Pusat Informasi Kesehatan Masyarakat >> S1 - Skripsi

Uji Validitas Alat Realtime Monitoring Particulate Matter 2,5 Berbasis Low-cost Sensor di Area Indoor dan Outdoor

Dhiaurrahman, Axell Raditya

Deskripsi Lengkap: https://lib.fkm.ui.ac.id/detail.jsp?id=139151&lokasi=lokal

---

Abstrak

Pajanan konsentrasi PM2,5 merupakan salah satu bahaya kimia di lingkungan kerja yang dapat menyebabkan berbagai gangguan kesehatan. Dalam keilmuan Higiene Industri, salah satu tahapan yang ditujukan untuk menanggulangi pajanan konsentrasi PM2,5 di lingkungan kerja adalah evaluasi, yang dapat dilakukan dengan cara mengukurnya dengan alat ukur berstandar. Akan tetapi, harga dan biaya operasional alat ukur tersebut sangat tinggi. Seiring berkembangnya teknologi, telah dikembangkan alat realtime monitoring PM2,5 berbasis low-cost sensor. Akan tetapi, validitas hasil pengukuran alat tersebut masih belum diketahui secara komprehensif. Maka dari itu, penelitian ini bertujuan untuk mengetahui dan menganalisis validitas alat realtime monitoring PM2,5 berbasis low-cost sensor terhadap DustTrak TSI 8530 sebagai alat ukur referensi di area indoor dan outdoor. Penelitian ini menggunakan desain studi komparasi dengan pendekatan analitik observasional. Validitas alat tersebut akan dianalisis melalui perbandingan hasil pengukuran konsentrasi PM2,5 antara kedua alat tersebut berdasarkan kriteria presisi, bias, linearitas, dan error sesuai dengan panduan yang ada pada SNI Nomor 9178 tahun 2023. Hasil penelitian menunjukkan bahwa pada pengujian di indoor, kriteria validitas yang diterima sesuai persyaratan terdiri dari Standar Deviasi (SD) yang didapatkan sebesar 1,25 μg/m^3, Koefisien Variasi (KV) sebesar 5,33%, Intercept sebesar -3,419, dan Koefisien Determinasi (R²) sebesar 0,924. Akan tetapi, terdapat kriteria validitas yang tidak diterima sesuai persyaratan, yaitu slope yang didapatkan sebesar 0,515 dan Root Mean Square Error (RMSE) sebesar 26,9 μg/m^3. Selanjutnya, pada pengujian outdoor kriteria validitas yang diterima sesuai persyaratan terdiri dari SD yang didapatkan sebesar 3,81 μg/m^3, KV sebesar 8,35%, Intercept sebesar -3,454, dan R² sebesar 0,916. Akan tetapi, terdapat kriteria validitas yang tidak diterima sesuai persyaratan, yaitu slope yang didapatkan sebesar 0,532 dan RMSE sebesar 50,2 μg/m^3. Maka dari itu, hasil Uji Validitas di kedua area pengukuran tidak valid karena kriteria slope dan RMSE di dua area pengukuran tidak diterima sesuai persyaratan, sehingga diperlukan adanya rumus adjusted sensor concentration ke dalam program alat tersebut agar dapat valid dan setara dengan DustTrak TSI 8530. <hr /> Exposure to PM2,5 concentration is one of the chemical hazards in the workplace that can cause various health problems. In Industrial Hygiene science, one of the stages aimed at overcoming exposure to PM2,5 concentration in the workplace is evaluation, which can be done by measuring it with standardized measuring instruments. However, the price and operational costs of these measuring instruments are very high. As technology develops, realtime monitoring device for PM2,5 based on low-cost sensors have been developed. However, the validity of the measurement results of these tools is still not comprehensively known. Therefore, this study aims to determine and analyze the validity of realtime monitoring device for PM2,5 based on low-cost sensors against the DustTrak TSI 8530 as a reference measuring tool in indoor and outdoor areas. This study uses a method comparison study with a analytical observasional approach. The validity of the tool will be analyzed by comparing the results of PM2,5 concentration measurements between the two tools based on the criteria

of precision, bias, linearity, and error in accordance with the guidelines in SNI Number 9178 of 2023. The results of the study show that in indoor testing, the validity criteria accepted according to the requirements consist of a Standard Deviation (SD) obtained of 1.25 μg/m^3, a Coefficient of Variation (CV) of 5.33%, an Intercept of -3.419, and a Coefficient of Determination (R²) of 0.924. However, there are validity criteria that are not accepted according to the requirements, namely the slope obtained of 0.515 and a Root Mean Square Error (RMSE) of 26.9 μg/m^3. Furthermore, in the outdoor testing, the validity criteria accepted according to the requirements consist of SD obtained at 3.81 μg/m^3, CV at 8.35%, Intercept at -3.454, and R² at 0.916. However, there are validity criteria that are not accepted according to the requirements, namely the slope obtained at 0.532 and RMSE at 50.2 μg/m^3. Therefore, the results of the validation test in both measurement areas are invalid because the slope and RMSE criteria in the two measurement areas are not accepted according to the requirements, so that an adjusted sensor concentration formula is needed in the device program so that it can be valid and equivalent to the DustTrak TSI 8530.