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Exame de Proficiência

2023.2

Inglês **Engenharia**

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1	Confira se os dados contidos na parte inferior desta capa estão corretos e, em seguida, assine no espaço reservado para isso. Se, em qualquer outro local deste Caderno, você assinar, rubricar, escrever mensagem, etc., será excluído do Exame.
2	Este Caderno contém 5 questões discursivas referentes à Prova da Língua Estrangeira escolhida pelo candidato. Não destaque nenhuma folha.
3	As respostas às questões deverão ser redigidas **em PORTUGUÊS**.
4	Se o Caderno estiver incompleto ou contiver imperfeição gráfica que impeça a leitura, solicite imediatamente ao Fiscal que o substitua.
5	Será avaliado apenas o que estiver escrito no espaço reservado para cada resposta, razão por que os rascunhos não serão considerados.
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7	**Só será permitido o uso de dicionário INGLÊS/INGLÊS.**
8	A Comperve recomenda o uso de caneta esferográfica, confeccionada em material transparente, de tinta preta. Em nenhuma hipótese se avaliará resposta escrita com grafite.
9	Utilize para rascunhos o verso de cada página deste Caderno.
10	Você dispõe de, no máximo, três horas, para responder as 5 questões que constituem a Prova.
11	Antes de retirar-se definitivamente da sala, devolva ao Fiscal este Caderno.

Assinatura do Candidato: _____

As questões de 01 a 05, cujas respostas deverão ser redigidas EM PORTUGUÊS, referem-se ao texto abaixo.

CHEMICAL ENGINEERING AND INDUSTRIAL ECOLOGY: REMANUFACTURING AND RECYCLING AS PROCESS SYSTEMS

Piero Salatino, Roberto Chirone, Roland Clift

We live in 'interesting times.' The starting point for this paper is that human activities are putting the Earth's biosphere into crisis. Climate change, caused by anthropogenic emissions of greenhouse gases, is a well-recognized component of the environmental crisis, but the capacity of the planet to absorb the emissions of human activities and supply the resources on which humans depend has already been exceeded in other ways. These aspects of the unsustainability of current human society and economy come together in the concept of the 'Nexus': that water, food, and energy security are inextricably linked, so that economic activities and some social habits must be changed radically and urgently if we are to leave a sustainable future for our descendants.

The developing global crises require the role of chemical engineering to be rethought. As an urgent example, many of the industries in which many chemical engineers work—notably, oil, gas, and petrochemicals—must address carbon management to mitigate emissions of greenhouse gases and, in some cases, be phased out if we are to avoid catastrophic damage to the biosphere. For the discipline to remain relevant, the skill set that makes up chemical engineering must therefore be deployed in new ways. One response is the growing application of chemical engineering to produce materials from biological sources, for example, through the development of biorefineries. This paper, thus, aims to illustrate how the skills of the chemical engineer can be redeployed in the emerging field of industrial ecology.

Discussion

Economic growth is inherently unsustainable, as it implies unbounded access to limited resources on a finite planet. One of the main goals of sustainable development is to ensure universal access to a decent quality of life while reducing resource depletion to a level compatible with societal, demographic, technological, and economic development. Resource exploitation is a large component of conventional measures of economic activity, such as gross domestic product (GDP), so this implies limiting economic growth. The 'post-growth' agenda has explored the implications of focusing on the provision of social welfare rather than economic growth per se from a macro-economic perspective. The analysis developed here complements that approach by taking a process-based perspective.

A notable consequence of the search for sustainable primary resources as substitutes for abiotic materials is the growth of the bio-based economy, whose underlying vision is that using biological resources and processes can lead to less unsustainable growth in bio-based products, energy, and services. However, this general aspiration must be qualified by recognizing that land itself is a scarce resource, so that material and energy crops must be reconciled with food and feed production. Therefore, development of biorefineries and bioproducts in pursuit of sustainability requires an approach to process engineering that incorporates broader system thinking using life cycle assessment.

Conclusions

Chemical engineering as a discipline and as a way of thinking can play its full role in the transition to a more sustainable economy if the skills of the chemical engineer are deployed in new ways, going beyond developing new technologies. Systems for the production, use, remanufacture, and recycling of durable goods are an area where relatively simple process analysis can yield new and valuable insights and stimulate creative solutions. Modelling the system in terms of the material flows needed to build up, operate, and maintain the stock relates demand for virgin material to the proportion of end-of-life products recovered and recycled and to

a dimensionless growth rate of stock representing the fractional growth of stock during the lifetime of a single item. The analysis shows how demand for scarce materials develops as their industrial ecologies mature and reveals the importance of extending product life and intensifying the use of stock. Remanufacturing goods is preferable to recycling of individual elements. The penalties of recycling increase rapidly with the decreasing concentration of valuable materials and the increasing number of materials in the mixture. Therefore, promoting closed-loop use of materials involves rethinking product design to reduce the number of different materials used. Material substitution can reduce demand for scarce materials, but vision and foresight are essential to look beyond the current use of materials and consider how they will be utilized in the future economy.

Adapted from https://doi-org.ez18.periodicos.capes.gov.br/10.1002/cjce.24625

Question 1

Present the objective(s) of the present research.

Espaço para Resposta

Question 2

Discuss what the concept of nexus entails, according to the text.

Espaço para Resposta

Question 3

Define, according to the authors, one of the main aims of sustainable development in the context of unsustainable economic growth.

Espaço para Resposta

Question 4

Explain, according to the authors, what the fundamental vision of bio-based economy is.

Espaço para Resposta

Question 5

Translate the excerpt below. The translated text should be clear and accurate in terms of structure and meaning.

> *Chemical engineering as a discipline and as a way of thinking can play its full role in the transition to a more sustainable economy if the skills of the chemical engineer are deployed in new ways, going beyond developing new technologies. Systems for the production, use, remanufacture, and recycling of durable goods are an area where relatively simple process analysis can yield new and valuable insights and stimulate creative solutions. Vision and foresight are essential to look beyond the current use of materials and consider how they will be utilized in the future economy.*

Espaço para Resposta