

References

- Abdul Mutalib, A. A., Jaafar, N. F., Miskam, M., & Shafie, S. (2023). Comprehensive functionality analysis of spent coffee grounds activated using a microwave-assisted method. *Journal of Dispersion Science and Technology*, 46(1), 72–87.
<https://doi.org/10.1080/01932691.2023.2278495>
- Bawa, I. G. A. G. et al. (2023). Combined absorbent of corn husks and eggshells activated by sodium hydroxide as an adsorbent for Remazol Yellow FG dye in textile waste. *Journal of Applied and Natural Science*, 15(4), 1582 - 1586.
<https://doi.org/10.31018/jans.v15i4.5124>
- Berhane, H. (2024, April 26). *Rethinking clothing consumption: understanding the human cost of fast fashion*. Retrieved April 27, 2025, from UNC Policy:
<https://universitypolicy.unc.edu/news/2024/04/26/rethinking-clothing-consumption-understanding-the-human-cost-of-fast-fashion/>
- Beyer, K. (2024). “The adsorption of methylene blue by activated carbon from spent coffee grounds by microwave-induced phosphoric acid activation.” *Winona State University*. Retrieved April 27, 2025, from <https://openriver.winona.edu/rca/2024/schedule/31/>
- By analyzing the absorption spectrum of the bright blue dye, researchers gain valuable insights.* (n.d.) LabXchange. Retrieved April 27, 2025, from <https://www.labxchange.org/library/items/lb:LabXchange:df4ebab4:html:1#:~:text=By%20analyzing%20the%20absorption%20sp>

- Chen, X., Memon, H. A., Wang, Y., Marriam, I., & Tebyetekerwa, M. (2021). Circular Economy and Sustainability of the Clothing and Textile Industry. *Materials Circular Economy*, 3(1), 12. <https://doi.org/10.1007/s42824-021-00026-2>
- Elks, J. (2013). *Polluting paradise: Gap, Ince among companies exposed in Indonesian toxic water scandal*. Retrieved April 27, 2025, from Sustainable Brands: <https://sustainablebrands.com/read/polluting-paradise-gap-inc-among-companies-exposed-in-indonesian-toxic-water-scandal>
- Hsu, C. (2018, August 27). This bright blue dye is found in fabric. Could it also power batteries? Research shows that the chemical, a component of wastewater in textile-making, is good at tasks associated with energy storage. *University at Buffalo News*. Retrieved April 27, 2025, from <https://www.buffalo.edu/news/releases/2018/08/026.html>
- Letsiwe Mabuza, N. S.-P. (2023, April 4). *Natural versus synthetic dyes: Consumers' understanding of apparel coloration and their willingness to adopt sustainable alternatives*. Retrieved April 27, 2025, from ScienceDirect.
- Mersal, M. E., Kuok, K. K., Rahman, M. R., Chan, C. P., Bin Bakri, M. K., Chowdhury, M. D. A., and Patwary, M. A. M. (2024). Effect of activated carbon compaction on water filtration efficiency. *BioResources* 19(3), 5300-5315.
- Mogavero, T. (2020, April 16). *Clothed in Conservation: Fashion & Water*. Retrieved April 27, 2025 from FSU: <https://sustainablecampus.fsu.edu/blog/clothed-conservation-fashion-water>
- Mustapha, O. R., Osobamiro, T. M., Sanyaolu, N. O., & Alabi, O. M. (2023). Adsorption study of Methylene blue dye: an effluents from local textile industry using *Pennistenum pupureum*

(elephant grass). *International Journal of Phytoremediation*, 25(10), 1348–1358.

