

Description

The invention relates to a process for improving the flavor of coffee extracts which are obtained by a second extraction step, so-called secondary coffee extracts, especially for the production of soluble, i.e. instant coffees.

In the production of coffee extracts, first a primary extract from roast coffee is obtained under mild temperature and pressure conditions. Said primary extract usually has a high quality nearly reaching that of instant coffee infusions used in households. This primary extraction can for example be conducted in a percolator with hot water.

The primary extraction step has a yield of only 20 to 30% and it was therefore quite obvious to increase the yield by means of a second extraction step. This additional extraction is conducted under more rigorous temperature and pressure conditions (EP-A-151 772). However, the resulting secondary extract has a high acid content which is found to be unpleasant as regards flavor and furthermore, said extract has unpleasant flavor notes which are often called "hydrolytic flavor". These unpleasant notes impede the quality of the final product and add to the typical taste of soluble coffee which is different from ordinary roast coffee infusions.

Consequently, a number of methods for treating secondary coffee extracts have been proposed. EP-A-78 121 discloses for example the removal of undesirable substances from secondary coffee extract by means of a liquid/liquid-extraction with a plant oil. EP-A-78 618 suggests to treat secondary extracts with solid organic polymeres and DE-A-34 00 768 to treat them with low-alkalinity ion-exchangers.

DE-A-23 37 201 relates to a process for producing roast and extract coffee which has a low content of irritating roasting components. Undesirable irritating components, and not the essential flavor substances, are removed from roasted coffee. It is proposed to treat the roast coffee with an organic solvent in which all constituent substances of the coffee are dissolved. Subsequently, the constituent substances are separated from the solvent in a vacuum by distillation, and the aroma substances are freed from the irritating components by molecular sieve treatment. The molecular sieves which are used have a pore diameter of 25 Ångström.

DD-A-268 151 relates to a process for stabilizing the aroma of ground coffee which is supposed to result in a roast coffee with improved organoleptic properties and a higher storage stability. It is proposed to treat the ground roast coffee with adsorption agents such as finely or coarsely pored silica gels and synthetic or naturally occurring zeolites.

EP-A-13 451 discloses a process for removing caffeine from aqueous solutions of green or roasted coffee beans with a certain crystalline zeolite molecular sieve of the Y-type, namely the UHP-Y, which has a high selectivity for caffeine. [To be followed by the text at line 33, page 2 of the original specification dated June 27, 1991 and filed on August 19, 1991.]

SUMMARY OF THE INVENTION

The invention is based on the object to provide a process for treating secondary roast coffee extracts which is suitable to clearly improve the flavor of the secondary extract without reducing the content of dissolved flavor-enhancing substances in the extract.

This object is attained by treating the secondary extract with alkaline molecular sieves.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

According to a preferred embodiment of the invention, an alkaline molecular sieve with a pore size of approximately 0.3 to 1 nm is employed to reduce the content of suspended material, i.e. the content of undissolved and finely suspended particles in the beverage. The molecular sieves Merck Art.-No. 5703, 5704, 5705, Fluka Art.-No. 69831, 69834, 69842, 69844, 69848 and/or 69855 are particularly suitable for this purpose. The treatment for removing the off-flavor notes can be conducted in a particularly expedient way by circulating the secondary coffee extract over the molecular sieve being present in a column or by a direct flow through a column filled with a molecular sieve, the residence time being regulated by the flow speed or the length of the column. The change of the pH-value in the secondary extract can be regulated via the recirculation period. On the other hand, the respective pH-value which is determined during treatment can be regarded as a regulating variable for the treatment period or for setting a certain flavor note.

The treatment results are particularly favorable, if, prior to the actual treatment, the molecular sieve material is conditioned over a water vapour phase up to a water absorption of 7 to 30%. For regeneration, the molecular sieve material is washed with diluted aqueous sodium hydroxide solution or potassium hydroxide solution in a concentration of approximately 1 to 5% and is subsequently rinsed with demineralized water until the rinsing water has a pH-value of approximately 9. The ratio of molecular sieve to secondary coffee extract

to be treated can range from between about 1:30 to 1:5. Particularly good results are achieved with a ratio of 1:8 to 1:12.

The extract resulting from the ion-exchanger treatment of the secondary coffee extract is different from the secondary extract resulting from the molecular sieve treatment in that in the latter treatment, selectively small organic molecules are removed, whereas in an ion-exchanger treatment there is an unspecific adsorption. In contrast to the ion-exchanger treatment, no solids are lost in the molecular sieve treatment.

