American Journal of Interdisciplinary Research and Development
ISSN Online: 2771-8948
Website: www.ajird.journalspark.org
Volume 35, December - 2024

STUDY OF THE INFLUENCE OF THE HYDRODYNAMIC REGIMES OF THE DIFFUSER-CONFUSER PROFILE PIPE ON THE HEAT EXCHANGE PROCESS

Xomidov Xushnudbek Rapiqjon o‘g‘li
Assistant TDTU Kokan Branch Named After Islam Karimov
xomidovxushnudbek207@gmail.com

Yo’ldashev Bilolxon Iqboljon o’g’li
Assistant TDTU Kokan Branch Named After Islam Karimov
Bilolxonyuldashev462@gmail.com

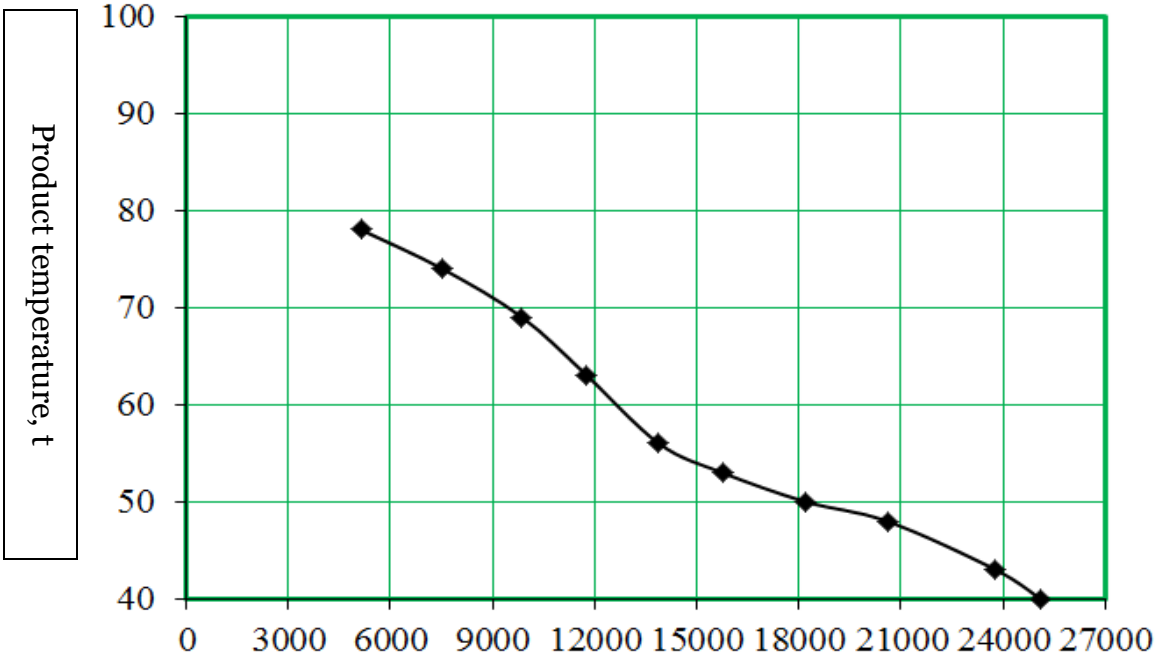
Jo’rayev Dostonbek Rustamjon o’g’li
TDTU Kokan Branch Named After Islam Karimov
TME Student of the Direction

Abstract
The article studies the impact of the shell-and-tube heat exchanger used in the oil refining industry, which is a hot topic today, on the hydrodynamic regimes of the diffuser-confuser profile pipe on the heat exchange process.

Keyswords: Spherical concave tube, hydrodynamic regime, cooling agent, heat, confusor, diffuser.

