



# The Socialization of Batik Jambi Liquid Waste Treatment in Siti Hajir's Batik House: Degradation of UV and Solar Irradiation

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ARTICLE INFO	ABSTRAK
<b>Article history</b> Received: 09 Mei 2025 Accepted: 05 Jun 2025 Published: 31 Jul 2025	<b>Background:</b> Kegiatan pengabdian kepada masyarakat untuk pengolahan limbah cair batik jambi telah dilakukan melalui sosialisasi. Studi ini bertujuan untuk menyediakan informasi tentang pengolahan limbah cair batik jambi menggunakan metode yang sederhana. Topik aktivitas ini sangat penting karena minimnya IPAL di sentra batik yaitu hanya ada satu IPAL yang menjangkau tujuh rumah batik. <b>Metode:</b> Persiapan, implementasi, dan evaluasi. <b>Hasil:</b> Berdasarkan kegiatan tersebut, pengrajin batik jambi sangat antusias menerima informasi penting ini. Mereka memahami bahwa paparan secara langsung cahaya matahari selama beberapa hari dapat mendegradasi limbah secara alami. Hal ini karena cahaya matahari memiliki panjang gelombang 310-2300 nm. Waktu radiasi sinar matahari yang lebih lama, semakin lebih banyak radikal *OH yang terbentuk sehingga partikel ini yang akan bereaktif pada ikatan rangkap dalam senyawa limbah cair batik. <b>Kesimpulan:</b> Kegiatan ini memiliki keuntungan untuk pengrajin batik yang tidak memiliki IPAL. Metode ini dapat digunakan sebagai alternatif untuk pengolahan limbah cair batik sebelum limbah dibuang ke lingkungan.
<b>Kata kunci:</b> Degradasi, Irradiasi Matahari, Limbah Cair Batik.	
<b>Keywords:</b> <i>Batik Wastewater,</i> <i>Degradation,</i> <i>Solar Irradiation.</i>	<b>ABSTRACT</b> <b>Background:</b> Community service activities for processing Jambi Batik wastewater have been done using socialization. This study aims to provide information about Jambi batik liquid waste treatment using simple methods. The topic of this activity is very important because there is a lack of IPAL in batik centers, namely there is only 1 IPAL, which only reaches seven batik houses. <b>Method:</b> Preparation, implementation, and evaluation. <b>Result:</b> Based on the activities, Jambi batik craftsmen were enthusiastic about receiving important information. They just realized that exposure to direct sunlight for several days can degrade liquid batik waste, which cannot be degraded naturally. This is because sunlight has a wavelength of 310-2300 nm. The longer the radiation time using sunlight, the more *OH radical is formed so that this particle will be reactive to the double bonds in batik liquid waste compounds. <b>Conclusion:</b> This activity has benefits for batik craftsmen who do not have an IPAL. This method can be used as an alternative for treatment of batik liquid waste before the waste is disposed of into the environment.



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## INTRODUCTION

The dangerous batik wastewater was resulted from the batik colouring process using synthetic and natural dyes. Synthetic dye contains organic and inorganic that disturb the environmental ecosystem. Moreover, batik wastewater surely comprises several heavy metals such as lead (Pb), nickel (Ni), copper (Cu), and Mangan (Mn), which trigger cancer in the human body if exposed for a long period and above the threshold (Ismet et al., 2022; Utami et al., 2022). (Sirait, 2018) explained that batik wastewater increases water quality parameters, which are *Biological Oxygen Demand* (BOD), *Chemical Oxygen Demand* (COD), *Total Solid Suspended* (TSS), and pH. The enhancement of these parameters can violate biota and ecosystems. About 25 m<sup>3</sup> of batik wastewater is discharged daily, and most batik craftments dispose of batik wastewater directly into the environment without treatment (Saputra et al., 2023; Maryani et al., 2023).

The Batik Jambi craftsmen still use a manual method for colouring fabric. (Putri et al., 2022) said that generally batik jambi craftsmen utilize synthetic dyes such as indigo sol, naphthol, red rapid, and reason. Natural dyes used in batik colouring are still dangerous pollutants, so synthetic dyes are more harmful (Martuti et al., 2020). The centre of Batik Jambi is near the Batanghari River, so the batik wastewaters have direct negative impacts on the river. Discharging batik wastewater without treatment will augment some non-degradable pollutants in the surroundings (Irawati et al., 2020; Heraningsih et al., 2023; Pane et al., 2023). Because of that, the treatment of batik wastewater before disposal is used to preserve environmental quality and minimize the destruction of the surrounding area and biota.

