

Supplementary data

Ball-mill, humic acid and rock phosphate modified conocarpus biochar for efficient removal of heavy metals from contaminated water

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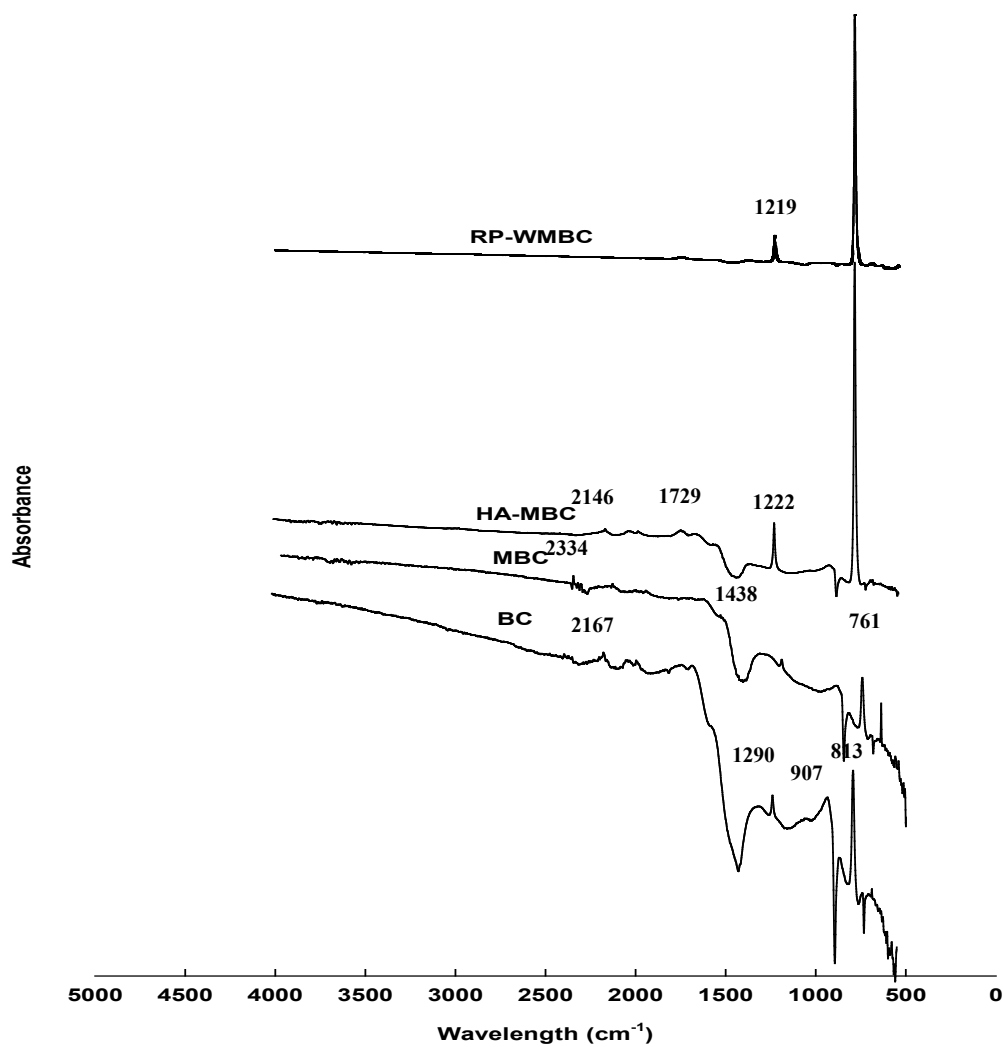


Figure S1. FTIR spectra of conocarpus biochar and its un-milled, milled and modified derivatives.

BC = Biochar, MBC = Ball milled biochar, HA-MBC = Humic acid modified ball milled biochar, RP-WMBC = Rock phosphate modified ball milled biochar with water.

