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— 包括国际检索报告(条约第 21 条(3))。

(54) Title: TEA BEVERAGE AND PREPARATION METHOD THEREFOR

(54) 发明名称 : 一种茶饮料及其制造方法

(57) Abstract: Provided is a tea beverage having a similar quality to that of freshly made tea and a preparation method therefor, characterised by taking the water-soluble components and volatile components in tea leaves as the targets, through choosing the same or different kinds of tea leaves, using different extraction processes to separately extract and obtain a water-soluble component extract (referred to as a first extract) in the tea leaves and a volatile component extract (referred to as a second extract) in the tea leaves, then combining the two extracts in a suitable amount and mixing evenly to form a tea infusion for tea beverage production, and blending, sterilizing and filling same according to conventional tea beverage production processes, so as to produce a tea beverage product having a quality similar to or even exceeding that of freshly made tea.

(57) 摘要: 本发明提供一种与现泡茶品质相近的茶饮料及其制造方法，其特征在于：分别以茶叶中的水溶性成分和挥发性成分为目标，通过选取相同或不同品种的茶叶，采用不同的提取工艺，分开提取得到茶叶的水溶性成分提取物（简称第一提取物）和茶叶的挥发性成分提取物（简称第二提取物），然后将二者以合适的量进行组合并混合均匀形成茶饮料生产用茶汤，按常规的茶饮料生产工艺进行调配、灭菌和灌装，即可生产出一种与现泡茶品质相近甚至超越的茶饮料产品。

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一种茶饮料及其制造方法

技术领域

本发明涉及一种茶饮料及其制造方法。采用这种方法制造出的茶饮料，能够均匀平衡因产地，气候，采摘时间及加工过程导致的不同批次茶饮料的品质差异，具有类似、保持或超越现泡茶所具有的滋味和香气协调及令人愉悦的产品品质。

背景技术

具有天然、健康、快捷和方便的茶饮料正日益成为人们日常生活中常用饮料。对于茶饮料，人们希望所饮用的茶饮料具有现泡茶的品质，如滋味和香气。现泡茶是中国茶叶传统的饮用方式的简称。取一定量的茶叶，用一定温度（通常是>80℃）的热水（茶水重量比例通常在 1:50-100）短时间（30 秒-5 分钟不等）冲泡，分离后的茶汤即为用于饮用的现泡茶。以现泡茶方式消费的茶叶在中国国内基本上都是以各类茶叶中的名优茶为主。名优茶是个广义的概念，包括名茶和优质茶两个方面，名茶是指知名度高、质量好、市场影响大的茶；优质茶是指市场影响较大，质量较好，卖价较高的茶。名优茶的最关键特征是制茶用的茶鲜叶多为初春季采摘、嫩度高、内含物丰富，经各类茶叶加工工艺加工后所形成的茶叶都具有水溶性成分和挥发性成分含量高且茶汤滋味鲜爽、醇厚、回甘快，香气浓度高且香型愉悦的特点。按中国各类茶叶的等级分类，质量由高到低依次将茶叶分为特级、一级、二级、三级、四级，有些还有五级、六级茶等，名优茶茶叶在茶叶的等级分类中一般都是指一级及以上等级的茶叶，相对于一级以上的茶叶，产量是有限的；而作为茶饮料生产用原料茶叶，多为产量多，品质相对稍差的二级及以下的各等级茶叶。市场上现有的茶饮料的滋味和香气与现泡茶相比，存在巨大的差异，尤其是香气部分，茶饮料中几乎都不具有现泡茶中天然的茶叶自身内含香气物质所带来的令人愉悦的香气。造成此现象的原因主要有：

1、制造茶饮料所选用茶叶原料自身的原因

作为茶饮料用的原料茶叶，由于用量巨大，多为等级不高的大宗茶叶，受采收季节、产地环境、加工工艺及茶叶老嫩度的影响，很少有茶饮料用原料茶叶在内含香气和滋味物质上都很丰富完美。对同一份茶叶，可能呈现滋味的成分（主要包括茶多酚类、咖啡碱类、氨基酸类、多糖类等水溶性成分）含量丰富，但呈现香气的成分（以含醇、醛、酮、酯和含氧类具较强挥发性的小分子化合物为主的挥发性成分）含量低或香气类型不佳；也可能情况相反，香气较好，但茶汤滋味单薄或粗老。

2、现有的茶饮料制造方法的限制

现有的茶饮料制造方法中，通常是在一定的提取条件下，采用一步法将茶叶中的水溶性成分（呈现出茶汤的滋味的物质）和挥发性成分（呈现出茶汤的香气的物质）同时用水为溶剂提取到茶汤中，以此茶汤去制造茶饮料。由于茶叶中的水溶性成分和挥发性成分在含量和化学性质上相差悬殊，难以通过同一提取条件和方法将需要的水溶性成分和挥发性成分同时充分提取到茶汤水溶液中。如低温提取绿茶，茶汤中的给人鲜爽感的水溶性成分尤其是氨基酸类会较多的被提取出来，但呈现香气的挥发性成分明显缺失；若采用高温提取绿茶，挥发性成分提出量虽会有所增加，但该条件下茶汤会由于茶多酚类、咖啡碱类水溶性成分的过多溶出而滋味苦涩，很难让人接受。

同时，茶汤提取后需经过澄清、调配、杀菌和灌装等多道工序，此过程很难做到全密闭操作，导致提取得到的茶汤中挥发性强的香气成分在加工过程中损失；常规杀菌工艺为高温热处理过程，会造成茶汤中所含热敏性的挥发性和水溶性成分的氧化或裂解反应而使香气及滋味成分损失进一步增加。

另外，现有茶饮料还有很多不是用茶叶直接提取，而是用速溶茶粉替代茶叶进行。速溶茶粉的制造过程中需要经历更多的热加工过程，如茶汤浓缩、喷雾干燥，在这些过程中，茶汤中原有的香气成分基本丧失殆尽。

近些年，针对上述茶饮料在滋味和香气品质难以两全的问题，也有很多的解决方法被提出并应用，但都存在一定的不足，例如：

针对一种原料茶叶可能在香气和滋味上的不足，采用茶叶拼配的方法来弥补。对同一类茶叶，由于产地、采收季节、老嫩度、加工工艺的不同，所产生的茶叶滋味和香气各有特点，可以相互取长补短，拼配起来以得到茶汤滋味和香气都比较好的原料茶叶。但这种拼配茶叶受限于现有的茶饮料提取方法：由于茶叶中呈现滋味的水溶性成分和呈现香气的挥发性成分在化学性质上的天然差异，难以通过同一提取条件和方法将需要的水溶性成分和挥发性成分同时充分提取到茶汤中；同时，在多道加工工序中茶汤中的香气成分进一步损失，所以，即使用拼配过的原料茶叶来生产茶饮料，以现有的茶饮料制造方法，仅能在一定程度上提高茶饮料品质，仍不能生产出在滋味和香气品质上都令人满意的即饮茶饮料。另外，类似还有对茶叶高温复火以提高香气成分含量的方法，同样受限于现有的茶饮料提取方法，不能从根本上解决问题。

通过香气回填改善茶饮料和速溶茶粉的香气品质。具体来说，因提取得到的茶汤中初始香气成分的含量即有限，因此，香气回填往往采用将提取用原料茶叶加水粉碎成茶浆后，采用减压浓缩蒸馏、降膜浓缩或 SCC 等设备在比较温和的条件下尽可能多的提取香气成分并收集；浓缩的茶浆通过离心分离得到澄清的茶汤浓缩液去制备茶饮料或通过进一步浓缩后喷雾干燥成速溶茶粉。前述收集的香气成分回填到茶汤浓缩液或速溶茶粉中。这种方法在一定程度上改善了茶饮料中香气不足的问题，但由于茶叶需经粉碎后制成茶浆，在经过香气的提取过程后，茶叶中的各种成分在茶浆中溶出过多，无法再对呈现滋味的水溶性成分有选择地根据需要进行提取，后续会造成茶饮料中呈现滋味的各种水溶性成分的比例不均衡而呈现不出现泡茶的协调的滋味。

针对茶饮料滋味的苦涩问题，有人提出采用聚乙烯吡咯烷酮（简称 PVPP）来吸附茶汤中的茶多酚，以降低茶汤的苦涩感，但实际应用中，我们发现用 PVPP 吸附处理过的茶汤，其香气强度下降很多，也

就是说，PVPP 在茶汤中吸附茶多酚的同时，很多香气成分也同时被吸附而导致香气损失。

茶饮料中添加香精。现阶段市场上的茶饮料基本都是依靠添加香精来改善香气不足或香型不佳的问题。香精分合成香精和天然香精。近些年，随着人们对健康意识的加强，越来越多的消费者开始关注食品的安全性。合成香精虽然在不过量使用的前提下也是安全的，但在消费者的意识中，添加有这类香精的茶饮料通常都会被归类到不健康的食品行列。而天然的茶叶香精数量很少，且常规提取过程中会用到有机溶剂或经历高温浓缩过程，其在茶饮料中也很难表现出现泡茶的滋味和香气。

发明内容

本发明的目的是提供一种茶饮料的制造方法，采用这种方法所生产的茶饮料具有现泡茶所具有的滋味和香气协调并令人愉悦的感官品质。

因此，本发明的第一方面提供一种茶饮料的制造方法，其包括：

1） 获取第一提取物：以水为溶剂，用合适的提取工艺提取茶叶中呈现茶汤特征滋味的水溶性成分，获得第一提取物；

2） 获取第二提取物：以合适的提取溶剂或介质，用合适的提取工艺提取茶叶或其他原料中呈现茶汤特征香气的挥发性成分，获得第二提取物；

3） 将上述步骤 1）和 2)中所获得的第一提取物和第二提取物分别调整到合适的浓度后澄清，或者澄清后调整至合适的浓度，然后将二者以合适的比例混合均匀，获得茶饮料生产用茶汤；

4） 将步骤 3）获得的茶汤按常规的茶饮料生产工艺进行调配、灭菌和灌装，即得。

本发明第一方面所述的茶饮料的制造方法的一个实施方案中，其中用于提取第一提取物的茶叶和用于提取第二提取物的茶叶可以是同一种类同一来源的茶叶，也可以是同一种类但来源不同的茶叶

（包括但不限于茶叶的产地、茶叶的采摘季节、茶叶的老嫩度、茶叶的加工制造工艺等的不同的茶叶），也可以是不同种类的茶叶。优选地，所述的茶叶可以选自绿茶、红茶、乌龙茶、花茶、普洱茶、或上述各类茶叶在加工过程中产生的次生料（如茶梗、碎茶、黄片等）、或上述相同或不同品种茶叶中选取不同来源的茶叶相互拼配而形成的原料茶叶。

