

GAMBARAN KADAR DEBU PARTIKULAT DAN FAKTOR METEOROLOGI DI SMP NEGERI 1 GAMPING TAHUN 2026

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INTISARI

Latar Belakang: Debu PM_{2,5} dan PM₁₀ merupakan salah satu pencemar yang banyak dihasilkan oleh emisi kendaraan bermotor dan dapat berdampak pada kesehatan, terutama pada anak sekolah yang lebih rentan terhadap polutan udara. SMP Negeri 1 Gamping berlokasi di dekat Jalan wates yang memiliki volume lalu lintas tinggi sehingga berpotensi meningkatkan konsentrasi partikulat di lingkungan sekolah.

Tujuan: Menggambarkan kadar debu partikulat (PM_{2,5} dan PM₁₀) dan kondisi meteorologi di SMP Negeri 1 Gamping.

Metode: Jenis penelitian ini adalah deskriptif dengan menggunakan metode observasi kuantitatif. Pengukuran kadar debu pada penelitian ini dilakukan di 3 titik pada pagi dan siang hari dengan pengulangan sebanyak 3 kali selama lima hari pengukuran. Parameter yang diukur meliputi kadar PM_{2,5} dan PM₁₀ menggunakan CEM DT-96 (*Mini Particle Counter*), suhu, kelembaban udara, kecepatan angin, serta volume kendaraan di lokasi penelitian.

Hasil: Rata - rata kadar PM_{2,5} pagi hari sebesar 15,13 µg/m³ dan menurun menjadi 6,5 µg/m³ pada siang hari. Kadar PM₁₀ pagi sebesar 36,76 µg/m³ dan menurun menjadi 12,76 µg/m³ pada siang hari. Kondisi meteorologi menunjukkan suhu udara pagi hari sebesar 27,4°C dan meningkat menjadi 32,9°C pada siang hari. Kelembaban udara pada pagi hari sebesar 83,73 %RH dan menurun menjadi 66,9%RH pada siang hari. Kecepatan angin yang terukur pagi hari sebesar 0,9 m/s dan siang hari sebesar 1,0 m/s. Volume kendaraan harian di lokasi penelitian sebesar 1.215 smp/jam pada pagi hari dan 677 smp/jam siang hari.

Kesimpulan: Hasil penelitian menunjukkan bahwa kadar PM_{2,5} dan PM₁₀ lebih tinggi pada pengukuran pagi hari dibandingkan siang hari. Kondisi meteorologi selama penelitian menunjukkan suhu udara yang lebih tinggi pada siang hari, sedangkan kelembaban udara lebih tinggi pada pagi hari. Volume kendaraan di lokasi penelitian juga lebih tinggi pada pagi hari. Secara umum, kadar PM_{2,5} dan PM₁₀ di SMP Negeri 1 Gamping masih memenuhi baku mutu sesuai Permenkes Nomor 2 Tahun 2023.

Kata kunci: PM_{2,5}, PM₁₀, debu partikulat, kualitas udara sekolah, kondisi meteorologi

OVERVIEW OF PARTICULATE DUST LEVELS AND METEOROLOGICAL CONDITIONS AT SMP NEGERI 1 GAMPING IN TAHUN 2026

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ABSTRACT

Background: $PM_{2.5}$ and PM_{10} dust are pollutants produced primarily by motor vehicle emissions and can impact health, especially for students who are more susceptible to air pollutants. SMP Negeri 1 Gamping is located near Jalan Wates, which has a high traffic volume, potentially increasing particulate matter concentrations in the school environment

Objective: To describe the levels of particulate matter ($PM_{2.5}$ and PM_{10}) and meteorological conditions at SMP Negeri 1 Gamping

Method: This is a descriptive study using quantitative observation. Dust levels were measured at three locations in the morning and afternoon, with three repetitions over five days. Parameters measured included $PM_{2.5}$ and PM_{10} levels using a CEM DT-96 (Mini Particle Counter), temperature, air humidity, wind speed, and vehicle volume at the study site.

Result: The average $PM_{2.5}$ level in the morning was $15.13 \mu\text{g}/\text{m}^3$ and decreased to $6.5 \mu\text{g}/\text{m}^3$ during the day. The PM_{10} level in the morning was $36.76 \mu\text{g}/\text{m}^3$ and decreased to $12.76 \mu\text{g}/\text{m}^3$ during the day. Meteorological conditions showed a morning air temperature of 27.4°C and increased to 32.9°C during the day. Air humidity in the morning was $83.73\%\text{RH}$ and decreased to $66.9\%\text{RH}$ during the day. The measured wind speed was 0.9 m/s in the morning and 1.0 m/s during the day. The daily vehicle volume at the research location was $1,215 \text{ smp/hour}$ in the morning and 677 smp/hour during the day.

Conclusion: The results showed that $PM_{2.5}$ and PM_{10} levels were higher in the morning measurements compared to the afternoon. Meteorological conditions during the study showed higher air temperatures during the day, while humidity was higher in the morning. Vehicle volume around the study site was also higher in the morning than during the day. In general, $PM_{2.5}$ and PM_{10} levels at SMP Negeri 1 Gamping still met the quality standards stipulated in Minister of Health Regulation No. 2 of 2023.

Keyword: $PM_{2.5}$, PM_{10} , particulate dust, school air quality, meteorological conditions