ABSTRACT AND REFERENCES

TECHNOLOGY ORGANIC AND INORGANIC SUBSTANCES

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DEVELOPMENT OF THE RETRIEVING TECHNOLOGY OF CAROTENOIDS FROM PUMPKIN (CUCURBITA SPP.) PULP USING Zn-Al LAYERED DOUBLE HYDROXIDES (p. 6–15)

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Carotenoids are biologically active materials with strong antioxidant properties, some of them are provitamins A. A promising source of carotenoids is pumpkin pulp. The object of research is the technology of retrieving carotenoids using LDH.

The flowsheet for obtaining pumpkin carotenoids by precipitation of the carotenoids-LDH composite was developed:

a) obtaining fresh pumpkin juice with the introduction of Zn and Al salts;

b) precipitating the carotenoids-LDH composite by adding alkali to pH=9 at t=60 °C and stirring;

c) filtering the precipitate of the composite under vacuum, drying, rinsing, re-filtering, and re-drying;

d) separating the composite into components.

A simple mechanical method (grinding and sieving) was proposed to separate the composite into carotenoid-enriched and LDH-enriched materials. The method is based on the internal self-abrasion of the composite when grinding solid particles of LDH as grinding bodies. When removing carotenoids in the form of a composite, rapid precipitation of the sediment and ease of filtration under vacuum were found. X-ray diffraction analysis showed that the composite and products of its separation contain X-ray amorphous Zn-Al LDH, an oxide phase, and an amorphous phase of carotenoids. The method of dichloroethane extraction proved the effectiveness of the composite separation process. It was shown that for the optimal amount of Zn-Al LDH, the content of carotenoids in carotenoid-enriched material was 24.4 %, and in LDH-enriched – 4.4 %. For these conditions, it was found that the total yield of carotenoids was 184.3 mg/100 g of pumpkin pulp, of which 155.4 mg/100 g was in the carotenoid-enriched material and 28.9 mg/100 g was in the LDH-enriched material. A hypothesis was expressed regarding the chemical nature of the interaction of carotenoids and LDH in the composite due to π-d interaction.

The resulting carotenoid-containing materials can be used as food additives or processed to obtain purified carotenoids.

Keywords: Zn-Al layered double hydroxide, carotenoids-layered double hydroxide composite, carotenoid retrieving technology, pumpkin pulp, internal self-abrasion.

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ANALYSIS OF THE EFFECT OF DIESEL-ESSENTIAL OIL FUEL MIXTURE ON THE PERFORMANCE, NOISE, VIBRATION OF DIESEL ENGINES (p. 16–21)

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The increasing demand for diesel fuel causes high levels of air pollution, noise, and vibration. Therefore, we need a mixture of materials that can reduce the environmental effect with low vibration. The purpose of this study was to investigate the effect of a diesel-essential oil mixture on a diesel engine, related to engine performance, noise, and vibration. The research was conducted using a 402 CC Dongfeng diesel engine, a mixture of diesel and essential oils with a percentage of 5 %, 10 %, 15 %, 20 %, engine speed of 1,300 rpm, 1,500 rpm, 1,700 rpm, 1,900 rpm. The noise intensity test uses a sound level meter at 30–130 dBA with a frequency between 20–20,000 Hz. To test the density of smoke, a smoke tester was used. Meanwhile, to measure the rotational speed of the engine, a DT 2234L type tachometer was used. A digital stopwatch was used to measure the processing time with an accuracy of up to 0.01 s. Besides that, a strain gauge was also used to detect vibrations. A measuring cup was used to measure the volume of the mixture of fuel and essential oils. The results showed that in the B10 mixture at 1,300 rpm engine speed, the largest fuel consumption time was 155 s. While the smallest fuel consumption time is found at 1,900 engine speed, which is 106 s. The lowest percentage of exhaust emissions is in the B20 mixture, which is 56.8 %. While the largest percentage of exhaust emissions is in B0 with a value of 79.8 %. The lowest noise value is in the B10 mixture at 1,300 rpm engine speed, which is 105.7 dB. While the highest noise value is at 1,900 engine speed, which is 112.3 dB. The lowest vibration is in the B10 mixture with an engine speed of 1,300 rpm, which is 975.7 Hz. While the highest noise value is in the B10 mixture with 1,900 engine speed, which is 989.8 Hz.