上述本发明第一方面所述的茶饮料的制备方法中，步骤 2）中所述的其他原料括各种可食用或饮用的鲜花、花干、中草药茶或其组合，如茉莉花、玫瑰花、杭白菊、金银花、玄米茶、大麦茶等。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制造方法，其中，第一提取物的提取温度为 40℃-95℃，优选为 50℃-95℃、50℃-85℃、或 60℃-85℃;

优选的提取时间为 1min-1hr，更优选的提取时间为 5min-45min、10 min -30min、或 10min-20min;

优选地，提取时茶叶与水的重量比为 1:20-120，进一步优选的茶叶与水的重量比为 1:30-100、1:40-90、1:55-70 或 1:50-80。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制造方法，其中，第二提取物的提取方法可以是常规的挥发性物质提取方法，如减压蒸馏浓缩法、降膜浓缩法、旋转锥体柱法（Spinning Cone Column，简称 SCC 法）、超临界流体萃取法等各种现已存在并使用的方法和设备。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制备方法，其中步骤 2）中所述的合适的提取溶剂或介质可以为水、水蒸气、或非水溶剂（例如二氧化碳）。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制备方法，其中用于提取第一提取物的茶叶和用于提取第二提取物的茶叶或其他原料在提取前，可按工艺优选的需要，进行适度的破碎，然后进行提取。优选将茶叶或其他原料粉碎至颗粒粒径＜1mm。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制

造方法，步骤 3）中的澄清方法包括但不限于常规的低温冷却静置、离心、膜过滤等方法。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制备方法，其中步骤 4）中的调配过程包括但不限于常规的茶汤的稀释、加入抗氧化剂、酸度调节剂及其他食品添加剂、食品配料的加入等过程。所述的抗氧化剂可以是维生素 C、异抗坏血酸钠等。所述的酸度调节剂可以是碳酸氢钠、磷酸盐等。酸度调节剂的用量视情况而定，优选将茶饮料的 pH 值调节至 5.5-6.5。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制备方法，其中步骤 4）中的灭菌方法包括但不限于常规的高温瞬时灭菌（简称为 UHT）、巴氏杀菌等方法。

在一个具体的实施方案中，本发明第一方面所述的茶饮料的制备的方法，其中，当茶叶原料为绿茶时，其第一提取物的酚氨比<8，第二提取物的 FI 值与现泡茶相近；当茶叶为茉莉花茶时，其第二提取物 FI 值高于其现泡茶的 FI 值；当茶叶为乌龙茶时，其第二提取物 FI 值高于其现泡茶的 FI 值。

本发明的第二方面提供一种茶饮料，其是由本发明第一方面所述的茶饮料的制备方法所生产的茶饮料。

本发明的制备方法与常规的茶饮料制造方法相比，采用本发明的制备方法制造出的茶饮料，能够均匀平衡因产地，气候，采摘时间及加工过程导致的不同批次茶饮料的品质差异，具有类似、保持或超越现泡茶所具有的滋味和香气协调及令人愉悦的产品品质。本发明的特征在于：可以采用相同或不同品种的茶叶，采用不同的工艺方法和提取条件，分开提取茶叶中呈现茶汤滋味的水溶性成分和呈现茶汤香气的挥发性成分，然后将两者按一定的比例混合均匀，即得用于茶饮料生产的茶汤。用本发明方法得到生产茶饮料用的茶汤，可以克服前文提到的现有茶饮料生产方法的缺陷，具体如下：

呈现茶汤滋味的成分多为水溶性的化合物，在茶叶中含量高，易于溶出；呈现茶汤香气的成分主要是一些挥发性的分子量较小且水中

溶解度不高的化合物，在茶叶中含量低。所以在以水为溶剂进行提取时，这两类化合物所需的提取条件相差很大。本发明方法分别以这两类化合物各自最佳提取方法和条件分开进行提取，可以避开同时提取存在的二者均提取不完全，或一类物质过量提取等造成的茶汤滋味与香气不协调的问题。水溶性成分提取时，以呈现茶汤特征滋味的成分含量高或感官评价方法得到的茶汤滋味好为目标，优选提取条件；挥发性成分提取时，以呈现茶汤特征香气的成分含量高且感官评价方法得到的香气类型佳为目标，优选提取方法和条件。

本发明方法的另一优点是作为茶饮料生产用的原料茶叶可选择性更强。由于不要求呈现茶汤特征滋味的化合物和呈现茶汤特征香气的化合物在同一提取条件和同一份茶叶中同时提取，所以可以降低对原料茶叶的要求，优选每种茶叶的优点，避开其缺点。例如，原料茶叶 A 中呈现好的滋味的水溶性成分含量高，但香气不足或香型不佳，就可以单独用它来作为提取本发明中所述的茶叶第一提取物的原料，另外挑选呈现特征香气的挥发性成分的含量较高且香型佳的原料茶叶 B 来提取本发明中所述的茶叶第二提取物。

本发明的方法还可以克服现有茶饮料制造方法过程中的茶汤滋味和香气损失造成的产品品质下降问题。分开提取的茶叶第一提取物和茶叶第二提取物可以按照需要自由配比。具体来讲，可以预先通过简单常规试验，了解呈现茶汤特征滋味的水溶性成分和呈现茶汤特征香气的挥发性成分在茶饮料制造过程中的损失量，进行评估计算后，在两种水提液混合时就可以较为精确地根据最终期望的茶饮料成品中滋味和香气的程度调整二者的混合比例，以消除生产过程造成的风味成分的损失对茶饮料成品品质的影响。

本发明所述茶饮料的制造方法，通过将现有的茶饮料生产技术和茶叶香气提取或回收的设备技术进行组合即可，可很容易地实现大规模的茶饮料生产。

根据本发明的茶饮料的制备方法，呈现茶叶滋味物质的所述的第一提取物的提取可采用现有的茶叶提取装置，如常用的密闭式提取罐

和可翻倒的吊篮式提取设备，仅着重在优选茶叶的基础上优化提取参数，如水温、浸提时间、搅拌速率等常规参数，使茶叶第一提取物中呈现该类茶叶好的滋味，即一种或多种水溶性成分含量提高或比例合适。例如绿茶常用茶汤中茶多酚和氨基酸含量的比值（简称酚氨比）来表征绿茶茶汤的滋味，一般认为酚氨比<8 的绿茶茶汤具有现泡茶的滋味：鲜爽、醇厚、甘甜等特征，同类型茶叶中，茶汤酚氨比值的数值越小，滋味越好。以下表 1 中为采用本发明生产方法所生产绿茶茶饮料（实施例 1）与常规生产方法所生产的绿茶茶饮料（对比例 1-1、1-2、1-3，对应产品 1'-1，产品 1'-2，产品 1'-3）以及现泡茶的酚氨比的测定值。

表 1：绿茶的酚氨比测定值

产品	产品 1	产品 1'-1	产品 1'-2	产品 1'-3	现泡茶 1
酚氨比值	7.1	9.6	8.5	11.2	6.5

（注：上表中酚氨比值的计算方法：分别测定各茶饮料中茶多酚的含量和氨基酸的含量，酚氨比值=茶多酚的含量/氨基酸的含量；其中茶多酚的含量测定方法按中华人民共和国国家标准 GB/T21733-2008 茶饮料中茶多酚的检测方法进行，氨基酸的含量测定方法按中华人民共和国国家标准 GB/T8314-2002 茶 游离氨基酸总量的测定方法进行；上表中的现泡茶 1 所用茶叶为与绿茶实施例 1 中所选原料绿茶 B 香气类型相同的特级绿茶）

根据本发明的茶饮料的制备方法，所述的第二提取物的提取可以利用现在常规的一些挥发性成分提取所用的设备，如减压蒸馏浓缩器、降膜浓缩器及旋转锥体柱法（Spinning Cone Column，简称 SCC 法）、超临界流体萃取法等，在优选香型佳的原料茶叶的基础上调整提取参数，使茶叶中呈现茶汤特征香气的挥发性成分得到充分提取；并且能优选提取参数使所得挥发性成分之间的比例合适以呈现出好的香型，如使所得挥发性成分呈现出香气指数高的特点从而达到现泡茶所具有的香气品质。

本发明所述的香气指数，简称 FI，它表示香气成分中高沸点成分含

量的总和与低沸点成分含量的总和的比率。在香气成分的分析中，把保留时间在芳樟醇之前的香气成分作为低沸点香气，之后的为高沸点香气。FI 指数可以用来定性的分析茶叶香气的好坏，对同一种茶类，FI 值高的比 FI 值低的香气类型更佳。

以下表 2 中为采用本发明生产方法所生产各品项茶饮料产品（实施例 1、2、3、4，对应绿茶产品 1、茉莉花茶产品 2、乌龙茶产品 3、红茶产品 4）与常规生产方法所生产各品项茶饮料产品（对比例 1-1、1-2、1-3、2、3、4，对应绿茶产品 1'-1，绿茶产品 1'-2，绿茶产品 1'-3、茉莉花茶产品 2'、乌龙茶产品 3'、红茶产品 4'）及各品项现泡茶的 FI 指数测定值。由表 2 的数据可以看出，相对于传统方法制备的茶饮料，本发明的茶饮料的制备方法所生产的茶饮料的香气类型更好。

表 2:

茶饮料类别	产品	FI 指数
绿茶	产品 1	0.6419
	产品 1'-1	0.2576
	产品 1'-2	0.2158
	产品 1'-3	0.3233
	现泡茶 1	0.6448
茉莉花茶	产品 2	6.772
	产品 2'	2.159
	现泡茶 2	4.275
乌龙茶	产品 3	0.7755
	产品 3'	0.5103
	现泡茶 3	0.6788
红茶	产品 4	0.5873
	产品 4'	0.2257
	现泡茶 4	0.7865

（注：上表中 FI 指数的测定及计算方法：采用气相色谱-质谱联用仪分别测定各茶饮料中香气成分的种类和含量，找出质谱图中芳樟醇的

保留时间点，然后按 FI 指数的定义进行计算.）

上表 2 中的现泡茶 1 所用茶叶为与绿茶实施例 1 中所选原料绿茶 B 香气类型相同的特级绿茶；现泡茶 2 所用茶叶为与茉莉花茶实施例 2 中所选原料茉莉花茶 A 香气类型相同的特级茉莉花茶；现泡茶 3 所用茶叶为与乌龙茶实施例 3 中所选原料乌龙茶 B 香气类型相同的一级乌龙茶；现泡茶 4 所用茶叶为与红茶实施例 4 中所选原料红茶 B 香气类型相同的一级红茶。）

