

CO₂ rebreathing test



Re-breathing carbon dioxide/exhaled air



Carbon Dioxide Rebreathing Assessment

2.2.6 Test Setup

To determine the location of an evaluation sight, components that possess filled or partially filled volumetric characteristics are identified. For the previous assessment WOUK05200, the Mimos pillow was evaluated at different locations to identify the most significant potential location on the pillow where the hazard may be at its highest level. For this current assessment, an assessment was completed on the same location on the pillow, as seen below in Figure 7 and Figure 8. For all experiments, the head of the mannequin was placed with its face pressed into the Mimos sample to represent the worst case scenario. To assess the Mimos pillow case, CO₂ readings in the Mimos pillow were compared with and without the pillowcase.



Figure 7 Assessment of Mimos Pillow with Pillow Case



The carbon dioxide retention for the Mimos Pillowcase sample was compared to that of the Mimos pillow and products of known hazard levels. Products with high known hazard level are bean bags and sheepskin, while a mattress with a cotton sheet has a known low hazard level. Figure 9 through Figure 11 show the positioning of the mannequin on the reference products. The reference products with the high level of hazard are the beanbag (Figure 9) and the sheepskin (Figure 10).



Figure 9 Bean Bag Carbon Dioxide Rebreathing Evaluation Detail



Figure 7 Assessment of Mimos Pillow with Pillow Case



Figure 9 Bean Bag Carbon Dioxide Rebreathing Evaluation Detail

The mattress with cotton sheet is used as a reference product with a low level of hazard and can be seen in Figure 11.



Figure 10 Long Haired Sheepskin Carbon Dioxide Rebreathing Evaluation Detail



Figure 11 Firm Mattress and Cotton Sheet Carbon Dioxide Rebreathing Evaluation

2.3 Results

The amount of carbon dioxide and its rate of dispersal over time are calculated by integrating the area under the plotted curve. The results (CO₂ vs Time) were plotted for the samples and comparator products and can be seen in Figure 12. The values for the area can be seen in Table 2 for each sample and comparator product.

