Spectrum Journal of Innovation, Reforms and Development

Volume 09, Nov., 2022 | ISSN (E): 2751-1731

Website: www.sjird.journalspark.org

THE INFLUENCE OF WATER-SOLUBLE SALTS ON THE MOISTURE CONDITION IN THE EXTERIOR PACKAGING STRUCTURES OF INDUSTRIAL ENTERPRISES

Qodirov Giyozjon Mirzajonovich
Ferghana Polytechnic Institute, senior teacher
g.qodirov@ferpi.uz (ORCID 0000-0002-4772-3770)

Annotation
This article presents the work done on the calculation of the moisture condition of packing structures under the influence of salts, the vapor permeability and sorption processes in various chemical compositions and structures of salt solutions.

Keywords: closed constructions, types, properties, physical, chemical and biological processes, moisture, steam, salts, sorption processes, moisture condition, closed materials and pores.

The walls of production buildings under the influence of an aggressive environment are operated in different conditions compared to those under the influence of only moisture and temperature.

Most production buildings of the chemical industry can be classified as buildings with normal or dry temperature and humidity conditions. This is also confirmed by the scientific research conducted by the institutes of scientific inspection and design on the temperature-humidity of the air environment of potassium plants [1,2,3,4].

But in most cases, the walls of such buildings are covered with wet traces and salts. This, in turn, indicates that the moisture condition of the walls is not good.

Analysis of samples taken from raw brick walls showed that in some buildings the average humidity was 5% higher than normal by the end of the wet accumulation period, and the local maximum humidity was 7% higher. They did not have time to build walls during the hot season.

High humidity in buildings causes erosion of wall material especially on the outer surface under the influence of salts.

The main reason for this is that the outer surface is under rapidly changing temperatures, and the salt dust collected in the outdoor air is more than the indoor air dust.

The degree of salinity, the structural solution of the wall and other conditions affect the process of wetting of closed structures and the distribution of moisture in thickness.

If the structural solution of the wall is chosen correctly, then the main influence on the moisture condition of the wall is salt solutions in the thickness of the covering. Because the salt solutions settled in the pores of the wall material differ from water in their physico-chemical conditions [5,6].

The presence of chlorine salts in the coating thickness increases the material's hygroscopicity (the ability to absorb moisture from the air).

Moisture absorption (sorption) properties of building materials are determined by the nature of moisture binding to the surface of pores and capillaries.

The amount of sorbed moisture under the influence of salts depends not only on the temperature-humidity condition of the environment and the nature of the moistened material, but also on the physico-chemical properties of salts and their number in the pores of the material.

Capillary condensation (condensation) in the small pores of salted material begins depending on the relative humidity of the air [7].

Increasing the sorption properties of salted building materials is directly proportional to the hygroscopicity of the affected salts.

O.V. Vlasov - Z.A. Calculations based on the Kazbek-Kazievlar formula show that the value of relative humidity under the influence of salts can be considered equal to the moisture balance on the flat surface of the solution:

$$\frac{R_{ўр} - E_{осм}}{E} = \frac{Sn}{Sэж}\ln\frac{Ep}{E} - 2\left(\frac{Ep}{E} - 1\right) \qquad (1\text{-}1)$$

Here: Ror is the average curvature of the meniscus surface, cm-1;

Sj - volume in the dark period, l/kg;

Sn – volume of saturated steam, l/kg;

Eosm - osmotic pressure of solution, kg/cm2;

E is the saturated pressure of water vapor under the flat surface of water in kg/cm2;

Er - the equilibrium pressure of the vapor on the analytical surface of the solution kg/cm2;

It can be said that the excess sorbed moisture that fills the pores and capillaries of the material under the influence of salts is held by capillary pressure forces [8,9].

This moisture can move inside the material under external influences, that is, under the difference of partial pressures that exceed the magnitude of the capillary pressure in terms of its energy level. In this case, the displacement of moisture occurs under the partial pressure difference, because it is higher than the capillary pressure that holds moisture.

