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The study for the development salt incubator from waste heat recovery in the rock salt boiling process

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Abstract

This research is studying and designing to the development salt incubator that using waste heat recovery from the chimney of the rock salt boiling process, Ban Dung District, Udon Thani Province. The objection from this research is to bring the remaining waste heat recovery that use drying to salt with high humidity to have lower humidity. The rock salt with low humidity is worth more than having high humidity and does not cause salt to clump together. The developed salt incubator has size of 71 x 91 x 83 cm and 3 compartments for salt tray which each compartment is 51 x 71 x 12 cm. The hot air from the chimney of the salt boiling process is not directly exposed to salt. From the study found that the variables that affect to drying rate of salt are the relative humidity of the boiled salt, hot air temperature from the chimney of the salt boiling process, the drying time and the velocity speed of hot air passing through the inlet and outlet chimney. In this test of research will considering to the hot air temperature and the drying time. The experiment are begin with setting weigh of the salt and then put into a tray. Then put the tray with salt into the compartments of the development salt incubator. Determine the duration of the drying time for 1 hour and the hot air temperature used to 3 levels of 150 ± 25 ºC, 250 ± 25 ºC and 350 ± 25 ºC, respectively. From the experiment, it was found that if using 1 kg of salt and 1 hour of drying time, the temperature at the inlet salt incubator of 350 ± 25 ºC was reduced the salt mass to 0.82 kg, 250 ± 25 ºC reduced to 0.83 kg and 150 ± 25 ºC reduced to 0.95 kg, respectively. Then, the temperature is set at 350 ± 25 ºC, 1 kg of salt and set drying time to 3 values of 1 hour, 2 hours and 3 hours, it is found that the drying time of 1 hour was reduced the salt mass to 0.82 kg, 2 hours reduced to 0.80 kg and 3 hours reduced to 0.78 kg, respectively. Therefore, to see that if using higher temperature and longer drying time will be massless of salts or can remove water in salt or reduce the moisture of salt. This incubator can be drying for the maximum mass of salt is 15 kilograms and can be reduce the amount of water in salt up to 18% by mass. From the study, it was found that the moisture of salt should be less than 15%.When, compared with the salt drying from sunlight, it was found that the reduce moisture of salt from the hot air is more efficient and takes of 1 to 2 hours to drying, depending on the amount of salt. As for drying form sunlight, it takes time to expel moisture from the salt for many days. In addition, the development salt incubator is using the waste heat recovery from the salt boiling process, which is the most beneficial use of heat in combustion of fuel.

Keywords*:* Salt incubator, Waste heat recovery, Salt boiling process.