

## Prova Inglês PPGQUIM –Processo seletivo 2025\_2

### Chave de resposta

Leia o texto para responder as questões que seguem:

**Texto: “RESILIENCE by design: ten principles to guide chemistry in a volatile world” (Green Chem., 2025, 27, 7742–7747)**

The article *“RESILIENCE by design: ten principles to guide chemistry in a volatile world”* addresses the growing dependence of the chemical sciences on electricity and the vulnerabilities that arise from this reliance. A large-scale power outage that affected Iberian Peninsula in April 2025 disrupted chemical manufacturing, scientific research, and education. This incident raised critical questions about how chemistry can become more resilient to unexpected disruptions.

To respond to these concerns, the article proposes a set of ten guiding principles for resilient chemistry, organized under the acronym RESILIENCE. Each letter represents a different principle aimed at strengthening the ability of chemical systems to withstand and adapt to crises:

- R – Range of renewable feedstocks: Chemical industries should use a diverse portfolio of renewable raw materials to reduce dependency on fossil fuels and avoid supply vulnerabilities.
- E – Evaluate potential disruptions: Chemists must identify and assess risks such as power failures, climate events, or supply chain breakdowns using tools like HAZOP (Hazard and Operability Study) and FMEA (Failure Mode and Effects Analysis).
- S – Safe operation in all circumstances: Processes must be designed with broad safety margins so they can continue operating or shut down safely under unusual conditions.

- I – Interruptible processes: Chemical processes should be able to pause and restart without safety hazards, loss of materials, or excessive cost.
- L – Localized production on distributed sites: Moving away from centralized factories, smaller and geographically spread manufacturing units offer better security and flexibility.
- I – Inherently safe processes: Following the idea that “what you don’t have, can’t leak,” chemists should design systems that are safe by nature and avoid hazardous intermediates whenever possible.
- E – Educate a resilient chemical workforce: Training should prepare future professionals with transdisciplinary skills, lifelong learning, and adaptability to rapid changes.
- N – Net-zero but with multiple energy sources: Resilient chemistry requires alternative energy options, such as steam from biomass or solar power, not just grid electricity.
- C – Continuous flow reactors: These systems offer flexibility, safety, and energy efficiency, and can be powered by renewable sources like solar energy.
- E – Engineer for both resilience and sustainability: New and existing processes must be robust in the short term and environmentally responsible in the long term, benefiting both current and future generations.

The article emphasizes that resilience in chemistry is not limited to maintaining industrial production. It also protects education, research infrastructure, and broader societal systems. The authors call on the global chemistry community to adopt resilience as a core value, integrating it into daily practice, education, and policymaking.

## Questões

**1. What triggered the discussion about resilience in chemistry, according to the article?**

- A) A shortage of chemical products in Asia
- B) The expansion of green chemistry programs
- C) A major power failure in the Iberian Peninsula
- D) The development of continuous flow reactors

**Resposta: C**

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**2. Which of the following is not mentioned as a consequence of the 2025 blackout?**

- A) Interruption in manufacturing of chemical products
- B) Interruption of laboratory research
- C) Loss of internet access globally
- D) Suspension of educational activities

**Resposta: C**

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**3. In the context of the article, what is the best synonym for “resilient”?**

- A) Fragile
- B) Adaptable
- C) Predictable
- D) Automated

**Resposta: B**

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**4. In the sentence “Resilient chemistry is portrayed as essential not only for maintaining production, but also for protecting research...”, the phrase “not only.. but also” expresses:**

- A) Contradiction
- B) Condition
- C) Emphasis on alternatives
- D) Addition of related ideas

**Resposta: D**

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**5. The principle “Engineer for both resilience and sustainability” suggests that chemical processes must:**

- A) Use only traditional engineering methods
- B) Focus on immediate results and ignore the future
- C) Meet present needs while preserving long-term viability
- D) Avoid digital technologies at all costs

**Resposta: C**

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**6. In the context of the article, the word “robust” is closest in meaning to:**

- A) Expensive
- B) Reliable
- C) Basic
- D) Unstable

**Resposta: B**

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**7. In the sentence “It also protects education, research infrastructure, and broader societal systems,” in the last paragraph, what does the pronoun “It” refer to?**

- A) Education
- B) Resilience in Chemistry
- C) societal systems
- D) Industrial production

**Resposta: B**

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**8. Which of the following best summarizes the main message of the article?**

- A) Chemistry should return to fossil-based systems.
- B) Electricity is no longer necessary in chemical processes.
- C) Chemists should ignore political concerns when designing processes.
- D) Resilience must become a central value in chemical science.

**Resposta: D**