should be revised as follows:

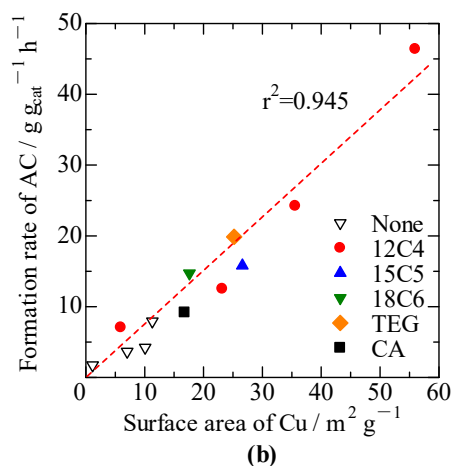


Figure 5. (b) Effect of SA_{Cu} on the formation rate of AC at 200 °C.

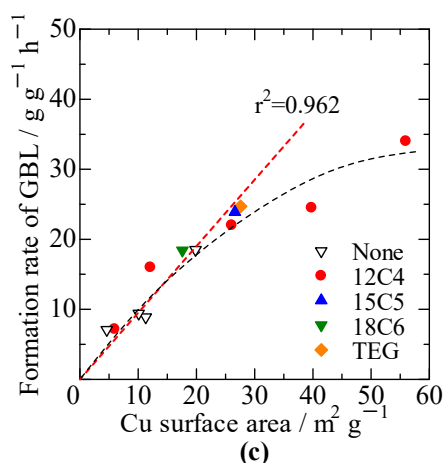


Figure 7. (c) Relation between Cu surface area and the formation rate of GBL at 240 °C.

The D , SA_{Cu} , and D_{Cu} are also depicted in supporting information. The original Table S2 has also been updated.

The authors state that the scientific conclusions are unaffected. This correction was approved by the Academic Editor. The original publication has also been updated.

Reference

1. Kurniawan, E.; Hosaka, S.; Kobata, M.; Yamada, Y.; Sato, S. Vapor-Phase Oxidant-Free Dehydrogenation of 2,3- and 1,4-Butanediol over Cu/SiO₂ Catalyst Prepared by Crown-Ether-Assisted Impregnation. *Chemistry* **2023**, *5*, 406–421. [[CrossRef](#)]

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