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Preliminary study of novel coal spills-based physical activated carbon for copper ions adsorption in aqueous solution: Kinetics and isotherms (Article)

(Open Access)

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Abstract

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This study proposed a novel activated carbon which was prepared from coal spills by physical activation. It was activated in tube furnace at 500 °C with nitrogen injection. Based on Fourier Transform Infrared Spectroscopy and Scanning Electron Microscopy analyses, the coal spills-based activated carbon (CSFAC) was expected to have more pores and cavities compared to the untreated coal spills (UCS). This preliminary study focused on adsorption kinetics and isotherms by investigating separately the effects of two independent variables i.e. contact time and initial Cu(II) ions concentration. The temperature of ion solution was set at 30 °C (1 atm) and initial pH 5. The Cu (II) ions adsorbed onto the CSFAC and USC had best fitting to the pseudo-second-order kinetics model with R^2 being 1.000 and 0.978, respectively. The Cu(II) ions equilibrium adsorption capacity and adsorption rate of the CSFAC were 90.909 mg/g and 0.093 g/mg. min respectively and they tracked well Freundlich adsorption isotherms with R^2 being 0.811 and 0.917, respectively. The Freundlich-based pore volume and adsorption intensity were 3.861 L/mg and 1.132 respectively. The Brunauer-Emmett-Teller surface area and total pore volume of the CSFAC were approximately 50.848 m/g and 0.018 cc/g respectively. Based on this research, CSFAC was found to be a good potential candidate to be used in water treatment in the near future. © 2020 PENERBIT AKADEMIA BARU.

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1 Clare, D., Roman, P.
The nexus between industrialization and environment. A case study of Indian enterprises
(2002) *Environmental Management and Health*, 13 (1), pp. 80-97. Cited 21 times.
https://doi.org/10.1108/09566160210417859

2 Theophanides, T., Anastassopoulou, J.
Copper and carcinogenesis
(2002) *Critical Reviews in Oncology/Hematology*, 42 (1), pp. 57-64. Cited 256 times.
doi: 10.1016/S1040-8428(02)00007-0
View at Publisher

3 Carl, L., Elizabeth, M.W.
A review: The impact of copper on human health
(2003) *International Copper Association Ltd., New York*, p. 19. Cited 2 times.

4 Kandah, M.I., Abu Al-Rub, F.A., Al-Dabaybeh, N.
The aqueous adsorption of copper and cadmium ions onto sheep manure
(2003) *Adsorption Science and Technology*, 21 (6), pp. 501-510. Cited 23 times.
doi: 10.1260/026361703771953569
View at Publisher

5 Gupta, R., Ahuja, P., Khan, S., Saxena, R.K., Mohapatra, H.
Microbial biosorbents: Meeting challenges of heavy metal pollution in aqueous solutions
(2000) *Current Science*, 78 (8), pp. 967-973. Cited 232 times.
View at Publisher

6 Srivastava, N.K., Majumder, C.B.
Novel biofiltration methods for the treatment of heavy metals from industrial wastewater
(2008) *Journal of Hazardous Materials*, 151 (1), pp. 1-8. Cited 351 times.
doi: 10.1016/j.jhazmat.2007.09.101
View at Publisher

7 Minamisawa, M., Minamisawa, H., Yoshida, S., Takai, N.
Adsorption behavior of heavy metals on biomaterials
(2004) *Journal of Agricultural and Food Chemistry*, 52 (18), pp. 5606-5611. Cited 164 times.
http://pubs.acs.org/journal/jafcau
doi: 10.1021/jf0496402
View at Publisher

8 Guo, Y.-B., Feng, H., Chen, C., Jia, C.-J., Xiong, F., Lu, Y.
Heavy metal concentrations in soil and agricultural products near an industrial district
(2013) *Polish Journal of Environmental Studies*, 22 (5), pp. 1357-1362. Cited 27 times.

9 Eslami, H., Ehrampoush, M.H., Esmaeili, A., Ebrahimi, A.A., Salmani, M.H., Ghaneian, M.T., Falahzadeh, H.

Efficient photocatalytic oxidation of arsenite from contaminated water by Fe_2O_3-Mn_2O_3 nanocomposite under UVA radiation and process optimization with experimental design

(2018) *Chemosphere*, 207, pp. 303-312. Cited 25 times.
www.elsevier.com/locate/chemosphere
doi: 10.1016/j.chemosphere.2018.05.106

View at Publisher

10 Tolonen, E.-T., Sarpola, A., Hu, T., Rämö, J., Lassi, U.

Acid mine drainage treatment using by-products from quicklime manufacturing as neutralization chemicals

(2014) *Chemosphere*, 117 (1), pp. 419-424. Cited 42 times.
www.elsevier.com/locate/chemosphere
doi: 10.1016/j.chemosphere.2014.07.090

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11 Kalhor, M.M., Rafati, A.A., Rafati, L., Rafati, A.A.

