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THE MODERN METHODS OF PROCESSING MISSELLA

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Abstract
During the extraction process, sediments are left in the micelles that come out of the extractor, and modern methods of processing the micelles are used to clean them. These include simple methods, detection methods, centrifugal methods, and filtration methods, which are widely used. The use of these methods helps the clarity of the missella to carry out the distillation process well.

Keywords: Missella, centrifugal methods, volatile component, distillation.

Introduction

It is known that the missella released from the extractor during extraction contains about 0.4-2% of residual slag clots. Therefore, before distillation of the missella, the sediment in the missella solidifies under the influence of heat inside the pipes of the heater and the distiller, slowing down the heat exchange process in these devices. Of course, the heater or distiller tubes can be removed and cleaned mechanically, but this workforce the distillation system to stop for a long time and consume a large mechanical cocktail. Due to this, the missella obtained from the extractor is cleaned of scale in various ways [2-8].

One of the simplest methods is 1) the Search method. This method involves the immersion of the particles under the influence of their own weight to the bottom of the vessel in which the missella is stored, i.e., this method uses the gravitational forces of the particles. The method is used in some industries only because of its long duration. Another method is to separate the fuzzy missella from the centre by 2) centrifugal force. In this case, a separator operating in any liquid system is used to clean the missella, and the sediment is separated from the missella liquid due to the centrifugal force generated.

The execution time is extremely short, but since the highly dispersed particles are difficult to separate from the missella, the cleaned missella leaves some more short residue.

As for the first method 3, it is a 3) filtration method, which is performed by passing a fuzzy missella through the filter surface. Although this method requires relatively much manual labour, it is very common and allows the filtered missella to be cleaned of almost all shrot particles. Various fabrics are used for filtration, which can be made of yarn, synthetic fibres or filter paper. Whatever type of material is used, they are not considered to be a filtering surface, but only a barrier-forming filtering surface [5-9]

From these methods, it can be seen that in method 1, the missella is at rest and the dispersed particles are in motion, and in method 2, both the missella and the dispersed particles are in motion at the same time. In method 3, the dispersed particles are at rest and the dispersion medium is in motion. Purified and suitable for distillation, the missella should be clear and the amount of sediment should not exceed 0.2%. The composition of micelles obtained from the extraction of oil from oily material consists of a light volatile solvent, oil and fine particles of the extracted material attached to them. Missella is processed to remove solid particles and separate oil and solvent. The lightly volatile component - the solvent - is converted to a vapour state and separated from the practically non-volatile oil. This process is called distillation in the oil industry [14-16].

During distillation, the solvent should be completely separated from the oil as soon as possible and at a minimum temperature. The complete dissolution of the solvent is controlled by the flash temperature of the extracted oil.

Reducing the distillation time and temperature leads to an improvement in the quality of the oil obtained, a reduction in heat consumption and an increase in the efficiency of the device.

The efficiency of distillation can be increased by choosing the right temperature and method of driving the solvent from missella.

From the point of view of molecular-kinetic theory, the mechanism of the process of vapour formation is as follows. Molecules of liquid close to the heating surface fly into the space above the liquid at high speed, break away from the remaining molecules, and become free. Each evapourating molecule dissipates some of the heat energy introduced from the outside, eliminating the gravitational force of the liquid and the external pressure resistance [1-7].

There are the following methods of removing solvent from missella: evapouration using closed steam, driving with water vapour at atmospheric pressure or under vacuum.

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When the missella is heated with a closed vapour, there is only one component on the vapour cavity - solvent vapours, and this process consists of simple evapouration, which in practice takes the form of boiling or evapouration.
During boiling, the partial pressure of the solvent vapour changes to a solvent vapour at a temperature equal to the ambient pressure. However, evapouration by boiling alone is not sufficient to completely dissolve the solvent, as the boiling point of the missella increases as the concentration increases. As a result, the quality of the oil may deteriorate and thermal decomposition may occur.
During evapouration, the solvent changes from a liquid state to a vapour state even at a temperature when the partial pressure of the solvent vapour is less than the ambient pressure. However, this will slow down the solvent drive. To accelerate the evapouration process and reduce the solvent temperature of the micelle completely, open water vapour is introduced into the drive at atmospheric pressure or under a vacuum [4-17].
The use of open water vapour to dissolve the solvent reduces the vapour concentration of the solvent on the missella, i.e., reduces the partial pressure of the solvent vapours and reduces the boiling point of the missella, speeding up and facilitating the driving process.
In addition to lowering the solvent driving temperature, the open vapour supplied to the missella mixes it and to some extent increases the separating surface between the liquid and vapour phases. As a result, the flight of solvent vapour accelerates. At the same time, the oil is deodorized, free of aromatic substances that accompany it and the solvent [6-11].
The use of a vacuum in combination with open vapour to drive the solvent serves to further reduce the boiling point of the missella and to heat the open vapour used.
All of the listed methods of solvent loss in missella are widely used in modern extraction devices.

