

Valorization of Bambara groundnut shell via intermediate pyrolysis: Products distribution and characterization

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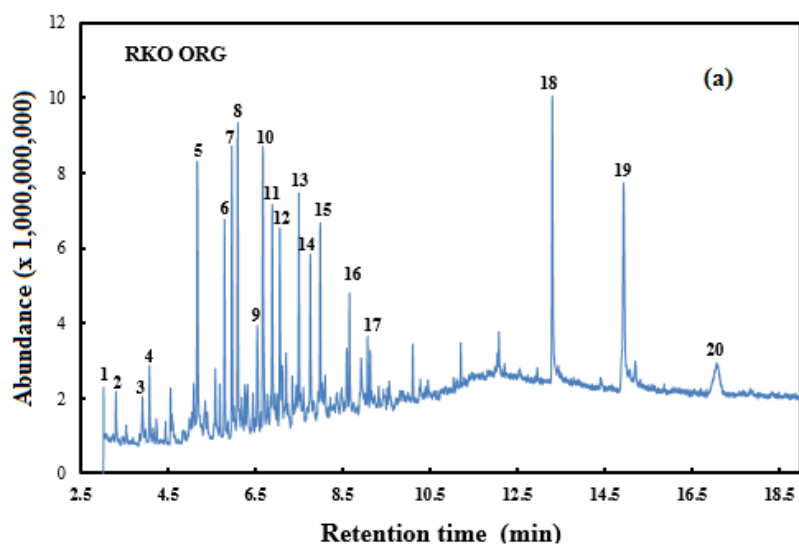
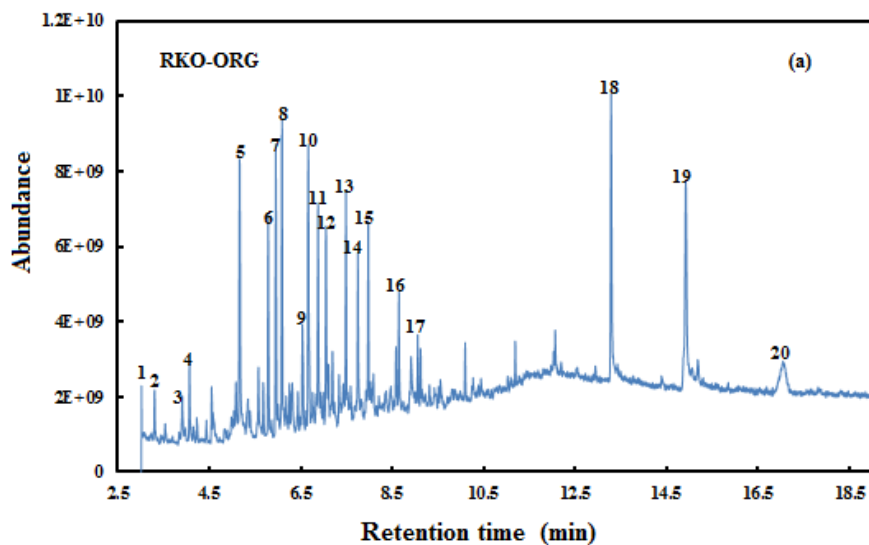
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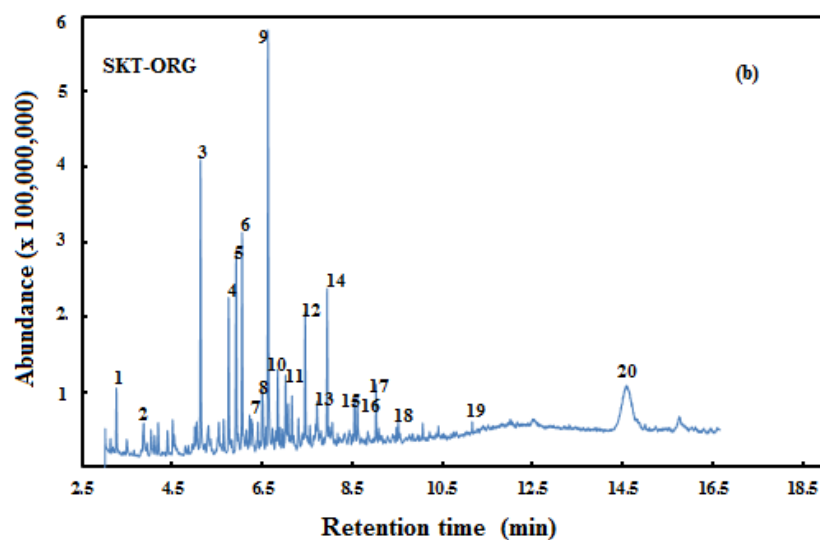
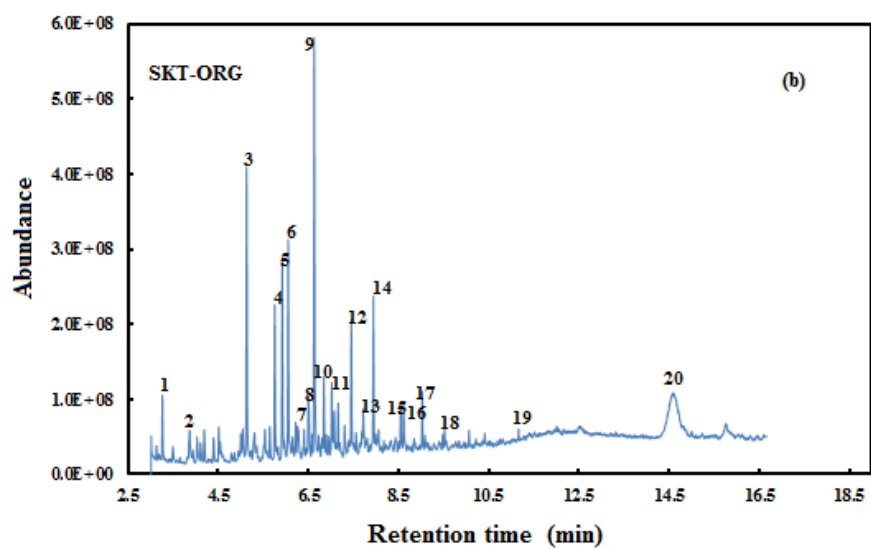
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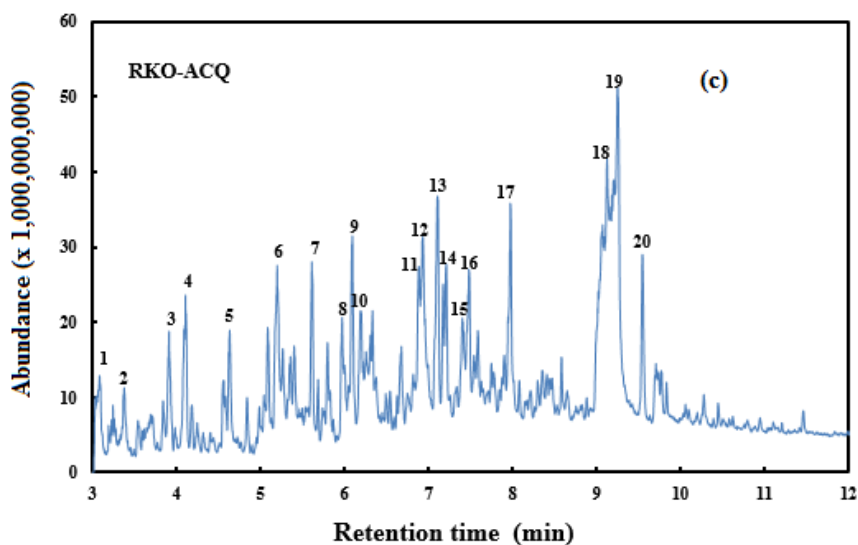
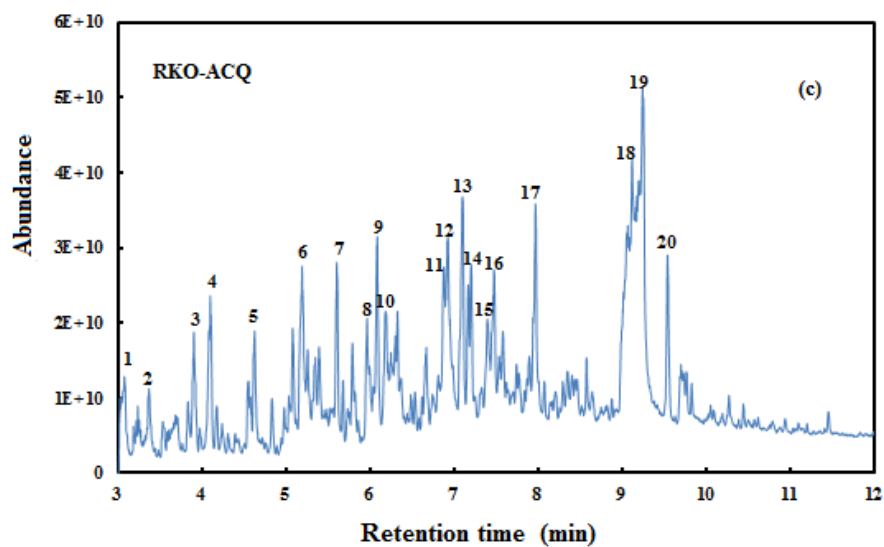
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1. 2-Myristinoyl pantetheine; 2. Pyridine; 3. Cyclobutene, 2-propenylidene-; 4. L-Galactose, 6-deoxy-; 5. Cyclobarbitol; 6. 2,4-Hexadienenitrile; 7. 2-Furanmethanol; 8. Phenol; 9. Phenol, 3-methyl-; 10. p-Cresol; 11. Mequinol; 12. Phenol, 2,5-dimethyl-; 13. Phenol, 3-ethyl-; 14. Creosol; 15. Benzaldehyde, 3-methyl-; 16. Phenol, 4-ethyl-2-methoxy-; 17. 2-Methoxy-4-vinylphenol; 18. Phenol, 2,6-dimethoxy-; 19. Hexadecanoic acid, 1-(hydroxymethyl)-1,2-ethanediyl ester; 20. trans-13-Octadecenoic acid

