Abstract

In one embodiment, a method for forming charcoal from coffee grounds is provided, which includes pyrolyzing coffee grounds to form pyrolyzed coffee grounds. The pyrolyzed coffee grounds are mixed with a binding agent to form a mixture. The mixture is pressed into a charcoal cube. In another embodiment charcoal formed from coffee grounds is provided including pyrolyzed coffee grounds and a binding agent. The pyrolyzed coffee grounds are mixed with the binding agent and pressed into a charcoal cube.
102 Place Coffee Grounds in Pipe
104 Place Pipe in Enclosed Bed of Charcoal to Pyrolyze Coffee Grounds
106 Mix Pyrolyzed Coffee Grounds with a Binding Agent and Shredded Paper to Form a Slurry
108 Place Slurry in a Press
110 Press Charcoal Cube

FIGURE 1
CHARCOAL FORMED FROM COFFEE AND METHODS THEREFOR
CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE DISCLOSED EMBODIMENTS

[0002] Coffee grounds left over from brewing coffee are generally thrown out as they cannot be used again. Coffee houses in particular may go through a large amount of coffee grounds in one day. When these grounds are thrown out, they take up space in garbage bags and ultimately in a landfill. In today’s society, there is a desire to reduce waste that is left in landfills and to recycle or reuse as much waste as possible.

[0003] Accordingly, there is a need to recycle used coffee grounds in a manner that prevents them from being thrown in a landfill.

SUMMARY OF THE CONCEPTS DISCLOSED

[0004] In one embodiment, a method for forming charcoal from coffee grounds is provided, wherein the method includes pyrolyzing the coffee grounds. The coffee grounds may be pyrolyzed in a steel pipe at approximately 1200 degrees Fahrenheit for approximately 45 minutes. The method also includes mixing the pyrolyzed coffee grounds with a binding agent and a fibrous material. The binding agent may be oil treated with a surfactant before being mixed with the pyrolyzed coffee grounds and the fibrous material. Additionally, the mixture may include 70 parts pyrolyzed coffee grounds, 10 parts binding agent, and 1 part fibrous material. The method further includes pressing the mixture into a charcoal cube. The mixture may be pressed in a tube mold having a press plate on top and a cap on the bottom.

[0005] In one embodiment, charcoal formed from coffee grounds is provided, wherein the charcoal includes pyrolyzed coffee grounds and a binding agent. The pyrolyzed coffee grounds are mixed with the binding agent and pressed into a charcoal cube.

BRIEF DESCRIPTION OF THE DRAWINGS

[0006] The embodiments described herein and other features, advantages and disclosures contained herein, and the manner of attaining them, will become apparent and the present disclosure will be better understood by reference to the following description of various exemplary embodiments of the present disclosure taken in conjunction with the accompanying drawing, wherein:

[0007] FIG. 1 is a flowchart of a method for forming charcoal from coffee grounds according to at least one embodiment of the present disclosure.

[0008] FIG. 2 is a cross-sectional view of an end of a pipe having used coffee grounds therein according to at least one embodiment of the present disclosure.

[0009] FIG. 3 is a perspective view of a charcoal bed for pyrolyzing the used coffee grounds according to at least one embodiment of the present disclosure.

[0010] FIG. 4 is a perspective view of a press for forming charcoal cubes from pyrolyzed coffee grounds according to at least one embodiment of the present disclosure.

[0011] FIG. 5 is a cross-sectional view of a coffee ground slurry in the press according to at least one embodiment of the present disclosure. FIG. 5 also illustrates an exploded view of the coffee ground slurry according to at least one embodiment of the present disclosure.

[0012] FIG. 6 is a perspective view of a charcoal bag filled with charcoal formed from pyrolyzed coffee grounds according to at least one embodiment of the present disclosure.

[0013] FIG. 7 is a side cross-sectional view of a barbeque pit having a charcoal bag positioned therein according to at least one embodiment of the present disclosure.

DETAILED DESCRIPTION OF THE DRAWINGS

[0014] The features and advantages of this disclosure, and the manner of attaining them, will be more apparent and better understood by reference to the following descriptions of the disclosed methods and systems, taken in conjunction with the accompanying drawings. The components in the figures are not necessarily to scale, emphasis instead being placed upon illustrating the principles of the disclosure. Moreover, in the figures like referenced numerals designate corresponding parts throughout the different views, but not all reference numerals are shown in each of the figures.