It follows that the moisture in the pores and capillaries of this size moves only in the diffusion process, because the internal air temperature is high and the elasticity of water vapor is large, that is, the energy level of the partial pressure is greater than the energy that binds moisture to the material.

At low temperature, the diffusion process does not occur under partial pressure, if there are no displacements exceeding the value of capillary pressure under other external influences, the moisture in the small porous material maintains equilibrium. This process can also be reversed, which is often the case for closed structures when the room air temperature is positive. also happens at

From the above, it can be concluded that the moisture displacement coefficient depends on the moisture content of the material, temperature and pore classification.

In additive materials, the temperature dependence of the rapid change of the transfer coefficient due to the different moisture retention of the material is less noticeable.

The critical value of relative humidity, which corresponds to the conditions of condensation under the influence of saturated solutions, is equal to the formula for some salts when t=200 ^{0}C in capillaries $t=0.26*10^{-5}$ cm:

1) MgCl2 for magnesium chloride – 33%
2) KCl for potassium chloride – 83%
3) NaCl for sodium chloride – 75%
4) H2O for water – 96%

The main reason for the subsequent increase in capillary condensation at low values of relative air humidity is the rapid increase in the sorption humidity of salted materials [10-11].

The main reason for the acceleration of the sorption process is the increase in the relative humidity interval during the formation of dense moisture in the material.

The maximum value of sorption moisture accumulation also depends on the interval of increasing relative humidity, because at this time moisture condensation occurs in the pores of the material [12].

The size of this interval can be classified by $1-\varphi_p$ where φ_p is the relative humidity, which is equal to the dew point under the influence of certain salts.

According to the scientific research on determining the sorption capacity of salted materials, the maximum sorption moisture accumulation for raw brick is $\gamma=1800$ kg/m^2 t=180 ^{0}C:

1. It contains 0.86% CaCl2 ($\varphi_p=0.32$) equal to 17%.
2. Contains 0.92% KCl ($\varphi_p=0.85$) equal to 14%.
3. Contains 0.90% NaCl ($\varphi_p=0.75$) equal to 14%.
4. It contains 1.35% $MgSO_4$ ($\varphi_p=0.97$) equal to 8%.
5. It is equal to 0.9% in salted material

$1-\varphi_p$ depends on the size, which is shown in Figure 1 above.

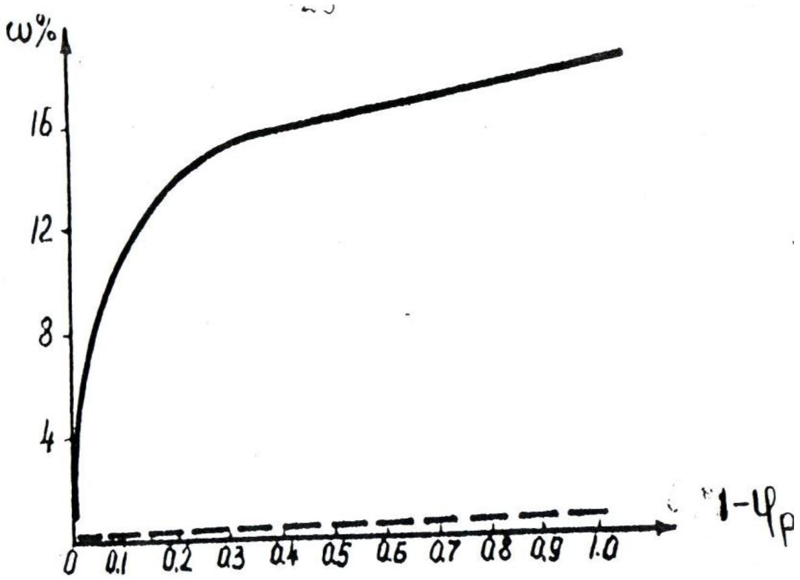

Figure 1. Sorption capacity of raw brick with hygroscopic salts defined by $1 - \varphi_p$ in pores at t=18 ^{0}C. - sorption wetting limit of brick without salts.