采用本发明所述茶饮料制造方法所制造的茶饮料产品和常规茶饮料制造方法所制造的茶饮料产品在茶汤滋味和香气方面的差异可以从以下表 3 感官对比打分的结果中看出。可以看出，本发明的制备方法所制造的茶饮料 产品与现泡茶的相似度均在 9.0 以上，口味更接近于现泡茶。

产品 1、2、3、4：本发明方法所生产茶饮料产品，分别来自实施例 1、2、3、4；

产品 1'-1、1'-2、1'-3、2'、3'、4'：常规茶饮料生产方法所生产茶饮料产品，分别来自对比例 1-1、1-2、1-3、2、3、4。

表 3：

茶饮料类别	感官属性得分	香气和滋味协调性	滋味		香气		与现泡茶的相似度
			优劣	强度	优劣	强度	
绿茶	产品 1	9.0	8.3	8.5	9.1	8.9	9.1
	产品 1'-1	6.5	7.1	8.2	6.2	6.0	6.3
	产品 1'-2	6.1	8.2	8.6	6.0	4.1	5.4
	产品 1'-3	5.9	4.6	9.1	8.9	8.6	5.9
茉莉花茶	产品 2	9.6	8.8	8.2	9.1	10.0	9.8
	产品 2'	7.4	7.8	8.0	7.1	5.7	6.1
乌龙茶	产品 3	8.9	8.6	8.7	9.0	9.5	9.2
	产品 3'	6.2	6.4	7.7	8.2	6.0	6.7
红茶	产品 4	9.1	8.6	8.5	9.1	8.9	9.0
	产品 4'	6.1	7.8	7.6	7.0	5.8	5.7

(注：上表中：共有 10 位品评员，每项评价指标均按 10 分制进行打分，表中所列为去掉最高和最低分后每一组的平均分。现泡茶均是优选上述各实施例中所选原料茶叶的同类型茶叶的名优茶冲泡而得)。

具体实施方式

下面将结合实施例对本发明的实施方案进行详细描述，但是本领域技术人员将会理解，下列实施例仅用于说明本发明，而不应视为限定本发明的范围。实施例中未注明具体条件者，按照常规条件或制造商建议的条件进行。所用设备未注明生产厂商者，均为可以通过市购获得的常规产品。

实施例 1：绿茶茶饮料 1

在原料茶叶中经品评优选，绿茶 A（二级炒青绿茶）的茶汤滋味醇厚鲜爽，香气类型尚佳，但香气强度明显不够，因此以绿茶 A 50kg 作为茶叶第一提取物提取用原料，经试验， 选取如下条件进行提取：去离子水为溶剂，茶水比 1:70，60℃,提取 20min。所得提取液经冷却静置后离心得澄清的第一提取物 3.6 吨。

同时在原料茶叶中经品评优选，绿茶 B（三级炒青绿茶）的香气类型佳且香气含量尚高，但茶汤内含物含量低，滋味单薄，因此以绿茶 B 50kg 作为茶叶第二提取物提取用原料，经试验，采用 SCC-1000 型的旋转锥体柱设备进行香气提取，提取参数为：茶叶粉碎至颗粒粒径≤1mm，按干茶叶重量占茶浆总重量的 9%的比例加水混合成茶浆，提取时塔顶温度为 75℃，进料温度为 55℃，茶浆流量为 360kg/hr，提取用水蒸汽流量（ISR）为茶浆流量的 4.0%，冷却水温度为 10±2℃。提取得到第二提取物 10.8kg。

上述得到的第一提取物和第二提取物经配比试验，最终确定能保持茶饮料成品滋味和香气协调且香气强度足够的二者重量配比为：第一提取物：第二提取物=350:1。按此比例将二者混合均匀后，加水稀释并定容至 10 吨，按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加

入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 1。

对比例 1-1：绿茶茶饮料

取上述实施例 1 中的绿茶 A 和绿茶 B 按 1:1 进行混合，混合后的茶叶 60kg 作为茶汤提取用茶叶进行提取：去离子水为溶剂，茶水比 1:60，75℃,提取 15min。所得提取液经冷却静置后离心得茶汤 3.8 吨。此茶汤加水定容至 11.5 吨，然后按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 1'-1。

对比例 1-2：绿茶茶饮料

取上述实施例 1 中的绿茶 A 60kg 作为茶汤提取用茶叶进行提取：去离子水为溶剂，茶水比 1:70，70℃,提取 20min。所得提取液经冷却静置后离心得澄清的茶汤 4.3 吨。此茶汤加水定容至 12.0 吨，然后按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 1'-2。

对比例 1-3：绿茶茶饮料

取上述实施例 1 中的绿茶 B 为茶饮料生产用原料，采用香气回填技术进行茶饮料的生产：取绿茶 B 50kg 按上述实施例 1 中第二提取物的提取方法，采用 SCC-1000 型的旋转锥体柱设备进行香气提取，提取参数为：茶叶粉碎至颗粒粒径≤1mm,按干茶叶量占茶浆总重的 9%的比例加水混合成茶浆，提取时塔顶温度为 75℃，进料温度为 55℃，茶浆流量为 360kg/hr，提取用水蒸汽流量（ISR）为茶浆流量的 4.0%，冷却水温度为 10±2℃。提取得到茶汤香气物质水提液 10.8kg。同时香气提取过程中排出的茶浆浓缩液进行离心去渣，得澄清的茶汤浓缩液 600kg。

上述所得 10.8kg 茶汤香气物质水提液全部回填入 600kg 的茶汤浓缩液中即得茶饮料生产用茶汤，此茶汤加水定容至 13.5 吨，然后按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调

节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 1'-3。

实施例 2: 茉莉花茶茶饮料

在原料茶叶中经品评优选，茉莉花茶 A（二级茉莉花茶）的茶汤滋味醇厚较鲜爽，香气类型佳，但香气强度不够。以此茉莉花茶 A 50kg 作为茶叶第一提取物提取用原料，经试验， 选取如下条件进行提取: 去离子水为溶剂，茶水比 1:55，75℃,提取 15min。所得提取液经冷却静置后离心得澄清的茶叶第一提取物 2.9 吨。

同时以此茉莉花茶 A 50kg 作为茶叶第二提取物提取用原料，经试验，单效浓缩器进行香气提取，提取参数为: 茶叶粉碎至颗粒粒径≤1mm，按干茶叶重量占茶浆总重量的 1.5%的比例加水混合成茶浆，提取时系统真空度为-0.085MPa,内部物料温度为 50℃，冷却水温度为 10±2℃。提取得到茶叶第二提取物 900kg。

上述得到的第一提取物和第二提取物经配比试验，最终确定能保持茶饮料成品滋味和香气协调且香气强度足够的二者重量配比为: 第一提取物: 第二提取物= 3:1。按此比例将二者混合均匀后，加水稀释并定容至 12 吨，按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 2。

对比例 2: 茉莉花茶茶饮料

取上述实施例 2 中的茉莉花茶 A 60kg 作为茶汤提取用茶叶进行提取: 去离子水为溶剂，茶水比 1:65，85℃,提取 15min。所得提取液经冷却静置后离心得澄清的茶汤 4.0 吨。此茶汤加水定容至 13.5 吨，然后按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 2'。

实施例 3: 乌龙茶茶饮料

在原料茶叶中经品评优选，乌龙茶 A（二级浓香型铁观音）的茶汤滋味浓强鲜爽，但香气类型不佳，因此以乌龙茶 A 50kg 作为茶叶第一提取物提取用原料，经试验， 选取如下条件进行提取：去离子水为溶剂，茶水比 1:60，80℃,提取 12min。所得提取液经冷却静置后离心得澄清的第一提取物 3.1 吨。

同时在原料茶叶中经品评优选，乌龙茶 B（四级浓香型铁观音）的香气类型佳且香气含量高，但茶汤滋味较粗涩，因此以乌龙茶 B 50kg 作为茶叶第二提取物提取用原料，经试验，采用 SCC-1000 型的旋转锥体柱设备进行香气提取，提取参数为：茶叶粉碎至颗粒粒径≤1mm,按干茶叶量占茶浆总重的 9.5%的比例加水混合成茶浆，提取时塔顶温度为 75℃，进料温度为 74℃，茶浆流量为 500kg/hr，提取用水蒸汽流量（ISR）为茶浆流量的 2.5%，冷却水温度为 10±2℃。提取得到第二提取物 12.5kg。

上述得到的第一提取物和第二提取物经配比试验，最终确定能保持茶饮料成品滋味和香气协调且香气强度足够的二者重量配比为：第一提取物：第二提取物= 250:1。按此比例将二者混合均匀后，加水稀释并定容至 10.9 吨，按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 3。

对比例 3：乌龙茶茶饮料

取上述实施例 3 中的乌龙茶 B 60kg 作为茶汤提取用茶叶进行提取：去离子水为溶剂，茶水比 1:60，85℃,提取 15min。所得提取液经冷却静置后离心得澄清的茶汤 3.7 吨。此茶汤加水定容至 12.5 吨，然后按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 3'。

实施例 4：红茶茶饮料

在原料茶叶中经品评优选，红茶 A（三级工夫红茶）的茶汤滋味浓

强鲜爽，香气类型尚佳，但香气强度明显不够，因此以红茶 A 50kg 作为茶叶第一提取物提取用原料，经试验， 选取如下条件进行提取：去离子水为溶剂，茶水比 1:70，85℃,提取 10min。所得提取液经冷却静置后离心得澄清的第一提取物 3.6 吨。

同时在原料茶叶中经品评优选，红茶 B（二级工夫红茶）的香气类型较佳且香气含量尚高，但茶汤不够浓强鲜爽，因此以红茶 B 50kg 作为茶叶第二提取物提取用原料，经试验，采用单效降膜浓缩器香气提取，提取参数为：茶叶粉碎至颗粒粒径≤1mm,按干茶叶量占茶浆总重的 2%的比例加水混合成茶浆，提取时物料温度为 75℃，系统真空度为-0.085MPa,水蒸汽蒸发量为 2 吨/小时,茶浆在系统内部循环 5 次进行香气的提取，冷却水温度为 10±2℃。收集得到第二提取物 510kg。

上述得到的第一提取物和第二提取物经配比试验，最终确定能保持茶饮料成品滋味和香气协调且香气强度足够的二者重量配比为：第一提取物：第二提取物= 5:1。按此比例将二者混合均匀后，加水稀释并定容至 9.5 吨，按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 4。

