



STUDYING THE EFFECT OF RELATIVE HUMIDITY AND COMPACTION PRESSURE ON THE QUALITY OF TABLETS AND PRESSED MASS

N.B. Ilkhamova*, Z.A. Nazarova and Kh.M. Yunusova

Tashkent Pharmaceutical Institute.

Article Received on
25 March 2019,
Revised on 16 April 2019,
Accepted on 07 May 2019
DOI: 10.20959/wjpps20196-13895

***Corresponding Author**
N.B. Ilkhamova
Tashkent Pharmaceutical
Institute.

ABSTRACT

This article presents the results of the influence of relative humidity and compaction pressure on the quality of anti-inflammatory tablets “Nimes-S”. According to the data obtained the optimum relative humidity and pressure was chosen for the recommended tablet.

KEYWORDS: Tablet, Moisture, Technological Properties, Friability, Scatter Density, Compaction Pressure, Technology.

INTRODUCTION

Pressure has a direct impact on the quality of the finished product, that is, pressure affects the physic mechanical properties, tablet hardness, crushing, hardness in relation to friction.^[2,6]

The pressing pressure brings the particles close to each other, and the particles begin to exhibit electrostatic properties. In accordance with the laws of gravity Vander-Waltz, the attraction of particles occurs when approaching each other at a distance of $10^{-6}10^7$ cm. These processes are observed during the extrusion of tablets.^[1,3]

As is known from the literature, humidity has a direct effect on the plastic properties of particles. Materials with high moisture content will have more plastic properties. The presence of free moisture on the surface of the particles causes the particles to approach each other and simultaneously reduce the friction force on the surface. This, in turn, leads to tablet crushiness and a reduction in the buoyancy of the tablets from the matrix. At the same time, the absorbed moisture can lead to a decrease in the surface energy of the crystals and sticking of the tablets to the surface of the poaason and the matrix, and a decrease in the hardness of the tablet.^[4,5,7]

Thus, the moisture content in the powder is one of the most important factors in pressing, and moisture control increases the efficiency of the equipment, the quality of the finished product.

Experimental Section

Based on the foregoing, this study was devoted to the study of the effect of compaction pressure and relative humidity on the quality of tablets and the technological properties of the pressed mass.

This study is devoted to studying the effect of compaction pressure on the quality of tablets. For this study, Nime-S tablets were prepared by wet granulation. Tablet weight was pressed at a pressure of from 50 to 300 MPa in punches with a diameter of 9 mm.

The following criteria were used to select specific indicators of pressing pressure: the appearance of the tablets, fragmentation, hardness in relation to friction and fracture. These studies were identified using the methods outlined in SP XI and MTH.

Research is determined on the basis of the following law: with an increase in the pressing pressure from 50 to 300 MPa, respectively, the tablet crumbling increased by 4–30 minutes, and the abrasion of tablets increased from 72.14 to 99.92%, respectively. In addition, the hardness was 36-128 N. All extruded tablets were white and cylindrical.

In the studies, tablets obtained at a pressure of 100-180 MPa met all the requirements of SP XI and MTH.

Thus, the study showed a direct dependence of the quality of the tablets on the compaction pressure.

The results of the study of the choice of a specific compaction pressure are shown in Figure 1-2. From the results it can be seen that the compaction pressure directly influenced the quality of the tablets.

The effect of compaction pressure on tablet hardness is shown in Figure 1.

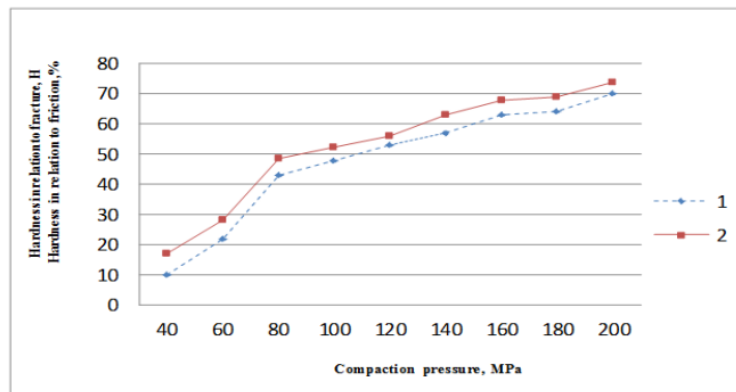


Figure 1. The effect of compaction pressure on tablet hardness and abrasion of tablets.