[0015] For the purposes of promoting an understanding of the principles of the present disclosure, reference will now be made to the embodiments illustrated in the drawings, and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of this disclosure is thereby intended.

[0016] Disclosed herein is charcoal formed from coffee grounds and methods therefor. The method 100 for forming charcoal from used coffee grounds according to at least one embodiment of the present disclosure is illustrated in FIG. 1. In particular, at step 102, the used coffee grounds are placed in a pipe to be pyrolyzed. It should be noted that in other embodiments the used coffee grounds may be pyrolyzed in any container that reduces the amount of oxygen in the container, while allowing gases from the pyrolyzation process to seep out of the container. For example, the used coffee grounds may be pyrolyzed between flat sheets of heat conductive material that are clamped together or in a gas-fired rotating drum, to name two non-limiting examples. At step 104, the pipe is positioned in proximity to a heat source to pyrolyze the coffee grounds within the pipe. In one exemplary embodiment, the pipe is positioned on a bed of charcoal. At step 106, the pyrolyzed coffee grounds are mixed with oil and shredded paper to form a slurry. At step 108, a portion of the slurry is positioned in a press and, at step 110, the slurry is pressed into a charcoal cube. The specific details of the method 100 will become more apparent from the description of FIGS. 2-7 below.

[0017] FIG. 2 illustrates a pipe 120 utilized to pyrolyze used coffee grounds 122. In at least one embodiment of the present disclosure, the pipe 120 is a 1" by 18" steel pipe having caps 124 screwable onto each end and a hollow interior capable of retaining the coffee grounds 122. It should be noted that other sized pipes may be used for the pyrolyzation process. Additionally, the material of the pipe 120 is not limited to steel, but may include other materials capable of conducting heat to the contents of the pipe and withstanding temperatures of up to approximately 1200 degrees Fahrenheit.
The caps 124 are screwed onto the end of the pipe 120 to prevent the coffee grounds 122 from escaping. However, the threads 126 joining the end caps 124 to the pipe 120 do not form an air tight seal, thereby enabling gases 128 within the pipe 120 to be emitted therefrom during the pyrolysis process. In other embodiments, the end caps 124 may be secured to the pipe 120 using suitable mechanisms other than screw threads 126, provided the seal between end caps 124 and pipe 120 is not air tight. Additionally, the pipe 120 may be constructed so that one end is closed and only the opposite end includes a screw cap 124 or other closing mechanism.

The interior of the pipe 120 is filled with coffee grounds 122. In at least one embodiment of the present disclosure, approximately two ounces of coffee grounds 122 are added to the interior of the pipe 120. In the embodiment illustrated in FIG. 2, used coffee grounds 122 are added to the pipe; however, it should be appreciated that unused coffee grounds also may be pyrolyzed. The coffee grounds 122 are loosely packed in the pipe 120. The pipe 120 is then closed by securing the end caps 124 in a manner that allows gas to escape, and the pipe 120 is placed in an oven 130, as illustrated in FIG. 3. In the embodiment illustrated in FIG. 3, ten pipes 120 are placed in the oven 130 at a time; however, any suitable number of pipes 120 may be positioned in the oven 130. The oven 130 illustrated in FIG. 3 includes a bed of charcoal 132 contained by cinderblocks 134, however other oven configurations are possible and within the scope of the present disclosure. The oven 130 is enclosed around the pipes 120 but includes vents 136 to allow forced airflow, such as from a fan 138, to pass through the oven 130. In at least one embodiment, the oven 130 is heated to approximately 1200 degrees Fahrenheit. In other embodiments, the oven 130 may be heated to a range of 1000-1400 degrees Fahrenheit. In at least one embodiment of the present disclosure, pipes 120 are heated in the oven 130 for approximately 30 minutes to an hour. In at least one embodiment of the present disclosure, pipes 120 are heated in the oven 130 for approximately 45 minutes. It should be appreciated that the time required to pyrolyze the coffee grounds 122 in the pipes 120 may be dependent on the number of pipes 120 in the oven 130 and the temperature of the oven 130. Alternatively, the coffee grounds 122 may be pyrolyzed in an electric oven, for example, when the coffee grounds 122 are positioned between flat sheets of heat conductive material that are clamped together as described above.

