

been contaminated/polluted (Kastiyowati, 2011). 2.2. Indoor air pollution Indoor air quality is a problem that needs attention because it will affect human health. According to Hunter (2004), indoor air pollution becomes more serious health problem than outdoor air pollution, because on average we spend 75% of time to be in the room. According to the EPA and mud (1990) in Fitria et al. (2008), the main problems are often obtained from a variety of research on indoor air quality include three general categories that are sorted by frequency of occurrence, which is the highest is not strong ventilation, chemical contamination, and the lowest is microbiological contamination. Maryanto et al. (2009), based on the effects of air pollution on health disorders can be divided into three types: irintasi, asfiksia, and anesthesia. 2.3. Carbon Monoxide Carbon monoxide is a gas that is colorless, odorless and tasteless. CO gas can be a liquid at a temperature of -192°C (Wardhana, 2001). Furthermore, according to Mark Goldstein (2008) in Agusta (2012), carbon monoxide is known as a pollutant that is harmful to humans so that its content in the air is very necessary to be reduced. Reaction formation CO quicker than the reaction of the formation of CO, so that the end result is still possible there is a gas combustion CO (Wardhana, 2001). 2.4. Air sanitation Clean air is a gas that is invisible, odorless, colorless and tasteless. But the air is really clean has been difficult to obtain, is because many natural activities and human activities that can damage the environment and human life. Means less environmental damage (damage) natural carrying capacity which in turn reduces the quality of human life (Wardhana, 2001). Therefore it is very necessary efforts to restructure the air, where the air is a definition of restructuring carried out in order to restructure the air around us as living beings are not experiencing contamination that can impact on health. Restructuring includes monitoring air until an analysis of the quality and state of the air. Restructuring the air is not only limited to the gases in the air, but including humidity, temperature, etc. (Depkes, 2002) 3. Methodology The study was conducted in PT Kalimaya Surabaya and Laboratory of Health Ministry health Polytechnic Surabaya (Laboratory of Environmental Health and Integrated Laboratory) in January-December 2015. Materials research: coconut shell activated carbon grain size of 125 μm (obtained from a sieve mesh size of 120), sealant seal, reagent gas absorption (CO) for sampling gas CO, reagent for inspection of CO gas, plastic tube (diameter 0.3 cm), glass bottle, and kasa aluminum. Equipment research; recovery tools on sanitation indoor air (cyclone/turbine ventilator and activated carbon reactor), midget impinger, flow meter, stopwatch, handscoon, and mask. The research sample that CO gas that comes from the burning cigarette smoke. The samples for the measurement of CO gas levels by purposive sampling. This study is experiment research using one group pre-test post-test design and data analysis using the paired t test. 4. Result and Discussion 4.1. Gas content analysis CO The results of the analysis of the gas content of CO after a recovery tool to air the room in terms of ratio of CO gas levels before and after through room air recovery tool shown in Table 1. Table 1. Measurement of CO gas levels before and after through room air recovery tool No. Test Pre-test (ppm) The results of the levels of CO gas Post-test (ppm) Difference decrease (ppm) 1. 291 39 252 2. 295 40 255 3. 298 37 261 4. 302 45 257 5. 281 38 243 6. 294 42 252 7. 299 43 256 8. 303 49 254 9. 281 33 248 10. 296 37 259 11. 301 41 260 12. 289 36 253 13. 297 56 241 14. 284 52 232 15. 293 63 230 16. 297 59 238 17. 288 60 228 18. 291 64 227 19. 270 59 211 20. 294 68 226 21. 302 81 221 22. 294 80 214 23. 297 90 207 24. 296 87 209 Average 293,04 54,12 238,92 Table 1 shows that the decreased levels of CO gas on average 238.92 ppm after passing gas recovery tool inserted room activated carbon. Decreased levels of CO gas after through room air recovery tool can be the result of an adsorpsi process in reactors containing activated carbon. The adsorption process is a process in which a particle attaches to a surface due to the difference in charge between the two objects is weak, so that eventually will form a thin layer of fine particles on the surface (Reynolds, 1982 in Basuki et al., 2008). The adsorption process can occur by activated carbon because of their pores in activated carbon are capable mengadsorpsi CO gas. A porous carbon-based material has a thermal stability and high chemical and good adsorption capability (Figuroa et al., 2008; Huang et al., 2014; Belhalchemi et al., 2014; Huang and Wen, 2014). Meilita (2003) in Dunggio (2012) explains that the activated carbon material is in the form of free carbon or charcoal that has been created and processed exclusively through the activation process, so that the pores open and thus has great absorption of the gas phase. The use of this carbon has the advantage that, as the prevention of pollution, low cost and can be recycled (Foo & Hameed, 2009; Nowicki et al., 2010; Chen et al., 2013). In normal circumstances the interlayer space on activated carbon (coconut shell) filled by free water molecules located around cations. When the coconut shell charcoal is heated to a temperature of 100°C , the water molecules will evaporate (out) so that akit carbon (coconut shell charcoal) can function as a gas absorber. But if the coconut shell charcoal is heated to temperatures above 150°C , the structure of coconut shell charcoal will be broken because it does not heat