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Área Temática: Educativa

Applying biotechnology research to achieve a sustainable university with students of Biotechnology area at the Polytechnic Universities from Mexico

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Applying biotechnology research to achieve a sustainability environment with students of Biotechnology area at the Polytechnic Universities from Mexico

This project introduces Community Problem Solving as a teaching and learning strategy considered pedagogical approach used in engineering courses. This paper describes implementation of the teaching theory and practice approach on laboratory by introductory environmental engineering course. This helps to develop the important citizenship objectives of learning for a sustainable future and integrates skills for both students and teachers of using experiential and enquiry-based strategies. It also integrates skills in the planning of values clarification and values analysis with the possible solutions so students can take action to help achieve a sustainable future. Our basic goal is the removal of blue Sandocryl BB41 textile dye from aqueous solution in order to decrease the possibility of detrimental impacts on humans from textile industry in studies to future. A team format was followed for all activities. Each team (2 total) was required to maintain a standard laboratory notebook with meticulous records of all activities (raw data, measurement procedures, interpretation, etc.). Finally, we will conduct a team to the adsorption data fitted well into the kinetics adsorption. (Scott N., H. R. 2003)

Keywords

Interdisciplinary education, Biotechnology environmental, Adsorption.

Introduction

Most Engineering programmers do not facilitate the continuous assessment process and an interdisciplinary connection between different subject matters. Traditional learning is mostly an end-term process in which the fundamental acquired competency would be the competency to pass final exams. A more contextualized, autonomous, interdisciplinary learning and student-conduced process, continuously assessed, could contribute to a more effective learning process (R.M Lima, 2007). Biotechnology is becoming more popular and well identified as a mainline industry. Students have shown greater interest in learning the e. As a discipline biotechnology has led to new advancements in many areas. Industrial biotech applications have led to cleaner processes that produce less waste and use less energy and water in such industrial sectors as chemicals, pulp and paper, textiles, food, energy and metals and minerals. Agricultural biotechnology benefits farmers, consumers and the environment by increasing yields and farm income, decreasing pesticide applications and improving soil and water quality and providing healthful foods for consumers. This rise in application has led to an increased rise in the number of students undertaking University level biotechnology engineering.

Objective

This study introduces to the students on how biotechnological tools can be used to study environmental assessment, monitoring and remediation of water. This project associate to courses of bioremediation and physical chemistry, the which will facilitate understanding in biotechnology and the application in wastewater treatment, this study introduces students to the use of some experimental methods for determining of adsorption physical, kinetics and surface phenomena.

Education, Training and Development

Remotion of dyes textile BB41 on wastes maize from Puebla Mexico

Agricultural and food wastes are high volume, low value materials that are highly prone to microbial spoilage, limiting their exploitation. Further exploitation can also be precluded by legal restrictions and the costs of collection, drying, storage and transportation. Thus, for the most part, currently these materials are either used as animal feed (not always adequate due to difficulties in properly balancing the nutritional requirements), combustion feedstock or disposed to landfill causing major environmental issues (e.g., emission of large quantities of volatile organic compounds in the case of combustion, and contamination of groundwater in the case of landfill). These materials usually contain high levels of cellulose, hemicellulose, lignin and proteins and as such can constitute renewable natural resources for a plethora of inexpensive eco-friendly and sustainable materials. Examples of such inexpensive materials are low cost adsorbents. Adsorption has been deemed one of the best techniques for the removal of organic and inorganic pollutants of wastewaters and of undesirable chemical components in the agri-food industry. Because of their excellent adsorption ability, activated carbons are the most widely used sorbents and have been employed in the agro-food industry for a diversity of applications such as the decolorization of sugar and vegetable oils, the removal of copper ions and undesirable organics in the distilled alcoholic beverages industry and others. However, although activated carbon is certainly the preferred sorbent, its widespread use is restricted by its inherently high cost (mostly related to the costs of the precursor material and of the energy intensive production processes) and hence, the production of low cost adsorbents has been recently intensively sought. (Elizalde-González M. P., 2006). In differents studies described that diverses adsorbents has received special attention in chemical activation involves an impregnation of the precursor material with the chemical agent (either in aqueous solution or in solid state) prior to heat treatment. The specific problem addressed in this learning process is that the adsorption of dyes is mainly in the natural adsorbents, although the removal efficiency that is achieved dependent on the dye's properties and structure, and to an equal extenti on the surface chemistry of the adsorbent. The adsorption capacity of these

nonconventional adsorbents is due to the presence of biopolymers such as polysaccharides, lignin, hemicelluloses, and cellulose. (Dávila-Jimenez M.M, 2005)

Methods

The goals of study reported and analyze the perceptions of the participants in this experience in regard to learning process and discuss the implications of these in improving teaching/learning process in particular teacher`s and student`s role. 4 students participating in the experience which included selection of materials:

Adsorption experiments

Adsorption experiments were conducted by varying contact time in various concentration of basic blue 41 (BB41). The experiments were carried out in 10 ml Erlenmeyer flasks and the total volume of the reaction mixture was kept at 5 mL. The equilibrium concentrations of the solution samples were analyzed using UV-Vis spectrophotometer (Model Perkin Elmer). Standard calibration curve was prepared by recording the absorbance values of various concentration of BB41 dye at maximum absorbance of wavelength (610 nm). A magnetic stirrer was used to agitating the samples.