After pyrolyzing the coffee grounds 122, the pipes 120 are removed from the oven 130 and quenched in water before removing the pyrolyzed coffee grounds 140 (shown in FIG. 5) from each pipe 120. The pyrolyzed coffee grounds 140 are mixed with a binding agent 142 (shown in FIG. 5) and a fibrous material 144 (shown in FIG. 5) to form a charcoal slurry 146 (shown in FIG. 5). In at least one embodiment of the present disclosure, the binding agent 142 may include used oil, for example, used cooking oil, used vegetable oil, used olive oil, or the like. In other embodiments, unused oil may be added to the slurry 146. In yet other embodiments, the binding agent 142 may include any food product capable of binding the pyrolyzed coffee grounds 140, for example corn syrup. The binding agent 142 may be treated with a surfactant before being added to the slurry 146. The fibrous material 144 may include shredded paper or any other suitable material that forms a lattice, for example, corn starch. FIG. 5 includes an exploded view of the slurry 146. In at least one embodiment of the present disclosure, the slurry 146 contains approximately 70 parts pyrolyzed coffee grounds 140, approximately 10 parts binding agent 142, and approximately 1 part fibrous material 144.

The slurry 146 is then added to a tube mold 152 (shown in FIGS. 4 and 5) to form charcoal briquettes 160 (shown in FIG. 6). As illustrated in FIG. 4, the tube mold 152 is positioned in an arbor press 150 or any other suitable press. The tube mold 152 may be a steel mold measuring approximately 1 ¼” by 1 ¼” square. The press 150 includes a pressing plate 154 at the top and an end cap 156 on the bottom. In one embodiment, the slurry may be positioned in a press that does not include an end cap 156 and a pressing plate 154. In particular, any press may be used to form the charcoal briquette so long as both ends of the press can be removed. The size of the mold 152 may be altered to alter the size of the charcoal briquettes 160. Additionally, the mold 152 may be formed from any suitable material. The mold 152 includes perforations 158 (shown in FIG. 5) to allow excess binding agent 142 to be discharged from the slurry 146 during a pressing process. The slurry 146 is pressed using approximately 5000 psi of pressure. If too much pressure is applied, the charcoal briquettes will not fully ignite, and if too little pressure is applied, the charcoal briquettes will fall apart. During the pressing process, at least some of the excess binding agent 142 is discharged through the perforations 158 and the slurry 146 is pressed into a charcoal briquette 160 having approximately half of the volume of the slurry 146 as originally positioned in the tube mold 152. In one embodiment, the completed charcoal briquette 160 has dimensions of approximately 1”x1”x1”. It should be noted that other size briquettes 160 may be formed by changing the dimensions of the tube press 152 and/or the amount of slurry 146 added to the tube press 152; however, the size and shape of the briquette 160 are selected so that the briquette 160 fully ignites without burning up too quickly. In particular, if the briquette 160 is too large, the briquette 160 will not fully ignite, and if the briquette 160 is too small, the briquette 160 will burn too quickly.

As illustrated in FIG. 6, the charcoal briquettes 160 are packaged in a bag 162 for retail. In at least one embodiment of the present disclosure, approximately 55 briquettes 160 equalling approximately 5 pounds are added to a 5 pound coffee bag 162. As will be appreciated, other sized bags 162 may be used and the number of briquettes 160 may vary for other sized bags. The bag 162 may be unlined, lined with wax, lined with petroleum, or the like. The bag 162 may be formed from any flammable material that prevents the binding agent from soaking therethrough. The top of the bag 162 is rolled down and an integrated wire 164 is bent to hold the bag 162 in a closed position. The bag 162 may be printed, for example, silk screened with soy-based inks, to describe the contents of the bag 162. The bags 162 of charcoal briquettes 160 may be sold at coffee shops, online, or at any other suitable location where charcoal or coffee is sold.