1- Hardness in relation to fracture, H.

2- Hardness in relation to friction, %.

All tablets obtained at a pressure of from 50 to 100 MPa were almost similar to those described above. It was found that by increasing the pressure above 100, the tablets meet the requirements. Increasing the compaction pressure up to 200 MPa leads to an increase in hardness. This, in turn, increased the fragmentation time by 30 minutes.

When studying the effect of pressing pressure on the fragmentation time of tablets “Nim-S”, a natural increase in the index of fragmentation time was revealed with increasing pressure. When the pressure was 100-180 MPa, it was noted that the tablets met all the recommended requirements. With increasing pressure above 200 MPa, there was a sharp increase in the time of fragmentation of the recommended tablets in relation to the required level.

The effect of pressure on tablets fragmentation is shown in Figure 2.

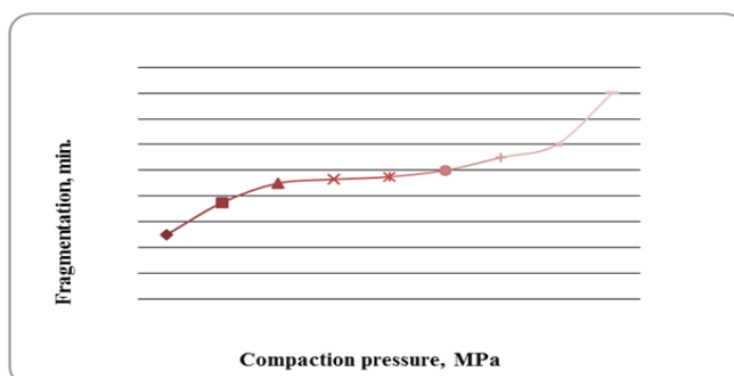


Figure 2: Research results the effects of compaction pressure on tablet fragmentation.

The moisture content in the mass directly affects the pressing pressure. According to the theory of R.A. Reh binder, the force of interaction between particles is determined by the presence of a liquid phase on a solid particle. The thickness of adsorbed in hygrophilic substances is dense and carbide, when the thickness is 3 microns. In this case, the particles have a higher hardness. Increasing or decreasing the humidity in such cases leads to a decrease in the hardness of the tablets.^[5,7]

Figure 3 shows the results of a study of the effect of mass moisture on scatter density

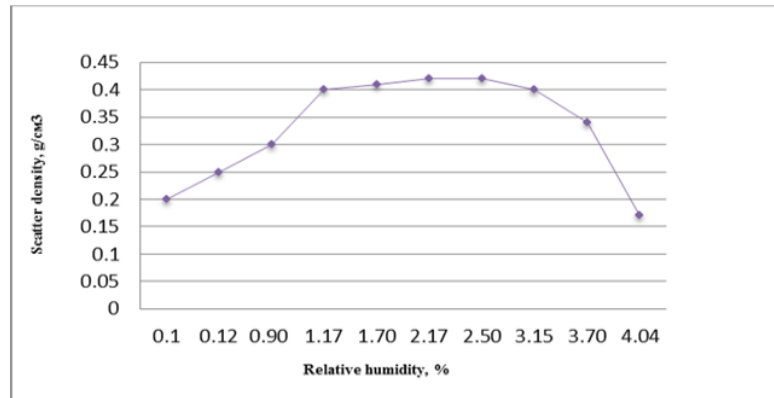


Figure. 3. The effect of relative humidity on the scatter density of pressed mass.

According to the indicators shown in Figure 3, it can be seen that with increasing humidity, the density indicator of the scattering of the pressed mass gradually decreases. With a moisture indicator of more than 4%, the density of the scattering decreased from 0.75 g / cm³ to 0.62 g / cm³. In the humidity range of the mass of 2-3%, retention of the density indicator of scattering was observed at the same level.

Figure 4 The effect of relative humidity on the friability of the pressed mass model.

