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# DETERMINATION OF THE RELATIVE HUMIDITY OF THE DRYING AGENT IN THE PROCESS OF DRYING HIGH-GRADE COTTON RAW MATERIALS USING SOLAR ENERGY IS JUSTIFIED

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## ANNOTATION

In this article, one of the urgent tasks that is energy-saving and relevant has been studied, an analytical calculation of the mass moisture content of the drying agent in the process of drying raw cotton in a solar dryer with optical magnifiers, taking into account the various climatic conditions of Uzbekistan, has been developed, a method has been developed for calculating the change in the absolute and relative humidity of the drying agent when drying raw cotton using mathematical models.

**Keywords;** mass moisture, vaporizolation, cotton, optical flakes, air pipe, drying chamber, thermometer, parsial pressure, air conditioner.

The mass moisture of the drying agent (d) of the amount of available mass vapor in the wet air ($M_п$), of the mass dry air quantity ($M_{св}$), нисбатига тенг, яъни:

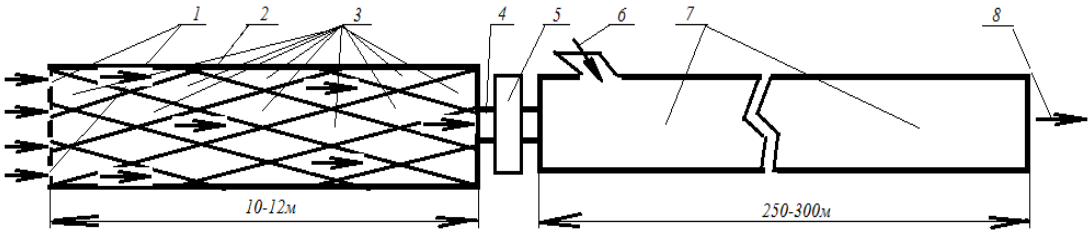



Figure 1. Scheme of a sunny drying device for drying high-grade cotton raw materials: 1-air inlet (zaslonka); 2 - an air conditioner with optical loupes; 3-optical loupes; 4-hot air pipe; 5 - a fan that sucks hot air; 6-drying cotton raw materials; 7-chamber drying; 8-dried cotton raw materials.

$$d = \frac{M_п}{M_{св}}, \qquad (1)$$

Using solar heating devices (Photo 1) the drying agent, which is obtained through the Airfryer, is in the drying chamber $d_o$–the change from the initial harorat to d is mukin, but the drying agent according to the rule in the Airfryer will be unchanged (ya'ani d=const). Drying agent charter ($t_м$) moisture content of drying cotton raw materials according to wet thermometer ($t_{хл}$) the maximum humidity of the drying agent equal to ($d_o$) it can only happen under conditions where the drying process is constant.

$$P_п V = \frac{M}{\mu_п} R_п T \qquad (2)$$

and in relation to dry air:

$$P_в V = \frac{M}{\mu_в} R_в T \quad (3)$$

Considering the amount of molecular mass of water vapor: ($\mu_п = 18{,}016$ кг/$gmal$) and for dry air ($\mu_{св} = 28{,}96$ кг/$gmal$) In the wet $R = 8{,}314$ кДж/( $gmal$ grad), (1) the ratio can be written as:

$$d = 0{,}6221 \frac{P_п}{P_и} \quad (4)$$

Sum of the parsial pressure of a water joint in a wet basin ($P_и$) and dry air ($P_{св}$) the sum of the parsial pressure is the barometric pressure in the wet air :

$$P_\delta = P_п + P_{св} \quad (5)$$

(5) from the equation $P_{св}$ determine the value of it (4) we get the following if we put it in the equation:

$$d = 0{,}6221 \frac{P_п}{P_б} = \varphi \quad (4`)$$

(5) from the equation $P_{св}$ if we put the value ni in (4) taking into account the following equality,

$$\frac{P_п}{P_и} = \varphi\ , \quad (6)$$

Concentration [2] according to the case

$$P_и = 4{,}579 * 10^{\frac{7{,}45t}{235+t}} \quad (7)$$

У холда қуритиш агентининг аналитик намлиги (4) ни қуйидаги кўринишда ёзиш мумкин:

$$d = 0{,}622 \left( \frac{P_\delta}{\varphi * 4{,}579 * 10^{\frac{7{,}45t}{235+t}}} \right)^{-1}, \quad (8)$$

bunda where T is the curitish agenting of temperature; φ is the curitish agenting relative namligi. bunda where T-is the curitish agenting of temperature; φ-is the drying agent relative humidity.Similarly (8), the initial moisture of the drying agent $d_o$ the analytical value is in the form of:

$$d_o = 0{,}6221 \left( \frac{P_\delta}{\varphi * 4{,}579 * 10^{\frac{7{,}45t}{235+t}}} \right)^{-1} \quad (9)$$

To determine the analytical value of ni (8) the change in the relative humidity of the drying agent in the drying process as a result of some mathematical steps of the above equations, we determine the parameters of the drying agent in the Airfryer until it warms up and after it warms up: $d_o, P_{\delta o}, t_o, \varphi_o$ и $d_1, P_{\delta 1}, t_1, \varphi_1$ $d_o$ и $d_1$ (8) according to analytical value of the drying agent will be:

$$d_o = 0{,}6221 \left( \frac{P_\delta}{\varphi_o * 4{,}579 * 10^{\frac{7{,}451t_o}{235+t_o}}} - 1 \right)^{-1} \quad (10)$$

$$d_1 = 0{,}6221 \left( \frac{P_\delta}{\varphi_1 * 4{,}579 * 10^{\frac{7{,}451t_1}{235+t_1}}} - 1 \right)^{-1} \quad (11)$$

In the process of heating the drying agent in the Airfryer, its moisture does not change, namely $d = const$. therefore, the air vent and the drying chamber are the external air flow $P_\delta$ and this value in relation to the drying agent in the heating process, the ham and then the Ham are invariant. Therefore, from the equations (10) and (11) it is possible to obtain:

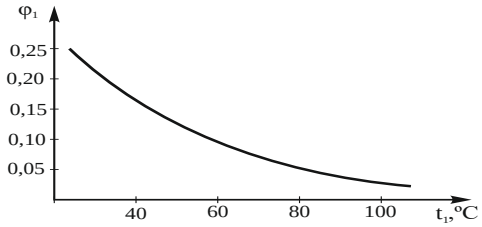
$$\varphi_1 = \varphi_o * 10^{7{,}45\left(\frac{t_o}{t_o+235} - \frac{t_1}{t_1+235}\right)} \quad (12)$$

After it is heated in the Airfryer for all values of the drying agent, for example t and φ for analytical values, the following equality (13) can be written:

$$\varphi = \varphi_0 * 10^{7,45\left(\frac{t_0}{t_0+235}-\frac{t_1}{t_1+235}\right)} \quad (13)$$

He took into account the initial parameters of the drying agent in the drying device for the territory of the Tashkent region $t_o = 40^oC$ и $\varphi = 0{,}25$. We write the equation (12) as follows:

$$\varphi_1 = 0{,}25 * 10^{7,45\left(\frac{t}{t+235}\right)} \quad (14)$$




Picture.1. Graph of the temperature dependence of the relative humidity of the drying agent: $t_o = 45^oC$, $\varphi = 0{,}25$ ва $d = const$.

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