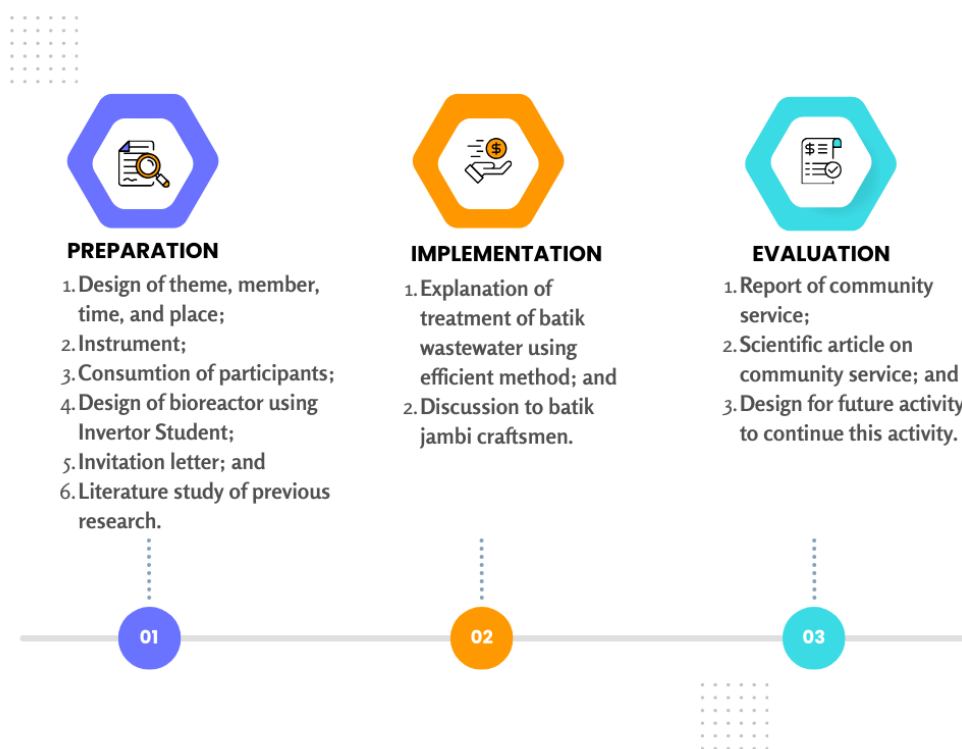
The treatment and processing of batik wastewater should be realized more comprehensively by batik craftsmen. This phenomenon is due to the different levels of insight about wastewater. Collaboration among stakeholders is required for the preservation of the environment. The stakeholders are the government, Non-Government Organizations (NGOs), society, and higher education (Febriana et al., 2022). One method that could be used to provide new insight to Batik craftsmen is through socialization. This activity is conducted to improve society's awareness of environmental preservation, inherited by the young generation (Nurfaisal et al., 2023). The disposed batik wastewater must be ensured to be environmentally friendly using certain methods.

Several batik wastewater methods are physics, chemistry, and biology (Diyah et al., 2023). Of all the methods, photocatalytic degradation is promising because it is cheap and efficient in implementation (Saputra et al., 2023). This community service activity aimed to socialize with the batik craftsmen about batik wastewater treatment using a cheap and efficient photocatalytic degradation method. This activity was a research outcome conducted by the lecturer of the chemistry department, UIN Sulthan Thaha Saifuddin Jambi (Saputra et al., 2023; Putri et al., 2022). Socialization with a similar theme has never been carried out at the Jambi Siti Hajir Batik House. This socialization activity was carried out at Rumah Batik Siti Hajir because Rumah Batik Siti Hajir has a Waste Water Treatment Plant or Instalasi Pengolahan Air Limbah (IPAL) assisted by Bank Indonesia Jambi Representative. However, the IPAL does not have a wide coverage distance. The results of this research can be used as a source of basic knowledge in processing Jambi Batik liquid waste simply and efficiently.

## METHOD

This socialization activity is a preliminary community service or PKM activity carried out

downstream of research results by lecturers and students of the Chemistry study program at UIN Sulthan Thaha Saifuddin Jambi. The research implication was experienced directly by society, one of the stakeholders (Aji & Subakdi, 2023). This activity included a Mechanical engineering lecturer as a bioreactor designer, who proposed for degradation in Batik House (Lusiria et al., 2025; Nurfaizal et al., 2023; Rahayu et al., 2024). The steps of this activity are figured in Figure 1.