对比例 4：红茶茶饮料

取上述实施例 4 中的红茶 A 60kg 作为茶汤提取用茶叶进行提取：去离子水为溶剂，茶水比 1:60，85℃,提取 15min。所得提取液经冷却静置后离心得澄清的茶汤 3.7 吨。此茶汤加水定容至 12.0 吨，然后按定容总量的 0.02%（kg/kg）加入抗氧化剂维生素 C 并加入适量碳酸氢钠调节 pH 值为 5.5-6.5 即得调配液。该调配液经 UHT 137℃,10 秒进行灭菌后用 PET 瓶无菌灌装即得茶饮料成品产品 4'。

权 利 要 求

1. 一种茶饮料的制造方法，其包括:

1） 获取第一提取物：以水为溶剂，用合适的提取工艺提取茶叶中呈现茶汤特征滋味的水溶性成分，获得第一提取物;

2） 获取第二提取物：以合适的提取溶剂或介质，用合适的提取工艺提取茶叶或其他原料中呈现茶汤特征香气的挥发性成分，获得第二提取物;

3） 将上述步骤 1）和 2)中所获得的第一提取物和第二提取物分别调整到合适的浓度后澄清，或者澄清后调整至合适的浓度，然后将二者以合适的比例混合均匀，获得茶饮料生产用茶汤;

4） 将步骤 3）获得的茶汤按常规的茶饮料生产工艺进行调配、灭菌和灌装，即得。

2. 权利要求 1 所述的茶饮料的制造方法，其中用于提取第一提取物的茶叶和用于提取第二提取物的茶叶可以是同一种类同一来源的茶叶，也可以是同一种类但来源不同的茶叶（包括但不限于茶叶的产地、茶叶的采摘季节、茶叶的老嫩度、茶叶的加工制造工艺等的不同的茶叶），也可以是不同种类的茶叶。

3. 权利要求 1 或 2 所述的茶饮料的制造方法，其中所述的茶叶选自绿茶、红茶、乌龙茶、花茶、普洱茶、或上述各类茶叶在加工过程中产生的次生料（如茶梗、碎茶、黄片等）、或上述相同或不同品种茶叶中选取不同来源的茶叶相互拼配而形成的原料茶叶。

4. 权利要求 1-3 任一项的茶饮料的制造方法，其中，第一提取物的提取温度为 40℃-95℃，优选为 50℃-95℃、50℃-85℃、或 60℃-85℃;

优选的提取时间为 1min-1hr，更优选的提取时间为 5min-45min、10 min -30min、或 10min-20min;

优选地，提取时茶叶与水的重量比为 1:20-120，进一步优选的茶叶与水的重量比为 1:30-100、1:40-90、1:55-70 或 1:50-80。

5. 权利要求 1-4 任一项的茶饮料的制造方法，其中，第二提取

物的提取方法是常规的挥发性物质提取方法，如减压蒸馏浓缩法、降膜浓缩法、旋转锥体柱法、超临界流体萃取法。

6. 权利要求 1-5 任一项的茶饮料的制备方法，其中，步骤 2）中所述的其他原料包括各种可食用或饮用的鲜花、花干、中草药茶或其组合，如茉莉花、玫瑰花、杭白菊、金银花、玄米茶、大麦茶。

7. 权利要求 1-5 任一项的茶饮料的制备方法，其中步骤 2）中所述的合适的提取溶剂或介质为水、水蒸气、或非水溶剂（例如二氧化碳）。

8. 权利要求 1-7 任一项的茶饮料的制备方法，用于提取第一提取物的茶叶和用于提取第二提取物的茶叶或其他原料在提取前，可按工艺优选的需要，进行适度的破碎，然后进行提取。

9. 权利要求 1-7 任一项的茶饮料的制造方法，步骤 3）中的澄清方法为常规的低温冷却静置、离心、或膜过滤。

10. 权利要求 1-7 任一项的茶饮料的制备方法，其中步骤 4）中的调配过程包括常规的茶汤的稀释、加入抗氧化剂、酸度调节剂及其他食品添加剂、食品配料的加入。

11. 权利要求 1-7 任一项的茶饮料的制备方法，其中步骤 4）中的灭菌方法包括常规的高温瞬时灭菌、巴氏杀菌。

12. 权利要求 1-7 任一项的茶饮料的制备的方法，其中，当茶叶原料为绿茶时，其第一提取物的酚氨比<8，第二提取物的 FI 值与现泡茶相近；当茶叶为茉莉花茶时，其第二提取物 FI 值高于其现泡茶的 FI 值；当茶叶为乌龙茶时，其第二提取物 FI 值高于其现泡茶的 FI 值。

13. 权利要求 1-12 的茶饮料的制造方法所生产的茶饮料。

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/074236

A. CLASSIFICATION OF SUBJECT MATTER

A23F 3/16 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A23F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, VEN, CNKI: tea, polyphenols, aroma, mix, water, extract+, supercritical, vacuum d distill+, HANGZHOU EVER MAPLE FLAVOR AND FRAGRANCE CO. , LTD. , rotating cone column, reduced pressure distillation, falling film evaporation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 1907060 A (YUNNAN LONGRUN PHARMACEUTICAL CO., LTD.) 07 February 2007 (07.02.2007) claim 1	1-13
X	CN 101715853 A (YUNNAN LONGRUN TEA GROUP CO., LTD.) 02 June 2010 (02.06.2010) claim 1	1-13
PX	CN 103300182 A (HANGZHOU EVER MAPLE FLAVOR AND FRAGRANCE CO., LTD.) 18 September 2013 (18.09.2013) claim 1	1-13
A	CN 101914097 A (ZHANG, Hai) 15 December 2010 (15.12.2010) the whole document	1-13
A	JP 2000135059 A (INABATA KORYO CO LTD) 16 May 2000 (16.05.2000) the whole document	1-13

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 2014	08 July 2014
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer QI, Lulu Telephone No. (86-10) 62414347

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/074236

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN 1907060 A	07 February 2007	CN 100421567 C	01 October 2008
CN 101715853 A	02 June 2010	None	
CN 103300182 A	18 September 2013	None	
CN 101914097 A	15 December 2010	CN 101914097 B	13 February 2013
JP 2000135059 A	16 May 2000	JP 2813178 B1	22 October 1998

国际检索报告

国际申请号
PCT/CN2014/074236

A. 主题的分类

A23F 3/16(2006.01)i

按照国际专利分类(IPC)或者同时按照国家分类和IPC两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

A23F

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

CNABS,VEN,CNKI:提，混合，旋转锥体柱，减压蒸馏，水，降膜浓缩，混配，茶，混匀，调配，超临界，杭州艾菲曼普香精香料有限公司，茶多酚，香气，混合，tea，polyphenols，aroma，mix，water extract+，supercritical，vacuum d distill+

C. 相关文件

类 型*	引用文件，必要时，指明相关段落	相关的权利要求
X	CN 1907060A（云南龙润药业有限公司）2007年 2月 07日 (2007-02-07) 权利要求1	1-13
X	CN 101715853A（云南龙润茶业集团有限公司）2010年 6月 02日 (2010-06-02) 权利要求1	1-13
PX	CN 103300182A（杭州艾菲曼普香精香料有限公司）2013年 9月 18日 (2013-09-18) 权利要求1	1-13
A	CN 101914097A（张海）2010年 12月 15日 (2010-12-15) 全文	1-13
A	JP 2000135059A (INABATA KORYO CO LTD) 2000年 5月 16日 (2000-05-16) 全文	1-13

☐ 其余文件在C栏的续页中列出。

☑ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件（如具体说明的）

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
2014年 6月 10日	2014年 7月 08日
ISA/CN的名称和邮寄地址 中华人民共和国国家知识产权局(ISA/CN) 北京市海淀区蓟门桥西土城路6号 100088 中国 传真号 (86-10)62019451	受权官员 齐璐璐 电话号码 (86-10)62414347

表 PCT/ISA/210（第2页）(2009年7月)

国际检索报告
关于同族专利的信息

国际申请号
PCT/CN2014/074236

检索报告引用的专利文件		公布日（年/月/日）	同族专利		公布日（年/月/日）
CN	1907060A	2007年 2月 07日	CN	100421567C	2008年 10月 01日
CN	101715853A	2010年 6月 02日		无	
CN	103300182A	2013年 9月 18日		无	
CN	101914097A	2010年 12月 15日	CN	101914097B	2013年 2月 13日
JP	2000135059A	2000年 5月 16日	JP	2813178B1	1998年 10月 22日

(19) Europäisches Patentamt
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(11) EP 2 987 411 A1

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(54) TEA BEVERAGE AND PREPARATION METHOD THEREFOR

(57) The present invention provides a tea beverage having a quality similar to that of freshly made tea and a manufacturing method thereof, characterized in that taking the water-soluble components and volatile components in tea leaves as the targets, through choosing the same or different kinds of tea leaves, using different extraction processes to respectively extract and obtain a water-soluble component extract (referred to as a first extract) in the tea leaves and a volatile component extract (referred to as a second extract) in the tea leaves, then mixing well the two extracts in a suitable amount to get a tea liquor for tea beverage production, and blending, sterilizing and canning according to conventional tea beverage production processes, so as to produce a tea beverage product having a quality similar to or even exceeding that of freshly made tea.

EP 2 987 411 A1

Description

Technical field of the invention

[0001] The invention relates to a tea beverage and a method for manufacturing the tea beverage. The method can balance the differences in the quality of tea beverages in different batches due to different place of origin, climate, picking time and manufacturing process, the tea beverage manufactured thereby has a coordination of taste and fragrance and pleasant quality which are similar to or better than those possessed by the freshly made tea.