resistant (Basuki et al., 2008). Coconut shell charcoal is the raw material that has the potential for the production of activated carbon, because it has an excellent natural structure and low ash content. Conversion coconut shells into activated carbon which is better (Huang et al., 2015) and can be used as adsorbent cost to absorb heavy metals in the solution of industrial wastewater (Song et al., 2013; Rajput et al., 2015), helps reducing waste disposal costs and provide alternatives that have the potential cost of carbon commercial (Bansode et al., 2003; González et al., 2006; Ioannidou and Zabaniotou, 2007; Li et al., 2008; Chengwen et al., 2014; Etim et al., 2015). The results of the percentage reduction in the levels of CO gas by activated carbon to the air recovery tool room that had been treated (heating) are shown in Figure 1. Figure 1. Percentage decrease in the levels of CO gas in room air recovery tool Figure 1 shows the percentage reduction in the levels of CO gas in room air recovery tool experiencing declining graph from test to test for a 1 to 8, which is then increased back to the test to 9. The movement of the fall looks back up at test 13 to the test to 24. the percentage decrease in the levels of CO gas in air sanitation tool room is the highest percentage in the test to 12 with 88.26%, while the lowest percentage drop is the test to 23 to 69.7%. Figure 1 also shows that the value of the measured levels of CO gas is not stable, increasing and lowering the test 1 to test 24. This can occur because of differences in the ability of granular activated carbon to adsorb CO gas that react to each reactor in the tool. Contaminants gas that has passed through the adsorption section has a concentration of zero, but because of factors equilibrium and kinetic factors, some gas with low concentrations of contaminants will escape in the effluent (Basuki et al., 2008). Paired t test results obtained $p = 0.000 < \alpha (0.05)$, which indicates that there are differences between the levels decrease significantly before and after CO gas by means of air recovery room. 4.2. Evaluation of recovery tools indoor air the ability to reduce levels of CO Ability vacuum efficiency air used for room air recovery tool can be viewed in terms of the energy source to turn on the device, the device can work when the pressure and the heat coming from inside the room sank out of the room that drives the tool to have dayaberputar. In addition, the air stream being outdoors also helps push the device to spin. Cyclone works by forcing the suspension of gas flowing spirals in a closed space, so that the particles exhaled towards the vessel wall centrifuges. Particles moving downwards by gravity and is removed from the cyclone container, and the gas which has been filtered spun out upwards (De Nevers, 2010). As for the ability of vacuum suction airflow by air amounted to 8.49 m/s. With disuse of AC and DC power source that can play a cyclone, then use the difference in pressure and temperature inside and outside the room can be said to save costs used in welding operations. The room air recovery tool has an average of 81.54% effectiveness in lowering levels of CO gas. According Maryanto et al. (2009), adsorption on activated charcoal occurs physically, adsorption occurs because the properties owned activated charcoal as an adsorbent, molecular sieves, catalysts and ion exchangers. Activated charcoal is an adsorbent which has pores very small diameter which can absorb the gas, so gas CO who pass by it will be bound and experience the attractive forces with pores of activated charcoal. So there is a long enough contact time for this reaction occurs. In this process will affect the capacity of the adsorbent. Adsorbent capacity will be saturated with increasing time since had many adsorbate attached to the adsorbent (Basuki et al., 2008). According to the theory of adsorption, adsorbate particles will approach the pores. Supposedly Langmuir during contact occurs between the adsorbate and adsorbent particles will occur two-way process is the adsorption and desorption. At the time of equilibrium, the adsorption rate equal to the rate of desorption so that the concentration of the adsorbate in the solvent remains. The time required from start comes in contact with the adsorbent adsorbate equilibrium to occur is called the equilibrium time. At the time of equilibrium, it is considered that all the parts on the surface of the adsorbent has been filled by particles of adsorbate (Sukir, 2008). So that when the time equilibrium occurs, the CO gas (adsorbate) will only pass through the reactor without experiencing a reaction. So that the contact time will be faster. 5. Conclusion CO gas levels before and after through the recovery tool room air differs significantly according to the statistical test paired t-test is $p = 0.000$. The results of the evaluation of the effectiveness of sanitation tool room air to reduce levels of CO gas that has been made can be said to be very effective because it can reduce levels of CO gas is an average of 81.54% ($\geq 75\%$). Evaluation of the efficiency of the room air

recovery tool to reduce levels of CO gas that has been made can be said for including the effective and efficient use of the air without using electricity restructuring. Implementation of this research that this room air recovery tool can be used for the general public, industry and others in dealing with pollution of carbon dioxide and gases - other gases. Given the restructuring of air tools with coconut shell activated carbon adsorbent is effective and efficient in reducing pollutant gases CO. References

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