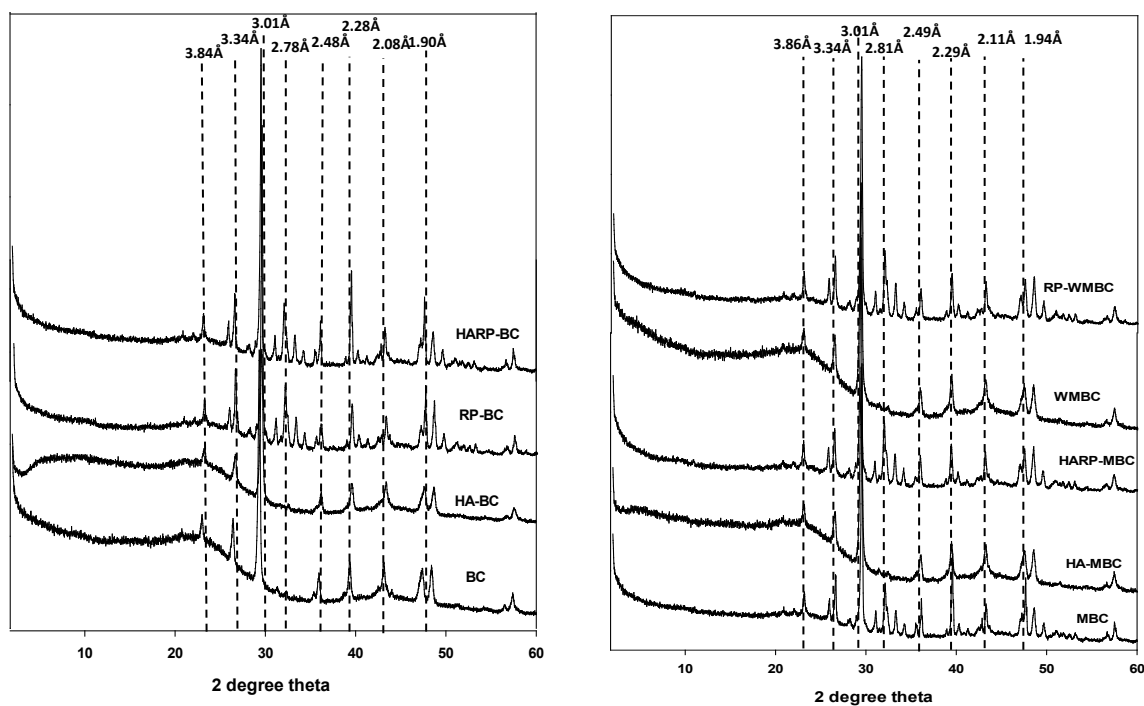


Figure S2. XRD spectra of conocarpus biochar and its un-milled, milled and modified derivatives. BC = Biochar, HA-BC = Humic acid modified biochar, RP-BC = Rock phosphate modified biochar, HARP-BC = Humic acid and rock phosphate modified biochar, MBC = Ball milled biochar, HA-MBC = Hum acid modified ball milled biochar, HARP-MBC = Humic acid and rock phosphate modified ball milled biochar, WMBC= Ball milled biochar with water RP-WMBC = Rock phosphate modified ball milled biochar with water.

