Pengembangan masa phase change materials sebagai elemen pemanas inkubator bayi non-elektrik = Mass development of phase change materials as heating element for non-electric neonatal incubator

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Abstrak

[Salah satu tantangan dalam meningkatkan standar kesehatan di Indonesia adalah masih tingginya angka kelahiran bayi prematur. Upaya penyelamatan bayi
yang lahir prematur terhambat oleh beberapa faktor terutama faktor ekonomi yang disebabkan mahalnya biaya perawatan di ruang NICU rumah sakit. Selain itu, distribusi listrik yang belum merata menyebabkan sedikitnya rumah sakit yang menyediakan fasilitas inkubator terutama pada wilayah terpencil di Indonesia. Penggunaan Phase Change Materials dari kelompok organik sebagai elemen pemanas inkubator portable non-elektrik agar aman bagi pernafasan bayi
dan mudah pendistribusiannya menjadi salah satu alternatif upaya penyelamatan bayi prematur yang lahir terutama diwilayah yang belum dialiri listrik nasional. Eksperimen ini bertujuan mendapatkan masa PCM yang paling efisien sesuai Standar Nasional Indonesia untuk mendapatkan rentang waktu dan temperatur paling ideal bagi bayi prematur. Juga pengurangan masa PCM akan meringankan bobot inkubator secara total serta mengurangi biaya. Eksperimen dilakukan menggunakan prototype Inkubator Grashof seri-F yang memanfaatkan fenomena konveksi natural dalam proses pemanasan ruang inkubator. Temperatur diukur menggunakan termokopel tipe K yang dihubungkan pada Modul NI9211. Grafik pengukuran digambarkan oleh perangkat lunak Labview 8.5 yang diinstal pada Personal Computer Unit. Hasil eksperimen menunjukkan masa PCM jenis Beeswax sebesar 3kg adalah yang paling efisien dalam penggunaan energi. Aplikasi fin juga membantu mempersingkat waktu tunggu sebelum penggunaan
inkubator dan distribusi panas yang lebih merata dalam ruang inkubator.
.....One of the challenges in improving health standards in Indonesia is a high number of neonatal birth. Government efforts to save neonatals hampered by several factors especially economic factors caused by high cost of neonatals care in NICU room at the hospital. Moreover, the uneven of electricity distribution cause least hospitals providing incubator facilities, especially for remote areas in Indonesia.
The use of Phase Change Materials from the organic group as a heating element for portable non-electric incubator to be safe for the baby's breathing and
easy distribution into an alternative rescue efforts, especially premature babies born in the region that has not been electrified nationwide. Experiments aimed at finding the most efficient mass of PCM based on Indonesian National Standard to get the ideal time and temperature range for premature babies. PCM mass reduction also will lighten the weight of the incubator in total as well as reduce costs. Experiments conducted using prototype Incubator Grashof-F series which utilizes natural convection phenomena in the process of incubator space heating.
Temperatures were measured using a K-type thermocouple connected to the module NI9211. Measurement chart illustrated by Labview 8.5 software installed on the Personal Computer Unit. The experimental results indicate the mass of 3kg PCM types Beeswax is the most efficient in energy use. Applications fin also help shorten the waiting time before the use of incubators and more even heat distribution within the

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