Background of the invention

[0002] Natural, healthy, fast and convenient tea beverages are increasingly becoming common beverages in daily life. As to tea beverages, it is desired that the tea beverages to be drunk have the qualities of freshly made tea, e.g., taste and fragrance. Freshly made tea is the abbreviation of the traditional drinking way of Chinese tea leaves. A certain amount of tea leaves are taken and brewed with hot water (the weight ratio of tea leaves to water is usually in the range of 1: 50 to 100) at a certain temperature (usually, being > 80 °C) for a short time period (from 30 seconds to 5 minutes), and the separated tea liquor is the freshly made tea for drinking. Tea leaves which are consumed in the way of freshly made tea in the Chinese domestic mainly are famous and excellent tea among various tea leaves. The term "famous and excellent tea" is a generalized concept, including two aspects: famous tea and excellent tea, wherein the famous tea refers to tea having a high reputation, a good quality and significant impacts on the market, and the excellent tea refers to tea having significant impacts on the market, a good quality and a high price. The most key features of the famous and excellent tea are that fresh tea leaves for making the tea are picked in early spring and have a high tenderness and abundant inclusions, and tea leaves which are obtained by various tea leaves processing techniques have the following characteristics: the content of water-soluble components and volatile components is high, the taste of the tea liquor is fresh and refreshing, mellow and thick, and fast back to sweet after taste, and the tea liquor has a high intensity of fragrance and a pleasant fragrance type. According to the Chinese grade classification of various types of tea leaves, tea leaves are classified into special grade, grade A, grade B, grade C and grade D depending on their quality from high to low, sometimes, including grade E and grade F. The tea leaves of the famous and excellent tea generally refer to tea leaves in grade A or above, and the yield of tea leaves in grade A or above is limited. Tea leaves used as raw material for the production of a tea beverage are mainly tea leaves in grade B or lower which have a high yield and a slightly inferior quality. Existing tea beverages on the market have great differences in taste and fragrance as compared with freshly made tea, particularly the fragrance, and the tea beverages almost does not have any pleasant fragrance produced by fragrant substances that are comprised in natural tea leaves in freshly made tea. Main reasons for this phenomenon are shown as follows:

1. Quality of tea leaves used as raw material to manufacture tea beverages

[0003] Tea leaves used as raw material to manufacture tea beverages, due to the large usage amount, are mostly staple tea leaves in low grades. Due to influence of picking seasons, environments of the place of origin, manufacturing processes and tenderness of tea leaves, few tea leaves used as raw material to manufacture tea beverages are rich and perfect in the both aspects of fragrance and taste substances. As for such tea leaves, components which exhibit taste (mainly including water soluble component such as tea polyphenols, caffeine, amino acids, and polysaccharides) may be abundant, while components which exhibit fragrance (volatile components mainly based on small molecular compounds having a strong volatility including alcohol, aldehyde, ketone, ester and oxygen-containing small molecular compounds) have a low content or the fragrance type is inferior. Alternatively, the fragrance may be superior, while the taste of the tea liquor is thin or coarse.

2. Restrictions of existing methods for manufacturing tea beverages

[0004] In existing methods for manufacturing a tea beverage, usually, water-soluble components (substances exhibiting the taste of tea liquor) and volatile components (substances exhibiting the fragrance of tea liquor) in tea leaves are simultaneously extracted into the tea liquor under certain extraction conditions with an one-step method in which water is used as the solvent, and the resulting tea liquor is used for making tea beverages. Since the water-soluble components in tea leaves differ greatly from volatile components in terms of content and chemical properties, it is difficult to sufficiently and simultaneously extract the desirable water soluble components and volatile components under the same extraction conditions and by the same method to an aqueous solution of tea liquor. For example, green tea is extracted at a low temperature, the water soluble components which can provide fresh and refreshing sense, particularly amino acids, are more likely to be extracted into the resulting tea liquor, while the volatile components which exhibit the fragrance will

significantly lose. When a high temperature extraction is used to extract green tea, although the exaction amount of the volatile components will rise, the tea liquor obtained under this conditions will have bitter and astringent taste due to excessive dissolution out of soluble components such as tea polyphenol, caffeine, and is hardly accepted.

[0005] At the same time, after the extraction, the tea liquor should be subjected to a plurality of processing steps, including clarifying, blending, sterilizing and canning, and it is difficult to operate under full-closed condition through this whole process, which will lead to the loss of highly volatile fragrance components in the extracted tea liquor during the processing. A conventional sterilization process is a thermal treatment process, which will result in oxidation or cracking reaction of heat-sensitive volatile components and water soluble components in the tea liquor, so that the loss of fragrance and taste compounds will be further increased.

[0006] In addition, a lot of existing tea beverages are not obtained by directly extracting tea leaves, but obtained by using instant tea powder. More thermal processing procedures are carried out during the manufacture of the instant tea powder, such as tea liquor concentration, and spray drying, and in the processes, initial fragrance components in the tea liquor are almost lost at all.

[0007] In recent years, aiming at the above problem that the taste and fragrance qualities of tea beverages cannot be co-existing, a plurality of solving methods are proposed and applied, but all of them involve some disadvantages. For example,

[0008] The defect that the taste and fragrance of a kind of tea leaves used as raw material may be insufficient may be compensated by using a method of blending tea leaves. As to the same kind of tea leaves, due to the differences in place of origin, harvest season, tenderness, and processing technique, the tea leaves may have different characteristics in the taste and fragrance, and by blending tea leaves having different taste and fragrance, it is possible to obtain the raw material tea leaves which can produce a tea liquor having better taste and fragrance both. However, use of the blended tea leaves are restricted by existing extraction methods of tea beverages for the following reasons: because of differences in chemical properties of the water-soluble components exhibiting the taste and volatile components exhibiting the fragrance in tea leaves, it is difficult to sufficiently and simultaneously extract desirable water soluble components and volatile components into tea liquor under the same extraction conditions and by the same method; meanwhile, the fragrance components in the tea liquor are further lost during the plurality of processing steps. Thus, by means of existing methods for manufacturing tea beverages, even if the blended raw material tea leaves are used to produce tea beverages, the quality of the tea beverages only can be increased to a certain extent, which cannot still produce the instant-drinking tea beverages having satisfactory qualities in the taste and fragrance both. In addition, there are methods in which tea leaves are re-dried at high temperature so as to increase the content of the fragrance components therein, however the methods are restricted by existing extraction methods of tea beverages, and thus the above problems cannot be fundamentally solved.

[0009] The fragrance quality of tea beverages and instant tea powder may be improved by back-filling fragrance. Specifically, because the content of initial fragrance components in the extracted tea liquor is limited, the fragrance back-filling usually comprises the following steps: tea leaves used as raw material for extraction are comminuted with the addition of water to give a tea slurry; then a vacuum distillation equipment, a falling-film concentration equipment or spinning cone column (SCC) equipment etc. are used to extract and collect fragrance components as much as possible under mild conditions; the concentrated tea slurry is centrifugalized to obtain a clear concentrated solution of tea liquor, and the clear concentrated solution is used to prepare tea beverages or is spray dried after further concentration to give instant tea powder. The above collected fragrance components are back filled into the concentrated solution of tea liquor or instant tea powder. This method can improve the problem regarding to insufficient fragrance of tea beverages to a certain extent. However, because tea leaves have to be comminuted to prepare a tea slurry, various components in tea leaves are overly dissolved out in the tea slurry after the fragrance extraction, the water soluble components exhibiting taste therein cannot be selectively extracted according to needs, which subsequently can lead to unbalanced ratio of various water soluble components exhibiting taste in tea beverages, resulting in that the coordinated taste of freshly made tea cannot be exhibited.

[0010] Aiming at the problem regarding to the bitter and astringent taste of tea beverages, it is proposed to use polyvinylpyrrolidone (PVPP) for the adsorption of tea polyphenols in tea liquor so as to reduce the bitter and astringent taste. However, in practical applications, the inventors find out that after tea liquor is treated with PVPP adsorption, its fragrance intensity will be much reduced. That is to say, while PVPP adsorbs tea polyphenols in the tea liquor, a lot of fragrance components are also adsorbed, which leads to the loss of the fragrance.

[0011] It is possible to add essences into tea beverages. Currently, for most of tea beverages on the market, the addition of essences is used to solve the problems regarding to insufficient fragrance or inferior fragrance type. The essences may include synthetic essences and natural essences. In recent years, with the strengthening health awareness, more and more consumers begin to pay attention to the safety of food. Although synthetic essences are also safe on the premise of no excessive uses, in the consumer's awareness, tea beverages with the addition of such essences are usually classified as unhealthy foods. However, the yield of natural tea essences is limited, and the conventional extraction processes thereof usually include use of organic solvents or high temperature concentrating procedures, and

thus, in tea beverages, it is difficult for these natural tea essences to exhibit taste and fragrance as those of freshly made tea.

Summary of the invention

[0012] The objective of the invention is to provide a method for manufacturing a tea beverage, and the tea beverage produced by the method can have the coordination of taste and fragrance and pleasant sensory quality as possessed by freshly made tea.

[0013] Therefore, a first aspect of the present invention is to provide a method for manufacturing a tea beverage, comprising the following steps:

1) obtaining a first extract: extracting water soluble components in tea leaves which exhibit the characteristic taste of tea liquor by using a suitable extraction process and using water as a solvent to obtain a first extract;
2) obtaining a second extract: extracting volatile components in tea leaves or other raw materials which exhibit the characteristic fragrance of tea liquor by using a suitable extraction process with a suitable extracting solvent or medium to obtain a second extract;
3) adjusting the first and second extracts as obtained in the above steps 1) and 2) to a suitable concentration respectively, and then clarifying them; or clarifying respectively the first and second extracts, and then adjusting them to suitable concentrations;
and then, mixing well the two extracts in a suitable ratio to obtain a tea liquor for producing a tea beverage;
4) blending, sterilizing and canning the tea liquor obtained in the step 3) with a conventional process for producing tea beverage, to obtain a tea beverage.

[0014] In one embodiment of the invention, in the method for manufacturing a tea beverage according to the first aspect of the invention, the tea leaves for extracting the first extract and the tea leaves for extracting the second extract either may be tea leaves of the same kind and coming from the same source, or may be tea leaves of the same kind while coming from different sources (including, but not limited to, different tea leaves with different places of origin, different picking season, different tenderness and different manufacturing processes), or may be tea leaves of different kinds. Preferably, the tea leaves can be selected from the group consisting of green tea, black tea, oolong tea, scented tea, Pu'er tea or secondary material produced during the productions of the above tea leaves (such as tea stalks, broken tea, yellow sifting tea), or tea leaves obtained by blending tea leaves with different sources but from the above tea leaves of the same or different kinds.

[0015] In the method for manufacturing a tea beverage according to the above first aspect of the invention, the other raw materials in the step 2) includes various edible or drinkable fresh flowers, dried flowers, herb tea, or combinations thereof, for example, jasmine flowers, rose, ghrysanthemum morifolium from Hangzhou of china, honeysuckle, genmai-cha, barley tea, etc.

[0016] In one embodiment of the invention, in the method for manufacturing a tea beverage according to the first aspect of the invention, the extraction temperature to obtain the first extract is 40°C-95°C, preferably 50°C-95°C, 50°C-85°C, or 60°C-85°C.

[0017] Preferred extraction time is 1 min-1 hr, and most preferred extraction time is 5 min-45 min, 10 min-30 min, or 10 min-20 min.

[0018] Preferably, the weight ratio of tea to water is 1:20-120, and further preferably, the weight ratio of tea to water is 1:30-100, 1:40-90, 1:55-70 or 1:50-80.

[0019] In one embodiment of the invention, in the method for manufacturing a tea beverage according to the first aspect of the invention, the extraction methods for obtain the second extract can be conventional extraction methods of volatile substances, such as vacuum distillation concentration method, falling-film concentration method, spinning cone column (SCC) method, and supercritical fluid extraction method.