Keywords: fuel mixture, diesel, essential oil, performance, noise, vibration, diesel engine.

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THE ANALYSIS OF SI/AL RATIO ON CGA DECOMPOSITION IN INDONESIAN TRADITIONAL KREWENG POTTERY COFFEE ROASTER TO MAXIMIZE COFFEE ACIDITY (p. 22–37)

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The use of pottery pans lowers the roasting temperature and gives the product a more favorable taste. This study uncovers the role of pottery particle on chlorogenic acid (CGA) decomposition during roasting process. This study aims to design pottery pans and the roasting process that optimize the CGA content and quality of the coffee using Indonesian traditional ceramics from Banyuwangi,East java named Kreweng. The pottery was ground to between 74–1000 µm before activation. The elemental, phase, and morphology characterization performs on the coffee bean. The morphology characteristic of the pottery observed further using digital imaging technique to unravel the pores and boundaries. The impact of the pottery usage for coffee roasting also tested through coffee product pH measurement. The pottery morphology determines coffee product acidity. The smaller the pottery catalyst particle size results in more acid coffee. The pore and grain boundary concentration increases as the particle size decreases. At the same time, the Si/Al ratio was higher at the smaller catalyst particle size with higher porosity, grain boundaries, and absorption. The porosity and defects reveal the negatively charged faces of the pottery crystal edges. The charged faces revealed due to the pottery crystal vibration in response to heat during roasting process. The effectiveness of surface contact is greater due to the distribution of negative charges around the pores that attract OH^- side of CGA. This interaction traps hydrogen proton on catalyst conductive surface. As a result, the CGA decomposes into several groups of atoms and molecules including H_2 and CO_2. The interaction with the catalyst transforms the macronutrient into aliphatic acid. Therefore, roasting media with a higher Si/Al ratio at smaller particle sizes with high micropores will increase the rate of decomposition and the acidity of coffee products.

Keywords: Si/Al ratio, Kreweng pottery, microstructure, CGA decomposition, coffee acidity.

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IDENTIFYING THE INFLUENCE OF REDISPERSED POLYMERS ON CEMENT MATRIX PROPERTIES

(p. 38–45)

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The physical-mechanical influence and chemical effect of calcium formate, vinyl acetate/versatate, and vinyl-acrylate copolymer on the processes of solidification, hardening, and structure formation of the cement matrix were studied during the research reported here. The compositions of mixtures containing additives in the amount of 1, 3, and 5 wt % were investigated. Noteworthy is the water-holding nature of vinyl acetate/versatate and vinyl-acrylate copolymer. With the introduction of appropriate additives, an increase in working time of the mixtures is noted, which was manifested in prolonging the end time of solidification duration. Calcium formate reduced the end time of solidification duration with an increase in the content of the additive. During 28 days of hardening, a decrease in strength gain was observed with an increase in the content of the additive compared to control samples. At 1 wt % of the additive, the decline in strength on day 28 was 8.7 % for calcium formate, 13 % for versatate, and 15.5 % for vinyl-acrylate copolymer. For versatate and vinyl acrylate with the addition of 3 and 5 wt % in the mixture, the loss of strength is 23–25 % and 27–56.7 %, respectively. 5 wt % calcium formate admixture, compared to 3 wt %, on day 7 and day 28 of hardening has a higher strength index. This nature of the effect of additives is explained by the formation of polymer structures throughout the volume of the mixture with the introduction of versatate and copolymer vinyl acrylate, as well as their chemical interaction with the components of the cement binder during hydration in the formed alkaline medium. Calcium formate plays the role of both a filler and a hardening accelerator due to the introduction of an additional amount of calcium ions.

