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A Research Paper on Design and Development of a Portable Peltier-Based Insulin Cooler

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Abstract: This study investigates the design and performance of a promising and efficient Peltier-based insulin cooler designed for mobility and reliability. The cooler uses a box made of expanded polystyrene (EPS) as a housing inside which two plastic holders are used to securely hold the insulin pen. To ensure the humidity is controlled, edible silica gel packs are placed below the plastic insulin holder. While internal fans provide air circulation around the entire insulin pen. The thermostat measures the internal temperature and disconnects only the Peltier module to prevent overcooling when the temperature decreases below 4 °C. The fans remain on after the Peltier device shuts off to prevent heat from affecting the cooler side. The Peltier module is mounted on the lid of the box and is attached with a thermal paste, heat sink and an external fan to optimize heat dissipation. This innovation is designed to maintain uniform temperature and humidity, ensuring insulin safety and usability during travel. The detail on this study is included in the research paper.

Keywords: Insulin Cooler, Peltier Insulin Cooler, Travel Insulin Cooler, Medical Insulin Cooler, Portable Insulin Cooler, Mains- Powered Insulin Cooler, Thermoelectric Insulin Cooler, Smart Insulin Cooler

