INSULATED CONTAINER

PRIORITY CLAIM

[0001] This application claims priority under 35 U.S.C. § 119(e) to U.S. Provisional Applications Serial No. 61/498,455, filed June 17, 2011 and Serial No. 61/618,587, filed March 30, 2012, which are expressly incorporated by reference herein.

BACKGROUND

[0002] The present disclosure relates to vessels, and in particular to insulated containers, such as cups, for containing hot or cold beverages or food. More particularly, the present disclosure relates to an insulated cup formed from polymeric materials.

SUMMARY

[0002A] According to various embodiments, an insulative cup may be provided, comprising: a body including a sleeve-shaped side wall; and a floor coupled to the body to define an interior region bounded by the sleeve-shaped side wall and the floor, wherein the body comprises a sheet comprising insulative cellular non-aromatic polymeric material configured to provide means for enabling localized plastic deformation in at least one selected region of the body to provide a plastically deformed first material segment having a first density located in a first portion of the selected region of the body and a second material segment having a second density lower than the first density located in an adjacent second portion of the selected region of the body without fracturing the insulative cellular non-aromatic polymeric material so that a predetermined insulative characteristic is maintained in the body, wherein the insulative cellular non-aromatic polymeric material comprises a polypropylene base resin, a polypropylene secondary resin, at least one nucleation agent, and gas means for expanding the resins to reduce density.

[0003] A vessel in accordance with the present disclosure is configured to hold a product in an interior region. In illustrative embodiments, the vessel is an insulated container such as a drink cup, a food-storage cup, or a dessert cup.

[0004] In illustrative embodiments, an insulative cup includes a body having a sleeve- shaped side wall and a floor coupled to the body to cooperate with the side wall to form an interior region for storing food, liquid, or any suitable product. The body also includes a rolled brim coupled to an upper end of the side wall and a floor mount coupled to a lower end of the side wall and to the floor.

[0005] In illustrative embodiments, the body is made of a sheet comprising an insulative cellular non-aromatic polymeric material. In some embodiments of the present disclosure, the body is made of a

multi-layer sheet including a substrate layer comprising the insulative cellular non-aromatic polymeric material and an outer layer comprising a skin coupled to the substrate layer and configured to display artwork and text. In other embodiments of the present disclosure, such text and artwork are printed directly on an exterior surface of the insulative cellular non-aromatic polymeric material. In illustrative embodiments, the floor also comprises insulative cellular non-aromatic polymeric material.

[0006] The insulative cellular non-aromatic polymer material included in the body is configured in accordance with the present disclosure to provide means for enabling localized plastic deformation in at least one selected region of the body (e.g.,

CLAIMS

1. An insulative cup comprising

a body including a sleeve-shaped side wall and

a floor coupled to the body to define an interior region bounded by the sleeve-shaped side wall and the floor, wherein the body comprises a sheet comprising insulative cellular non-aromatic polymeric material configured to provide means for enabling localized plastic deformation in at least one selected region of the body to provide a plastically deformed first material segment having a first density located in a first portion of the selected region of the body and a second material segment having a second density lower than the first density located in an adjacent second portion of the selected region of the body without fracturing the insulative cellular non-aromatic polymeric material so that a predetermined insulative characteristic is maintained in the body,

wherein the insulative cellular non-aromatic polymeric material comprises a polypropylene base resin, a polypropylene secondary resin, at least one nucleation agent, and gas means for expanding the resins to reduce density.

2. An insulative cup of claim 1, wherein

(a) the gas means comprises carbon dioxide,

(b) the polypropylene base resin has high melt strength, or

(c) the polypropylene base resin comprises broadly distributed molecular weight polypropylene characterized by a distribution that is unimodal.

3. The insulative cup of claim 1, wherein a first of the selected regions of the body in which localized plastic deformation is enabled by the insulative cellular non-aromatic polymeric material is in the sleeve-shaped side wall and wherein the sleeve-shaped side wall includes an upright inner tab arranged to extend upwardly from the floor and configured to provide the first material segment having the first density in the first of the selected regions of the body, an upright outer tab arranged to extend upwardly from the floor and to mate with the upright inner tab along an interface therebetween, and an upright fence arranged to interconnect the upright inner and outer tabs and surround the interior region and configured to provide the second material

segment having the second density in the first of the selected regions of the body and cooperate with the upright inner and outer tabs to form the sleeve-shaped side wall.