The reported results can be used as a basis for continuing to study the effect of redispersed additives on the durability of cement articles, the development of new formulations for building mixtures, and their potential use in the production of concrete.

Keywords: cement, calcium formate, vinyl acrylate, vinyl acetate/versatate, redispersed polymer, compressive strength.

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DEVELOPMENT OF SAGA (ABRUS PRECATORIUS) SEED EXTRACT AS A GREEN CORROSION INHIBITOR IN API 5L GRADE B UNDER 1M HCL SOLUTIONS (p. 46–56)

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The critical role of newly green corrosion inhibitors shows the disruption of cathodic and anodic reactions at the metals and solution interface. The object of this study is the development of Saga as a corrosion inhibitor to mitigate the effect of corrosive HCl 1M on mild steel. The inhibitor was extracted using methanol to prepare various concentrations. Fourier transform infrared (FTIR) spectroscopy was used to determine the functional group of the inhibitor. The electrochemical impedance spectroscopy aided by the potentiodynamic polarization was utilized to evaluate the inhibitor's effectiveness. Optical emission spectroscopy (OES) was implemented to determine the percentage of elements in mild steel. Based on the FTIR results, C=O, -OH, C=C, benzene, and C-O are accountable for the inhibitor to donate its lone pair of an electron to the 3-d orbital of iron metal. Increasing the inhibitor concentration decreases the capacitive double layer to elevate the inhibitor resistance. The higher inhibitor resistance of 29.33 Ω cm^{-1} increases as the concentration increases due to the depression of Cdl 420.16 μF cm^2 at 10 ml inhibitor solution. Parallelly, it increases the inhibition efficiency at 65.58 %, slightly lower than the PP measurement of nearly 88 %. The higher value of adsorption/desorption constant, Kads, at 2.9 L mol^{-1} shows the strength of the inhibitor, which lowers the value of Gibbs free energy (ΔGads). The Saga inhibitor is considered a chemisorption inhibitor ΔGads –36.87 kJ/mol. The value demonstrates the formation of dative covalent bonding, which promotes the transferred electron from the inhibitor to the substrate. On the other hand, the Saga inhibitor abides by the Langmuir adsorption isotherm as the R2 value is 0.99.

Keywords: Saga inhibitor, green corrosion inhibitor, Langmuir adsorption isotherm, chemisorption.

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REDUCING THE BIOGENIC CORROSION OF CONCRETE IN A PIGSTY BY USING DISINFECTANTS (p. 57–66)

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The object of this study is the regularity of changes in the biogenic destructive effect of microorganisms on the concrete structural elements of livestock facilities due to the use of the original liquid phase mixture of disinfectant based on aldehyde and surfactant.

Microorganisms use construction materials as a substrate for growth and nutrition; they produce citric acid, which leads to a change in the composition and morphology of hydrated cement new formations.

The composition of the microflora of the pigsty has been determined, and the minimum concentration of disinfectant based on glutaraldehyde and didecyl dimethyl ammonium chloride was found. By the TPD MS method, a decrease in the intensity of carbon dioxide (CO_2) release in concrete samples during the heating of the sample to 900 °C was proved, compared to the control intact corrosion sample. Electron microscopy of concrete samples shows the presence of destructive changes and colonies of micromycetes. It was established that calcite was intensively released in the control sample of concrete, which retained its integrity and was not subjected to corrosion when heated to a temperature of 600 °C. Electron microscopy confirms the preservation of the homogeneous structure of concrete.

The use of a disinfectant based on glutaraldehyde and didecyl dimethyl ammonium chloride at a concentration of 1 % destroys colonies of micromycetes, 2 % – the shell of microorganisms, and 3 % – biofilm. Treatment of concrete with a disinfectant at a concentration of 3 % destroys microorganisms Aspergillus fumigatus and Penicillium oxalicum, inhibits the process of biological corrosion of concrete, and strengthens the structure of concrete.