**Figure 1.** Steps of Socialization Activities for Jambi Batik Wastewater Treatment at Siti Hajir Batik House

## RESULT AND DISCUSSION

Batik house of Siti Hajir was built in 1982 located Jelm, Pelayangan, Jambi Province. Kemas Junaidi and his wife manage this batik house as the second generation. Batik House of Siti Hajir (Figure 2c) has the integrity to batik wastewater treatment. Their understanding of the impact of liquid waste on the environment is remarkable. The Siti Hajir Batik house often invites other houses to discuss environmental studies. This Batik House was also often a place for education about batik making and also collaborated with universities to accept students for internships from various study programs. Siti Hajir Batik House produced batik products from synthetic and natural dyes. When using natural batik dyes, they still use synthetic elements as salt compounds so that the dyes are long-lasting.

a



b



c



**Figure 2.** (a) IPAL Placed in front of The Siti Hajir Batik House, (b) Signature of The Inauguration of The IPAL by the Mayor of Jambi, and (c) Siti Hajir Batik House

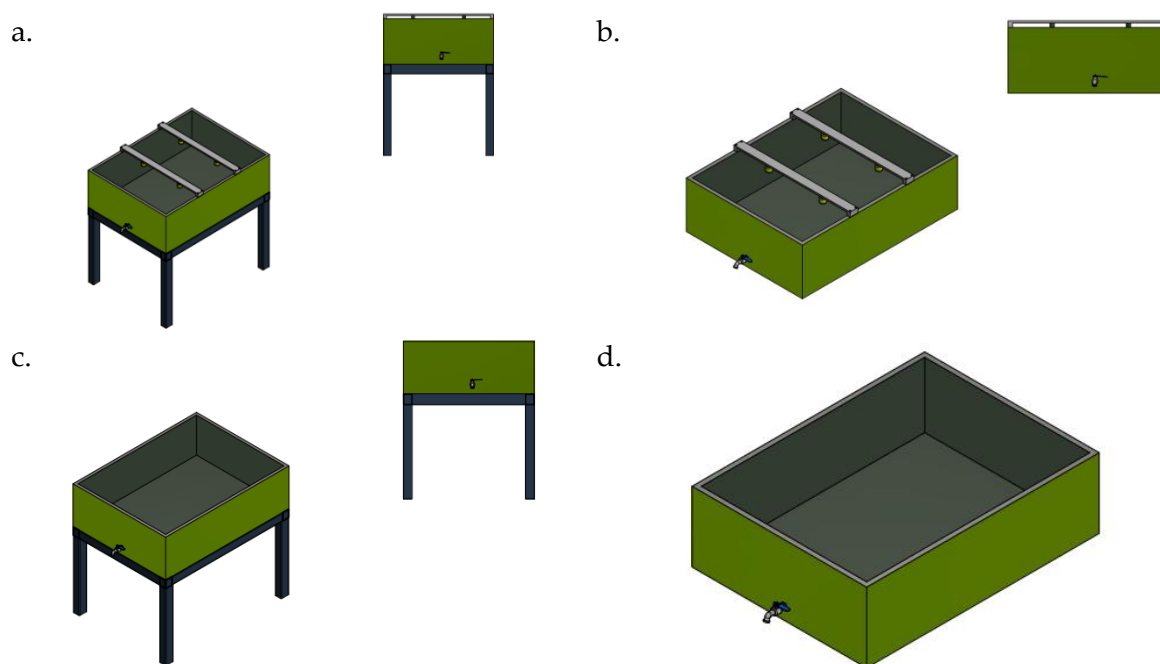
The Jambi Batik Center is located near the Batanghari River, so improper processing will directly impact the river. The Jambi City Government and Bank Indonesia assisted by building a IPAL for batik houses around Pelayangan District, as seen in Figure 2a. Figure 2a is a sign of the inauguration of the IPAL by the Mayor of Jambi and the Deputy Governor of Bank Indonesia. Only one (1) unit is available at the IPAL in the Batik Center, so this installation can only accommodate some of the liquid waste in the Jambi Batik Center area. This condition is also the background for the PKM team to hold socialization on Jambi batik liquid waste processing in a simple way and based on scientific facts.

