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**Sustainability of Refilling Disposable Gas Canisters**

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**Abstract**

This study investigates the sustainability of refilling disposable gas canisters as an alternative to single-use disposal. With increasing environmental concerns over waste generation and resource depletion, refilling canisters may provide economic and ecological benefits. The research assesses factors such as material integrity, cost-effectiveness, safety considerations, and environmental impact. Data was gathered through laboratory testing, cost analysis, and user surveys. The findings suggest that while refilling can reduce waste and lower costs, challenges related to safety risks, regulation compliance, and long-term durability remain significant. The study concludes that refilling disposable canisters is a viable but conditional approach, requiring proper implementation and safety measures for widespread adoption.

**Introduction**

Disposable gas canisters are commonly used for portable stoves, camping, and small-scale heating. While convenient, they contribute significantly to metal waste and environmental pollution due to their single-use nature. The growing global emphasis on sustainable practices necessitates exploring alternatives such as refilling and repurposing these canisters. This study aims to assess the feasibility and sustainability of refilling disposable gas canisters by examining its economic, environmental, and safety implications. Specifically, it seeks to answer whether refilling such canisters is practical in reducing waste while maintaining safety and efficiency.

**Findings**

**1. Environmental Impact**

Refilling canisters significantly reduces metal waste and carbon emissions associated with manufacturing new canisters. Properly cleaned and reused canisters lower landfill contributions and resource depletion.

**2. Economic Viability:**

The cost of refilling a canister is substantially lower than purchasing new ones, making it an attractive option for consumers seeking affordability.

**3. Material Integrity:**

Refilled canisters undergo wear and stress, which may weaken the structural integrity over multiple refills. Testing shows that most canisters maintain durability after one or two refills but degrade with repeated use.

**4. Safety Concerns:** Refilling poses safety risks, including leaks, explosions, and improper sealing. Regulations typically discourage or prohibit refilling disposable canisters due to these hazards.

**5. Public Perception:** Survey data indicates mixed opinions, with users expressing interest in sustainability but hesitancy due to safety concerns. Proper education and safety measures could improve acceptance.

**Conclusion**

Refilling disposable gas canisters presents a promising yet challenging sustainability solution. While the practice reduces waste and costs, safety risks and regulatory restrictions must be addressed for it to become a mainstream alternative. Future efforts should focus on improving canister designs for safe refilling, enforcing strict safety guidelines, and raising awareness of proper refilling techniques. Overall, with the right policies and technological advancements, refilling disposable gas canisters could contribute significantly to sustainable fuel usage.