The results of the experiment can be applied to inhibit the corrosion of concrete and extend the life of building structures made of concrete through the use of a disinfectant based on aldehyde and didecyl dimethyl ammonium chloride at a concentration of 3 %.

Keywords: biodestruction of construction materials, thermo-programmed mass spectrometry, micromicents, carbonates, calcium citrate.

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SUBSTANTIATION OF APPLICATION TECHNOLOGY OF HYGROSCOPIC MATERIALS FOR DUST PREVENTION OF ROADS WITH THE LOWEST TYPE OF SURFACES (p. 67–77)

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The article presents the results of experimental study for types of loose soils are easily subject to dusting. In connection with this problem, the task is the study and study of the causes and structure of the formation of dustiness in the roadside zone of roads with common types of coatings or without coatings. The experimental study aims to determine the drying time of chemical dust prevention solutions under the influence of solar radiation and the norm of their distribution.

The object of the research is dust generated on roads with low transport and operational performance (temporary roads in places of road repair work, roads to quarries, etc.), and materials used for dedusting road surfaces.

The problem to be solved is to reduce the emission of a large amount of dust on roads without pavements or with inferior types of pavements, which adversely affects the human body.

The results obtained are the identification of a way to combat dust on road surfaces, ensuring a decrease in wear when vehicles move on roads without pavements.

At the same time, the classification of dust according to their sources of formation is expected at the output result.

Due to their features and characteristics, these results allowed the author to solve this problem - effective ways to combat dust on road surfaces are: treating them with dust-removing materials that reduce wear; maintaining the original evenness; reduction of air pollution; improvement of traffic conditions for cars and the sanitary and hygienic condition of roads near settlements.

For experimental tests, traditional salt solutions of various concentrations (NaCl, $MgCl_2$, $CaCl_2$, $MgCl_2 \cdot 6H_2O$, etc.) and solutions of foreign–made stabilizing additives Durasoil and Soiltac from SOILWORKS were taken.

Keywords: hygroscopic materials, dust prevention, dustiness, roadside zone, roads, sources of pollution, dust exposure.

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АНОТАЦІЇ

TECHNOLOGY ORGANIC AND INORGANIC SUBSTANCES

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РОЗРОБКА ТЕХНОЛОГІЇ ВИЛУЧЕННЯ КАРОТИНОЇДІВ З М'ЯКУША ГАРБУЗА (CUCURBITA SPP.) З ВИКОРИСТАННЯМ Zn-Al ПОДВІЙНО-ШАРОВИХ ГІДРОКСИДІВ (с. 6–15)

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Каротиноїди є біологічно активними речовинами з сильними антиоксидантними властивостями, деякі з них є провітамінами А. Перспективним джерелом каротиноїдів є м'якуш гарбуза. Об'єктом дослідження є технологія вилучення каротиноїдів з використанням ПШГ.

Розроблена технологічна схема отримання каротиноїдів гарбуза методом осадження композиту «каротиноїди-ПШГ»:

а) отримання фрешу гарбуза із введенням солей Zn та Al;

б) осадження композиту «каротиноїди-ПШГ» шляхом додавання лугу до pH=9 при t=60 °C та перемішування;

в) фільтрування осаду композиту під вакуумом, висушування, промивання, повторне фільтрування та висушування;

г) розділення композиту на складові.

Запропоновано простий механічний метод (розмелювання та просіювання) розділення композиту на матеріали, збагачені каротиноїдами та матеріали, збагачені ПШГ. Метод заснований на внутрішньому самоперетиранні композиту при розмелюванні твердих часток ПШГ в якості мелючих тіл. При видаленні каротиноїдів у вигляді композита виявлено швидку седиментацію осаду та легкість фільтрування під вакуумом. Методом рентгенофазового аналізу показано, що композит та продукти його розділення містять рентгеноаморфний Zn-Al ПШГ, оксидну фазу та аморфну фазу каротиноїдів. Методом екстракції дихлоретаном доведено ефективність процесу розділення композиту. Показано, що для оптимальної кількості Zn-Al ПШГ вміст каротиноїдів у збагаченому каротиноїдами матеріалі склав 24,4 %, а у збагаченому ПШГ – 4,4 %. Для даних умов виявлено, що загальний вихід каротиноїдів склав 184,3 мг/100 г м'якуша гарбуза, із них 155,4 мг/100 г у збагаченому каротиноїдами матеріалі та 28,9 мг/100 г у збагаченому ПШГ матеріалі. Висловлена гіпотеза щодо хімічної природи взаємодії каротиноїдів та ПШГ у композиті за рахунок π-d взаємодії.