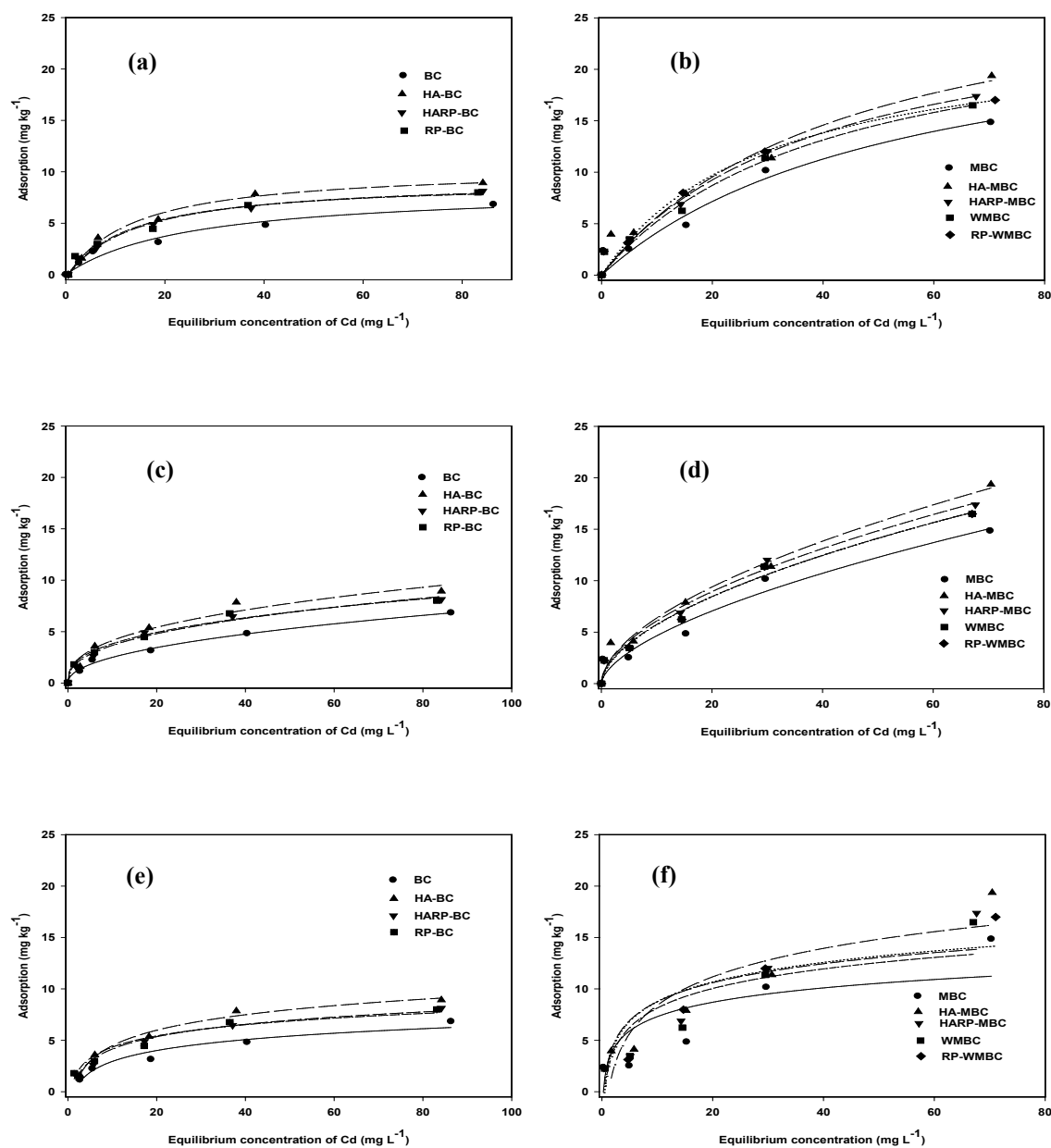


Figure S3. Langmuir(a-b), Freundlich (c-d) and Temkin (e-f) adsorption isotherms of Cd by (a) un-milled adsorbents and (b) milled adsorbents.

BC = Biochar, HA-BC = Humic acid modified biochar, HARP-BC = Humic acid and rock phosphate modified biochar, RP-BC = Rock phosphate modified biochar, MBC = Ball milled biochar, HA-MBC = Humic acid modified ball milled biochar, HARP-MBC = Humic acid and rock phosphate modified ball milled biochar, WMBC= Ball milled biochar with water, RP-WMBC = Rock phosphate modified ball milled biochar with water.