Bio adsorbents wastes maize

The wastes of peel maize were collected from Mercado la COCOTA from Puebla Mexico. Collected materials were washed with distilled water for several times to remove all the dirt particles and laid flat on clean table to dry. After, the peel tamale particles were sieved by using dp 0.3 mm. This produced a uniform material for the complete set of adsorption tests, which was stored in an air-tight plastic container for all investigations.

Results

Biosorption studies

The adsorption experiments were carried out by batch process 0.1 g of biosorbent was placed in Erlenmeyer flasks with 5 mL solution of basic blue 41 of a set concentration in the range 0.2–1.0 mM.. The mixture was agitated.. The contact time was varied from 0 to 80 minutes. All the experiments were performed in duplicates. The amount of basic blue 41 adsorbed at equilibrium per unit mass of bio sorbent was determined according to the following equation 1:

$$q_e = \frac{(C_0 - C_e)V}{m} \qquad (1)$$

Where, m is the mass of adsorbent (g), V is the volume of the solution (L), C0 is the initial concentration of methylene blue (mg/L), Ce is the equilibrium concentration of the adsorbate (mg/L) in solution and qe is the methylene blue quantity adsorbed at equilibrium (mg/g).

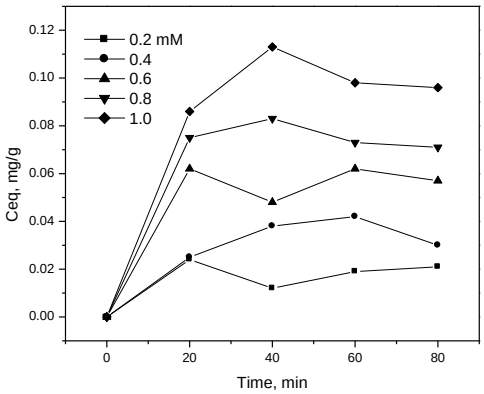

Fig 1. Adsorption of basic blue 41 onto wastes maize reached equilibrium in 80 min.

Results depicted in Fig. 1 clearly show that the adsorption of basic blue (0.2-1.0 mM) onto wastes maize reached equilibrium in 80 min. Adsorption first followed linear rising in which instantaneous, extremely fast uptake takes place in 20 min, and then a stationary state was observed 60 min. The fast initial uptake was due to accumulation of basic blue on surfaces of maize adsorbent which is a rapid step. It was concluded that 160 min was sufficient for adsorption to attain equilibrium.

Student's perceptions

The Students identified a wide range of learning process and outcomes. They said to have learned how to engage in team work and how collaborate with colleagues. Peer interaction emerges as a source of motivation, also was observed that during the semester they have learned how to learn this method enable to be more responsible and your experimental project. See Fig 2

Fig.2 Students also highlighted that they have learned how applied knowledge to the experimental project

The students comments that the project was the opportunity to put into practice theory knowledge learned in the previous semester for develop the competencies related to biotechnology Engineering.

Main difficulties

The universities require laboratories to educate sufficient target group with the details of common biotechnological techniques and protocols, as well as, complicated instruments that are routinely employed in biological and chemical laboratories.

Discussion

The perceptions of students and teachers with regard to their experience in the project are in general, positive. They refer to teamwork, communication skill, connection with the professional practice, and increased motivation for learning. The characteristics of project learning as identified by (Elizalde-González M. P, 2006). This project experimental appears to be an answer to the initial motives for the implementation of this proposal and needs to be more explored in further research.

Conclusions

The perceptions of students and teachers with regard to their experiences in the project are, in general, positive. They all refer to teamwork, communication skills, connection with the professional practice, and an increased motivation for learning. However, most students did not have any experience with project work and were therefore rather disorganized. This projects enhance quality of learning in engineering education has proven to be useful in a sense that contents became more interrelated, student motivation has increased and teacher job satisfaction also has increased. In spite of the negative aspects that are evidently identified by students and teachers, all clearly recognize the advantages and compared to more traditional approaches to teaching and learning whit this experimental practice.

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