### Preparation

Socialization about Jambi Batik liquid waste processing was carried out to provide information about the process, which is simple and can be done by anyone using simple tools. Apart from that, the output of this activity was the understanding of Jambi Batik craftsmen towards preserving the environment by processing Jambi Batik liquid waste. The material presented at the socialization resulted from previous research conducted by a collaboration between Lecturers and Students of the Chemistry Study Program at UIN Sulthan Thaha Saifuddin Jambi (Saputra et al., 2023). Downstreaming research results to PKM is a criterion for a quality study program. This indicates that a study program's bureaucratic and management system operates based on academic quality.

Participants involved in the socialization of Jambi Batik liquid waste processing were lecturers and students of the Chemistry Study Program at UIN Sulthan Thaha Saifuddin Jambi, Jambi Province Language Ambassadors, several Jambi Batik craftsmen, intern students, and several people in the community around the Jambi Siti Hajir Batik House. Apart from that, the activities committee also

prepared all supporting things such as presentation equipment and consumption. Then, the PKM team collaborated with lecturers from the Sriwijaya State Polytechnic Mechanical Engineering Study Program to design a simple bioreactor that could be adopted by the community [Figure 3](#).



**Figure 3.** Simple Jambi Batik Liquid Waste Degradation Bioreactor (a) UV Lamp with Frame, (b) UV Lamp without Frame, (c) Solar Irradiation with Frame, and (d) Solar Irradiation without Frame

Based on [Figure 3a](#), it can be seen that the bioreactor is designed using a frame; this is done so that it can be placed in the yard, whereas [3b](#) does not use a frame and can be placed on a support or directly on the ground. In [Figures 3a](#) & [Figures 3b](#), there is a transverse lamp holder that can be used to install a UV lamp. This bioreactor can be used at night by turning on a UV lamp to degrade Jambi Batik liquid waste compounds. Meanwhile, [Figures 3c](#) and are the same as [Figures 3a](#) & [Figures 3b](#), only the images are for the bioreactor under exposure to sunlight.

## Implementation

The socialization of Jambi Batik Liquid Waste Processing carried out at the Jambi Siti Hajir Batik House has been successfully done. These activities are depicted in [Figure 4](#). Based on [Figure 4a](#) it was seen that one of the teams opened a socialization event with the hope that the event material could be conveyed well. Next, [Figure 4b](#) explained the resource person who explained the results of research on the degradation of Jambi Batik liquid waste to participants in the socialization event. All participants listened and observed the material [Figure 4c](#) is the condition of participants listening to the material and atmosphere after the activity [Figure 4d](#).

The Batik wastewater socialization participants were very enthusiastic, especially the Batik craftsmen. The craftsmen know that disposing of Jambi Batik liquid waste without processing it can pollute the environment and cause various damages to the biota. After the socialization activities were completed, discussion activities were carried out to sharpen the information presented ([Rahayu et al., 2024](#)). Apart from the owner of Rumah Batik Siti Hajir, other batik houses were also present at the socialization activity, namely Rumah Batik Humairoh, Tiga Putri, and Yumas.





**Figure 4.** (a) Opening and Welcoming Speech, (b) Presentation of Material, (c) Participant Socialization Material, and (d) Photo with Presenters and Participants

Based on the discussion session conducted by Jambi Batik Craftsmen, the information was obtained: the IPAL in front of the Siti Hajir Batik House can only accommodate liquid waste from seven (7) batik houses. This is due to the distance and the difficulty of installing winding pipes. The housing conditions in the Jambi Batik central area are complex houses on stilts. One of the participants provided an answer regarding this question, namely:

*"The IPAL built by the government can handle batik waste from only 7 batik houses, while liquid waste from other batik houses is not processed before being discharged into the environment. So the 7 batik houses use pump machines from their houses to push liquid waste to reach the IPAL machine. "If the distance between the batik house and the IPAL is too far and winding, it will be difficult to reach because it requires pipe installation."*

The knowledge of some of the Jambi Batik craftsmen who were present regarding liquid waste left over from batik making was quite good. They realize that liquid waste dumped directly into the environment can damage the environment. However, the level of damage and long-term impacts that can be caused still need to be fully understood. This liquid waste is very dangerous for the environment, animals, and humans. For the environment, this waste causes several reductions in the quality of environmental parameters, namely odor, color, BOD, COD, TSS, and TDS. Living creatures can cause several diseases, such as nausea, skin ulceration, dermatitis, and hemorrhage, due to metal contamination in liquid waste (Budiyanto et al., 2018; Zakaria et al., 2023). Therefore, this socialization activity is very useful and can increase the knowledge of batik craftsmen. The curiosity of batik craftsmen is very high about the simple method which is the topic of this socialization activity.