Experimental Part

Before studying the distillation process, it is necessary to study some theoretical information related to this process. For example, the boiling point of a missella depends on its concentration. As the concentration increases, the boiling point of the missella increases, but this equilibrium does not change proportionally and is slightly different.

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For example, the partial pressure of a substance on a liquid in an ideal solution varies proportionally with its concentration, but in a missella the rule is slightly different, that is, it disproportionately. This leads to the idea that the solution of the oil in organic solvents does not give a normal solution, but a mixture close to some colloidal solution.

From the above, it can be concluded that due to the presence of high molecular weight triglycerides dissolved in the micelles and sterols, thiamine, phosphatides, etc., which have a large molecular weight, accompanied by oil, the oil solution in gasoline is not a normal solution The resulting solution is formed. Of course, missella does not exhibit coagulation, peptization and other properties like colloidal solutions, but at the same time, it does not fully correspond to the properties of normal solvents [3-12].

This is especially evident when measuring the viscosity of the missella, i.e., as the temperature increases, the viscosity of the missella decreases disproportionately instead of proportionally. This is reflected in the fact that the substances in the micelles are exposed to different temperatures missella is a complex solution whose physical properties are manifested during distillation. This means that, as we see in the diagram (Figure 1) when the concentration of the micelle is low (up to 60-65%) it obeys Raoult's law, but when the concentration is high it does not obey this law, the molecules of solvents and solutes are considered to depend on the strength of the mutual tension between. Therefore, the distillation process is conventionally divided into two stages: in the first stage, due to the low product concentration, the amount of solvent molecules is much higher than the triglyceride molecules, and this part of the solvent molecules can be removed by simple heating or boiling. As the concentration increases, the number of oil molecules exceeds the number of solvent molecules.

It is known that just as there are mutual gravitational forces between any molecule, these forces also exist between the solvent and triglyceride molecules. As concentration increases, it becomes harder to overcome these gravitational forces.

Now only heating, boiling and melting molecules do not have the power to evapourate, and some other means must be used, that is, the second stage of distillation begins, in which, in addition to the closed steam used, open steam and vacuum must be used.

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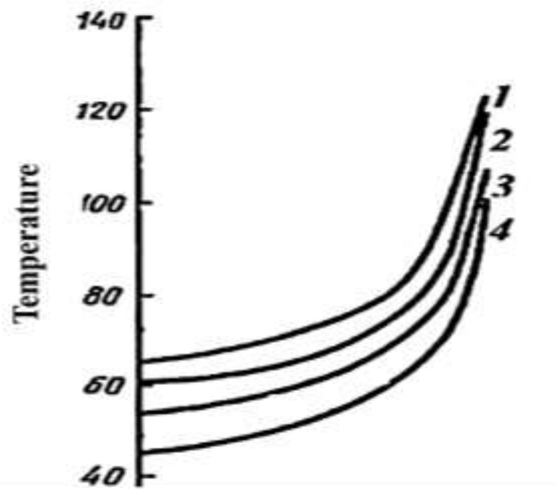
In addition to the mutual gravitational forces, the emulsion state, which is relatively straightforward due to the complexity of the missella, and the effect of this state can cause foaming and other phenomena on the surface of the missella, all of which further complicate the second stage of the distillation process.

A graph of the relationship between the pressure of the solvent vapour on the missella and its concentration is shown, showing the existence of a deviation from Raoult's law. An analysis of the geometric appearance of the curve shows that the lack of idealism in the oil-gasoline system is due to the intermolecular Van der Vaals forces.

The gravitational forces between the solvent molecules in the micelle are smaller than the gravitational forces between the oil and the solvent molecules.