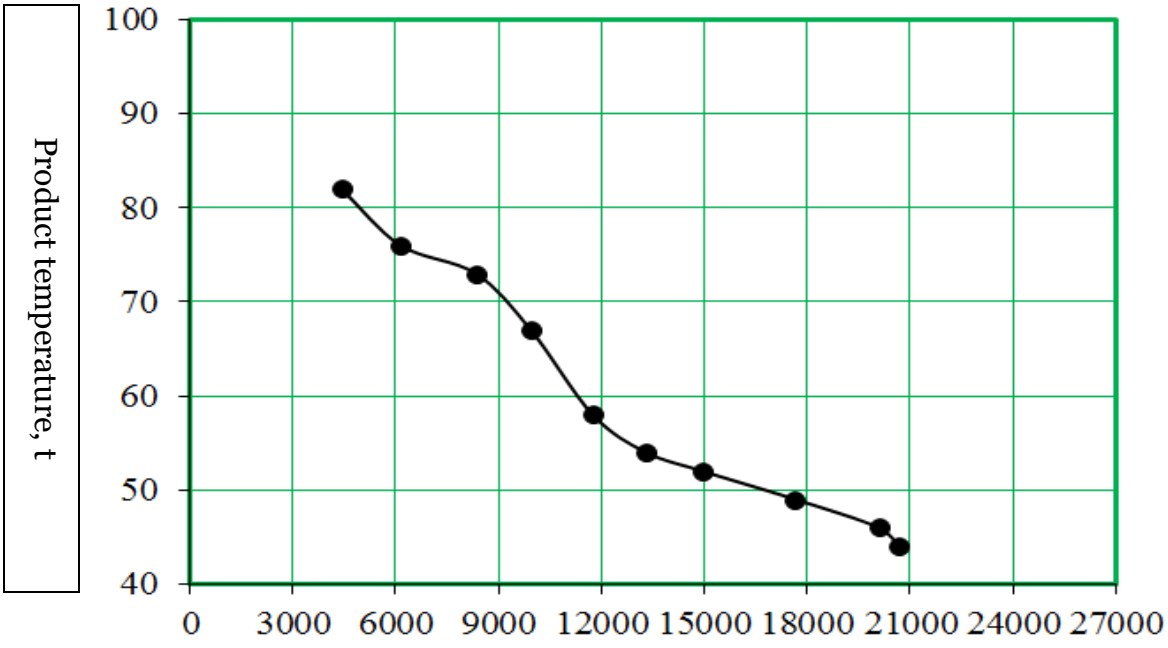
Introduction

In researching the heat exchange process in shell-and-tube devices, the experiment's results and calculation on determining the hydrodynamic regimes of the spherical concave pipe and the existing calculation methods were used. In the conducted experiments, the following limits of variable factors, spherical concave length S=25 mm, spherical concave radius R=10; 20 and 30 degrees, the inner diameter of the pipe D=10 mm and d=7 mm, the temperature of the cooled product is 100°C ±2, the temperature of the heat exchange agent is 20°C ±2, and the density of the liquid is rs=1000 kg/m3.
Taking into account the influence of the externals environment during the experiments, the temperature for the water and gas system was set at 30°C±2. Based on the obtained experimental results, comparison graphs were constructed on the effect of heat exchange agent flow regimes on the heat exchange process. (Figures 1.1; 1.2 and 1.3)



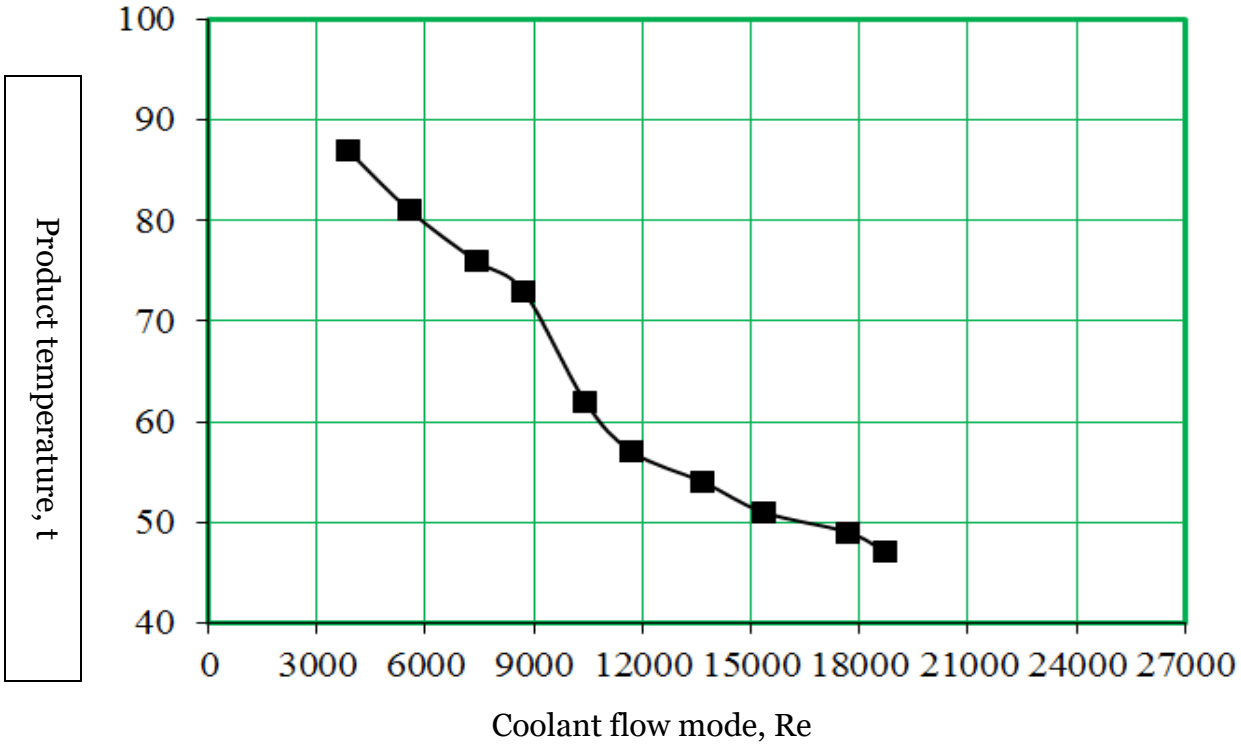
When a=15gr-const.