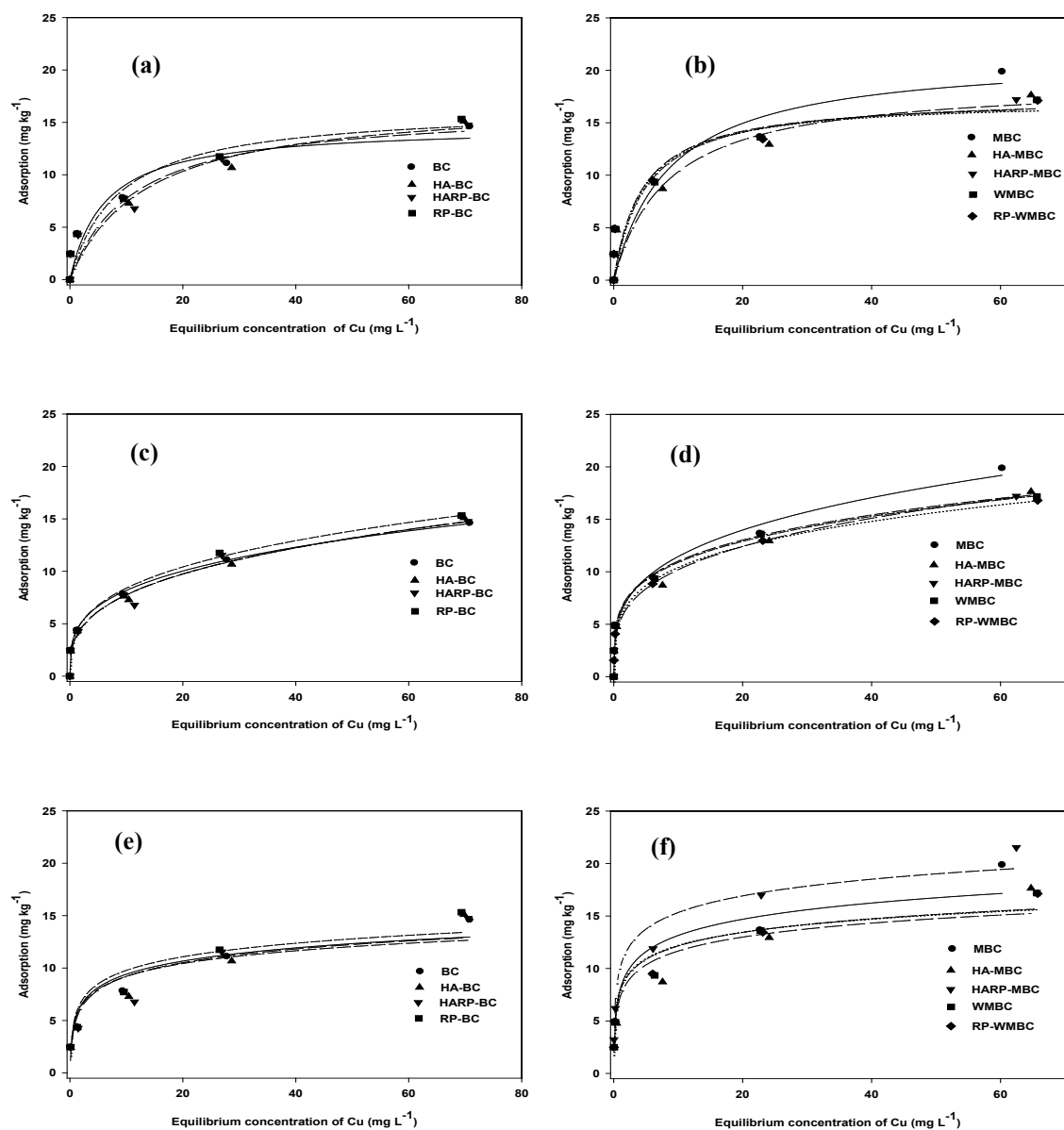


Figure S4. Langmuir(a-b), Freundlich (c-d) and Temkin (e-f) adsorption isotherms of Cu by (a) un-milled adsorbents and (b) milled adsorbents.

BC = Biochar, HA-BC = Humic acid modified biochar, HARP-BC = Humic acid and rock phosphate modified biochar, RP-BC = Rock phosphate modified biochar, MBC = Ball milled biochar, HA-MBC = Humic acid modified ball milled biochar, HARP-MBC = Humic acid and rock phosphate modified ball milled biochar, WMBC= Ball milled biochar with water, RP-WMBC = Rock phosphate modified ball milled biochar with water.