4. The insulative cup of claim 2, wherein a second of the selected regions of the body in which localized plastic deformation is enabled by the insulative cellular non-aromatic polymeric material is in a rolled brim included in the body and coupled to an upper end of the sleeve-shaped side wall to lie in spaced-apart relation to the floor and to frame an opening into the interior region and wherein the rolled brim includes an inner rolled tab configured to provide the first material segment in the second of the selected regions of the body and coupled to an upper end of the upright outer tab included in the sleeve-shaped side wall, an outer rolled tab coupled to an upper end of the upright inner tab included in the sleeve-shaped side wall and to an outwardly facing exterior surface of the inner rolled tab, and a rolled lip arranged to interconnect oppositely facing side edges of each of the inner and outer rolled tabs and configured to provide the second material segment having the second density in the second of the selected region of the body and cooperate with the inner and outer rolled tabs to form the rolled brim, and optionally;

wherein a third of the selected regions of the body in which localized plastic deformation is enabled by the insulative cellular non-aromatic polymeric material is in a floor mount included in the body and coupled to a lower end of the sleeve-shaped side wall to lie in spaced-apart relation to the rolled brim and to the floor to support the floor in a stationary position relative to the sleeve-shaped side wall to form the interior region and wherein the floor mount includes a web-support ring coupled to the lower end of the sleeve-shaped side wall and configured to provide the second material segment having the second density in the third of the selected regions of the body, a floor-retaining flange coupled to the floor and arranged to be surrounded by the web-support ring, and a web arranged to interconnect the floor-retaining flange and the web-support ring and configured to provide the first material segment having the first density in the third of the selected regions of the body, and optionally;

wherein a fourth of the selected regions of the body in which localized plastic deformation is enabled by the insulative cellular non-aromatic polymeric material is in the floor-retaining flange of the floor mount, the floor-retaining flange includes an alternating series of upright thick and thin staves arranged in side-to-side relation to extend upwardly from the web toward the interior region bounded by the sleeve-shaped

side wall and the floor, a first of the upright thick staves is configured to include a right side edge extending upwardly from the web toward the interior region, a second of the upright thick staves is configured to include a left side edge arranged to extend upwardly from the web toward the interior region and lie in spaced-apart confronting relation to the right side edge of the first of the upright thick staves, and a first of the upright thin staves is arranged to interconnect the left side edge of the first of the upright thick staves and the right side edge of the second of the upright thick staves and to cooperate with the left and right side edges to define therebetween a vertical channel, the first of the upright thin staves is configured to provide the first material segment in the fourth of the selected regions of the body, and the first of the upright thick staves is configured to provide the second material segment in the fourth of the selected regions of the body, and optionally;

(a) wherein the first of the upright thin staves is located relative to the first and second of the upright thick staves to cause the vertical channel to open inwardly into a lower interior region bounded by the floor-retaining flange and a horizontal platform included in the floor and located above the floor-retaining flange, or;

(b) wherein the first of the upright thin staves is located relative to the first and second of the upright thick staves to cause the vertical channel to open outwardly in a direction toward the web-support ring.

5. The insulative cup of claim 3, wherein (i) the upright inner tab includes an inner surface bounding a portion of the interior region and an outer surface facing toward the upright outer tab, the upright outer tab includes an inner surface facing toward the interior region and mating with the outer surface of the upright inner tab to define the interface between the upright inner and outer tabs, and the upright outer tab further includes an outer face facing away from the upright inner tab, and optionally;

wherein each of the inner and outer surfaces of the upright inner and outer tabs has an arcuate shape in a horizontal cross-section and subtends an acute angle of less than 20°, or;

(ii) wherein the upright fence is C-shaped in a horizontal cross-section and each of the upright inner and outer tabs has an arcuate shape in a horizontal cross-section, or;