Figure 1.1. Dependence of the temperature of the cooled product on the flow mode of the cooling agent.



When a=20 gr-const.

Figure 1.2. Dependence of the temperature of the cooled product on the flow mode of the cooling agent.



When a=25 gr-const.

Figure 1.3. Dependence of the temperature of the cooled product on the flow mode of the cooling agent.

1.1; From the data given in Figures 1.2 and 1.3, it can be seen that when the spherical concave radius a=15 gr const and the speed of the heat exchange agent changes depending on the shape of the rotometer, the lower indicator of the flow regime at 5129 shows a decrease in the temperature of the product to 78 oS if, At 25087, the temperature of the product decreased to 40 ° C at the high flow rate.

When the spherical concave radius a=20 gr const and the speed of the heat exchange agent changes depending on the shape of the rotometer, the product's temperature decreases to 82 °C at the lower indicator of the flow regime 4417. At 20660, the temperature decreases to 44 ° C.

When the spherical concave radius a=25 gr const and the speed of the heat exchange agent changes depending on the shape of the rotometer, the lower indicator of the flow regime at 3855 shows a decrease in the product's temperature to 87 °C. At 18704, the temperature of the product decreased to 47 degrees Celsius.

The following empirical formulas were obtained for the results using the least squares method.

$y = -08x^2 - 0{,}0033x + 94{,}99$ $R^2 = 0{,}9887$ (1.1)

$y = 08x^2 - 0{,}0046x + 101{,}76$ $R^2 = 0{,}9816$ (1.2)

$y = 07x2 - 0{,}0056x + 108{,}59$ $R^2 = 0{,}981$ (1.3)

The following values were adopted as optimal parameters in the experimental studies conducted to use different parameters of the concave radius of the spherical concave pipe and evaluate its effect on the efficiency of the heat exchange process. The mathematical planning method and the PLANEX programs were used to obtain the values [57-59].

According to him:

The temperature of the product decreases to 59 C when the radius of the spherical concave is 22 gr, the consumption of the cooling agent is Q=0.188 m3/hour, and the speed of the cooling agent is ω=1.28 m/s. This situation fully satisfies the students of technological regulation. In addition, it is ensured that the efficiency of using a cooling agent increases by 1.75 times.

Conclusions

- Cooling agent consumption, speed and flow regimes in the pipe were experimentally determined in different parameters of the radius of the pipe with a confusor-diffuser profile;
- The effect of flow regimes on product temperature was studied;
- Optimal parameters of the pipe profile were based on the experiments using the mathematical planning method;
- It is ensured that the efficiency of using the cooling agent increases by 1.75 times.

References

1.Akhmadjonovich, E. N., Salomidinovich, I. A., & Aliyorovich, O. X. (2022). EXPERIMENTAL DETERMINATION OF THE INDUSTRIAL APPLICATION AND DETERMINATION EFFICIENCY OF FLUID GASES CLEANING APPARATUS BY CONTACT ELEMENT METHOD. American Journal of Technology and Applied Sciences, 7, 72-78.

2. Akhmadjonovich, E. N., Salomidinovich, I. A., & Bektoshevich, U. R. (2022). INTENSIFICATION OF DUST GAS CLEANING PROCESS. American Journal of Technology and Applied Sciences, 7, 67-71.