The process as taught by the invention attains a significant improvement of the flavor of the secondary extract as well as of the final product obtained by mixing the secondary with the primary extract. This improvement was tasted and confirmed by coffee experts and it can also be analytically measured by a reduction of the furfural content used as an off-flavor indicator in instant coffees. The treatment period only ranges from approx. 5 to 20 min., and there is no or only an insignificant loss of solids. But since, on the other hand, there is a significant reduction of the content of suspended material, i.e. a better solubility of the product, there may also be a positive effect on the tactile sensation when the beverage is consumed.

The flow chart describes the present invention according to a preferred embodiment.

Prior to the molecular sieve treatment, the material was treated with acidic coffee extract or diluted acetic acid having a pH-value of approx. 4.5, in order to wash out mobile aluminium. Subsequently, the material was washed with NaOH in a concentration of 5% and then rinsed with demineralized water until the rinsing water had acquired a pH-value of approx. 9. The molecular sieve material is located in a column provided with a cooling or heating wall. The still warm secondary extract is pumped from a storage tank to a mixing tank comprising an agitator and is from there passed to the column heated to 50 to 70°C. After the desired pH-value is reached, the treated secondary coffee extract is transferred to the receiving tank and is then made into instant coffee in the customary way.

The following examples shall further illustrate the invention and describe the process as taught by the invention on a laboratory and on an industrial scale.

Example 1

The molecular sieve material Merck Art.-No. 5703 was preconditioned in a desiccator which had been charged with 300 ml of water until the molecular sieve material had a water content of 7.4%. 25 g of this material were introduced to a glass column provided with a heating wall. A second heatable column served as a buffer and storage vessel. 200 ml secondary extract with a gravimetrically determined solids content of 2.75% and a pH-value of 4.38 was pumped with a flow inducer over the molecular sieve material for a period of 9.5 min. In this process, the heating wall of the columns had a temperature of 70°C. At the end of the test, the pH-value had risen to 5.68 and no loss of solids could be found. The quantity of titrable acid (up to pH 8) had decreased from approx. 80 mmol to approx. 27 mmol, with respect to 100 g of solids. The formation of precipitations after a settling period of 20 hours at a temperature of 20°C was also reduced by approx. 25%.

In an organoleptic test, the secondary extract was mixed with the primary extract in the ratio of 1:1 and was consumed. A raw secondary extract which had not been treated according to the process as taught by the invention was tested in the same way. Coffee experts clearly preferred the mixture with the treated secondary extract.

Example 2

1.4 kg molecular sieve material 10 A, Merck Art.-No. 5703 was pretreated as described above until it had acquired a water content of 11.8%. Again, the material was filled in a column of the above-described type and 16 kg of secondary coffee extract with a solids content of approx. 2.6% were pumped in a cycle through the column charged with the molecular sieve at a flow rate of 2.3 l/min. After an average contacting period of 16 min, the extract was pumped out of the cycle and after samples were taken for analytical tests, said extract, together with the primary extract, was made into soluble coffee.

Gravimetrically, no reduction of solids could be found. The pH-value had increased to 5.8, and the titrable acid content had decreased from approx. 71 mmol to approx. 23 mmol, with respect to 100 g solids in a titration of up to pH 8. A product which was prepared according to the ordinary process was also tested and the results of these tests were compiled in the following table.

	no treatment	molecular sieve treatment
5		
water content (%)	2.35	1.60
caffeine (%)	0.09	0.07
10 titrable acid (mmol)*	84.4	76.5
acetate (% acid)	0.66	0.66
formiate (% acid)	1.65	1.70
HMF (ppm)	479	476
15 furfural (ppm)	50	26
sulphate ash (% in dry matter)	10.0	10.9

* in a titration of up to pH 9

The two final products were tasted by coffee experts with the surprisingly clear result that the product made with the treated secondary extract was clearly superior and was found milder and very neutral.