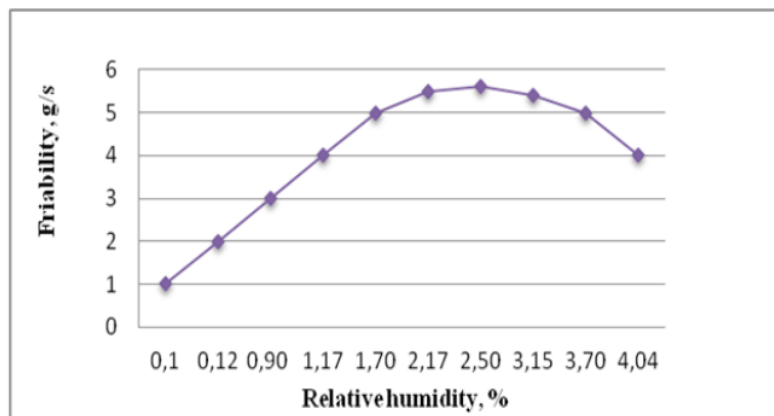


Figure 4. Effect of relative humidity on the friability of the pressed mass.

The results of studying the effect of moisture on the tablet weight and technological properties show that the optimum humidity is 2 -3% for this selected compound. Under these conditions, the friability of the compressible mass is $5,94 \pm 0,288$ g / s, while the bulk density is 692 ± 0.015 k / g³, respectively. The following figure 5 shows the results of the study of the effect of relative humidity and pressing pressure on hardness in relation to fracture.

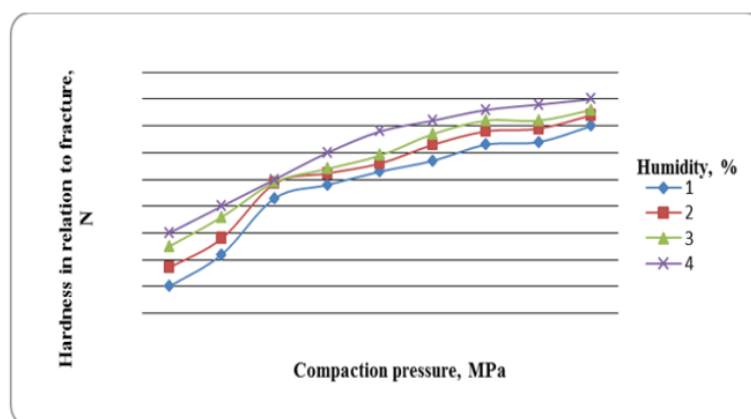


Figure. 5. Results of the study of the effect of relative humidity and pressing pressure on hardness in relation to fracture.

CONCLUSION

Thus, on the basis of studies of tablets Nime-"S" an optimal pressing pressure and the amount of residual moisture were revealed. In these conditions, the tablets have a good appearance and quality.

REFERENCES

1. Alekseev K.V. Technological aspects of the production of modern tablet forms. Manufacture of drugs by GMP. M.: Medical Business Publishing House, 2005; 316.
2. The current state of creation, production and research of tableted drugs. / M.M. Wasenda, N.M. Beley, M.B. Demchuk, V. Trigubchak, M.B. SM. Gureeva, A.Melnik, V.Ya. Shalata, T.A. Denegniy// Pharmaceutical Journal, 2009; 4(9): 77-80.
3. Gavrilov A.S. Pharmaceutical technology. Manufacturing of drugs. - M.: Gootar-Media, 2010; 624p.
4. Коваленко, С.М. Актуальність створення нових комбінованих препаратів гепатопротекторної дії / С.М. Коваленко, Ю.І. Губін, С.М. Коваленко [та ін.] // Запорозький медичинський журнал, 2009; 1: С. 52-56.

5. Chan F., Lanas A., Scheiman, J. et al. // The Lancet.– 2010.– Advance online publication.DOI:10.1016/S0140-6736(10)60839-2.
6. Lopatin P.V. Methodological basis for the creation and reproduction of drugs / P.V. Lopatin, L. Barabanov // Priorities of pharmaceutical science and practice: Materials by correspondence. international conf. (Moscow, October 31, 2005). M .: Publishing house of RUDN, 2006; 86-90.
7. N.B. Shodieva, H.M. Yunusova. Study of the technological properties of the pressed mass of piracetam // Republican scientific journal “VESTNIK”, Kazakhstan, 2014; III-I: 102-104.