Synthesis, characterization and adsorption studies of amino functionalized silica nano hollow sphere as an efficient adsorbent for removal of imidacloprid pesticide

(2018) *Journal of Molecular Liquids*, 266, pp. 453-459. Cited 21 times.
doi: 10.1016/j.molliq.2018.06.041

View at Publisher

12 Eccles, H.

Treatment of metal-contaminated wastes: Why select a biological process?

(1999) *Trends in Biotechnology*, 17 (12), pp. 462-465. Cited 244 times.
www.elsevier.com/locate/tibtech
doi: 10.1016/S0167-7799(99)01381-5

View at Publisher

13 Mohan, D., Chander, S.

Removal and recovery of metal ions from acid mine drainage using lignite-A low cost sorbent

(2006) *Journal of Hazardous Materials*, 137 (3), pp. 1545-1553. Cited 144 times.
doi: 10.1016/j.jhazmat.2006.04.053

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14 Leung, W.C., Wong, M.-F., Chua, H., Lo, W., Yu, P.H., Leung, C.K.

Removal and recovery of heavy metals by bacteria isolated from activated sludge treating industrial effluents and municipal wastewater

(2000) *Water Science and Technology*, 41 (12), pp. 233-240. Cited 148 times.
https://iwaponline.com/wst
doi: 10.2166/wst.2000.0277

View at Publisher

15 Motsi, T., Rowson, N.A., Simmons, M.J.H.

Adsorption of heavy metals from acid mine drainage by natural zeolite

(2009) *International Journal of Mineral Processing*, 92 (1-2), pp. 42-48. Cited 336 times.
doi: 10.1016/j.minpro.2009.02.005

View at Publisher

16 Wulandari, D.A., Nasruddin, Djubaedah, E.
Selectivity of water adsorbent characteristic on natural zeolite in cooling application

(2019) *Journal of Advanced Research in Fluid Mechanics and Thermal Sciences*, 55 (1), pp. 111-118. Cited 3 times.
http://www.akademiabaru.com/doc/ARFMTSV55_N1_P111_118.pdf

17 Shukla, S.
Activated Carbon Market by Product Type (Powdered, Granular, and Others), End-Use (Water Treatment, Food & Beverage Processing, Pharmaceutical & Medical, Automotive, Air purification, and Other End-Uses), and Application (Liquid, and Gaseous) and-Global Opportunity Analysis and Industry Forecast, 2014-2022
(2016) *Activated Carbon Market, Allied Market Research*
https://www.alliedmarketresearch.com/activated-carbon-market

18 Carbon, G.
Activated Carbon-Filtration Equipment-General Carbon Corp
(1958) *General Carbon Corporation*
https://generalcarbon.com/activated-carbon-about-us/

19 Sun, J., Rood, M.J., Rostam-Abadi, M., Lizzio, A.A.
Natural gas storage with activated carbon from a bituminous coal

(1996) *Gas Separation and Purification*, 10 (2), pp. 91-96. Cited 31 times.
doi: 10.1016/0950-4214(96)00009-6

View at Publisher

20 Sun, J., Hippo, E.J., Marsh, H., O'Brien, W.S., Crelling, J.C.
Activated carbon produced from an Illinois basin coal

(1997) *Carbon*, 35 (3), pp. 341-352. Cited 29 times.
http://www.journals.elsevier.com/carbon/
doi: 10.1016/S0008-6223(96)00157-1

View at Publisher

21 Teng, H., Yeh, T.-S., Hsu, L.-Y.
Preparation of activated carbon from bituminous coal with phosphoric acid activation

(1998) *Carbon*, 36 (9), pp. 1387-1395. Cited 234 times.
http://www.journals.elsevier.com/carbon/
doi: 10.1016/S0008-6223(98)00127-4

View at Publisher

22 Chingombe, P., Saha, B., Wakeman, R.J.
Surface modification and characterisation of a coal-based activated carbon

(2005) *Carbon*, 43 (15), pp. 3132-3143. Cited 452 times.
doi: 10.1016/j.carbon.2005.06.021

View at Publisher

23 Lorenc-Grabowska, E., Gryglewicz, G.
Adsorption characteristics of Congo Red on coal-based mesoporous activated carbon

(2007) *Dyes and Pigments*, 74 (1), pp. 34-40. Cited 401 times.
http://www.journals.elsevier.com/dyes-and-pigments/
doi: 10.1016/j.dyepig.2006.01.027

View at Publisher

24 Imamoglu, M., Tekir, O.
Removal of copper (II) and lead (II) ions from aqueous solutions by adsorption on activated carbon from a new precursor hazelnut husks