[0020] In one embodiment of the invention, in the method for manufacturing a tea beverage according the first aspect of the invention, the suitable extraction solvent or medium in the step 2) may be water, steam, or solvents rather than water (e.g., carbon dioxide).

[0021] In one embodiment of the invention, in the method for manufacturing a tea beverage according to in the first aspect of the invention, the tea leaves for extracting the first extract and the tea leaves or other raw materials for extracting the second extract may be suitably comminuted before extraction according to the extraction process, and then are subjected to extraction. Preferably, the tea leaves or other material are comminuted to a particle size $\leq$ 1 mm.

[0022] In one embodiment of the invention, in the method for manufacturing a tea beverage according to the first aspect of the invention, the clarifying in the step 3) includes, but not limited to, conventional low temperature cooling and standing, centrifugalization, membrane filtration, etc.

[0023] In one embodiment of the invention, in the method for manufacturing a tea beverage according to the first

aspect of the invention, the blending in the step 4) includes, but not limited to, conventional dilution of tea liquor, addition of antioxidants, acidity regulators and other food additives, and addition of food ingredients. Said antioxidants may be vitamin C, sodium isoascorbate, etc. Said acidity regulators may be sodium bicarbonate, phosphate, etc. The dosage of the acidity regulators depends on actual situations, and it is preferred that the pH value of the tea beverage is adjusted to range from 5.5 to 6.5.

[0024] In one embodiment of the invention, in the method for manufacturing a tea beverage according the first aspect of the invention, the sterilizing in the step 4) includes, but not limited to, conventional ultra high temperature treatment (UHT), and pasteurization.

[0025] In one embodiment of the invention, in the method for manufacturing a tea beverage according to the first aspect of the invention, when the tea leaf used as raw material is green tea, the ratio of phenol to ammonia in the first extract is less than 8, and the fragrance index (FI) value of the second extract is close to the FI value of freshly made tea; when the tea leaf used as raw material is jasmine tea, the FI value of the second extract is higher than the FI value of freshly made tea; when the tea leaf used as raw material is the oolong tea, the FI value of the second extract is higher than the FI value of freshly made tea.

[0026] The second aspect of the present invention provides a tea beverage which is produced by the method for manufacturing a tea beverage according to the first aspect of the invention.

[0027] As compared with conventional manufacturing methods of tea beverages, the manufacturing method of the invention can balance the differences in the quality of tea beverages in different batches due to place of origin, climate, picking time and manufacturing process, the resulted tea beverage has coordination of taste and fragrance and pleasant quality which are similar to or better than those possessed by freshly made tea. The invention is characterized in that the water soluble components exhibiting the taste of the tea liquor and the volatile components exhibiting the fragrance of the tea liquor are extracted respectively from the tea leaves by using different extraction methods and extraction conditions and using tea leaves of the same or different kinds, and then the two kinds of the components are mixed evenly in a certain ratio to obtain a tea liquor for producing a tea beverage. The tea liquor manufactured by the method of the invention is used to produce a tea beverage, can overcome the defects of existing producing methods of tea beverages as mentioned in the preceding text, and the advantages of the method of the invention are described in detail as follows:

Components exhibiting taste of a tea liquor are mostly water soluble compounds, the content of which is high in tea leaves, and which are easily to be dissolved out. Components exhibiting fragrance of a tea liquor are mostly volatile compounds having a low molecular weight and a low solubility in water, the content of which is low in tea leaves. Thus, when water is used as a solvent to extract the two kinds of compounds, the extraction conditions required for each of them are greatly different. The method of the invention adopts respective optimum extraction methods and conditions to extract respectively the two kinds of compounds, which can avoid the problem caused by simultaneous extraction of the two kinds of compounds, such as the extraction of the two kinds of compounds is both incomplete, or the taste and fragrance of the tea liquor is discordance due to the excessive extraction of a kind of compounds,. When the water soluble components are extracted, the extraction conditions are optimized to obtain the high content of the components exhibiting the characteristic taste of the tea liquor or the good tea liquor taste as determined by sensory evaluation methods. When the volatile components are extracted, the extraction methods and conditions are optimized to obtain the high content of the components exhibiting the characteristic fragrance of the tea liquor and the good fragrance type as determined by sensory evaluation methods.

[0028] Another advantage of the method of the present invention is that there are more choices for tea leaves used as raw material for the production of tea beverages. Since compounds exhibiting the characteristic taste of the tea liquor and compounds exhibiting the characteristic fragrance of the tea liquor are not required to be extracted at the same extraction conditions and from the same tea leaves, the requirements on tea leaves used as raw material may be lowered, that is, advantages of each kind of tea leaves may be selected and disadvantages thereof may be avoided. For example, in a tea leaf A used as raw material, if the content of water soluble components exhibiting good taste is high, but the fragrance of which is insufficient, or fragrance type of which is inferior, it can be used alone as the raw material for extracting the first extract of tea leaves of the invention. Then, another raw material tea leaf B with a high content of volatile components exhibiting the characteristic fragrance and a good fragrance type may be selected for extracting the second extract of the invention.

[0029] The method of the invention can also overcome the problem that the product quality is declined due to the loss of taste and fragrance of the tea liquor during manufacturing a tea beverage with existing methods. The first and second extracts of tea leaves which are extracted respectively may be freely blended according to needs. Specifically, by means of simple conventional experiments, the loss amounts of the water soluble components exhibiting the taste of tea liquor and volatile components exhibiting the fragrance of tea liquor during manufacturing a tea beverage can be beforehand known, and after evaluations and calculations, the mixing ratio of the two extracts may be precisely adjusted according

to finally desired taste and fragrance of the finished tea beverage product, so as to eliminate impacts of the loss of the flavor components during the manufacturing processes on the quality of the finished tea beverage product.

[0030] The method for manufacturing a tea beverage of the invention can be carried out by combining existing tea beverages production techniques and tea fragrance extraction or recovery techniques and equipments, and can easily achieve a large scale production of tea beverage.

[0031] According to the method for manufacturing a tea beverage of the invention, the first extract exhibiting the taste of tea can be extracted by using existing tea leaves extraction equipment, for example, common closed extraction tank and reversible basket-type extraction equipment; and the extraction parameters, e.g., water temperature, impregnating time, stirring speed and other relevant conventional parameters, can be optimized on the basis of preferred tea leaves, so that the first extract may exhibit the good taste of the tea leaves, that is, the content of one or more water soluble components therein are increased or in a suitable ratio. For example, the content ratio of tea polyphenols to amino acids (abbreviated as the phenol to ammonia ratio) in tea liquor is usually used to characterize the taste of a green tea liquor, and generally, when a ratio of phenol to ammonia in a green tea liquor is < 8, the green tea liquor is considered to have the taste of fresh made tea, such as the characteristic taste of fresh and refreshing, mellow and thick, and sweet. As to this type of tea leaves, the lower the ratio of phenol to ammonia in tea liquor is, the better the taste of the tea liquor will be. The following Table 1 shows the measured ratios of phenol to ammonia ratios in the green tea beverage produced by the method of the present invention(Example 1) and the green tea beverages produced by conventional methods(Comparative Examples 1-1, 1-2, 1-3, corresponding to product 1'-1, product 1'-2, and product 1'-3).

Table 1: Measured ratios of phenol to ammonia in green tea beverage

Product	Product 1	Product 1'-1	Product 1'-2	Product 1'-3	Freshly made tea 1
Ratio of phenol to ammonia	7.1	9.6	8.5	11.2	6.5
(Note: the method for calculating the ratios of phenol to ammonia in the above table are described as follows: the contents of tea polyphenols and amino acids in various tea beverages are respectively measured, and the ratio of phenol to ammonia = the content of tea polyphenols/the content of amino acids, the contents of the tea polyphenols are measured according to the National Standard of the People's Republic of China GB/T21733-2008 (Method for determining tea polyphenols content in tea beverage), and the contents of the amino acids are measured according to the National Standard of the People's Republic of China GB/T8314-2002 (Method for determining total free amino acids in tea); the tea leaves used for the freshly made tea 1 in the above table and the raw material green tea leaves B as selected in Example 1 are special grade green tea having the same fragrance type).					

[0032] According to the method of manufacturing tea beverage of the invention, the second extract can be extracted by using conventional equipment for extracting some volatile components, such as a vacuum distillation concentration equipment, a falling-film concentration equipment and a spinning cone column (SCC), a supercritical fluid extraction equipment, and the extraction parameters may be adjusted on the basis of preferred raw material tea leaves having a good fragrance type, so that the volatile components exhibiting the characteristic fragrance of the tea liquor in the tea leaves may be sufficiently extracted. Furthermore, the extraction parameters may be optimized so that the ratio of various volatile components is suitable so as to exhibit a good fragrance type, for example, the volatile components can have the characteristic of a high fragrance index, thereby to achieve the fragrancy quality of freshly made tea.

[0033] The term "fragrance index" as described in the invention, abbreviated as FI, represents the ratio of the total amount of high boiling-point components to the total amount of low boiling-point components in the fragrance components. In the analyses of the fragrance component, fragrance components having a retention time shorter than that of linalool are deemed as the low boiling-point fragrance components, and fragrance components having a retention time longer than that of linalool are deemed as the high boiling-point fragrance components. The FI index may be used for qualitatively analyzing the fragrance of tea leaves, and for the same kind of tea leaves, tea leaves having a high FI have a better fragrance type than tea leaves having a low FI.

[0034] The following table 2 shows the measured FI values of various tea beverage products produced by the method of the invention (Examples 1, 2, 3 and 4, corresponding to green tea product 1, jasmine tea product 2, oolong tea product3, and black tea product 4), various tea beverage products produced by conventional methods (Comparative Examples 1-1, 1-2, 1-3, 2, 3, 4, corresponding to green tea product 1'-1, green tea product 1'-2, green tea product 1'-3, jasmine tea product 2', oolong tea product 3', and black tea product 4') and various freshly made tea. As seen from the data as shown in Table 2, as compared with tea beverages made by conventional methods, the tea beverages as produced by the method of the invention have a better fragrance type.

Table 2:

Kind of tea beverage	Product	FI index
Green tea	Product 1	0.6419
	Product 1'-1	0.2576
	Product 1'-2	0.2158
	Product 1'-3	0.3233
	Freshly made tea 1	0.6448
Jasmine tea	Product 2	6.772
	Product 2'	2.159
	Freshly made tea 2	4.275
Oolong tea	Product 3	0.7755
	Product 3'	0.5103
	Freshly made tea 3	0.6788
Red tea	Product 4	0.5873
	Product 4'	0.2257
	Freshly made tea 4	0.7865
(Note: the methods for determining and calculating the FI index in the above table are described as follows: the kinds and contents of the fragrance components in each tea beverage are determined respectively by a gas chromatography-mass spectrometer (GC-MS), the retention time point of the linalool are determined in the mass spectrum, and then the FI index is calculating according to its definition).		