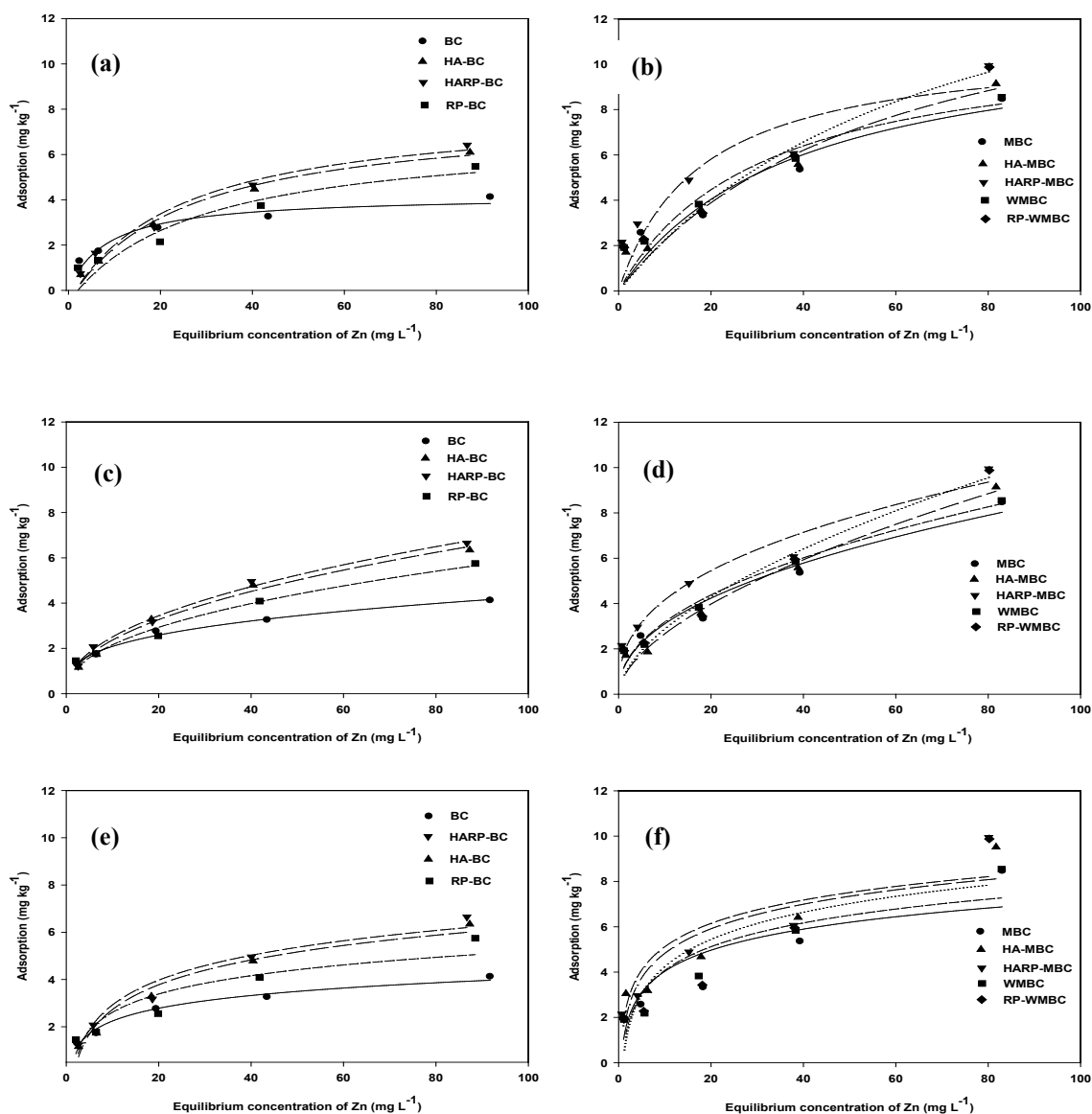


Figure S5. Langmuir (a-b), Freundlich (c-d) and Temkin (e-f) adsorption isotherms of Zn by (a) un-milled adsorbents and (b) milled adsorbents.

BC = Biochar, HA-BC = Humic acid modified biochar, HARP-BC = Humic acid and rock phosphate modified biochar, RP-BC = Rock phosphate modified biochar, MBC = Ball milled biochar, HA-MBC = Humic acid modified ball milled biochar, HARP-MBC = Humic acid and rock phosphate modified ball milled biochar, WMBC = Ball milled biochar with water, RP-WMBC = Rock phosphate modified ball milled biochar with water.