(2008) *Desalination*, 228 (1-3), pp. 108-113. Cited 376 times.
doi: 10.1016/j.desal.2007.08.011

View at Publisher

25 Demirbas, E., Dizge, N., Sulak, M.T., Kobya, M.
Adsorption kinetics and equilibrium of copper from aqueous solutions using hazelnut shell activated carbon

(2009) *Chemical Engineering Journal*, 148 (2-3), pp. 480-487. Cited 347 times.
doi: 10.1016/j.cej.2008.09.027

View at Publisher

26 Klasson, K.T., Wartelle, L.H., Rodgers III, J.E., Lima, I.M.
Copper(II) adsorption by activated carbons from pecan shells: Effect of oxygen level during activation

(2009) *Industrial Crops and Products*, 30 (1), pp. 72-77. Cited 40 times.
doi: 10.1016/j.indcrop.2009.01.007

View at Publisher

27 Bouhamed, F., Elouear, Z., Bouzid, J.
Adsorptive removal of copper(II) from aqueous solutions on activated carbon prepared from Tunisian date stones: Equilibrium, kinetics and thermodynamics

(2012) *Journal of the Taiwan Institute of Chemical Engineers*, 43 (5), pp. 741-749. Cited 137 times.
doi: 10.1016/j.jtice.2012.02.011

View at Publisher

28 Moreno-Piraján, J.C., Giraldo, L.
Adsorption of copper from aqueous solution by activated carbons obtained by pyrolysis of cassava peel

(2010) *Journal of Analytical and Applied Pyrolysis*, 87 (2), pp. 188-193. Cited 49 times.
doi: 10.1016/j.jaap.2009.12.004

View at Publisher

29 Milenković, D.D., Bojić, A.L., Veljković, V.B.
Ultrasound-assisted adsorption of 4-dodecylbenzene sulfonate from aqueous solutions by corn cob activated carbon (Open Access)

(2013) *Ultrasonics Sonochemistry*, 20 (3), pp. 955-962. Cited 38 times.
www.elsevier.com/inca/publications/store/5/2/5/4/5/1
doi: 10.1016/j.ultsonch.2012.10.016

View at Publisher

30 Muslim, A.
Australian pine cones-based activated carbon for adsorption of copper in aqueous solution

(2017) *Journal of Engineering Science and Technology*, 12 (2), pp. 280-295. Cited 11 times.
http://jestec.taylors.edu.my/Vol%2012%20issue%202%20February%202017/12_2_1.pdf

31 Muslim, A., Ellysa, Said, S.D.
Cu(II) ion adsorption using activated carbon prepared from pithecellobium jiringa (Jengkol) shells with ultrasonic assistance: isotherm, kinetic and thermodynamic studies (Open Access)

(2017) *Journal of Engineering and Technological Sciences*, 49 (4), pp. 472-490. Cited 7 times.
http://journals.itb.ac.id/index.php/jets/article/download/3827/2981
doi: 10.5614/j.eng.technol.sci.2017.49.4.4

View at Publisher

32 Syahiddin, D.S., Muslim, A.
Adsorption of Cu(II) ions onto myristica fragrans shell-based activated carbon: Isotherm, kinetic and thermodynamic studies

(2018) *Journal of the Korean Chemical Society*, 62 (2), pp. 79-86. Cited 4 times.
http://journal.kcsnet.or.kr/main/j_search/j_download.htm?code=K180201
doi: 10.5012/jkcs.2018.62.2.79

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33 Muslim, A., Marwan, Saifullah, R., Azwar, M.Y., Darmadi, Putra, B.P., Rizal, S.
Adsorption of Cu(II) ions on areca catechu stem-based activated carbon: Optimization using response surface methodology

(2019) *International Review on Modelling and Simulations*, 12 (2), pp. 123-129. Cited 3 times.
https://www.praiseworthyprize.org/jsm/index.php?journal=iremos&page=article&op=download&path[]=23403&path[]=pdf_314
doi: 10.15866/iremos.v12i2.16846

View at Publisher

34 Tiempo, R.E.
Caen 1.500 Toneladas De Carbon Al Magdalena
(1995) *El Tiempo*
November 27
http://www.eltiempo.com/archivo/documento/MAM-466148

35 Patino, E.
La historia sucia del carbön [The dirty history of coal]
(2013) *El Heraldo*
http://www.elheraldo.co/economia/la-historia-sucia-del-carbon137522

36 Department of environmental affairs grants for coal from MV Smart to be dumped into the ocean
(2013) *Republic of South Africa*
https://www.gov.za/department-environmental-affairs-grants-permit-coal-mv-smart-be-dumped-ocean