(iii) wherein the upright fence includes an upright left side edge and an upright right side edge arranged to lie in spaced-apart confronting relation to the upright left side edge and the upright outer tab is configured to have the first density and mate

with the upright inner tab to establish a bridge arranged to interconnect the upright left and right side edges of the upright fence and formed of plastically deformed material having the first density, and optionally;

wherein the upright fence has an inner surface bounding a portion of the interior region and an outer surface facing away from the interior region and surrounding the inner surface of the upright fence and cooperating with the inner surface of the upright fence to define a first thickness therebetween, the upright inner tab includes an inner surface bounding a portion of the interior region and an outer surface facing toward the upright outer tab, the upright outer tab includes an inner surface facing toward the interior region and mating with the outer surface of the upright inner tab to define the interface between the upright inner and outer tabs, and the upright outer tab further includes an outer face facing away from the upright inner tab, the inner and outer surfaces of the upright inner tab cooperate to define a second thickness therebetween that is about half of the first thickness, and the inner and outer surfaces of the upright outer tab cooperate to define a third thickness that is about half of the first thickness.

6. The insulative cup of claim 1, wherein the body further includes a rolled brim comprising the insulative cellular non-aromatic polymeric material, the rolled brim is coupled to an upper end of the sleeve-shaped side wall to lie in spaced-apart relation to the floor and to frame an opening into the interior region, and the rolled brim includes an inner rolled tab configured to provide the plastically deformed first material segment having the first density and to include oppositely facing left and right side edges and a rolled lip arranged to interconnect the oppositely facing left and right side edges of the inner rolled tab and configured to provide the second material segment having the second density.

7. The insulative cup of claim 6, wherein the rolled brim further includes an outer rolled tab coupled to an outwardly facing surface of the inner rolled tab to provide an outer shell covering the inner rolled tab and formed of plastically deformed material having the first density, and optionally;

wherein the outer rolled tab includes oppositely facing left and right side edges and the rolled lip is arranged to interconnect the oppositely facing left and right side edges of the outer rolled tab, and optionally;

wherein the rolled lip is C-shaped in horizontal cross-section and each of the inner and outer rolled tabs has an arcuate shape between the oppositely facing left and right side edges thereof to provide the rolled brim with an annular shape.

8. The insulative cup of claim 6, wherein (i) the body further includes a sleeve-shaped side wall comprising the insulative cellular non-aromatic polymeric material and the sleeve-shaped side wall includes an upright inner tab arranged to extend upwardly from the floor and configured to provide the plastically deformed first material segment having the first density, an upright outer tab arranged to extend upwardly from the floor and to mate with the upright inner tab along an interface therebetween, and an upright fence arranged to interconnect the upright inner and outer tabs and surround the interior region and configured to provide the second material segment having the second density, or;

(ii) wherein the body further includes a floor mount comprising the insulative cellular non-aromatic polymeric material and the floor mount includes a web-support ring coupled to a lower end of the sleeve-shaped side wall and configured to provide the second material segment having the second density, a floor-retaining flange coupled to the floor and arranged to be surrounded by the web-support ring, and a web arranged to interconnect the floor-retaining flange and the web-support ring and configured to provide the plastically deformed first material segment having the first density, or;

(iii) wherein the body further includes a floor-retaining flange comprising the insulative cellular non-aromatic polymeric material and wherein the floor-retaining flange is coupled to the floor and is formed to include an alternating series of upright thick and thin staves arranged in side-to-side relation to extend upwardly toward the interior region bounded by the sleeve-shaped side wall and the floor, a first of the upright thick staves is configured to include a right side edge extending upwardly toward the interior region, a second of the upright thick staves is configured to include a left side edge extending upwardly toward the interior region and lie in spaced-apart confronting relation to the right-side edge of the first of the upright thick staves, and a first of the upright thin staves is arranged to interconnect the left and right side edges to define therebetween a vertical channel, the first of the upright thin staves is configured to provide the plastically deformed first material segment, and the first of the upright thick staves is configured to provide the second material segment.

