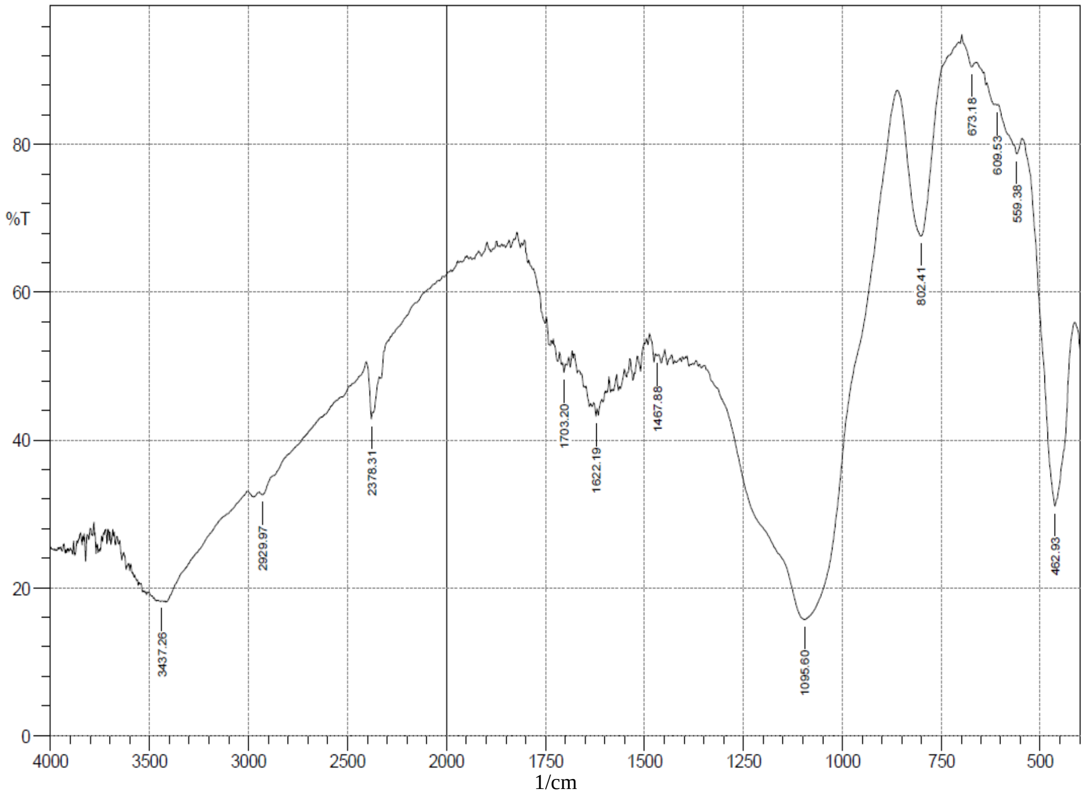

Figur 3. FTIR spectrum before acid modification

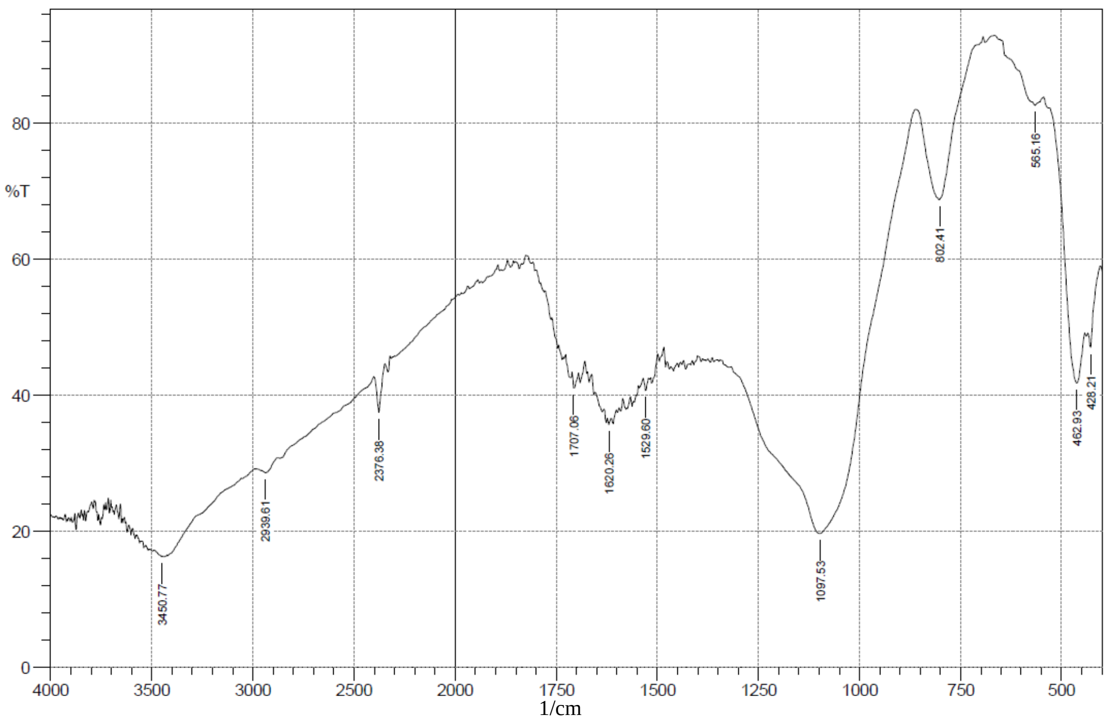

Figure 4. FTIR spectrum after acid modification

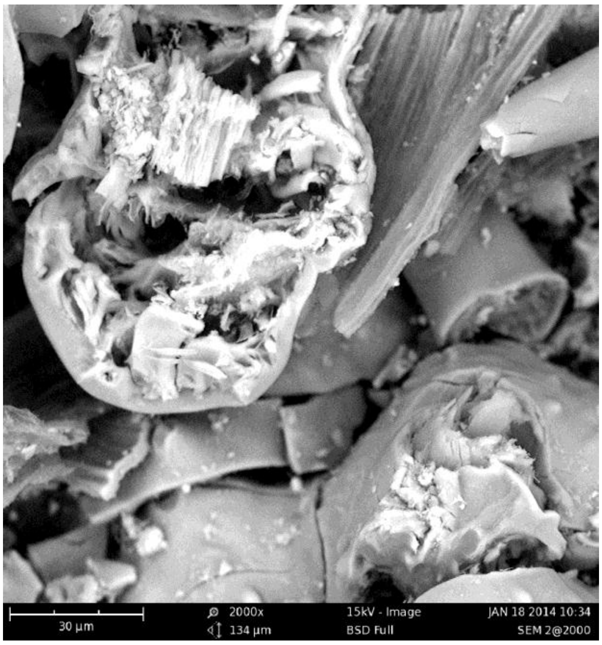

Figure 5. SEM Micrograph before acid modification

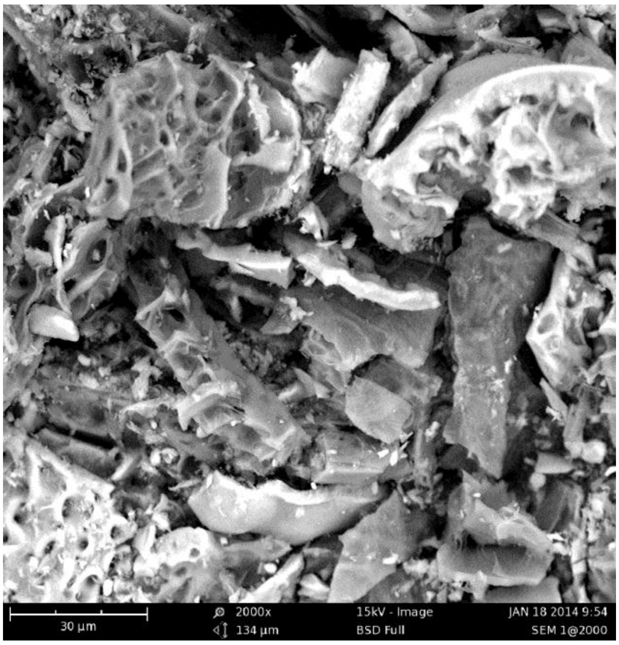

Figure 6. SEM Micrograph after acid modification

TABLE 1. Surface Area and Pore Size before and after Phosphoric Acid Modification

Sample	S_L (m^2/g)	S_{BET1} (m^2/g)	S_{BET2} (m^2/g)	V_{mic} (cm^3/g)	D_p (nm)
Before acid modification	12.47	9.553	9.071	0.0052	2.48
After acid modification	102.4	64.7	66.13	0.034	1.82

CONCLUSION

In conclusion, the BET analysis shows that modification of the charred residue with phosphoric acid enhanced the surface area of the activated carbon from 12.47 to 102.4m^2/g. The average pore diameter was also enhanced from 2.4 to 1.82nm. It also shows improvement in micropore volume from 0.0052 to 0.034cm^3/g. SEM analysis confirmed the improvement in surface area and pore development resulting from the phosphoric acid modification while