<https://doi.org/10.1080/15226514.2022.2158781>

Nealon, S. (2025, March 21). *Researchers advance efforts to turn spent coffee grounds into food packaging*. Retrieved April 27, 2025, from Oregon State University News Room:

<https://news.oregonstate.edu/news/researchers-advance-effort-turn-spent-coffee-grounds-foodpackaging#:~:text=An%20estimated%2060%20million%20tons,methane%2C%20a%20potent%20greenhouse%20gas.>

Niinimäki, K. (2021, August 30). *From fast to slow: how to construct a better balance in the fashion system*. Retrieved April 27, 2025, from Georgetown Journal of International

Affairs: <https://gjia.georgetown.edu/2021/08/30/from-fast-to-slow-how-to-construct-a-better-balance-in-the-fashion-system/>

P. Santhosh, A. S. (2013). *Studies on the removal of acid blue 25 from wastewater using activated carbon and turmeric (curcuma longa L.) as adsorbent*. Retrieved April 27, 2025, from

Nature Environment and Pollution Technology : <https://neptjournal.com/upload-images/NL-42-24-24.pdf>

Pujol, D., Liu, C., Gominho, J., Olivella, M. À., Fiol, N., Villaescusa, I., & Pereira, H. (2013).

The chemical composition of exhausted coffee waste. *Science of the Total Environment*, 463-464, 858–866. <https://doi.org/10.1016/j.scitotenv.2013.06.029>

Ranson, B. (2020). *The true cost of colour: The impact of textile dyes on water systems*.

Retrieved April 27, 2025, from Fashion Revolution:

<https://www.fashionrevolution.org/the-true-cost-of-colour-the-impact-of-textile-dyes-on-water-systems/>

- Regan, H. (2020, September 28). *Asian rivers are turning black. And our colorful closets are to blame*. Retrieved April 27, 2025, from CNN: <https://www.cnn.com/style/article/dyeing-pollution-fashion-intl-hnk-dst-sept/index.html>
- Stacey, N. (2024). *Buy Now! The Shopping Conspiracy*. Netflix. Retrieved April 27, 2025, from <https://www.netflix.com/lu-en/title/81554996>
- Statistics Kingdom. (n.d.). *ANOVA calculator - One way ANOVA and Tukey HSD test*. Retrieved April 27, 2025, from <https://www.statskingdom.com/180Anova1way.html>
- The Rana Plaza disaster ten years on: what has changed?* (2023, April). Retrieved April 27, 2025, from International Labour Organization: <https://webapps.ilo.org/infostories/en-GB/Stories/Country-Focus/rana-plaza#intro>
- Vellayati Hajad, H. I. (2024). Unveiling the political impact of fast fashion consumption: the role of lower middle class in environmental crisis in Indonesia? *Jurnal Wacana Politik*, DOI: 10.24198/jwp.v9i2.49065.

Appendix

Appendix A

I. Chart of All Trials and the Corresponding Data

Trial 1	Water	Pellet 10 grams 20 mins (Standard)	Pellet 5 grams 20 mins	Pellet 10 grams 10 mins	Ground 10 grams 20 mins (Standard)	Ground 5 grams 20 mins	Ground 10 grams 10 mins
R Values	0	0.25	0.34	0.2	0.36	0.13	0.18
G Values	0	0.25	0.33	0.24	0.68	0.34	0.6
B Values	0	0.35	0.46	0.4	1.06	0.63	1.02
Trial 2							
R Values	0	0.37	0.34	0.19	0.19	0.16	0.27
G Values	0	0.38	0.33	0.24	0.62	0.4	0.57
B Values	0	0.49	0.51	0.34	1.01	0.64	1
Trial 3							
R Values	0	0.27	0.34	0.2	0.38	0.37	0.31
G Values	0	0.26	0.37	0.27	0.72	0.65	0.64
B Values	0	0.33	0.54	0.43	1.14	0.94	1.1
Trial 4							
R Values	0	0.47	0.31	0.5	0.35	0.29	0.29
G Values	0	0.56	0.28	0.26	0.53	0.56	0.57
B Values	0	0.76	0.4	0.34	1.05	0.83	1.03