9. The insulative cup of claim 1, wherein the body further includes an annular rolled brim comprising the insulative cellular non-aromatic polymeric material, the annular rolled brim is coupled to an annular upper end of the sleeve-shaped side wall to lie in spaced-apart relation to the floor and to frame an opening into the interior region, the annular rolled brim includes a rolled tab configured to provide the plastically deformed first material segment having the first density and to include oppositely facing left and right side edges, and the annular rolled brim further includes a rolled lip coupled to the annular upper end of the sleeve-shaped side wall and arranged to interconnect the oppositely facing left and right side edges of the rolled tab and configured to provide the second material segment having the second density.

10. The insulative cup of claim 1, wherein the body further includes a floor mount comprising the insulative cellular non-aromatic polymeric material, the floor mount is coupled to a lower end of the sleeve-shaped side wall and to the floor to support the floor in a stationary position relative to the sleeve-shaped side wall to form the interior region, and the floor mount includes a floor-retaining flange coupled to the floor, a web-support ring coupled to the lower end of the sleeve-shaped side wall and arranged to surround the floor-retaining flange, and a web arranged to interconnect the floor-retaining flange and the web-support ring and configured to provide the plastically deformed first material segment having the first density, and the web-support ring is configured to provide the second material segment having the second density.

11. The insulative cup of claim 10, wherein (i) each of the web and the web-support ring has an annular shape, and optionally;

wherein the floor-retaining flange has an annular shape, or;

(ii) each of the floor-retaining flange, the web, and the web-support ring includes an inner layer having an interior surface mating with the floor and an overlapping outer layer mating with an exterior surface of the inner layer, or;

(iii) the floor includes a horizontal platform bounding a portion of the interior region and a platform-support member coupled to the horizontal platform and arranged to extend downwardly away from the interior region into a space provided between the floor-retaining flange and the web-support ring to mate with each of the floor-retaining flange and the web-support ring, and optionally;

(a) wherein the platform-support member has an annular shape and is arranged to surround the floor-retaining flange and lie in an annular space provided between the horizontal platform and the web, or;

(b) wherein each of the floor-retaining flange, the web, and the web-support ring includes an inner layer having an interior surface mating with the floor and an overlapping outer layer mating with an exterior surface of the inner layer and the inner layer of each of the floor-retaining flange, the web, and the web-support ring is arranged to mate with the platform-support member,

(iv) wherein the body further includes a sleeve-shaped side wall comprising the insulative cellular non-aromatic polymeric material and the sleeve-shaped side wall includes an upright inner tab arranged to extend upwardly from the floor and configured to provide the plastically deformed first material segment having the first density, an upright outer tab arranged to extend upwardly from the floor and to mate with the upright inner tab along an interface therebetween, and an upright fence arranged to interconnect the upright inner and outer tabs and surround the interior region and configured to provide the second material segment having the second density, or;

(v) wherein the body further includes a floor-retaining flange comprising the insulative cellular non-aromatic polymeric material and wherein the floor-retaining flange is coupled to the floor and is formed to include an alternating series of upright thick and thin staves arranged in side-to-side relation to extend upwardly toward the interior region bounded by the sleeve-shaped side wall and the floor, a first of the upright thick staves is configured to include a right side edge extending upwardly toward the interior region, a second of the upright thick staves is configured to include a left side edge extending upwardly toward the interior region and lie in spaced-apart confronting relation to the right-side edge of the first of the upright thick staves, and a first of the upright thin staves is arranged to interconnect the left and right side edges to define therebetween a vertical channel, the first of the upright thin staves is configured to provide the plastically deformed first material segment, and the first of the upright thick staves is configured to provide the second material segment.