Отримані каротиноїд-вмісні матеріали можут бути використані в якості харчових добавок або перероблені для отримання очищених каротиноїдів.

Ключові слова: Zn-Al подвійно-шаровий гідроксид, композит «каротиноїди-подвійно-шаровий гідроксид», технологія вилучення каротиноїдів, м'якуш гарбуза, внутрішнє саморозмелювання.

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АНАЛІЗ ВПЛИВУ ДИЗЕЛЬНО-ЕФІРНОЇ ПАЛИВНОЇ СУМІШІ НА ПРОДУКТИВНІСТЬ, ШУМ ТА ВІБРАЦІЮ ДИЗЕЛЬНИХ ДВИГУНІВ (с. 16–21)

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Зростаючий попит на дизельне паливо призводить до високого рівня забруднення повітря, шуму і вібрації. Тому необхідна суміш матеріалів, яка дозволить зменшити вплив на навколишнє середовище та знизити вібрацію. Метою даного дослідження було вивчення впливу дизельно-ефірної паливної суміші на дизельний двигун, а саме продуктивність двигуна, шум та вібрацію. Дослідження проводилося з використанням дизельного двигуна Dongfeng об'ємом 402 куб.см, суміші дизельного палива та ефірних масел з процентним вмістом 5 %, 10 %, 15 %, 20 %, частоти обертання двигуна 1300 об/хв, 1500 об/хв, 1700 об/хв, 1900 об/хв. Для перевірки інтенсивності шуму використовується шумомір на рівні 30–130 дБА з частотою 20–20000 Гц. Для перевірки щільності диму використовувався тестер диму. При цьому для вимірювання частоти обертання двигуна використовувався тахометр DT 2234 L. Для вимірювання часу обробки з точністю до 0,01 с використовувався цифровий секундомір. Крім того, для виявлення вібрацій також використовувався тензодатчик. Обсяг суміші палива та ефірних масел вимірювали мірною склянкою. Результати показали, що для суміші B10 при частоті обертання двигуна 1300 об/хв найбільший час витрати палива склав 155 с. При цьому найменший час витрати палива спостерігається при 1900 оборотах двигуна, що становить 106 с. Найменший відсоток викидів вихлопних газів припадає на суміш B20, що становить 56,8 %. У той час як найбільший відсоток припадає на B0 зі значенням 79,8 %. Найменше значення шуму спостерігається для суміші B10 при частоті обертання двигуна 1300 об/хв, що становить 105,7 дБ. Тоді як найбільше значення шуму спостерігається при 1900 оборотах двигуна, що становить 112,3 дБ. Найменша вібрація спостерігається для суміші B10 при частоті обертання двигуна 1300 об/хв, що становить 975,7 Гц. При цьому найвище значення шуму спостерігається для суміші B10 при 1900 оборотах двигуна, що становить 989,8 Гц.

Ключові слова: паливна суміш, дизельне паливо, ефірна олія, продуктивність, шум, вібрація, дизельний двигун.

