СИСТЕМНІ ЕКОЛОГО-ЕНЕРГЕТИЧНІ ДОСЛІДЖЕННЯ
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O. Vovk, doctor of techn. sc., prof., **R. Kravchuk,** master st., **A. Lutc,** master st., **Ch. Adeniyi** master st.,
V. Gladysheva postgraduate st. NAU
National technical university of Ukraine "Kiev Polytechnic Institute"

ALTERNATIVE PRODUCTION OF BIO-FUEL FROM THE BYE PRODUCTS OF OIL SPILLAGE

Analytical approach in identifying of ecologically effective methods for oil spills purification were investigated and new effective method of alternative biofuel production from the bye products of oil spillage were proposed.

Key words: hydrocarbons, oil spills, alternative fuels, algal farming.

Introduction

An oil spill is the release of a liquid petroleum hydrocarbons into the environment, especially marine areas, due to human activity, and is a form of pollution.This pollution can affect our environment in various ways like the depletion of fishes, loss of plantation and gas glaring.

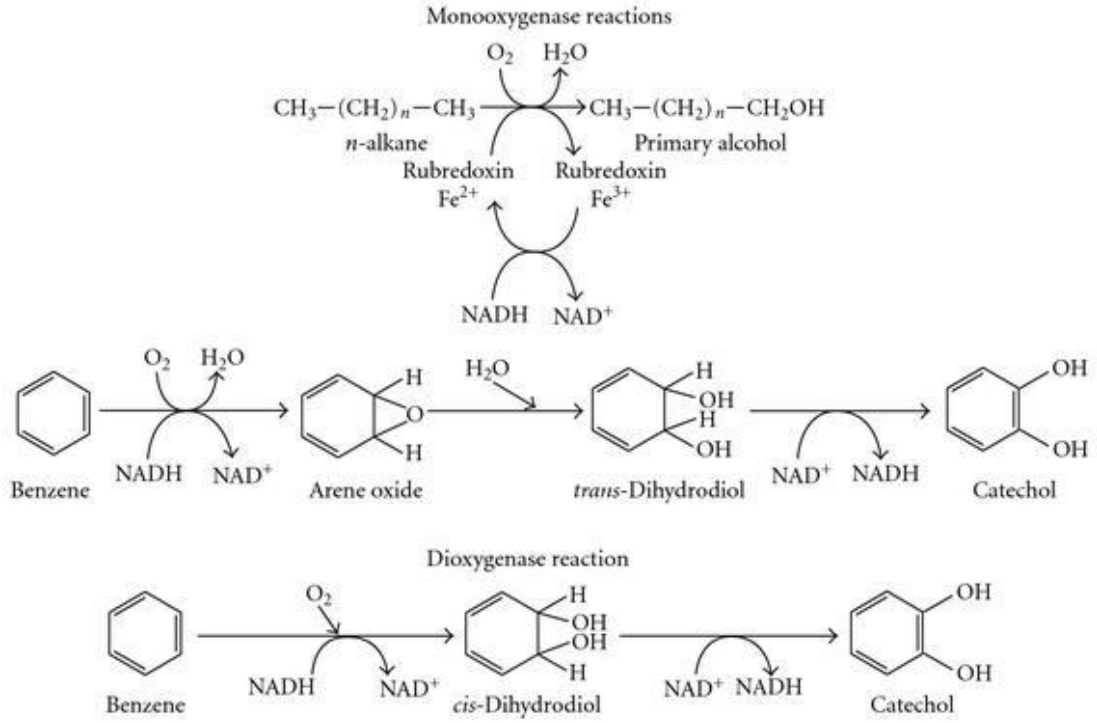
Goal and tasks

In many coastal regions, there were several cases of water pollution, mainly the reason for this action was the production of oil, which resulted in lost of drinking water, as the latter had unsatisfactory condition for consumption. Such damage to the environment requires a lot of effort to restore these ecosystems, so many scientists considerable time trying to come up with ways to solve the problem of water treatment that is, today is the actual implementation of new methods, in particular, and models to improve the state of water resources.

Material and research results

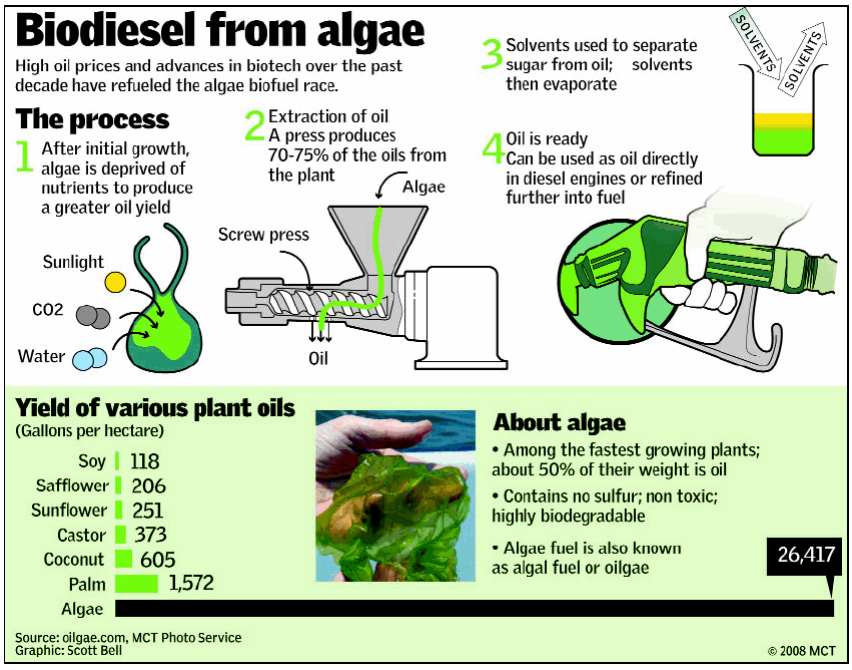
In the purification of water bodies oil-eating microbes naturally affect the oil, but they can be enhanced to effectively degrade the oil spills. Photosynthetic organisms use energy from sunlight to convert carbon dioxide and water into carbohydrates, proteins, and fats, with oxygen as a byproduct. The genetic machinery needed to make these oil-degrading enzymes is most commonly found in bacteria (although many fungi and some other organisms can also degrade oil). Biological mechanisms are not the only factor involved in cleaning up an oil spill. A variety of physical and chemical processes are also at work, such as: evaporation, dissolution, dispersion, photo-oxidation.