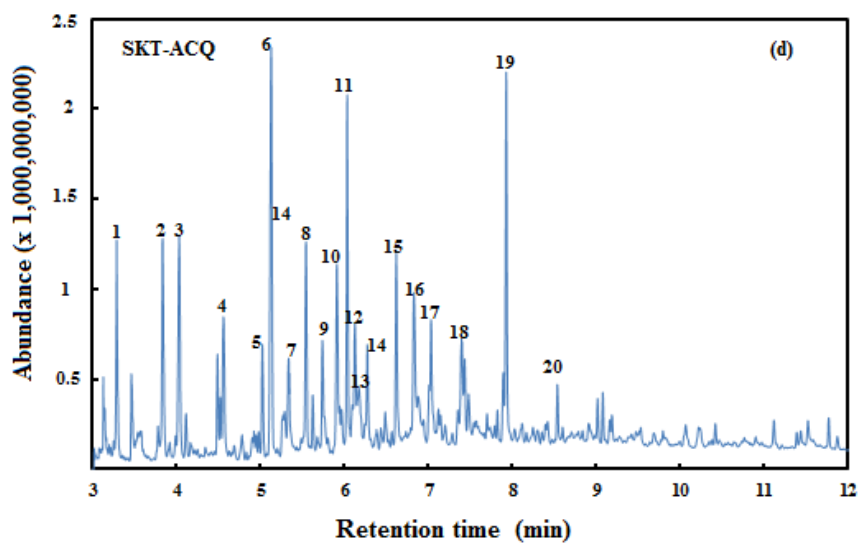
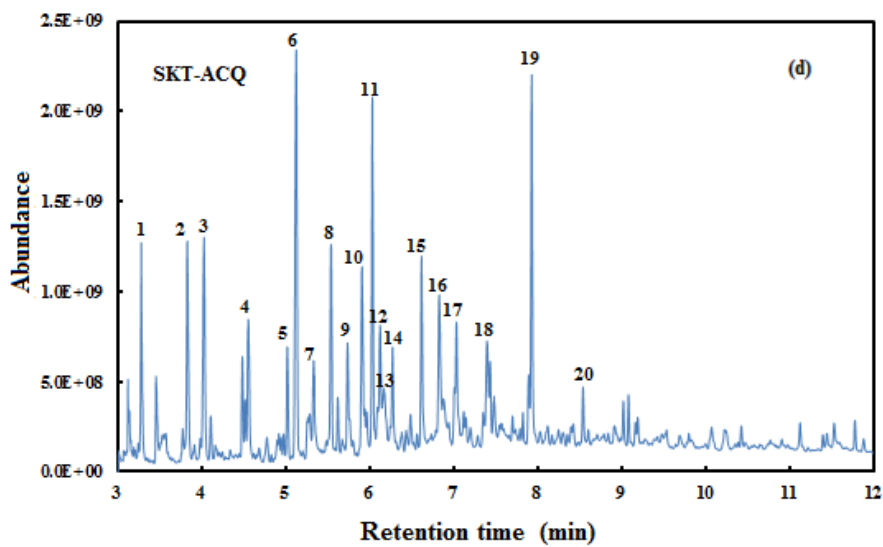