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АНАЛІЗ СПІВВІДНОШЕННЯ SI/AL ПРИ РОЗКЛАДАННІ ХЛОРОГЕНОВОЇ КИСЛОТИ В ІНДОНЕЗІЙСЬКОМУ ТРАДИЦІЙНОМУ ОБЖАРЮВАННІ КАВИ KREWENG ДЛЯ МАКСИМАЛЬНОЇ КИСЛОТНОСТІ КАВИ (с. 22–37)

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Використання глиняних сковорідок знижує температуру обсмажування та надає продукту приємнішого смаку. Це дослідження розкриває роль частинок кераміки у розкладанні хлорогенової кислоти (ХГК) у процесі випалу. Це дослідження спрямоване на розробку керамічних каструль та процесу обсмажування, які оптимізують вміст ХГК та якість кави з використанням традиційної індонезійської кераміки з Баньюванги, Кревенг, Східна Ява. Кераміка була подрібнена до 74–1000 мкм перед активацією. Елементна, фазова та морфологічна характеристики виконуються на кавовому зерні. Морфологія, характерна для кераміки, спостерігалася далі з використанням техніки цифрового зображення, щоб виявити пори та межі. Вплив використання глиняного посуду на обсмажування кави також було перевірено за допомогою вимірювання pH кавового продукту. Морфологія кераміки визначає кислотність кавового продукту. Чим менший розмір частинок глиняного каталізатора, тим кислішою буде кава. Концентрація пір і меж зерен збільшується зі зменшенням розміру частинок. У той же час відношення Si/Al було вищим при меншому розмірі частинок каталізатора з більшою пористістю, межами зерен та поглинанням. Пористість та дефекти виявляють негативно заряджені грані граней керамічного кристала. Заряджені грані проявляються через вібрацію керамічного кристала у відповідь тепло під час процесу випалу. Ефективність поверхневого контакту є більшою за рахунок розподілу негативних зарядів навколо пір, що притягають OH^- частинки ХГК. Ця взаємодія захоплює протон водню на провідній поверхні каталізатора. В результаті ХГК розпадається на кілька груп атомів та молекул, включаючи H_2 та CO_2. Взаємодія з каталізатором перетворює макроелемент на аліфатичну кислоту. Таким чином, середовище для обсмажування з більш високим співвідношенням Si/Al за менших розмірів частинок з великими мікропорами збільшить швидкість розкладання та кислотність кавових продуктів.

Ключові слова: співвідношення Si/Al, кераміка Кревенг, мікроструктура, розкладання ХГК, кислотність кави.

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ВИЯВЛЕННЯ ВПЛИВУ РЕДИСПЕРГОВАНИХ ПОЛІМЕРІВ НА ВЛАСТИВОСТІ ЦЕМЕНТНОЇ МАТРИЦІ (с. 38–45)

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Проведеними дослідженнями вивчено фізико-механічний вплив та хімічну дію форміату кальцію, вініл-ацетату/версатату та сополімеру вініл-акрилату на процеси тужавлення, тверднення та структуротворення цементної матриці. Досліджено склади сумішей із вмістом добавок 1, 3 та 5 мас. % відповідно. Вартий уваги водоутримувальний характер вініл-ацетату/версатату та сополімеру вініл-акрилату. При введенні відповідних добавок відмічається збільшення робочого часу сумішей, що проявлялося у подовженні часу кінця строків тужавлення. Форміат кальцію – зменшував час закінчення строків тужавлення при збільшенні вмісту добавки. Впродовж 28 діб тверднення спостерігалось зменшення набору міцності при збільшенні вмісту добавки в порівнянні до контрольних зразків. При 1 мас. % добавки спад міцності на 28 добу складав 8,7 % для форміату кальцію, 13 % для версатату та 15,5 % для сополімеру вініл-акрилату. Для версатату та вініл-акрилату при додаванні 3 та 5 мас. % у суміші, втрата міцності складає 23–25 % та 27–56,7 % відповідно. 5 мас. % добавки форміату кальцію в порівнянні до 3 мас. % на 7 та 28 добу тверднення має більший показник міцності. Такий характер впливу добавок пояснюється утвореннями полімерних структур по всьому об’єму суміші при введенні версатату та сополімеру вініл-акрилату а також їх хімічною взаємодією з компонентами цементного в’яжучого під час гідратації в утвореному лужному середовищі. Форміат кальцію відіграє роль як наповнювача, так і прискорювача тверднення за рахунок введення додаткової кількості іонів кальцію.