The socialization material presented was about simple processing that batik craftsmen can carry out before disposing of liquid waste, namely degradation techniques. Batik liquid waste comes from one of the batik production processes, namely the coloring stage. Batik coloring requires several tools and materials, namely wax and dye. The final stage in the dyeing process is boiling to remove

the wax remaining on the batik (Zakaria et al., 2023). PKM activities offer 2 degradation processes, namely using sunlight and UV light. Based on previous research, degradation using the sun with the addition of CaO compounds can degrade 60.3% for 3 hours, while using a UV lamp only reaches 36.12% (Saputra, et al., 2023). That method is very effective if the waste is exposed to sunlight for several days before being thrown into the environment. Long-term exposure to sunlight can form  $\cdot\text{OH}$  radicals, which can react with double bonds in liquid batik waste compounds. This is because sunlight has a wavelength of 310-2300 nm (Saputra et al., 2023).

## Evaluation

The Jambi Batik liquid waste processing socialization activity was successfully carried out, and the activity participants gave a positive response. This activity is the downstream application of research results that the research team of lecturers and students of the Chemistry Study Program at UIN Sulthan Thaha Saifuddin Jambi has carried out. This activity will continue on an ongoing basis from a research and PKM perspective. The next PKM will be able to make a bioreactor, which will be given to one of the batik houses that need it.

## CONCLUSION

Socialization activities at the Jambi Siti Hajir Batik House in Pelayangan District have been successfully carried out. The theme of socialization in this activity is the process of processing Jambi batik liquid waste using a simple method before the waste is disposed of into the surrounding environment. This method was obtained from research by lecturers and students of the Chemistry Study Program at UIN Sulthan Thaha Saifuddin Jambi. Siti Hajir's batik house has an IPAL that only accommodates seven batik houses around Siti Hajir's batik house, and this IPAL cannot reach any further distances. Batik craftsmen are very enthusiastic about obtaining information about batik liquid waste processing. They hope that there will be more similar activities to preserve nature so that it does not have a negative impact in the future.

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## REFERENCES

- A. Saputra, W. Utami, S. N. dan D. (2023). Degradasi Fotokatalitik Limbah Cair Batik Jambi Menggunakan Katalis Heterogen CaO dari Cangkang Kerang Bambu (*Ensis sp.*). *Jurnal Kimia (Journal of Chemistry)*, 17(2), 151–157.
- Aji, M. P., & Subakdi. (2023). Sosialisasi Politik Siber untuk Memperkuat Ketahanan Nasional dalam Menghadapi Tantangan Global. *Jurnal SOLMA*, 12(1), 275–282. <https://doi.org/10.22236/solma.v12i1.11576>
- Budiyanto, S., Anies, Purnaweni, H., & Sunoko, H. R. (2018). Environmental Analysis of the Impacts of Batik Waste Water Pollution on the Quality of Dug Well Water in the Batik Industrial Center of Jenggol Pekalongan City. *E3S Web of Conferences*, 31. <https://doi.org/10.1051/e3sconf/20183109008>
- Diyah, N., Ratuannisa, T., Ekawati, E., Yulia, E., Purwasasmita, B. S., & Nugraha, A. B. (2023). Studi Pengolahan Air Limbah Batik pada Skala Industri Rumah Tangga dan Usaha Kecil Menengah di Cirebon, Indonesia. *Jurnal Dampak*, 20(1), 8. <https://doi.org/10.25077/dampak.20.1.8-15.2023>
- Febriana, P., Aesthetika, N. M., & Cholifah. (2022). Workshop Pembuatan Popok Reusable Di Desa. *Pengabdian*

*Kepada Masyarakat*, 28(1 Januari-Maret 2022), 30–35.