Claims

1. A process for improving the flavor of coffee extracts, which are obtained by a second extraction step, so-called secondary coffee extracts, by separating undesirable substances from said secondary coffee extracts in response to their size, wherein, for separating said undesirable substances, the secondary extract is treated with alkaline molecular sieves and wherein molecular sieves with a pore size of approximately 0.3 to 1.0 nm are employed.
2. The process as claimed in claim 1, wherein the molecular sieves are conditioned over a water vapour phase up to a water absorption of approximately 7 to 30%.
3. The process as claimed in one of the preceding claims, wherein the secondary extract is recirculated over the molecular sieve which is present in a column.
4. The process as claimed in one of claims 1 and 2, wherein the secondary extract flows through a column filled with a molecular sieve and the residence time is adjusted via the length of the column and/or the flow rate.
5. The process as claimed in one of the preceding claims, wherein a change of the pH-value is regulated via the recirculation period.
6. The process as claimed in one of the preceding claims, wherein a change of the pH-value is regulated via the ratio of molecular sieve to secondary extract.
7. The process as claimed in one of the preceding claims, wherein the ratio of molecular sieve to secondary coffee extract is adjusted to 1:5 to 1:30.
8. The process as claimed in one of the preceding claims, wherein the ratio of molecular sieve to secondary coffee extract is adjusted to 1:8 to 1:12.

Patentansprüche

1. Verfahren zur Verbesserung des Geschmacks von Kaffee-Extrakten, sogenannten sekundären Kaffee-Extrakten, die durch einen zweiten Extraktionsschritt gewonnen werden, indem unerwünschte Substan-



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- 5 zen nach Maßgabe ihrer Größe vom besagten sekundären Kaffee-Extrakt getrennt werden, dadurch gekennzeichnet, daß der Sekundärextrakt mit alkalischen Molekularsieben behandelt wird um die besagten unerwünschten Substanzen zu entfernen, und daß Molekularsiebe mit einer Porengröße von etwa 0,3 bis 1,0 nm verwendet werden.
- 10 2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Molekularsiebe über einer Wasserdampfphase vorbehandelt werden, bis sie eine Wasseradsorption von etwa 7 bis 30 % erreicht haben.
- 15 3. Verfahren nach einem der vorherigen Ansprüche, dadurch gekennzeichnet, daß der Sekundärextrakt wiederholt über das in einer Kolonne vorhandene Molekularsieb zirkuliert wird.
4. Verfahren nach einem der Ansprüche 1 und 2, dadurch gekennzeichnet, daß der Extrakt durch eine mit dem Molekularsieb gefüllte Kolonne fließt und die Verweilzeit durch die Länge der Kolonne und/oder die Fließgeschwindigkeit geregelt wird.
- 20 5. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß eine Veränderung des pH-Wertes durch die Zirkulationszeit reguliert wird.
6. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß eine Veränderung des pH-Wertes durch das Mengenverhältnis von Molekularsieb und Sekundärextrakt reguliert wird.
- 25 7. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Mengenverhältnis von Molekularsieb und sekundärem Kaffee-Extrakt auf 1:5 bis 1:30 reguliert wird.
8. Verfahren nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das Mengenverhältnis von Molekularsieb und sekundärem Kaffee-Extrakt auf 1:8 bis 1:12 reguliert wird.

Revendications

- 30 1. Procédé pour améliorer l'arôme d'extraits de café, qui sont obtenus par une seconde étape d'extraction, appelés extraits de café secondaires, par la séparation des substances indésirables desdits extraits de café secondaires en réponse à leur taille, dans lequel, pour la séparation de ces substances indésirables, on traite l'extrait secondaire par des tamis moléculaires alcalins et dans lequel on utilise des tamis moléculaires avec une taille de pores d'approximativement 0,3 à 1,0 nm.
- 35 2. Procédé suivant la revendication 1, dans lequel les tamis moléculaires sont conditionnés sur une phase de vapeur d'eau jusqu'à une absorption d'eau d'approximativement 7 à 30 %.
- 40 3. Procédé suivant l'une quelconque des revendications précédentes, dans lequel l'extrait secondaire est remis en circulation sur le tamis moléculaire qui est présent dans une colonne.
- 45 4. Procédé suivant l'une ou l'autre des revendications 1 et 2, dans lequel l'extrait secondaire s'écoule dans une colonne remplie d'un tamis moléculaire et le temps de contact est ajusté via la longueur de la colonne et/ou le débit.
- 50 5. Procédé suivant l'une quelconque des revendications précédentes, dans lequel un changement de la valeur du pH est réglé via la période de remise en circulation.
6. Procédé suivant l'une quelconque des revendications précédentes, dans lequel un changement de la valeur du pH est réglé via le rapport du tamis moléculaire à l'extrait secondaire.
- 55 7. Procédé suivant l'une quelconque des revendications précédentes, dans lequel le rapport du tamis moléculaire à l'extrait de café secondaire est ajusté à une valeur de 1/5 à 1/30.
8. Procédé suivant l'une quelconque des revendications précédentes, dans lequel le rapport du tamis moléculaire à l'extrait de café secondaire est ajusté à une valeur de 1/8 à 1/12.