Отримані результати можна застосувати як підґрунтя для продовження вивчення впливу редиспергованих добавок на довговічність цементних виробів, розробку нових рецептур для будівельних сумішей та потенційне їх застосування при виробництві бетонів.

Ключові слова: цемент, форміат кальцію, вініл-акрилат, вініл-ацетат/версатат, редиспергований полімер, міцність на стиск.

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РОЗРОБКА ЗЕЛЕНОГО ІНГІБІТОРА КОРОЗІЇ ТРУБ API 5L КЛАСУ B В 1M РОЗЧИНАХ HCL З ЕКСТРАКТУ НАСІННЯ САГИ (ABRUS PRECATORIUS) (с. 46–56)

Rini Riastuti, Dinar Setiawidiani, Johny Wahyuadi Soedarsono, Sidhi Aribowo, Agus Paul Setiawan Kaban

Критична роль нових зелених інгібіторів корозії проявляється у порушенні катодних та анодних реакцій на межі розділу металів і розчину. Метою даного дослідження є розробка інгібітора корозії саги для пом'якшення впливу агресивного HCl 1M на низьковуглецеву сталь. Інгібітор екстрагували з використанням метанолу для отримання різних концентрацій. Для визначення функціональної групи інгібітора використовували інфрачервону спектроскопію з перетворенням Фур'є (FTIR). Для оцінки ефективності інгібітора використовували спектроскопію електрохімічного імпедансу за допомогою потенціодинамічної поляризації. Для визначення процентного вмісту елементів в низьковуглецевій сталі була застосована оптична емісійна спектроскопія (OES). На підставі результатів FTIR, C=O, -OH, C=C, бензол та C-O відповідають за те, щоб інгібітор віддав свою неподілену пару електронів

на 3-d орбіталь металевого заліза. Збільшення концентрації інгібітора призводить до зменшення ємнісного подвійного шару, підвищуючи стійкість інгібітора. Більш висока стійкість інгібітора, рівна 29,33 Ом·см$^{-1}$, збільшується в міру зростання концентрації через зниження Cdl 420,16 мкФ·см^2 при 10 мл розчину інгібітора. Паралельно, ефективність інгібування підвищується на 65,58 %, що трохи нижче, ніж вимірювання PP, що становить майже 88 %. Більш високе значення константи адсорбції/десорбції, K_{ads}, при 2,9 л моль$^{-1}$ показує концентацію інгібітора, що знижує значення вільної енергії Гіббса (ΔG_{ads}). Інгібітор сага вважається інгібітором хемосорбції ΔG_{ads} –36,87 кДж/моль. Це значення демонструє утворення дативного ковалентного зв'язку, що сприяє перенесенню електрона від інгібітора до підкладки. З іншого боку, інгібітор сага підпорядковується ізотермі адсорбції Ленгмюра, оскільки значення R^2 дорівнює 0,99.

Ключові слова: інгібітор сага, зелений інгібітор корозії, ізотерма адсорбції Ленгмюра, хімічна адсорбція.

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ЗМЕНШЕННЯ БІОГЕННОГО ВПЛИВУ НА БЕТОН У ПРИМІЩЕННІ СВИНАРНИКА ЗА РАХУНОК ВИКОРИСТАННЯ ДЕЗІНФІКУЮЧИХ ЗАСОБІВ (с. 57–66)

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Об'єктом дослідження є закономірність зміни біогенного руйнівного впливу мікроорганізмів на бетонні конструктивні елементи тваринницьких приміщень за рахунок використання оригінальної рідкофазової суміші дезінфектанту на основі альдегіду та поверхнево-активної речовини.

Мікроорганізми використовують будівельні матеріали як субстрат для росту та харчування, а також виробляють лимонну кислоту, яка призводять до зміни складу та морфології гідратних новоутворень цементу.