Appendix B

I. Data from Standard Ground Trials

Ground 20g	Experiment 1	R	G	B	Column1	Experiment 2	R2	G3	B4	Column5	Experiment 3	R6	G7	B8	Column9	Experiment 4	R10	G11	B12
Ground		0.36	0.68	1.06		Ground	0.19	0.62	1.01		Ground	0.384	0.722	1.14		Ground	0.35	0.53	1.053
100%		1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142
80%		0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102
60%		0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094
40%		0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076
20%		0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064
0%		0	0	0		0%	0	0	0		0%	0	0	0		0%	0	0	0

Average Standard Ground		
R values	G values	B Values
0.36	0.68	1.06
0.19	0.62	1.01
0.38	0.72	1.14
0.35	0.53	1.01
0.32	0.6375	1.055

Appendix C

I. Data from 5 Grams 20 Minutes Ground Trials

Ground 5g				High														
Experiment 1	R	G	B	Column1	Experiment 2	R2	G3	B4	Column5	Experiment 3	R6	G	B7	Column8	Experiment 4	R9	G10	B11
Ground 5g	0.13	0.34	0.63		Ground 5g	0.16	0.4	0.64		Ground 5g	0.37	0.65	0.94		Ground 5G	0.29	0.56	0.83
100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142
80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102
60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094
40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076
20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064
0%	0	0	0		0%	0	0	0		0%	0	0	0		0%	0	0	0

Average Values Ground 5g 20mins		
R Values	G Values	B Values
0.13	0.34	0.63
0.16	0.4	0.64
0.37	0.65	0.94
0.29	0.56	0.83
0.2375	0.4875	0.76

Appendix D

I. Data from 10 Grams 10 Minutes Ground Trials

Ground 10g 10 mins																		
Experiment 1	R	G	B	Column1	Experiment 2	R2	G3	B4	Column5	Experiment 3	R6	G7	B8	Column9	Experiment 4	R10	G11	B12
Ground 10g 10 mi	0.18	0.6	1.02		Ground	0.27	0.57	1		Ground	0.31	0.64	1.1		Ground	0.29	0.57	1.03
100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142
80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102
60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094
40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076
20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064
0%	0	0	0		0%	0	0	0		0%	0	0	0		0%	0	0	0

Average Values of Ground 10g 10mins		
RValues	GValues	BValues
0.18	0.6	1.02
0.27	0.57	1
0.31	0.64	1.1
0.29	0.57	1.03
0.2625	0.595	1.0375

Appendix E

I. Data from Standard Pellet Trials

Experiment 1	R	G	B	Column1	Experiment 2	R2	G3	B4	Column2	Experiment 3	R6	G7	B8	Column3	Experiment 4	R10	G11	B12
Pellet 10g	0.25	0.25	0.35		Pellet 10g	0.37	0.38	0.49		Pellet 10g	0.27	0.26	0.33		Pellet 10g	0.47	0.56	0.76
100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142
80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102
60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094
40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076
20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064
0%	0	0	0		0%	0	0	0		0%	0	0	0		0%	0	0	0

Average Values for Standard Pellet		
R Average	G Average	B Average
0.25	0.25	0.35
0.37	0.38	0.49
0.27	0.26	0.33
0.47	0.56	0.76
0.34	0.3623	0.483

Appendix F

I. Data from 5 Grams 20 Minutes Pellet Trials

Experiment 1	R	G	B	Column1	Experiment 2	R2	G3	B4	Column5	Experiment 3	R6	G7	B8	Column9	Experiment 4	R10	G11	B12
Pellet5g	0.34	0.33	0.46		Pellet5g	0.34	0.33	0.51		Pellet5g	0.34	0.37	0.54		Pellet5g	0.31	0.28	0.4
100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142		100%	1.254	0.132	0.142
80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102		80%	0.876	0.098	0.102
60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094		60%	0.636	0.074	0.094
40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076		40%	0.456	0.068	0.076
20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064		20%	0.226	0.03	0.064
0%	0	0	0		0%	0	0	0		0%	0	0	0		0%	0	0	0

Average Values Pellet 5g 20 mins		
R Average	G Average	B Average
0.34	0.33	0.46
0.34	0.33	0.51
0.34	0.37	0.54
0.31	0.28	0.4
0.333	0.328	0.478