As can be seen from Fig. 1, the hygroscopic property of salts given in the magnitude of $1 - \varphi_p$ is needed to determine the high sorption property. The amount of salts in specific saline solutions plays a key role in scientific research on the sorption properties of materials [13-14].

Conclusion

From the above, it can be concluded that as a result of the accumulation of salts on the inner surface of the wall, wetting on this surface is mainly due to the hygroscopicity of the salts, creating a moisture (gradient) limit.

Then, due to this gradient, the solution moves into the cover and moisture accumulation increases in the thickness of the cover structure. High sorption moisture in the material under the influence of salts leads to an increase in moisture in the coating.

List of used Literature

1. Власов О.Е. Долговечность ограждающих и строительных конструкций (физические основы). Госстройиздат. М., 1963.
2. Долговечность строительных конструкций зданий химической промышленности. Сб. трудов под ред. Г.А.Франчук, Ростов, 1968.
3. Hasanboy o‘g‘li, A. A. (2022). Stress Deformation of Flexible Beams with Composite Reinforcement under Load. American Journal of Social and Humanitarian Research, 3(6), 247-254.
4. Мирзабабаева, С. М., & Ахмадалиев, А. Х. (2022). Проверка характеристик прочности и устойчивости рекламной конструкции щита. Eurasian Journal of Academic Research, 2(6), 361-370.
5. Ахмадалиев, А. Х., & Мирзабабаева, С. М. (2022). КОМПОЗИТ АРМАТУРАЛИ ЭГИЛУВЧИ ТЎСИНЛАРНИНГ ЮК ОСТИДА КУЧЛАНИБ ДЕФОРМАТЦИЯЛАНИШИ. Eurasian Journal of Academic Research, 2(6), 416-423.
6. Abdug‘Ofurovich, U. S., O‘G‘Li, S. F. S., & O‘G‘Li, E. A. A. (2022). KOMPOZIT ARMATURALI GILUVCHI BETON ELEMENTLARNING KUCHLANIB-DEFORMATSIYALANGANLIK HOLATINI EKSPERIMENTAL TADQIQ ETISH. Talqin va tadqiqotlar ilmiy-uslubiy jurnali, 4(4), 41-46.
7. Абобакирова, З. А., Эркабоев, А. А. У., & Солижонов, Ф. С. У. (2022). ИССЛЕДОВАНИЕ СОСТОЯНИЯ ДЕФОРМАЦИИ ПРИ РАСТЯЖЕНИИ С ИСПОЛЬЗОВАНИЕМ СТЕКЛОВОЛОКОННОЙ АРМАТУРЫ В БАЛКАХ. Talqin va tadqiqotlar ilmiy-uslubiy jurnali, 4(4), 47-55.
8. Abdugofurovich, U. S., & Mirzaakbarovna, M. S., & Sodiqjon o‘g‘li, S. F. (2022). COMBINED COMPOSITE REINFORCED CONCRETE BEAMS. Spectrum Journal of Innovation, Reforms and Development, 8, 317-324.
9. Mirzaakbarovna, M. S., & Asrorovna, A. Z., & Sodiqjon o‘g‘li, S. F. (2022). DEVELOPMENT OF EFFECTIVE METHODS OF STRENGTHENING DAMAGED WALLS OF BUILDINGS TO BE RECONSTRUCTED. Spectrum Journal of Innovation, Reforms and Development, 8, 325-331.

