European Journal of Emerging Technology and Discoveries
ISSN (E): 2938-3617
Volume 1, Issue 3, June, 2023.

INSTALLATION FOR PRELIMINARY HEATING OF THE MATERIAL BEFORE DRYING

Rasuljon Tojiyev
Doctor of Science, Professor, Fergana Polytechnic Institute,
Fergana, Republic of Uzbekistan
E-mail: r.tojiyev@ferpi.uz

Azimjon Abdurayimov
Master's student, Fergana Polytechnic Institute, Fergana,
Republic of Uzbekistan

Abstract
At present, methods for drying dispersed materials in variable modes have been widely used, when not only the temperature and speed of the drying agent change over time, but also the state of the material layer undergoes changes due to controlled hydrodynamics in the working volume of the drying plant. Variable modes are used for drying in oscillating modes with stepped hydrodynamic and temperature modes, as well as for drying in an isothermal cycle. If oscillating drying with alternating zones of heating and cooling of the material and drying of the material in step modes is primarily aimed at maintaining the quality of the target product, then isothermal drying consists in preheating the material to the maximum allowable temperature during subsequent drying without reducing it during the entire process with maximum dehumidification rate.

Keywords: drying, material, energy, leading to cracking.

Introduction

Reducing heat and energy costs in drying processes with variable heat supply is achieved due to the maximum heat recovery of both the spent drying agent and the heat recovery of the dried material in closed thermodynamic cycles for the drying agent, including using heat pump technologies [1,2,3].

Drying is a mass transfer process consisting of the removal of water or another solvent by evaporation from a solid, semi-solid or liquid. This process is often used as a final production step before selling or packaging products. To be considered "dried", the final product must be solid, in the form of a continuous sheet (e.g., paper), long pieces (e.g., wood), particles (e.g., cereal grains or corn flakes) or powder (e.g., sand, salt, washing powder, milk powder). A source of heat and an agent to remove the vapor produced by the process are often involved. In bioproducts like food, grains, and pharmaceuticals like vaccines, the solvent to be removed is almost invariably water. Desiccation may be synonymous with drying or considered an extreme form of drying [4-9].

In the most common case, a gas stream, e.g., air, applies the heat by convection and carries away the vapor as humidity. Other possibilities are vacuum drying, where heat is supplied by conduction or radiation (or microwaves), while the vapor thus produced is removed by the

ISSN (E): 2938-3617
Volume 1, Issue 3, June, 2023.

vacuum system. Another indirect technique is drum drying (used, for instance, for manufacturing potato flakes), where a heated surface is used to provide the energy, and aspirators draw the vapor outside the room. In contrast, the mechanical extraction of the solvent, e.g., water, by filtration or centrifugation, is not considered "drying" but rather "draining".

The quality of the finished product and the intensity of drying are greatly influenced by the special preparation of the material (crushing, loosening, heating, the introduction of special additives into the material being dried, etc.).

The well-known method of increasing the drying process intensity is the material pre-heating [10-17]. The effectiveness of this technological method is based on the fact that the increase of material average temperature before drying increases the internal mass-transfer coefficient, and it determines the overall process duration. However, grounded recommendations concerning the choice of conditions of drying material pre-heating on the base of energy input analysis are absent in the literature. It is obviously, that the increase of material average temperature outside reduces duration of the next drying process, but, on the other hand, requires longer heating duration and therefore more total energy input for the entire drying process. That's why the goal of our research is the definition of pre-heating rational conditions under conductive heat transfer to the material in order to reduce overall energy input for the drying process. There is practical interest to research the possibility of additional increase of power efficiency through the use of wet material pre-heating. It is necessary to obtain the analytical model which relates the total duration of the drying process with parameters of the material pre-heating [18-26].

Before feeding fibrous materials for drying, it is desirable to loosen. Preliminary heating of the material in a stream of exhaust gases or in a special installation allows intensifying drying without the occurrence of unacceptable stresses in the material, leading to cracking; in addition, the thermal efficiency of the dryer is increased. To intensify drying and directly obtain a product in a commercial form, sometimes special additives are introduced into the material, for example, the introduction of a small amount of surfactants (up to 1%) into capillary-porous bodies accelerates the drying process. When surfactants are added to pastes, they acquire good fluidity, which makes it possible to dry such pastes by spraying [25-29].

Adding a blowing agent to a polymer solution makes it possible to obtain a finished product in the form of hollow balls with a bulk density of not more than 0.1 g/cm^3. Increased acidity of the material impairs drying, because. In this case, moisture is more difficult to remove, and the product is sticky. Therefore, the neutralization of excess $H+$ ions improves the drying process. For example, the process of dehydration and drying of a solution of potassium chloride and extraction phosphoric acid with an excess of ions to obtain potassium metaphosphate proceeds satisfactorily in the presence of a small amount of calcium salts, etc. When drying poorly flowing materials or pastes, an additive to them of the dried product is used. For mixing, it is most rational to use feather twin-shaft augers [30-33].