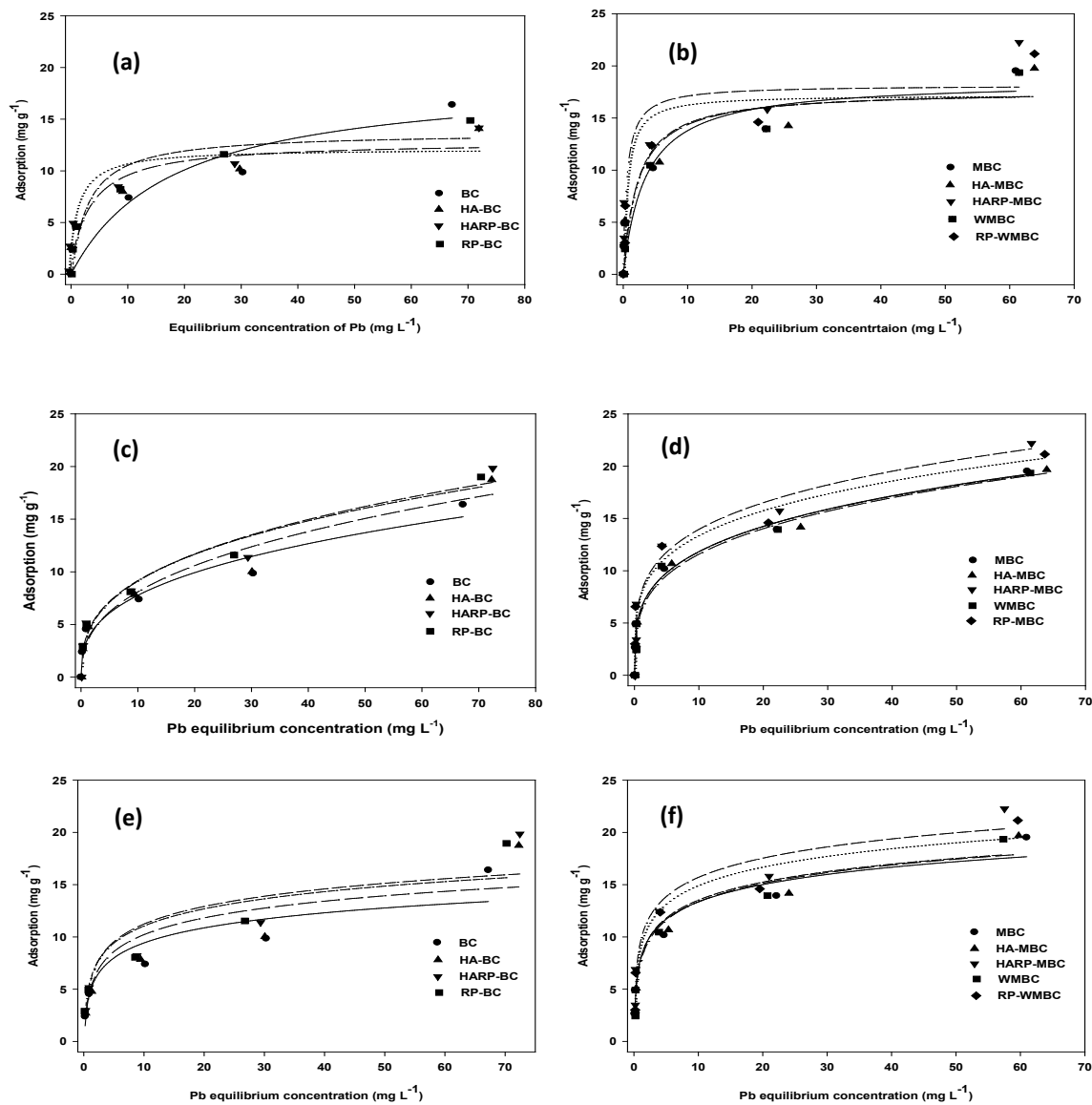


Figure S6. Adsorption isotherms of Pb by conocarpus derived biochar, its modified and milled derivatives. Fig. 2 a, b (Langmuir), c, d (Freundlich) and e, f (Temkin). BC = Biochar, HA-BC = Humic acid modified biochar, RP-BC = Rock phosphate modified biochar, HARP-BC = Humic acid and rock phosphate modified biochar, MBC = Ball milled biochar, HA-MBC = Humic acid modified ball milled biochar, HARP-MBC = Humic acid and rock phosphate modified ball milled biochar, WMBC= Ball milled biochar with water RP-WMBC = Rock phosphate modified ball milled biochar with water.