



ERRORS OF MANOMETRIC CO₂ SORPTION EXPERIMENTS ON COAL CAUSED BY ACCURACY OF PRESSURE SENSOR

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Abstract- The accuracy of supercritical CO₂ sorption determination on coal is important for estimating the CO₂ sequestration potential of coal bed using CO₂ injection into deep unminable coal seams. Based on the CO₂ density change and CO₂ sorption data of three selected coal samples, this paper investigates the effect of pressure-sensor accuracy on measurements of CO₂ adsorption isotherms on coals with manometric equipment. The characteristic density-change of CO₂ in proper pressure range determines a greater influence of pressure error on CO₂ adsorption data on coal. The sensor accuracy has significant influence on Excess sorption increment of CO₂ on coal in medium pressure (7-12 MPa), and on CO₂ Excess-sorption isotherm at medium- and high pressure. The medium pressures with a greater CO₂ density-change at a constant temperature in the sample cell are probably inevitable. A lower experiment-temperature will results in a greater measurement error of the sorption caused by pressure sensor accuracy. The pressure sensor accuracy may result in the less reproducibility and repeatability of CO₂ adsorption on coals at medium- and high pressure, and negative sorption increment and even negative adsorption.

Index terms: Pressure sensors, Measurement errors, Carbon dioxide, Sorption, Coal, Experimental uncertainty, Pressure effects, Manometers.