3. Akhmadjonovich, E. N., Salomidinovich, I. A., Uktamovich, S. R., & Bektoshevich, U. R. (2022). LIQUID GASES TRANSMISSION MEDIUM TOZALOVCHI INERTIAL HYDRODYNAMIC SCRUBBER. American Journal of Business Management, Economics and Banking, 7, 1-7.

4. 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.

5. Uktamovich, S. R., Akhmadjonovich, E. N., Salomidinovich, I. A., & Bektoshevich, U. R. (2022). RESEARCH OF RESISTANCES AFFECTING 195-198.

6. Davronbekov, A. A., & Isomidinov, A. S. (2022, November). Analysis of requirements for modern heat exchangers and methods of process intensification. In

INTERNATIONAL CONFERENCE DEDICATED TO THE ROLE AND IMPORTANCE OF INNOVATIVE EDUCATION IN THE 21ST CENTURY (Vol. 1, No. 7, pp. 174-183).
7.Rapiqjon o‘g‘li, Xomidov Xushnudbek, et al. "DETERMINING THE EFFICIENCY OF USING AND CLEANING THE ROTOR-FILTER DEVICE IN NEUTRALIZING HYDROGEN-FLUORITE (2HF) GAS." American Journal of Interdisciplinary Research and Development 29 (2024): 7-15.
8. Salomidinovich, Isomidinov Azizjon, Xomidov Xushnudbek Rapiqjon o‘g‘li, and Nematov Behzod Boburjon o'g'li. "CHANGLI GAZLARNI TOZALASH JARAYONINI INTENSIVLASH." Science Promotion 1.1 (2023): 245-248.
9.Salomidinovich, Isomidinov Azizjon, Xomidov Xushnudbek Rapiqjon o‘g‘li, and Nematov Behzod Boburjon o'g'li. "ROTOR-FILTRLI QURILMADA GIDRAVLIK QARShILIKNING TOZALASh SAMARADORLIGIGA TA’SIRINI TADQIQ ETISh." Science Promotion 1.1 (2023): 187-187.
10.Исомидинов, Азизжон Саломидинович. "РОТОР–ФИЛЬТРЛИ АППАРАТНИНГ ОПТИМАЛ ПАРАМЕТРЛАРИНИ МАТЕМАТИК МОДЕЛЛАШТИРИШ." Uzbek Scholar Journal 16 (2023): 71-78.
11.Rapiqjon o‘g‘li, Xomidov Xushnudbek. "Rotor-filtrli qurilmaning gidravlik qarshiligini tadqiq etish." Science Promotion 9.1 (2024): 528-537.
12.Rapiqjon o‘g‘li, Xomidov Xushnudbek. "Study of operating parameters of drum dust cleaning device." HOLDERS OF REASON 4.1 (2024): 120-127.
13.Rapiqjon o‘g‘li, Xomidov Xushnudbek. "Application of a rotor-filter device in the cleaning of coal dust and research of its effectiveness." Science Promotion 6.1 (2024): 142-153.
14.Azizjon, Isomidinov, and Xomidov Xushnudbek. "STUDY OF HYDRAULIC RESISTANCE OF ROTOR-FILTER APPARATUS." Механика и технология 1.14 (2024): 229-236.
15. Каримов, Икромали Тожиматович. "ЦЕМЕНТ ЧАНГИНИНГ ҲОСИЛ БЎЛИШИ ВА ДИСПЕРС ТАРКИБИ АНАЛИЗИ." Educational Yield Insights & Breakthroughs 1 (2024): 16-22.
16. Salomidinovich, Isomidinov Azizjon, Xakimov Akmaljon Axmedovich, and Xomidov Xushnudbek Rapiqjon o‘g‘li. "SUPERFOSFAT MINERAL O ‘G ‘ITINI ISHLAB CHIQARISH MUAMMOLARI." Educational Yield Insights & Breakthroughs 1 (2024): 11-15.
17. Salomidinovich, Isomidinov Azizjon, and Xomidov Xushnudbek Rapiqjon o‘g‘li. "GIDROSIKLONNING GIDRAVLIK QARSHILIGINI TADQIQ ETISH." Educational Yield Insights & Breakthroughs 1 (2024): 4-10.
18. Salomidinovich, Isomidinov Azizjon, and Xomidov Xushnudbek Rapiqjon o‘g‘li. "QOBIQ QUVIRLI APPARAT GIDRODINAMIKASI VA TIZMLI TAXLIL ASOSLARI." Educational Yield Insights & Breakthroughs 1 (2024): 23-31.