[0035] The tea leaves used to make the freshly made tea 1 in the above Table 2 and the green tea leaves B used as raw material in Example 1 are both green tea leaves in special grade and having the same fragrance type; the tea leaves used to make the freshly made tea 2 and the jasmine tea leaves A used as raw material in Example 2 are both jasmine tea leaves in special grade and having the same fragrance type; the tea leaves used to make the freshly made tea 3 and the oolong tea leaves B used as raw material in Example 3 are both oolong tea leaves in grade A and having the same fragrance type; and tea leaves used to make the freshly made tea 4 and the black tea leaves B used as raw material in Example 4 are both black tea leaves in grade A and having the same fragrance type.

[0036] The differences in the taste and fragrance of tea liquor between the tea beverage products manufactured by the method for manufacturing a tea beverage of the invention and the tea beverage products made by conventional methods for manufacturing a tea beverage can be determined from the sensory evaluation score results as shown in Table 3. It can be seen that the tea beverage products manufactured by the method of the invention have a similarity of more than 9.0 with freshly made tea, and the tastes thereof are closer to freshly made tea.

[0037] Products 1, 2, 3, 4 are the tea beverage products produced by the method of the invention, which are respectively from Examples 1, 2, 3 and 4.

[0038] Product 1'-1, 1'-2, 1'-3, 2', 3', 4' are the tea beverage products produced by conventional manufacturing methods of a tea beverage, which are respectively from Comparative Examples 1-1, 1-2, 1-3, 2, 3, 4.

Table 3

The kind of tea beverage	Scores of sensory attributes	Coordination of fragrance and taste	Taste		Fragrance		Similarity to freshly made tea
			Quality	Intensity	Quality	Intensity	
Green tea	product 1	9.0	8.3	8.5	9.1	8.9	9.1
	product 1'-1	6.5	7.1	8.2	6.2	6.0	6.3
	product 1'-2	6.1	8.2	8.6	6.0	4.1	5.4
	product 1'-3	5.9	4.6	9.1	8.9	8.6	5.9

(continued)

The kind of tea beverage	Scores of sensory attributes	Coordination of fragrance and taste	Taste		Fragrance		Similarity to freshly made tea
			Quality	Intensity	Quality	Intensity	
Jasmine tea	product 2	9.6	8.8	8.2	9.1	10.0	9.8
	product 2'	7.4	7.8	8.0	7.1	5.7	6.1
Oolong tea	product 3	8.9	8.6	8.7	9.0	9.5	9.2
	product 3'	6.2	6.4	7.7	8.2	6.0	6.7
Black tea	product 4	9.1	8.6	8.5	9.1	8.9	9.0
	product 4'	6.1	7.8	7.6	7.0	5.8	5.7
(Note: The result in the above table are from ten sensory evaluation experts, and each evaluation index is scored based on a ten-point system, and the values as listed in the above table are the average scores of the values in each group after removing the highest score and the lowest score. The each freshly made tea is obtained by brewing famous and excellent tea leaves of the same kind as the raw material tea leaves used in the above examples).							

Embodiment

[0039] The invention is further described in detail by the following examples. However, a person skilled in the art would understand that the following examples are only used to illustrate the invention, and should not be deemed as restriction of the scope of the invention. In the examples, when specific conditions are not specified, the examples are carried out according to conventional conditions or conditions suggested by manufacturers. When used devices are not specified with manufacturers, they are conventional products which can be commercially available on the market.

Example 1: green tea beverage 1

[0040] After tea leaves used as raw material were evaluated and selected, the tea liquor of the green tea A (pan-fired green tea in grade B) had a mellow and thick, fresh and refreshing taste and a good fragrance type, while the intensity of fragrance thereof was significantly insufficient. Thus, 50 kg of the green tea A was used as the raw material for extracting the first extract, and the following extraction conditions were selected by experiments: deionic water was used as the solvent, the weight ratio of tea to water was 1:70, and the extraction was conducted at 60°C for 20 min. The resulting extraction solution was cooled and standing, and then was centrifugated, to get 3.6 tons of clear first extract.

[0041] Meantime, after tea leaves used as raw material were evaluated and selected, the green tea B (pan-fired green tea in grade C) had a good fragrance type and a high content of the fragrance, while the contents of taste components in the tea liquor thereof were low, and the taste of the tea liquor thereof was thin. Thus, 50 kg of the green tea B was used as the raw material for extracting the second extract, and after experiments, a SCC-1000 spinning cone column was used to extract the fragrance components, the extraction parameters were as follows: tea leaves were comminuted to a particle size ≤ 1 mm, and then the comminuted tea leaves were mixed with water to produce a tea slurry in a ratio that the weight of dry tea leaves was 9% of the total weight of the resulting tea slurry, during the extraction, the temperature at the top of the column was 75 °C, the feeding temperature was 55 °C, the flow rate of tea slurry was 360 kg/hr; the flow rate of the steam for extracting was 4.0% of the flow rate of tea slurry, the temperature of cooling water was 10±2 °C. 10.8 kg of second extract was obtained.

[0042] The weight ratio of the above resulting first and second extracts was determined by experiments, the finally determined weight ratio of the first extract to the second extract was 350:1, and could maintain coordination of taste and fragrance of the finished tea beverage products and provide sufficient fragrance intensity. After the two extracts were mixed well in the ratio, water was added to dilute the mixture to a constant weight of 10 tons, and then, vitamin C as antioxidant was added in the diluted mixture in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with bottles made of polyethylene terephthalate (PET bottles), to get a finished tea beverage product 1.

Comparative Example 1-1: green tea beverage

[0043] Green tea A and green tea B in Example 1 was taken and mixed in a ratio of 1:1, and 60 kg of the mixed tea

leaves were used as raw material for extracting tea liquor. Deionic water was used as the solvent, the weight ratio of tea to water was 1:60, and the extraction was conducted at 75 °C for 15 min, the resulting extraction solution was cooled and standing and then centrifugated, to get 3.8 tons of the tea liquor. Water was added to the tea liquor until the constant weight was 11.5 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. the mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 1'-1.

Comparative Example 1-2: green tea beverage

[0044] 60 kg of the green tea A in Example 1 was used as raw material for extracting tea liquor. Deionic water was used as the solvent, the weight ratio of tea to water was 1:70, the extraction was conducted at 70 °C for 20 min. The resulting extraction solution was cooled and standing and then centrifugated, to get 4.3 tons of the clear tea liquor. Water was added to the tea liquor until the constant weight was 12.0 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 1'-2.

Comparative Example 1-3: green tea beverage

[0045] The green tea B in Example 1 was used as raw material for producing a tea beverage, and the tea beverage was produced by fragrance back-filling method. 50 kg of the green tea B was extracted to get the fragrance components by using a SCC-1000 spinning cone column according to the method for extracting the second extract in the above Example 1, and the extraction parameters were as follows: tea leaves were comminuted to a particle size ≤ 1 mm, and then the comminuted tea leaves were mixed with water to produce a tea slurry in a ratio that the weight of dry tea leaves was 9% of the total weight of the resulting tea slurry. During the extraction, the temperature at the top of the column was 75 °C, the feeding temperature was 55 °C, the flow rate of the tea slurry was 360 kg/hr, the flow rate of the steam was 4.0% of the flow rate of the tea slurry, the temperature of cooling water was 10±2 °C, to get 10.8 kg of the aqueous extraction solution of the fragrance substances in the tea liquor. Meantime, during the extraction of the fragrance, the discharged concentrated tea slurry solution was centrifugated to remove tea residues, to get 600 kg of a clear concentrated solution of tea liquor.

[0046] All the 10.8 kg above aqueous extraction solution of the fragrance substances in the tea liquor was back filled into 600 kg of the concentrated solution of the tea liquor, to get tea liquor for the production of a tea beverage. Water was added into the tea liquor until the constant weight was 13.5 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.56.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 1'-3.

Example 2: jasmine tea beverage

[0047] After tea leaves used as raw material were evaluated and selected, the tea liquor of the jasmine tea A (jasmine tea in grade B) had a mellow and thick, fresh and refreshing taste and a good fragrance type, while the intensity of fragrance thereof was insufficient. Thus, 50 kg of the jasmine tea A was used as raw material for extracting of the first extract of, and the following extraction conditions were selected by experiments: deionic water was used as the solvent, the weight ratio of tea to water was 1:55, and the extraction was conducted at 75 °C for 15 min. The resulting extraction solution was cooled and standing, and then was centrifugated, to get 2.9 tons of clear first extract.

[0048] Meantime, 50 kg of the jasmine tea A was used as raw material for extracting the second extract, and after experiments, a single-effect concentrator was use to extract the fragrance components, the extraction parameters were as follows: tea leaves was comminuted to a particle size ≤ 1 mm, and then the comminuted tea leaves were mixed with water to produce a tea slurry in a ratio that the weight of dry tea leaves was 1.5% of the total weight of the resulting tea slurry, during the extraction, the vacuum degree of the system was -0.085 MPa; the temperature of internal materials was 50 °C; the temperature of cooling water was 10±2 °C. 900 kg of second extract was obtained.

[0049] The weight ratio of the above resulting first and second extracts was determined by experiments, the finally determined weight ratio of the first extract to the second extract was 3:1, and could maintain coordination of taste and fragrance of the finished tea beverages and provide sufficient fragrance intensity. After the two extracts were mixed well in the ratio, water was added to dilute the mixture to a constant weight of 12 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137

°C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 2.

Comparative Example 2: jasmine tea beverage

[0050] 60 kg of the jasmine tea A in Example 2 was used as raw material for extracting a tea liquor. Deionic water was used as the solvent, the weight ratio of tea to water was 1:65, and the extraction was conducted at 85 °C for 15 min. The resulting extraction solution was cooled and standing and then centrifugated, to get 4.0 tons of the clear tea liquor. Water was added into the tea liquor until the constant weight was 13.5 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 2'.

Example 3: oolong tea beverage

[0051] After tea leaves used as raw material were evaluated and selected, the tea liquor of the oolong tea A (intensively fragrant Tieh-Kuan-Yin tea in grade B) had a heavy and strong, fresh and refreshing taste, while the fragrance type thereof was not good. Thus, 50 kg of the oolong tea A was used as raw material for extracting the first extract, and the following extraction conditions were selected by experiments: deionic water was used as the solvent, the weight ratio of tea to water was 1:60, and the extraction was conducted at 80 °C for 12 min. The resulting extraction solution was cooled and standing, and then was centrifugated, to get 3.1 tons of clear first extract.