In some cases, drying is associated with very great difficulties - the material does not release moisture well or stick together. In this case, it is sometimes advisable to change the process preceding drying. So, when drying urea-formaldehyde polymers (adhesives), an insoluble product was obtained or no free-flowing powder was formed at all. It turned out that depending on the degree of polycondensation of the initial monomers, the type of moisture bond with the material also changes. Therefore, in order to carry out drying to obtain a high-quality polymer, it was necessary to reorganize the previous process of polycondensation of urea molecules with formaldehyde so that the polymer gave off moisture more easily. A well-soluble powdered product was obtained at a spraying plant at an initial gas temperature of 200 - 250 °C and a final temperature of 75 - 78 °C.

Reference

1. Tojiev, R., Ortikaliyev, B., & Tojiboyev, B. (2019). Improving selecting technology of raw materials of fireproof bricks. *Тенденции и переспективы развития науки и оброзования в условиях глобализации. Украина*, *27*(46), 606-609.
2. Тожиев, Р. Ж., & Ортикалиев, Б. С. (2019). Оловбардош ғишт ишлаб чиқаришда хом ашёларни саралаш жараёнини тадқиқ қилиш. *Журнал Технических исследований*, (2).
3. Rasuljon, T., Azizbek, I., & Bobojon, O. (2021). Studying the effect of rotor-filter contact element on cleaning efficiency. *Universum: технические науки*, (6-5 (87)), 28-32.
4. Мухамадсадиков, К., Ортикалиев, Б., Юсуов, А., & Абдупаттоев, Х. (2021). Ширина захвата и скорости движения выравнивателя в зависимости удельного сопротивления почвы. *Збірник наукових праць SCIENTIA.*
5. Ortikaliev, B. S., & Mukhamadsadikov, K. J. (2021). Working widht and speed of the harrow depending on soil resistivity. *Web of Scientist: International Scientific Research.*
6. Мўминов, Ж. А., Умаров, Э. С., & Ортиқалиев, Б. С. (2019). Оғир юкланишли ва тез ҳаракатланувчи машина қисмларида сирпаниш подшипникларини танлаш. *Машинасозлик ишлаб чиқариш ва таълим: муаммолар ва инновацион ечимлар-2019й*, 338-340.
7. Tojiyev, R. J., Ortiqaliyev, B. S. O. G. L., Abdupattoyev, X. V. O., & Isomiddinova, D. I. J. Q. (2021). Donador-sochiluvchan mahsulotlarni saralashda sm-237a markali mashinalarini o ‘rni. *Scientific progress*, *2*(2), 1378-1381.
8. Tojiyev, R., Ortiqaliyev, B., & Sotvoldiyev, K. (2021). Improving the design of the screed for firebricks using solidworks. *Barqarorlik va yetakchi tadqiqotlar onlayn ilmiy jurnali*, *1*(5), 91-99.
9. https://www.brickwoodovens.com/pages/fire-brick
10. Ортиқалиев, Б. С., & Тожиев, Р. Ж. (2021). Sifatli olovbardosh g ‘isht ishlab chiqarishda xom ashyolarni saralash jarayonini tadqiq qilish. *Замонавий бино–иншоотларни ва уларнинг конструкцияларини лойиҳалаш, барпо этиш, реконструкция ва модернизация қилишнинг долзарб муаммолари.(1-65)*, 199-203.
11. Мўминов, Ж. А., Умаров, Э. С., & Ортиқалиев, Б. С. (2019). Чангларни комбинацион тозалаш технологияси. *Журнал Технических исследований*, (2).
12. Mukhamadsadikov, K., & Ortiqaliyev, B. (2022). Constructive Parameters of Earthquake Unit Before Sowing. *Eurasian Journal of Engineering and Technology*, *9*, 55-61.
13. Ортикалиев, Б. С., & Тожиев, Р. Ж. Оловбардош гишт ишлаб чикаришда хом ашёларни саралаш жараёнини тадкик килиш. *Техник тадкикотлар журнали-2019 й.*
14. Khoshimov, A., Abdulazizov, A., Alizafarov, B., Husanboyev, M., Xalilov, I., Mo’ydinov, A., & Ortiqaliyev, B. (2022). Extraction of caprolactam in two stages in a multiple-stage barbotation extractor. *Conferencea*, 53-62.