1. Cyclobutene, 2-propenylidene-; 2. 2-Cyclopenten-1-one; 3. Phenol; 4. Phenol, 2-methyl-; 5. p-Cresol; 6. Phenol, 2-methoxy-; 7. Benzene, 1-ethyl-4-methoxy-; 8. Phenol, 2,3-dimethyl-; 9. Phenol, 3-ethyl-; 10. Cresol; 11. Benzofuran, 2,3-dihydro-; 12. Phenol, 4-ethyl-2-methoxy-; 13. 2-Methoxy-4-vinylphenol; 14. Phenol, 2,6-dimethoxy-; 15. Propane-1,1,2,2-tetracarbonitrile, 3-(4-acetyl-2,5-dimethyl-3-furanoyl)-; 16. 1,3-Dioxane, 5-(hexadecyloxy)-2-pentadecyl-, trans-; 17. 4a,12c-Ethanooxepino[4,3,2-de]anthracene-7-carboxylic acid, 9,12-diacetoxy-3-methyl-8-oxo-2,3,4,5,6,7,7a,12b-octahydro-, methyl ester; 18. Stearic acid, 3-(octadecyloxy)propyl ester; 19. Heptasiloxane, hexadecamethyl-; 20. Octaethylene glycol monododecyl ether



1. Ethanol, 2-nitro-, propionate (ester); 2. Hydrazine, (1,1-dimethylethyl)-; 3. Cyclohexanepropanol-; 4. 3-Furanmethanol; 5. Hexane, 2,3,5-trimethyl-; 6. 2,4-Hexadienenitrile; 7. Formic acid, oct-2-yl ester; 8. Phenol, 2-methyl-; 9. Cyclohexane, (1-methylethylidene)-; 10. 2-Deoxy-D-galactose; 11. 2,3-Dimethylhydroquinone; 12. Hydroquinone; 13. 1,4:3,6-Dianhydro-à-d-glucopyranose; 14. 2,3-Anhydro-d-mannosan; 15. 2-Methoxyresorcinol; 16. Adrenalone; 17. Formic acid, 2,6-dimethoxyphenyl ester; 18. D-Allose; 19. Propanamide, 3-(1-piperaziny)-; 20. Lactose

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1. 1-Hydroxy-2-butanone; 2. 2-Cyclopenten-1-one; 3. 3-Furanmethanol; 4. Butanoic acid, 4-hydroxy-; 5. 2-Cyclopenten-1-one, 3-methyl-; 6. Phenol; 7. Butanoic acid, 2,2-dimethyl-, methyl ester; 8. 1,2-Cyclopentanedione, 3-methyl-; 9. Phenol, 2-methyl-; 10. Phenol, 3-methyl-; 11. Phenol, 2-methoxy-; 12. 1-Nonen-3-ol; 13. 3-Pyridinecarboxylic acid, 4-hydroxy-; 14. 4-Pentenoic acid, 4-methyl-3-methylene-, isopropyl ester; 15. Phenol, 3-ethyl-; 16. (S)-(+)-2',3'-Dideoxyribonolactone; 17. 1,4:3,6-Dianhydro- α -D-glucopyranose; 18. Hydroquinone; 19. Formic acid, 2,6-dimethoxyphenyl ester; 20. Squalene

Fig. 5. GC-MS chromatogram of bio-oil. (a) Organic-RKO; (b) Organic-SKT; (c) aqueous-RKO; (d) aqueous-SKT