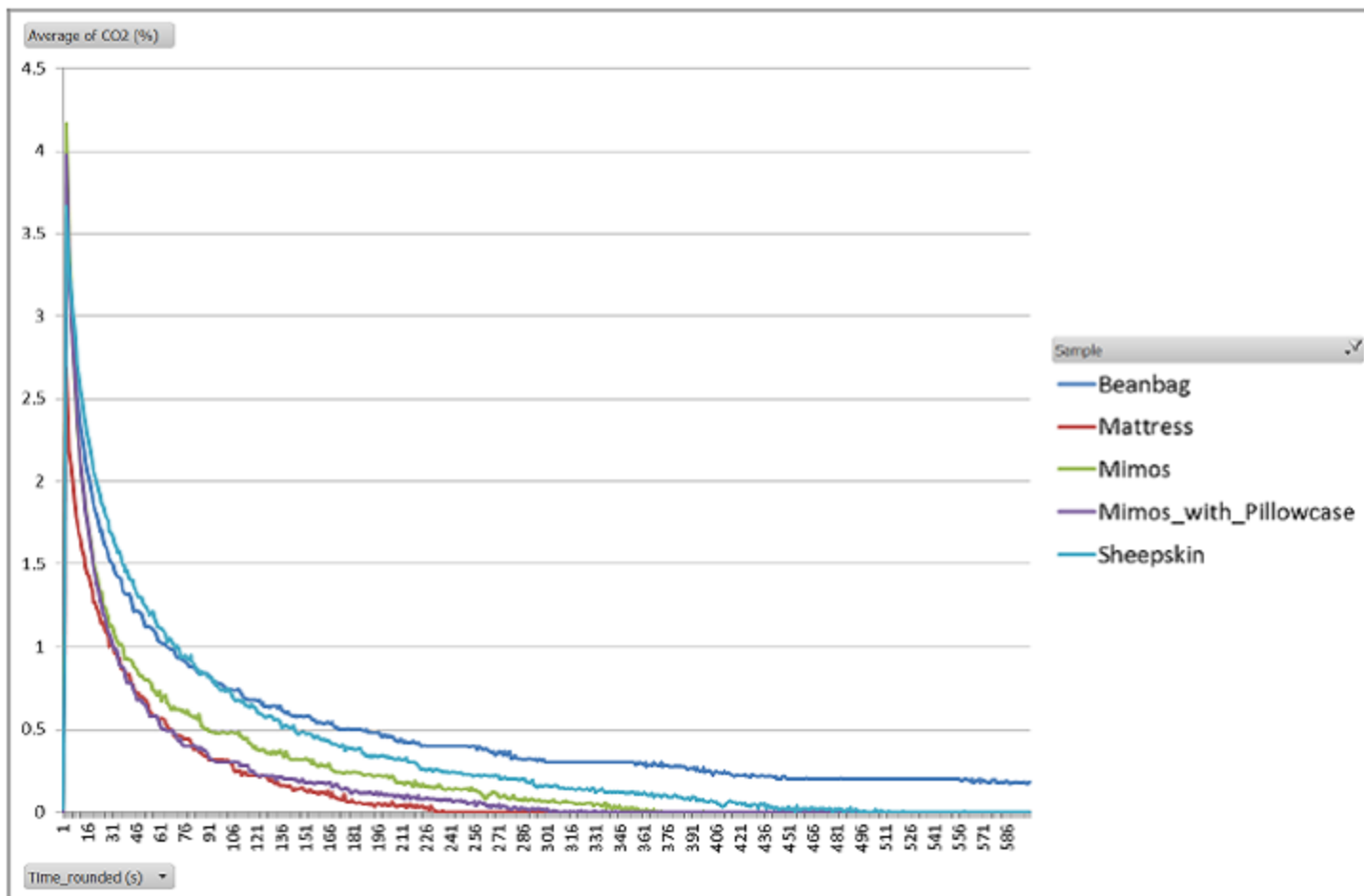


Figure 12 Carbon Dioxide Rebreathing Results

Table 2 Carbon Dioxide Rebreathing Results, Area Under Curve

Sample	Area Under Curve (%CO2)
Beanbag	303.10
Sheepskin	234.11
Mimos	155.02
Mimos with_Pillowcase	119.72
Mattress	99.10

As seen in previous report WOUK05200 and Table 2, the carbon dioxide retention levels for the Mimos Pillow lies just above the Mattress, a product known to pose a low hazard of CO2 retention. The CO2 retention further decreased when the Mimos pillowcase was applied.

The product samples were sent to Dr. William W. Fox, Division of Neonatology, Children's Hospital of Philadelphia, and Dr. Thomas H. Shaffer, Department of Biomedical Research, Alfred I. duPont Hospital for Children for expert medical opinion to confirm the level of hazard for carbon dioxide rebreathing. The results were reviewed and it was agreed that the Mimos pillow, used with or without the pillowcase, retains considerably less CO2 than the high level comparator products (Sheepskin and Beanbag). In addition, the use of the Mimos pillowcase further reduced the potential for the

Mimos pillow to act as a reservoir for CO2, and achieved CO2 retention levels comparable with the low level benchmarking product (Mattress).

Report conclusion

This CO₂ rebreathing evaluation was completed on the Mimos Pillowcase and Mimos pillow samples and compared to items with a known hazard level. These include a firm spring mattress with sheet (low hazard), sheepskin (high hazard), and bean bag (high hazard).

As seen in previous report WOUK05200 and Table 2, the carbon dioxide retention levels for the Mimos Pillow lies just above the Mattress, a product known to pose a low hazard of CO₂ retention. It was previously agreed by medical experts that this pillow not considered a reservoir for CO₂. When the Mimos pillowcase was placed on the pillow, CO₂ retention decreased to levels similar to the Mattress (potential low hazard level) comparator product. Medical experts confirmed that use of the Mimos pillowcase further reduced the potential for the Mimos pillow to act as a reservoir for CO₂, and achieved CO₂ retention levels comparable with the low level benchmarking product (Mattress).

Please note that this assessment has reviewed the product for CO₂ rebreathing hazard only. The above recommendations are not exhaustive, and there may be other hazards which are not presented here. Any design changes made to the product should be reviewed to ensure that there are no additional safety concerns.