15. Tojiyev, R., Rajabova, N., Ortiqaliyev, B., & Abduolimova, M. (2021). Destruction of soil crust by impulse impact of shock wave and gas-dynamic flow of detonation products. *Innovative Technologica: Methodical Research Journal*, *2*(11), 106-115.
16. Ортиқалиев, Б. С., & Тожиев, Р. Ж. (2019). Сито-бурат СМ-237Арусумли оловбардош ғишт хом ашёсини саралаш машинисини иш режмларини таҳлили.
17. Tojiyev, R., Ortiqaliyev, B., To'lashev, O., & Sobirov, X. (2022). Alumosilikat olovbardosh g 'ishtning xossalariga saralash jarayonini ta'siri tahlili. *Scientific progress*, *3*(4), 1271-1276.
18. Tojiyev, R. J., Ortiqaliyev, B. S. O. G. L., & Abdurayimov, A. A. O. G. L. (2021). Saralash mashinalarining qiyosiy tahlili. *Science and Education*, *2*(11), 359-367.
19. Mukhamadsadikov, K. J., & ugli Ortikaliev, B. S. (2021). Working width and speed of the harrow depending on soil resistivity. *Web of Scientist: International Scientific Research Journal*, *2*(04), 152-158.
20. Rasuljon, T., Isomiddinov, A., Ortiqaliyev, B., & Khursanov, B. Z. (2022). Influence of previous mechanical treatments on material grinding. *International Journal of Advance Scientific Research*, *2*(11), 35-43.
21. Tojiyev, R., Ortiqaliyev, B., Abdupattoyev, X., & G'ulomov, I. (2021). Production of refractory bricks in industrial enterprises and sorting of their raw materials. *Матеріали конференцій МЦНД*.
22. Tojiyev, R., Ortiqaliyev, B., To'lashev, O., & Sobirov, X. (2022). Alu-mosilikat olovbardosh g 'ishtning xossalariga.
23. Mukhamadsadikov, K., & Ortiqaliyev, B. (2021). Analysis of parameters of the working part of the planting plant before planting. *Scientific progress*, *2*(8), 115-125.
24. Mukhamadsadikov, K., Ortiqaliyev, B., Olimova, D., & Isomiddinova, D. (2021). Mathematical analysis of determining the parameters of the working part of the planting plant before planting. *Scientific progress*, *2*(7), 699-708.
25. Ортиқалиев, Б. С., & Абдурахмонов, А. А. (2019). " Шиша идишларнинг қуйилиш жараёнларини имитацион компютер моделини яратиш". Актуальные проблемы внедрения инновационной техники и технологий на предприятиях по производству строительных материалов, химической промышленности и в смежных отраслях.
26. Tojiev, R. J., Ortikaliev, B. S., Sobirov, K., & Tolashev, O. (2022). Study of the mechanical and physico-chemical process of the metal structure of the sorting machine. *Conferencea*, 44-51.
27. Ortiqaliyev, B. S. O. G. L. (2023). Zamonaviy saralash mashinalari konstruktsiyalarini tahlili. *Scientific progress*, *4*(1), 192-202.
28. Adil, A., Bobojon, O., Abdusama, M., Avzabek, X., Ismoiljon, X., Bekzod, A., ... & Abdulloh, A. (2022). Drying in the apparatus with a quick rotating rotor. *Conferencea*, 182-189.
29. Adil, A., Abdusamad, M., Abdulloh, A., Avzabek, X., Ismoiljon, X., Bekzod, A., ... & Bobojon, O. (2022). Modernization of working blades of the construction glass shell mixing device. *Conferencea*, 199-206.
30. Abdulloh, A., Gulnora, G., Avzabek, X., Ismoiljon, X., Bekzod, A., Muhammadbobur, X., ... & Abdusamad, M. (2022). Kinetics of drying of spray materials. *Conferencea*, 190-198.

ISSN (E): 2938-3617
Volume 1, Issue 3, June, 2023.

31. Adil, A., Abdusamad, M., Abdulloh, A., Avzabek, X., Ismoiljon, X., Bekzod, A., ... & Bobojon, O. (2022). Drying of mineral fertilizersresearch of hydrodynamic processes. *Conferencea*, 158-165.
32. Adil, A., Muhammadbobur, X., Ortiqaliyev, B., Abdusamad, M., Abdulloh, A., Avzabek, X. ... & Bekzod, A. (2022). Roasting of nickel hydrocarbonate. *Conferencea*, 174-181.
33. Mukhamadsadikov, K. J., & Ortiqaliyev, B. S. O. (2022). Nomogram for determining the performance parameters of the pre-seeding leveler. *International Journal of Advance Scientific Research*, *2*(11), 119-126.