37 Hanafiah, J.
Indonesia Demands Cleanup after Coal Spill Pollutes Beach
(2018) *Mongabay Environmental News*
August 6
https://news.mongabay.com/2018/08/indonesia-demands-cleanup-after-coal-spill-pollutes-beach/

38 Chakravarty, P., Sarma, N.S., Sarma, H.P.
Removal of lead(II) from aqueous solution using heartwood of Areca catechu powder

(2010) *Desalination*, 256 (1-3), pp. 16-21. Cited 71 times.
doi: 10.1016/j.desal.2010.02.029

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39 Hoseinzadeh Hesas, R., Wan Daud, W.M.A., Sahu, J.N., Arami-Niya, A.
The effects of a microwave heating method on the production of activated carbon from agricultural waste: A review

(2013) *Journal of Analytical and Applied Pyrolysis*, 100, pp. 1-11. Cited 163 times.
doi: 10.1016/j.jaap.2012.12.019

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40 Mengistie, A.A., Siva Rao, T., Prasada Rao, A.V., Singanan, M.
Removal of lead(II) ions from aqueous solutions using activated carbon from Militia ferruginea plant leaves

(2008) *Bulletin of the Chemical Society of Ethiopia*, 22 (3), pp. 349-360. Cited 31 times.

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41 Muslim, A., Aprilia, S., Suha, T.A., Fitri, Z.
Adsorption of Pb(II) ions from aqueous solution using activated carbon prepared from areca catechu shell: Kinetic, isotherm and thermodynamic studies

(2017) *Journal of the Korean Chemical Society*, 61 (3), pp. 89-96. Cited 7 times.
http://newjournal.kcsnet.or.kr/main/j_search/j_download.htm?code=K170301
doi: 10.5012/jkcs.2017.61.3.89

View at Publisher

42 Abrar, M.
Optimization of PB(II) adsorption onto australian pine cones-based activated carbon by pulsed microwave heating activation

(2017) *Iranian Journal of Chemistry and Chemical Engineering*, 36 (5), pp. 115-127. Cited 2 times.
http://www.ijcce.ac.ir/article_30035_6ce2e90cef9d2542dc6426d94fbb4eb7.pdf

43 Muslim, A., Syamsuddin, Y., Salamun, A., Abubakar, Ramadhan, D., Peiono, D.
Adsorption of Cu(II) Ions in Aqueous Solutions by HCl Activated Carbon of Oil Palm (Open Access)

(2017) *IOP Conference Series: Materials Science and Engineering*, 206 (1), art. no. 012075. Cited 3 times.
http://www.iop.org/EJ/journal/mse
doi: 10.1088/1757-899X/206/1/012075

View at Publisher

44 Lagergren, S.K.
About the theory of so-called adsorption of soluble substances
(1898) *Sven. Vetenskapsakad. Handingarl*, 24, pp. 1-39. Cited 9457 times.

45 Ho, Y.S., Wase, D.A.J., Forster, C.F.
Kinetic studies of competitive heavy metal adsorption by sphagnum moss peat

(1996) *Environmental Technology (United Kingdom)*, 17 (1), pp. 71-77. Cited 492 times.
doi: 10.1080/09593331708616362

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46 Langmuir, I.
The adsorption of gases on plane surfaces of glass, mica and platinum (Open Access)

(1918) *Journal of the American Chemical Society*, 40 (9), pp. 1361-1403. Cited 13831 times.
doi: 10.1021/ja02242a004

View at Publisher

47 Freundlich, H.M.F.
Over the Adsorption in Solution
(1906) *Journal of Physical Chemistry*, 57, pp. 385-471. Cited 11340 times.

48 Gupta, H., Gogate, P.R.
Intensified removal of copper from waste water using activated watermelon based biosorbent in the presence of ultrasound (Open Access)

(2016) *Ultrasonics Sonochemistry*, 30, pp. 113-122. Cited 42 times.
www.elsevier.com/inca/publications/store/5/2/5/4/5/1
doi: 10.1016/j.ultsonch.2015.11.016

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49 Kobya, M., Demirbas, E., Senturk, E., Ince, M.
Adsorption of heavy metal ions from aqueous solutions by activated carbon prepared from apricot stone

(2005) *Bioresource Technology*, 96 (13), pp. 1518-1521. Cited 587 times.
doi: 10.1016/j.biortech.2004.12.005

View at Publisher

50 Tan, I.A.W., Ahmad, A.L., Hameed, B.H.
Adsorption isotherms, kinetics, thermodynamics and desorption studies of 2,4,6-trichlorophenol on oil palm empty fruit bunch-based activated carbon (Open Access)

(2009) *Journal of Hazardous Materials*, 164 (2-3), pp. 473-482. Cited 497 times.
doi: 10.1016/j.jhazmat.2008.08.025

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