12. The insulative cup of claim 1, wherein the body further includes a floor-retaining flange arranged to lie in a stationary position relative to the sleeve-shaped side wall and coupled to the floor to retain the floor in a stationary position relative to the sleeve-shaped side wall, the floor includes a horizontal platform having a perimeter edge

mating with an inner surface of the sleeve-shaped side wall and an upwardly facing top side bounding a portion of the interior region, and the floor-retaining flange includes an alternating series of upright thick and thin staves arranged to lie in side-to-side relation to one another to extend upwardly toward a downwardly facing underside of the horizontal platform, a first of the upright thick staves is configured to include a right side edge extending upwardly toward the underside of the horizontal platform, a second of the upright thick staves is configured to include a left side edge arranged to extend upwardly toward the underside of the horizontal platform and lie in spaced-apart confronting relation to the right side edge of the first of the upright thick staves, and a first of the upright thin staves is arranged to interconnect the left and right side edges and cooperate with the left and right side edges to define therebetween a vertical channel, the first of the thin staves is configured to provide the first material segment having the first density, and the first of the thick staves is configured to provide the second material segment having the second density, and optionally;

(a) wherein the first of the upright thin staves is located relative to the first and the second of the upright thick staves to cause the vertical channel to open inwardly into a lower interior region bounded by the horizontal platform and the floor-retaining flange, or;

(b) wherein the body further includes a web-support ring coupled to a lower end of the sleeve-shaped side wall and arranged to surround the floor-retaining flange and a web arranged to interconnect the web-support ring and the floor-retaining flange, and the first of the upright thin staves is located relative to the first and second of the upright thick staves to cause the vertical channel to open outwardly in a direction toward the web-support ring, or;

(c) wherein the floor-retaining flange has an annular shape and is arranged to surround a vertically extending central axis intercepting a center point of the horizontal platform and the first of the thin staves has an inner wall facing toward a portion of the vertically extending central axis passing through the lower interior region, and optionally;

wherein the floor further includes a platform-support member arranged to surround the floor-retaining flange and cooperate with the horizontal platform to form a downwardly opening floor cavity containing the alternating series of upright thick and thin staves therein, or;

(d) wherein the body further includes a sleeve-shaped side wall comprising the insulative cellular non-aromatic polymeric material and the sleeve-shaped side wall includes an upright inner tab arranged to extend upwardly from the floor and configured to provide the plastically deformed first material segment having the first density, an upright outer tab arranged to extend upwardly from the floor and to mate with the upright inner tab along an interface therebetween, and an upright fence arranged to interconnect the upright inner and outer tabs and surround the interior region and configured to provide the second material segment having the second density.

13. The insulative cup of claim 1, wherein (i) the first material segment in the sheet of insulative cellular non-aromatic polymeric material has a relatively thin first thickness and the second material segment in the sheet of insulative cellular non-aromatic polymeric material has a relatively thicker second thickness, and optionally;

wherein the body further comprises cellular non-aromatic skin comprising a biaxially oriented polypropylene film adhered to the insulative cellular non-aromatic polymeric material, or;

(ii) wherein the body further comprises a graphics skin coupled to an exterior surface of a strip of the insulative cellular non-aromatic polymeric material and configured to include a film, an adhesive interposed between the film and the exterior surface, and an ink printed on the film to provide a graphics design, and optionally;

wherein the film is biaxially oriented polypropylene, or;

(iii) wherein the insulative cellular non-aromatic polymeric material comprises a polypropylene base resin having a high melt strength, a polypropylene copolymer resin, at least one nucleation agent, and gas means for expanding the resins to reduce density, and optionally;

(a) wherein the gas means comprises carbon dioxide.

(b) wherein the polypropylene base resin comprises broadly distributed molecular weight polypropylene characterized by a distribution that is unimodal.

(c) wherein the polypropylene base resin further includes a polypropylene homopolymer resin.

14. The insulative cup of claim 1, wherein (i) the polypropylene base resin comprises a broadly distributed molecular weight polypropylene characterized by a distribution that is unimodal, or;

(ii) wherein the first density is about 0.350 g/cm^3 and the second density is about 0.175 g/cm^3, or;

(iii) the insulative cellular non-aromatic polymeric material is formed to include cells filled with gas and each cell is bounded by a cell wall provided in the insulative cellular non-aromatic polymeric material and configured to be inelastically deformable during exposure to localized plastic deformation, or;

(iv) wherein the insulative cellular non-aromatic polymeric material comprises a high melt strength polypropylene characterized by long-chain branching to provide a predetermined balance of processability and high melt elasticity.