

ABSTRACT

PM_{2.5} is a particulate suspended in air and is <2.5 μm in size. If the concentration exceeds the threshold, it can endanger human, animal and / or plant health. This study produced a mass concentration measurement PM_{2.5} by using low-cost sensors in the Bandung Raya air basin and analyzed the effects of meteorology and chemical elements of their particulates on PM_{2.5} measurements. The sensor used is sensor SKU: SEN0177 which is calibrated in a laboratory using a particle generator (model KG-02, Rion Co. Ltd.) using polystyrene latex spheres (PSL) measuring 0.309, 0.479, and 1.005 μm, which will be forwarded to diffusion dryer as a dryer to reduce humidity (RH ~ 40%), then forward it to sensors, optical particle counters (OPC, KC-01E, Rion Co. Ltd.) and exhaust models simultaneously. OPC is used as a calibrator and has the same method as a sensor, which uses the principle of light scattering. The research was conducted on August 17 to September 11, 2018, at Tokong Nanas Building, Telkom University, Bandung. Measurements are equipped with Nanosampler, DHT22 sensor (temperature and humidity), BMP180 sensor (pressure), BH1750 sensor (light intensity), HMC 5883L sensor (wind direction), and hall effect sensor (wind speed). From the observations, sensor readings are influenced by RH (> 80%) and chemical composition. Hygroscopic growth as long as the availability of water vapor in the air causes an overestimate reading of the sensor. The most common chemical element found during the measurement period is sodium chloride (NaCl, measuring more than 1 μm) and ammonium sulfate ((NH₄)₂SO₄, <1 μm). The chemical composition with a smaller refractive index causes the scattering intensity captured by the detector photo to be underestimated. During the research period the sensor can follow the value of the Nanosampler with a mean daily deviation of $1.1 \pm 12.1 \mu\text{g m}^{-3}$.

Keywords: Air Pollution, Low-Cost Sensors, Nanosampler, PM_{2.5}