[0052] Meantime, after tea leaves used as raw material were evaluated and selected preferably, the oolong tea B (intensively fragrant Tieh-Kuan-Yin tea in grade D) had a good fragrance type and a high content of the fragrance, while the taste of the tea liquor thereof was harsh and astringent. Thus, 50 kg of the oolong tea B was used as raw material for extracting the second extract, and after experiments, a SCC-1000 spinning cone column was used to extract the fragrance components, the extraction parameters were as follows: tea leaves were comminuted to a particle size ≤ 1 mm, and then the comminuted tea leaves were mixed with water to produce a tea slurry in a ratio that the weight of dry tea leaves was 9.5% of the total weight of the resulting tea slurry, during the extraction, the temperature at the top of the column was 75 °C, the feeding temperature was 74 °C, the flow rate of tea slurry was 500 kg/hr; the flow rate of the steam for extracting was 2.5% of the flow rate of the tea slurry, the temperature of cooling water was 10±2 °C. 12.5 kg of second extract was obtained.

[0053] The of weight ratio of the above resulting first and second extracts was determined by experiments, the finally determined weight ratio of the first extract to the second extract was 250:1, and could maintain coordination of taste and fragrance of the finished tea beverage and provide sufficient fragrance intensity. After the two extracts were mixed well in the ratio, water was added to dilute the mixture to a constant weight of 10.9 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 3.

Comparative Example 3: oolong tea beverage

[0054] 60 kg of the oolong tea B in Example 3 was used as raw material for extracting tea liquor. Deionic water was used as the solvent, the weight ratio of tea to water was 1:60, and the extraction was conducted at 85 °C for 15 min. The resulting extraction solution was cooled and standing and then centrifugated, to get 3.7 tons of clear tea liquor. Water was added into the tea liquor until the constant weight was 12.5 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust to the pH value to 5.56.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 3'.

Example 4: black tea beverage

[0055] After tea leaves used as raw material were evaluated and selected preferably, the tea liquor of the black tea A (unshredded black tea in grade C) had a heavy and strong, fresh and refreshing taste and a good fragrance type, while the fragrance intensity thereof was significantly insufficient. Thus, 50 kg of the black tea A was used as raw material for extracting the first extract, and the following extraction conditions were selected by experiments: deionic water was used as the solvent, the weight ratio of tea to water was 1:70, and the extraction was conducted at 85 °C for 10 min. The resulting extraction solution was cooled and standing, and then was centrifugated, to get 3.6 tons of clear first extract.

[0056] Meantime, after tea leaves used as raw material were evaluated and selected, the black tea B (unshredded black tea in grade B) had a good fragrance type and a high content of the fragrance, while the taste of the tea liquor

was not sufficiently heavy and strong, fresh and refreshing. Thus, 50 kg of black tea B was used as raw material for extracting the second extract, and after experiments, a single-effect falling-film concentrator was used to extract the fragrance components, the extraction parameters were as follows: tea leaves were comminuted to particle size ≤ 1 mm, and then the comminuted tea leaves were mixed with water to produce a tea slurry in a ratio that the weight of dry tea leaves was 2% of the total weight of the resulting tea slurry, during the extraction, the temperature of the materials was 75 °C, the vacuum degree of the system was -0.085 MPa, the evaporation rate of the steam was 2 ton/h, the tea slurry was recycled for 5 times in the interior of the system to extract the fragrance components, the temperature of cooling water was 10±2 °C, 510 kg of second extract was collected.

[0057] The weight ratio of the above resulting first and second extracts was determined by experiments, the finally determined weight ratio of the first extract to the second extract was 5:1, and could maintain coordination of taste and fragrance of the finished tea beverage and provide sufficient fragrance intensity. After the two extracts were mixed well in the ratio, water was added to dilute the mixture to a constant weight of 9.5 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 4.

Comparative Example 4: black tea beverage

[0058] 60 kg of the black tea A in Example 4 was used as raw material for extracting a tea liquor. Deionic water was used as the solvent, the weight ratio of tea to water was 1:60; and the extraction was conducted at 85 °C for 15 min. The resulting extraction solution was cooled and standing and then centrifugated, to get 3.7 tons of clear tea liquor. Water was added into the tea liquor until the constant weight was 12.0 tons, and then, vitamin C as antioxidant was added in the amount of 0.02% (kg/kg) of the total constant weight, and an appropriate amount of sodium dicarbonate was added to adjust the pH value to 5.5-6.5, to get a mixed solution. The mixed solution was sterilized by UHT at 137 °C for 10 seconds, and then, was aseptically canned with PET bottles, to get a finished tea beverage product 4'.

Claims

1. A method for manufacturing a tea beverage, comprising the steps of:

   1) obtaining a first extract: extracting water soluble components in tea leaves which exhibit the characteristic taste of tea liquor by using a suitable extraction process and using water as a solvent to obtain a first extract;
   2) obtaining a second extract: extracting volatile components in tea leaves or other raw materials which exhibit the characteristic fragrance of tea liquor by using a suitable extraction process with a suitable extracting solvent or medium to obtain a second extract;
   3) adjusting the first and second extracts as obtained in the above steps 1) and 2) to a suitable concentration respectively, and then clarifying them; or clarifying respectively the first and second extracts, and then adjusting them to suitable concentrations;
   and then, mixing well the two extracts in a suitable ratio to obtain a tea liquor for producing a tea beverage; and
   4) blending, sterilizing and canning the tea liquor obtained in the step 3) with a conventional process for producing tea beverage, to obtain a tea beverage.

2. The method for manufacturing a tea beverage according to claim 1, wherein the tea leaves for extracting the first extract and the tea leaves for extracting the second extract either may be tea leaves of the same kind and coming from the same source, or may be tea leaves of the same kind while coming from different sources (including, but not limited to, different tea leaves with different places of origin, different picking season, different tenderness and different manufacturing processes), or may be tea leaves of different kinds.

3. The method for manufacturing a tea beverage according to claim 1 or 2, wherein the tea leaves is selected from the group consisting of green tea, black tea, oolong tea, scented tea, Pu'er tea, secondary material produced during the production of the above tea leaves (such as tea stalks, broken tea, yellow sifting tea), and tea leaves obtained by blending tea leaves with different sources but from the above tea leaves of the same or different kinds.

4. The method for manufacturing a tea beverage according to any one of claims 1-3, wherein the extraction temperature for obtaining the first extract is 40°C-95°C, preferably 50°C-95°C, 50°C-85°C, or 60°C-85°C;
   preferred extraction time is 1 min-1 hr, and most preferred extraction time is 5 min-45 min, 10 min-30 min, or 10 min-20 min;

preferably, the weight ratio of tea to water is 1:20-120, and further preferably, the weight ratio of tea to water is 1:30-100, 1:40-90, 1:55-70 or 1:50-80.

5. The method for manufacturing a tea beverage according to any one of claims 1-4, wherein the extraction methods for obtaining the second extract are conventional extraction methods of volatile substances, such as vacuum distillation concentration method, falling-film concentration method, spinning cone column (SCC) method, and supercritical fluid extraction method.

6. The method for manufacturing a tea beverage according to any one of claims 1-5, wherein said other raw materials in the step 2) includes various edible or drinkable fresh flowers, dried flowers, herb tea, or combinations thereof, for example, jasmine flowers, rose, ghrysanthemum morifolium from Hangzhou of china, honeysuckle, genmaicha, barley tea.

7. The method for manufacturing a tea beverage according to any one of claims 1-5, wherein said suitable extraction solvent or medium in the step 2) is water, steam, or solvents rather than water (e.g., carbon dioxide).

8. The method for manufacturing a tea beverage according to any one of claims 1-7, wherein the tea leaves for extracting the first extract and the tea leaves or other raw materials for extracting the second extract may be suitably comminuted before extraction according to the extraction process, and then are subjected to extraction.

9. The method for manufacturing a tea beverage according to any one of claims 1-7, wherein the clarifying in the step 3) is conventional low temperature cooling and standing, centrifugalization, or membrane filtration.

10. The method for manufacturing a tea beverage according to any one of claims 1-7, wherein the blending in the step 4) includes conventional dilution of tea liquor, addition of antioxidants, acidity regulators and other food additives, addition of food ingredients.

11. The method for manufacturing a tea beverage according to any one of claims 1-7, wherein the sterilizing in the step 4) includes, but not limited to, conventional ultra high temperature treatment, and pasteurization.

12. The method for manufacturing a tea beverage according to any one of claims 1-7, **characterized in that** when the tea leaf used as raw material is green tea, the ratio of phenol to ammonia in the first extract is less than 8, and the FI value of the second extract is close to the FI value of freshly made tea; when the tea leaf used as raw material is jasmine tea, the FI value of the second extract is higher than the FI value of freshly made tea; when the tea leaf used as raw material is the oolong tea, the FI value of the second extract is higher than the FI value of freshly made tea.

13. A tea beverage as produced by the method for manufacturing a tea beverage according to claims 1-12.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2014/074236

A. CLASSIFICATION OF SUBJECT MATTER

A23F 3/16 (2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A23F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNABS, VEN, CNKI: tea, polyphenols, aroma, mix, water, extract+, supercritical, vacuum d distill+, HANGZHOU EVER MAPLE FLAVOR AND FRAGRANCE CO. , LTD. , rotating cone column, reduced pressure distillation, falling film evaporation

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 1907060 A (YUNNAN LONGRUN PHARMACEUTICAL CO., LTD.) 07 February 2007 (07.02.2007) claim 1	1-13
X	CN 101715853 A (YUNNAN LONGRUN TEA GROUP CO., LTD.) 02 June 2010 (02.06.2010) claim 1	1-13
PX	CN 103300182 A (HANGZHOU EVER MAPLE FLAVOR AND FRAGRANCE CO., LTD.) 18 September 2013 (18.09.2013) claim 1	1-13
A	CN 101914097 A (ZHANG, Hai) 15 December 2010 (15.12.2010) the whole document	1-13
A	JP 2000135059 A (INABATA KORYO CO LTD) 16 May 2000 (16.05.2000) the whole document	1-13

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&"document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
10 June 2014	08 July 2014
Name and mailing address of the ISA State Intellectual Property Office of the P. R. China No. 6, Xitucheng Road, Jimenqiao Haidian District, Beijing 100088, China Facsimile No. (86-10) 62019451	Authorized officer QI, Lulu Telephone No. (86-10) 62414347

Form PCT/ISA /210 (second sheet) (July 2009)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2014/074236

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
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CN 101715853 A	02 June 2010	None	
CN 103300182 A	18 September 2013	None	
CN 101914097 A	15 December 2010	CN 101914097 B	13 February 2013
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Form PCT/ISA /210 (patent family annex) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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- CN GBT83142002 **[0031]**