As illustrated in FIG. 7, the entire bag 162 may be utilized to start a fire in a charcoal barbecue pit 170. Optionally, the briquettes 160 may be removed from the bag 162 and stacked in the barbecue pit 170. When the entire bag 162 is placed in the barbecue pit 170, the rolled end of the bag 162 is lit so that the bag 162 functions as kindling for the fire. After being left undisturbed for approximately 30 minutes, the bag 162 will have ignited all of the briquettes 160. When the briquettes 160 are ashed over, cooking may begin on the barbecue pit 170. Generally, the charcoal according to at least...
one embodiment of the present disclosure will burn at approximately 300-400 degrees Fahrenheit for approximately two hours.

While this disclosure has been described as having a preferred design, the systems and methods according to the present disclosure can be further modified within the scope and spirit of this disclosure. This application is therefore intended to cover any variations, uses, or adaptations of the disclosure using its general principles. For example, the methods disclosed herein and in the appended claims represent one possible sequence of performing the steps thereof. A practitioner may determine in a particular implementation that a plurality of steps of one or more of the disclosed methods may be combinable, or that a different sequence of steps may be employed to accomplish the same results. Each such implementation falls within the scope of the present disclosure as disclosed herein and in the appended claims. Furthermore, this application is intended to cover such departures from the present disclosure as come within known or customary practice in the art to which this disclosure pertains and which fall within the limits of the appended claims.

What is claimed is:

1. A method for forming charcoal from coffee grounds comprising:
   - pyrolyzing coffee grounds to form pyrolyzed coffee grounds;
   - mixing the pyrolyzed coffee grounds with a binding agent to form a mixture; and
   - pressing the mixture into a charcoal cube.

2. The method of claim 1 further comprising mixing the pyrolyzed coffee grounds with a binding agent that includes oil.

3. The method of claim 2 further comprising treating the oil with a surfactant before mixing the oil with the pyrolyzed coffee grounds.

4. The method of claim 1 further comprising mixing the pyrolyzed coffee grounds with a binding agent that includes a food product.

5. The method of claim 1 further comprising mixing approximately 70 parts pyrolyzed coffee grounds with approximately 10 parts binding agent.

6. The method of claim 1 further comprising mixing the pyrolyzed coffee grounds and the binding agent with a fibrous material.

7. The method of claim 6 further comprising mixing approximately 70 parts pyrolyzed coffee grounds with approximately 1 part fibrous material.

8. The method of claim 6 further comprising mixing the pyrolyzed coffee grounds and the binding agent with a fibrous material that includes at least one of corn starch or shredded paper.

9. The method of claim 1 further comprising pyrolyzing the coffee grounds at approximately 1200 degrees Fahrenheit for approximately 45 minutes.

10. The method of claim 1 further comprising pressing the mixture in a tube mold.

11. The method of claim 1 further comprising placing the charcoal cubes in a flammable bag.

12. A method for forming charcoal from coffee grounds comprising:
   - pyrolyzing coffee grounds to form pyrolyzed coffee grounds;
   - mixing the pyrolyzed coffee grounds with a food product and a fibrous material to form a mixture; and
   - pressing the mixture into a charcoal cube.

13. The method of claim 12 further comprising pyrolyzing the coffee grounds at approximately 1200 degrees Fahrenheit for approximately 45 minutes.

14. Charcoal formed from coffee grounds comprising:
   - pyrolyzed coffee grounds; and
   - a binding agent, wherein the pyrolyzed coffee grounds are mixed with the binding agent and pressed into a charcoal cube.

15. The charcoal of claim 14, wherein the binding agent includes oil.

16. The charcoal of claim 15, wherein the oil is treated with a surfactant before mixing the oil with the pyrolyzed coffee grounds.

17. The charcoal of claim 14, wherein the binding agent includes a food product.

18. The charcoal of claim 14 further comprising approximately 70 parts pyrolyzed coffee grounds mixed with approximately 10 parts binding agent.

19. The charcoal of claim 14 further comprising a fibrous material mixed with the pyrolyzed coffee grounds and binding agent.

20. The charcoal of claim 19, wherein the fibrous material includes at least one of corn starch or shredded paper.

21. The charcoal of claim 19 further comprising approximately 70 parts pyrolyzed coffee grounds mixed with approximately 1 part fibrous material.

22. The charcoal of claim 14, wherein the coffee grounds are pyrolyzed at approximately 1200 degrees Fahrenheit for approximately 45 minutes.

23. The charcoal of claim 14, wherein the charcoal cube is pressed in a tube mold.