FTIR analysis revealed the existence of phosphorous-oxy-containing functional groups on the surface of the phosphoric acid modified activated carbon. Therefore, modification of thermally pretreated rice husk with phosphoric acid has been noted to result in significant changes in the characteristics of the activated carbon which in turn governs its performance in various areas of application such as wastewater treatment.

REFERENCES

1. Song, X., Y. Zhang, C. Yan, W. Jiang and C. Chang, 2013. The Langmuir monolayer adsorption model of organic matter into effective pores in activated carbon. Journal of colloid and interface science, 389(1): 213-219.
2. Cadoni, P. and F. Angelucci, Analysis of incentives and disincentives for Rice in Nigeria. , in Technical Notes,2013: MAFAP, FAO, Rome.4-40.
3. Nhapi, I., N. Banadda, R. Murenzi, C. Sekomo and U. Wali, 2011. Removal of heavy metals from industrial wastewater using rice husks. Open Environmental Engineering Journal, 4: 170-180.
4. Zhang, J., H. Fu, X. Lv, J. Tang and X. Xu, 2011. Removal of Cu (II) from aqueous solution using the rice husk carbons prepared by the physical activation process. biomass and bioenergy, 35(1): 464-472.
5. Masoud, M.S., W.M. El-Saraf, A.M. Abdel-Halim, A.E. Ali, E.A. Mohamed and H.M. Hasan, 2012. Rice husk and activated carbon for waste water treatment of El-Mex Bay, Alexandria Coast, Egypt. Arabian Journal of Chemistry.(2012):1-7
6. Wan Ngah, W. and M. Hanafiah, 2008. Removal of heavy metal ions from wastewater by chemically modified plant wastes as adsorbents: a review. Bioresource technology, 99(10): 3935-3948.
7. Foo, K. and B. Hameed, 2009. Utilization of rice husk ash as novel adsorbent: a judicious recycling of the colloidal agricultural waste. Advances in colloid and interface science, 152(1): 39-47.
8. Xu, X., H. Fu, K. Zhu, J. Zhang, X. Lv and J. Tang, 2012, Studies on removal of NH4+-N from aqueous solution by using the activated carbons derived from rice husk. 43:18-25
9. Lin, L., S.-R. Zhai, Z.-Y. Xiao, Y. Song, Q.-D. An and X.-W. Song, 2013. Dye adsorption of mesoporous activated carbons produced from NaOH-pretreated rice husks. Bioresource technology, 136: 437-443.