- Heni Irawati, Novi Luthfiyana, Imra, Triyana Wijayanti, Andi Izza Naafilah, & Sari Wulan. (2020). Aplikasi Pewarnaan Bahan Alam Mangrove Pada Kain Batik Sebagai Diversifikasi Usaha Masyarakat. *Dinamisia : Jurnal Pengabdian Kepada Masyarakat*, 4(2), 285–292. <https://doi.org/10.31849/dinamisia.v4i2.3982>
- Heraningsih, S. F., Alfernando, O., Sidauruk, J., Sinaga, J., Bectari, D., Pitri, E., Chasanah, F. N., Marpaung, G. A. P., Kasmiyanti, K., Nabila, M., Mauliani, M., Wahyuningsih, N. S., Qona'a, R. N., & Aulia, S. P. (2023). Aplikasi Pengolahan Limbah Batik Menggunakan Membran Keramik Berbiaya Rendah pada Kolom Batch. *Jurnal Daur Lingkungan*, 6(1), 60. <https://doi.org/10.33087/daurling.v6i1.201>
- Ismet, L. M., Suryadri, H., Tessal, D., & Nurdin, A. (2022). Pemanfaatan Zat Warna Merah Antosianin Dari Ekstrak Buah Naga Sebagai Bahan Pewarna Alami Pada Pengrajin Batik Kelurahan Mudung Kecamatan Pelayangan Jambi. *Jurnal Pengabdian Masyarakat Pinang Masak*, 3(1), 37–42. <https://doi.org/10.22437/jpm.v3i1.18222>
- Lusiria, D., Pratama, M., & Erlin, N. A. (2025). Pelatihan Psychological First Aid ( PFA ) untuk Meningkatkan Mitigasi Bencana Anggota Pramuka Peduli Kwarcab Kota Payakumbuh. *Jurnal Solma*, 14(1), 942–949.
- Martuti, N. K. T., Hidayah, I., Margunani, M., & Alafima, R. B. (2020). Organic material for clean production in the batik industry: A case study of natural batik Semarang, Indonesia. *Recycling*, 5(4), 1–13. <https://doi.org/10.3390/recycling5040028>
- Maryani, A. T., Dewi, S., Syarifuddin, H., & Wibowo, Y. G. (2023). Strategy for Liquid Waste Management for Batik Industry in Ulu Gedong Village, Jambi, Indonesia. *Ecological Engineering and Environmental Technology*, 24(3), 176–183. <https://doi.org/10.12912/27197050/160067>
- Nurfaisal, N., Asfar, A., & Rahmat, A. (2023). Sosialisasi dan Kegiatan Penghijauan di SMA Negeri 5 Tapung, Kampar. *Dinamisia : Jurnal Pengabdian Kepada Masyarakat*, 7(2), 316–324. <https://doi.org/10.31849/dinamisia.v7i2.12332>
- Pane, Y., Togar Timoteus Gultom, & Suhelmi. (2023). Socialization of Batik Waste Utilization into Wood Putty. *Dinamisia : Jurnal Pengabdian Kepada Masyarakat*, 7(2), 504–508. <https://doi.org/10.31849/dinamisia.v7i2.13882>
- Putri, W., Rahmah, A., Mayasari, R., Nurmita, N., Deliza, D., Utami, W., Tanti, T., & Ma'ruf, R. (2022). *Is Batik Bad for Water and The Environment? Reveal The Perception of Batik Craftsmen About Environmental Care*. <https://doi.org/10.4108/eai.20-10-2021.2316351>
- Rahayu, P., Meiyanti, R., Tarmidi, D., Putra, Y. M., & Maulana, G. (2024). Peningkatan Literasi Keuangan UMKM Kota Jakarta Barat Melalui Pelatihan Aplikasi SIAPIK. *Dinamisia: Jurnal Pengabdian Kepada Masyarakat*, 6(6), 1486–1493.
- Sirait, M. (2018). Cleaner production options for reducing industrial waste: The case of batik industry in Malang, East Java-Indonesia. *IOP Conference Series: Earth and Environmental Science*, 106(1). <https://doi.org/10.1088/1755-1315/106/1/012069>
- Utami, M., Zahra', H. A., Khoirunisa, & Dewi, T. A. (2022). Green synthesis of magnetic activated carbon from peanut shells functionalized with TiO2 photocatalyst for Batik liquid waste treatment. *Open Chemistry*, 20(1), 1229–1238. <https://doi.org/10.1515/chem-2022-0231>
- Zakaria, N., Rohani, R., Wan Mohtar, W. H. M., Purwadi, R., Sumampouw, G. A., & Indarto, A. (2023). Batik Effluent Treatment and Decolorization—A Review. *Water (Switzerland)*, 15(7). <https://doi.org/10.3390/w15071339>