Рис. 6 - Выявленные места заражения бактериальной водянкой березы

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REGULAR PACKING FOR MASS TRANSFER EQUIPMENT

Abstract. *The article describes three variants of regular packings: zigzag, coaxial, and hexagonal with petals, compared to classical Raschig rings. To evaluate the efficiency of the packings, experiments were conducted to measure hydraulic resistance and mass transfer coefficients during the desorption of carbon dioxide from an aqueous solution. The results show that the coaxial packing has the lowest resistance, while the Raschig rings demonstrate the highest efficiency.*

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ОБЫЧНАЯ УПАКОВКА ДЛЯ МАССООБМЕННОГО ОБОРУДОВАНИЯ

Аннотация. *В статье описаны три варианта правильных насадок: зигзагообразная, коаксиальная и шестиугольная с лепестками, в сравнении с классическими кольцами Рашига. Для оценки эффективности насадок были проведены эксперименты по измерению гидравлического сопротивления и коэффициентов массопереноса при десорбции диоксида углерода из водного раствора. Результаты показывают, что коаксиальная насадка обладает наименьшим сопротивлением, в то время как кольца Рашига демонстрируют наибольшую эффективность.*

Currently, various methods are used to capture and neutralize vapor and gaseous substances from the air. The following gas purification methods are commonly applied in practice: absorption, adsorption, catalytic, thermal, and others.

Absorption of gas pollutants is most often carried out using packed and tray column apparatus. Packed columns are the most widespread type of absorber. Their advantages include simple design and the ability to operate with aggressive media. Another advantage of packed columns is their lower hydraulic resistance compared to bubble-cap absorbers.

Regular packing has several advantages over irregular packing, which is simply dumped into the column: it has lower hydraulic resistance, higher gas and liquid load capacities, and more.

The object of study is three variants of regular packing (zigzag, hexagonal with lobes on the ends, and zigzag), which are compared with one of the classical packings (Raschig rings). Figure 1 shows the packing types.

The principle of operation of the zigzag packing (Figure 1, *a*) is as follows: liquid entering the upper part of the apparatus flows down along the zigzag channels. The gas (vapor), entering from the lower part of the apparatus, rises upwards. As a result, a film contact area is formed on the packing, where mass transfer occurs between the liquid and the gas (vapor).

The principle of operation of the coaxial packing (Figure 1, *b*) is as follows: gas, evenly distributed across the cross-section of the apparatus body, enters the channels formed by the concentric cylinders, vertical coaxial strips, and the body of the apparatus, and rises upwards while interacting with the liquid film that flows down over the entire surface of the packing and the inner surface of the apparatus body.

a – zigzag; b – coaxial; c – hexagonal; d – Raschig rings

Fig. 1 – Packing types

The packing (Figure 1, *c*) is made of hollow hexagons assembled into a honeycomb structure. The hexagons are equipped with petals at the top and bottom. The petals are bent toward the center of the hexagons at a sharp angle. Inclined channels are formed between the petals for the passage of gas and liquid.

Raschig rings (Figure 1, *d*) are classified as irregular packing of the ring type. This packing has a low specific weight, low hydraulic resistance, and good liquid distribution capability.

To compare the studied packings, a series of experiments were conducted, including measurements of hydraulic resistance for both dry and irrigated packings, as well as efficiency for the gas and liquid phases. All experiments were carried out during the desorption of carbon dioxide (CO_2) from a previously saturated aqueous solution by blowing air through it, at three irrigation densities: 0.0028 $m^3/m^2 \cdot s$, 0.0036 $m^3/m^2 \cdot s$, and 0.0043 $m^3/m^2 \cdot s$.

Based on the results obtained, it can be concluded that in the absence of irrigation, the honeycomb packing with a swirl generator has the highest hydraulic resistance. The coaxial packing has the lowest resistance.

Analyzing the dependence of mass transfer efficiency during liquid evaporation on gas velocity and liquid flow rate, the following conclusions can be drawn: the Raschig ring packing demonstrates the highest efficiency, while the honeycomb packing shows the lowest. The coaxial packing is not significantly inferior in efficiency to the Raschig ring packing.

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