(All.2)

BANDO N. 400.6 ISMN PNRR

Selezione per titoli e colloquio ai sensi dell'art. 8 del *"Disciplinare concernente le assunzioni di personale con contratto di lavoro a tempo determinato"*, per l'assunzione, ai sensi dell'art. 83 del CCNL del Comparto "Istruzione e Ricerca" 2016-2018, sottoscritto in data 19 aprile 2018, di una unità di personale con profilo professionale di Ricercatore III livello, presso l'Istituto per lo Studio dei Materiali Nanostrutturati - Sede di Palermo – CUP B53C22004100001.

Domande codice 01

1) Descrizione dell'attività scientifica pregressa

2) I principi della chimica verde applicata all'economia circolare

3) Lettura e traduzione del seguente brano dell'articolo "Implementation of green chemistry principles in circular economy system towards sustainable development goals: Challenges and perspectives" Science of the Total Environment 716 (2020) 136998 (DOI: 0.1016/j.scitotenv.2020.136998):

1.1. Sustainable development goals (SDGs) and green chemistry

Sustainable development goals (SDGs), the collection of 17 goals proposed by the United Nations in 2015, aimed to improve the world welfare by tackling social, environmental, and economic sustainability. Among SDGs, clean water and sanitation (SDG 6), responsible consumption and production of resources (SDG 12), and actions against climate change (SDG 13) were related to the impacts of foul water, toxic waste, and climate change on the world welfare. Currently, 40% of world population is seriously impacted (negatively) by the water scarcity. Both leakage of toxic chemicals and global warming play a key role (negative) in causing water pollution and water scarcity. Therefore, the Paris Agreement, signed by a majority of the developed and developing countries (174 countries and European Union) in 2016, initiated the Green Climate Fund aiming at mitigating the greenhouse gas emissions (Seo, 2017).

Green chemistry principles (GCP) were created by Paul Anastas and John Warner, who had attempted to define a greener (or more environment-friendly) chemical process or product (Anastas, 2007). The concept was developed seeking the prevention of pollution before it would occur at its source by minimizing the use of hazardous chemicals. In general, GCP could highlight the design of safer chemicals, the use of catalysts rather than stoichiometric reagents, and the prevention of waste production (Anastas and Warner, 1998; Zhang, 2017).

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(All.3)

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Domande codice 02

1) Descrizione dell'attività scientifica pregressa

2) Processi chimici sostenibili e bioeconomia

3) Lettura e traduzione del seguente brano dell'articolo "Lignocellulose in future biorefineries: Strategies for cost-effective production of biomaterials and bioenergy" Bioresource Technology 344 (2022) 126241 (DOI: 10.1016/j.biortech.2021.126241):

2.7.1. Platform chemicals

The development of bio-refineries to manufacture platform chemical is a fantastic chance to reduce our inevitable reliance on petroleum-based chemicals. According to recent research, producing platform chemicals from feedstocks necessitates a variety of pretreatment methods, as well as single or multiple pretreatments with the purpose of initially separating cellulose, hemicellulose and lignin fractions (Takkellapati et al., 2018). The early pretreatment systems have the changes depending on the raw biomass existence and technical growth. The cellulose and hemicellulose components are hydrolyzed to sugar monomers after separation, while the lignin fraction is mainly used to manufacture aromatic compounds. The sugar monomers, either C_5 or C_6, are used in the sugar platform of a biorefinery to produce mainly propylene, xylose, galactose, ethylene, acetic acid and mannose (Kumar et al., 2018). The cellulosic biomass converted into platform chemicals such as toluene, glucaric acid, syringols xylitol, aspartic acid, styrene, 3-Hydroxypropionic acid (3-HPA), phenols, glutamic acid, xylene, eugenol, and others has been reported (Arevalo-gallegos et al., 2017; Bilal and Iqbal, 2019). While considering platform chemicals production from water hyacinth, several possibilities are involved. One route is decomposition of hydrolyzed cellulose into fructose and glucose at a temperature above 200 °C. Also, crystalline cellulose converted into polymorph or amorphous polymorph via gelatinization (Gaurav et al., 2020).

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Domande codice 03

1) Descrizione dell'attività scientifica pregressa

2) Le risorse biologiche come fonte di molecole ad alto valore aggiunto

3) Lettura e traduzione del seguente brano dell'articolo "Waste-to-chemicals: Green solutions for bioeconomy markets", Science of the Total Environment 887 (2023) 164006 (DOI: 10.1016/C2019-0-05237-5):

7. Importance of green chemistry in the bioeconomic market

A new model was proposed for the economy in 2015, collaborating with "closing the loop- An EU action plan for a circular economy" (Mhatre et al., 2021). Now a day, the challenging aim is how to enhance the value of waste by using it in another sector and producing valuable materials. The main requirement for the growth of this proposed model to get a circular chain was finalized in which products with high value were produced from agricultural waste, co-products and by-products. The main objective is to use waste materials as raw materials and substrates and to give innovative value-added products (Diacono et al., 2019).

Bioeconomy is also toward the process of the low carbon economy. Nowadays, various industries work on the waste obtained from agriculture, forest, household, and SMW to convert them into valuable products and contribute to an economy based on biomass, extending the term bioeconomy. The bioeconomy mainly focuses on three aspects: i) much investment is made in research, innovation and skill, ii) strengthening of policy interaction, iii) robustness in markets and competition in bioeconomy (Scarlat et al., 2015). An approach that uses organic waste as industrial raw material will move forward toward the era of bio-economy. Further, circular economy helps in the expansion of markets that are based on green products. The food waste is converted into many products like antioxidants (Lima et al., 2022), microbial oil, biofertilizers and biogas (Haouas et al., 2022; Saba et al., 2023), enzymes, bioplastics (Sharma et al., 2021), pectin, biodiesel (Mahmoud et al., 2022) as shown in Fig. 17 and contributes majorly to the bioeconomy (Maina et al., 2017).

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