Missella boiling point depends on concentration. Residual pressure in MPa: 1-0.10; 2-0.08; 3-0.07; 4-0.05; 5-0.03.

A similar correlation is observed in the solution of cottonseed oil in technical hexane and trichloroethylene. This correlation suggests that when the concentration of missella exceeds 60%, its boiling point rises sharply. This leads to an increase in the distillation temperature.

The boiling point of a high concentration of micelles is high, even when a deep vacuum is applied. As a result, it is not possible to complete the distillation process due to the decomposition of the oil. This indicates that the solvent in the oil is practically completely lost when the missella is distilled.

Therefore, the loss of solvent in the micelles is carried out in two stages.

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The first stage, the loss of gasoline in the micelle, is the evapouration period, which obeys all the existing laws of the process and can be carried out at atmospheric pressure or in a small vacuum. Vacuum evaporation has many advantages. In a vacuum, all liquids boil at a much lower temperature than at atmospheric pressure. This allows reducing the heat exchange surface in the apparatus, while at the same time reducing the boiling point, the temperature difference between the heating steam and the boiling micelle is higher. Therefore, low-pressure steam can be used for vacuum distillation [10-13].

The use of vacuum, mainly in the distillation of high-concentration missella, prevents unpleasant additional processes (oxidation, formation of melanoids, etc.) due to the decrease in boiling temperature. As a result, the amount of heat lost to the environment and the consumption of heating steam to compensate for it is lower than at distillation at atmospheric pressure [18].

In the first stage of distillation, the missella should reach such a concentration that its boiling point should not exceed 100 °C.

In the second stage of distillation, open water vapour is used, and the law of distillation is different.

Missella is a binary solution. When distilled using open steam, the system becomes a three-phase three-component system (gasoline, oil, water). Two of them are liquid (missella, water) and one is vapour (gasoline). According to the law of phases, such a system has two degrees of freedom. That is, in the missella - water vapour system, two parameters can be changed without disturbing the balance. At the same time, the total pressure and the concentration of the missella can be changed. In this case, as in a two-component system, it is possible to sufficiently determine the partial pressure of gasoline vapour and the boiling point of the missella. If the system is considered from the point of view of Dalton's law, this fact is fully confirmed. According to Dalton's law, the total pressure of vapour on a liquid.

$$R = R_b + R_s + R_m$$

zWhere R_b, R_s, and R_m are the partial pressures of gasoline, water, and oil vapour.In the distillation of missella, the oil vapour pressure R_m is too small to be taken into account. In this case, the system is practically two-component.

$$R = R_b + R_s$$

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When heated water vapour is used in the distillation process, all components (gasoline, oil, water vapour) have only two phases: liquid - missella, vapour phase - gasoline and water vapour. In this case, the number of degrees of freedom is three, so the three parameters can be changed without disturbing the balance. Indeed, distillation of a missella with heated open steam changes the total pressure, the concentration of the missella, and the partial pressure of the boiling component (water) at high temperatures. When there is heated water vapour in the system, the partial pressure of gasoline vapour is a quantitative function of the given open vapour. Therefore, by adjusting the amount of steam, it is possible to change the temperature at which the distillation process takes place.

In order to make the most of the open vapour heat in the apparatus, the temperature of the steam mixture leaving the apparatus must be equal to the condensing temperature of the boiling component (water) at the apparatus at high pressure. However, this is difficult to control, because when the temperature changes slightly, water vapour condenses and water remains in the oil, which is not allowed [15-21].

Therefore, the distillation apparatus is supplied with as much open vapour as needed, ie the temperature of the resulting mixture of gasoline and water vapour is 10-15 °C higher than the condensing temperature of the water vapour at the apparatus pressure. need This means that when pumped with heated open steam, the steam coming out of the distiller is heated by itself.

When a micelle is transferred from one apparatus to another at low pressure, it is heated and immediately begins to evapourate spontaneously.

Conclusion

A similar situation occurs if two devices are under the same pressure, but the second device is driven by heated steam. In the second apparatus, the boiling point of the missella is low, which means that it evapourates spontaneously. Due to the dependence of the boiling point of the missella on its concentration, methods such as spray distillation in oil extraction plants, thin-film distillation and thick-layer distillation are used in separate stages of the process.

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