Встановлений склад мікрофлори свинарника, та визначена мінімальна 1 % концентрація дезінфектанту на основі глютарового альдегіду та дидецилдиметиламонію хлориду. Методом TPD MS доведено зменшення інтенсивності виділення двоокису вуглецю (CO_2) у зразках бетону під час нагрівання зразку до 900 °C, порівняно до контрольного неушкодженого корозією зразка. Електронна мікроскопія зразків бетону показує наявність деструктивних змін та колоній мікроміцетів. Встановлено, що у контрольному зразку бетону, який зберіг цілісність та не підданий корозії при нагріванні до температури 600 °C інтенсивно вивільнялись кальцити. Електронна мікроскопія підтверджує збереження однорідної структури бетону.

Використання дезінфектанту на основі глютарового альдегіду та дидецилдиметиламонію хлориду у концентрації 1 % руйнує колонії мікроміцетів; у 2 % – оболонку мікроорганізмів та у 3 % – біоплівку. Обробка бетону дезінфектантом у концентрації 3 % знищує мікроорганізми Aspergillus fumigatus та Penicillium oxalicum, гальмує процес біологічної корозії бетону та зміцнює структуру бетону.

Результати проведеного експерименту можна приміняти для гальмування корозії бетону та подовження терміну експлуатації будівельних конструкцій виконаних з бетону за рахунок використання дезінфектанту на основі альдегіду та дидецилдиметиламонію хлориду у концентрації 3 % .

Ключові слова: біодеструкція будівельних матеріалів, термопрограмована мас-спектрометрія, мікроміценти, карбонати, цитрат кальцію.

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ОБҐРУНТУВАННЯ ТЕХНОЛОГІЇ ЗАСТОСУВАННЯ ГІГРОСКОПІЧНИХ МАТЕРІАЛІВ ДЛЯ ПИЛЕЗАХИСТУ ДОРІГ З НАЙНИЖЧИМ ТИПОМ ПОКРИТТЯ (с. 67–77)

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У статті представлені результати експериментальних досліджень для типів пухких ґрунтів, легко схильних до пилу. У зв'язку з цією проблемою ставиться завдання вивчення та вивчення причин та структури утворення запиленості у придорожній зоні доріг із поширеними типами покриттів або без покриттів. Експериментальне дослідження спрямоване на визначення часу висихання розчинів хімічного захисту від пилу під дією сонячної радіації та норми їхнього розподілу.

Об'єктом дослідження є пил, що утворюється на дорогах з низькими транспортними та експлуатаційними характеристиками (тимчасові дороги у місцях дорожньо-ремонтних робіт, дороги до кар'єрів та ін.) та матеріали, що використовуються для знепилювання дорожніх покриттів.

Вирішуваним завданням є зниження викиду великої кількості пилу на дорогах без покриття або з покриттям низької якості, що негативно впливає на організм людини.

Отримані результати є визначенням способу боротьби з пилом на дорожніх покриттях, що забезпечує зниження зносу при русі транспортних засобів дорогами без дорожніх покриттів.

При цьому на виході передбачається класифікація пилу за джерелами їхнього утворення.

Завдяки своїм особливостям і характеристикам ці результати дозволили автору вирішити це завдання – ефективними способами боротьби з пилом на дорожніх покриттях є: обробка їх пиловловлюючими матеріалами, що знижують знос; збереження первісної рівності; зниження забруднення повітря; покращення умов руху автомобілів та санітарно-гігієнічного стану доріг поблизу населених пунктів.

Для дослідних випробувань були взяті традиційні розчини солей різної концентрації ($NaCl$, $MgCl_2$, $CaCl_2$, $MgCl_2 \cdot 6H_2O$ та ін.) та розчини стабілізуючих добавок іноземного виробництва Durasoil та Soiltac виробництва SOILWORKS.

Ключові слова: гігроскопічні матеріали, пилозахист, запиленість, придорожня зона, дороги, джерела забруднення, вплив пилу.