10. Asrorovna, A. Z., Abdugofurovich, U. S., & Mirzaakbarovna, M. S., & Sodiqjon o‘g‘li, S. F. (2022). INVESTIGATION OF THE STRENGTH AND DUTNESS OF REINFORCED CONCRETE BEAMS WITH GLASS COMPOSITE REINFORCEMENTS. Spectrum Journal of Innovation, Reforms and Development, 8, 310-316.
11. Asrorovna, A. Z., Abdug‘ofurovich, U. S., & Sodiqjon o‘g‘li, S. F. (2022). ISSUES OF IMPROVING THE ECONOMY OF BUILDING MATERIAL-WOOD PRODUCTION. Spectrum Journal of Innovation, Reforms and Development, 8, 336-340.
12. Мирзаева З. А. К., Рахмонов У. Ж. Пути развития инженерного образования в Узбекистане //Достижения науки и образования. – 2018. – Т. 2. – №. 8 (30). – С. 18-19.
13. Zarnigor M., Ulug‘bek T. HUDUDNI VERTIKAL REJALASHTIRISH LOYIHASINI ISHLASHDA TABIIY SHART-SHAROITLARNI INOBATGA OLISH MASALALARI //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 1.
14. Mirzaeva Z. A. Improvement of technology technology manufacturing wood, wood with sulfur solution //Asian Journal of Multidimensional Research. – 2021. – Т. 10. – №. 9. – С. 549-555.
15. Nazirov A. S., Mirzayeva Z. A. ORDER OF INSTALLATION OF ELEMENTS OF ASSEMBLY-MONOLITHIC FLOORS AND COVERINGS //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 8. – С. 292-296.
16. Mirzajonovich Q. G., Qizi M. Z. A. Determination Of Condensation On The Inner Surface Of The Walls Of Canoe Buildings Under The Influence Of Aerosols //The American Journal of Engineering and Technology. – 2021. – Т. 3. – №. 12. – С. 14-19.
17. Мирзабабаева, С. М. (2022). Мирзажонович ҚҒ БЕТОН ВА ТЕМИРБЕТОН КОНСТРУКЦИЯЛАР БУЗИЛИШИНИНГ ТУРЛАРИ ВА УЛАРНИНГ ОЛДИНИ ОЛИШ. RESEARCH AND EDUCATION, 91.
18. Мирзажонович ҚҒ, М. С. (2022). Биноларни ўровчи конструкцияларини тузлар таъсиридаги сорбцион хусусиятини яхшилаш. RESEARCH AND EDUCATION, 86.
19. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние Водорастворимых Солей На Эксплуатационные Свойства Наружные Стен. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 44-47.
20. Кодиров, Г. М., Набиев, М. Н., & Умаров, Ш. А. (2021). Микроклимат В Помещениях Общественных Зданиях. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 36-39.
21. Tolkin, A. (2020). Reconstruction of 5-storey large panel buildings, use of atmospheric precipitation water for technical purposes in the building. The American Journal of Applied sciences, 2(12), 86-89.
22. Tolqin, A. (2021). Ancient greek and ancient rome architecture and urban planning. The American Journal of Engineering and Technology, 3(06), 82-87.

23. Axmedov, T. (2021). Gotika uslubining arxitekturadagi ahamiyati. Scientific progress, 2(6), 1305-1310.
24. Obidovich, A. T. (2022). Architecture And Urban Planning In Uzbekistan. Texas Journal of Engineering and Technology, 9, 62-64.
25. Yuvmitov, A. S., Toshpo‘latov, S. U., & O‘ktamov, B. B. (2021). Instrumental Study of Dynamic Characteristics of Secondary Schools with Different Syllabus and Construction Solutions in Fergana. CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES, 2(11), 200-208.
26. Бахромов, М. М. (2020). Исследование сил негативного трения оттаивающих грунтов в полевых условиях. Молодой ученый, (38), 24-34.
27. Abdullayev, I., & Umirzakov, Z. (2020). Optimization of bag filter designs (on the example of cement plants in the fergana region of the republic of Uzbekistan). Збірник наукових праць ΛΌГОΣ, 31-34.
28. Abdullayev, I. N., & Umirzakov, Z. A. (2021). Efficiency of Fabric in The Systems of Dust and Gas Cleaning of Cement Production.