Microbes can be counted on to biodegrade oil over time. However, the process may not be fast enough to prevent ecological damage. Immediate containment or physical removal of the oil is therefore an important first line of defense. Even though oil-degrading microbes are found everywhere, their mere presence does not mean that environmental conditions are ideal for oil biodegradation. Environmental conditions, as well as the location, duration, and form of an oil spill strongly affect how quickly biodegradation will occur. One of the most rapid ways this can happen is by horizontal gene transfer (HGT). HGT is a mechanism whereby microbes can share genes with each other—with HGT, a microbe that has the genetic instructions for producing oil-degrading enzymes can transfer copies of those genes to other microbes—even microbes of different species previously incapable of degrading oil components. In this way, microbes that were unable to use oil as a food source acquire that capability. The ability to share genes can greatly promote a local microbial community's capacity to clean up an oil spill.



Picture 1 – *Breakdown of hydrocarbons*

After the degradation there is still a residue. This residue can be used to grow algae, because it is nonpoisonous and organic which in turn can be used to produce bio-fuels. Developing alternative fuels is an essential step towards solving the problems associated with fossil fuels. It is important that alternative fuels be renewable, have less impact on the environment and be produced and used by currently available technology. The natural biodiesel resources such as oil crops and waste cooking oil are not sufficient to cover the global transportation fuel demand.



Picture 2 – *The process of biofuel production from algae*

The pivotal outcome of the project will be cost. This was proved in the well documented closure of the US Department of Energy's algae research program in 1996 after nearly 20 years of work. At the time it was estimated

that the $40-60/bbl cost of producing algal oil just couldn't compete with petroleum for the foreseeable future. In recent years, we have seen the increase in petroleum and the pollution that comes with it. Biofuel from algae will help reduce the fossil fuels usage and carbon emissions. It will also helps in land and nutrient preservation.

Conclusions

Micro algal farming has the potential to be combined with flue gas CO2 mitigation and wastewater treatment. It can also use seawater as a medium when marine micro algal species are utilized which mitigates the problem of freshwater shortages. In addition, there is much potential for cost savings when the production of novel products for use in medicine, food, and cosmetics are coupled with the production of biofuels. Technological developments which include advances in photo bioreactor design, microalgal biomass harvesting, drying and other downstream processing technologies are important areas that need to be addressed in order to effectively implement the use of biofuel from algae as a replacement for fossil fuels. Algal biodiesel has prospects in developing countries such as China, India, Nigeria etc, but research of algal as a source of biofuel is lacking among Ukrainian Universities compared to China and other developing countries.

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О.А. Вовк, д.т.н., проф., **Р. Кравчук,** магистр, **А.О.Луц,** магистр, **К. Адений**, магистр., **В. А. Гладышева,** аспирант НАУ
Национальный технический университет Украины «Киевский политехнический институт»

АЛЬТЕРНАТИВНОЕ ПРОИЗВОДСТВО БИОТОПЛИВ ИЗ ПОБОЧНЫХ ПРОДУКТОВ НЕФТЯНЫХ ПЯТЕН

В статье рассмотрен аналитический метод определения экологически эффективного способа очищения нефтяных пятен и предложен новый метод получения альтернативного биотоплива из побочных продуктов нефтяных пятен.

Ключевые слова: углеводороды, нефтяные пятна, альтернативные топлива, аквафермы.

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О.О. Вовк, д.т.н., проф., **Р. Кравчук,** магістр, **А.О. Луц,** магістр, **К. Аденій,** магістр., **В. А. Гладишева,** аспірант НАУ
Національний технічний університет України «Київський політехнічний інститут»

АЛЬТЕРНАТИВНЕ ВИРОБНИЦТВО БІОПАЛИВ З СУПУТНІХ ПРОДУКТІВ НАФТОВИХ ПЛЯМ

В статті розглянуто аналітичний метод визначення екологічно ефективного способу очистки нафтових плям та запропоновано новий метод отримання альтернативного біопалива з супутніх продуктів нафтових плям.

Ключові слова: вуглеводні, нафтові плями, альтернативні палива, аквaферми.

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