

Studying Absorbency in Various Types of Diapers

Student Name

Subject, Block #

Teacher Name

Date of Lab

Abstract

Best Absorbing Disposable Diaper

The experiment investigated how the brand of newborn disposable diaper affected its absorbency. Disposable diapers are convenient for children to wear and must be absorbent in order to prevent accidents. The hypothesis stated that Pampers would have the best absorbency compared to Luvs and Huggies. The procedure used a small section of diaper and immersed it in a beaker containing 100 mL of water. After a short period of time, the diaper section was removed and after dripping ceased; the volume of water remaining in the beaker was subtracted from the starting volume in order to determine the amount absorbed. Data showed that Pampers were most absorbent and outperformed the other brands tested. In conclusion, to prevent leakage and liquid accidents, have your newborn wear Pampers.

Introduction

The purpose of this experiment was to determine if different brands of diapers have differences in absorbency. Disposable diapers are convenient, used only once and then discarded; but they are costly. By the time a child is toilet trained, disposable diapers have cost the parents \$1,500- \$2,000. (Consumer News, 2009). The term absorb means to “suck up” or to “draw up like a sponge”. (Merriam-Webster Dictionary, 1997). The ability of the diaper to absorb liquid is inherent in its design. Diaper commercials often advertise that their diapers are the best because they are the most absorbent; but this may not always be the case due to bias on the part of the company (Ruth, 2012). An answer to this question will benefit parents in two ways. First, parents will know which diapers to purchase that are most absorbent thus resulting in fewer leakage accidents; and secondly, this will result in greater convenience due to the need for fewer diaper changes.

“Modern disposable diapers contain a super-absorbent polymer substance called sodium polyacrylate. This polymer can grab and hold water molecules, giving diapers the ability to absorb large quantities of

water". (Ruth, 2012). If you cut open a diaper, you will notice a crystal like substance called sodium polyacrylate and usually called super absorbent polymer or SAP. These crystals have a similar feel as fine sand. This polymer was created by the scientists from the Dow Chemical Company. When these crystals are exposed to water, the water is drawn inside the sodium polyacrylate molecule through osmosis. The polymer will continue to absorb water until the water inside the molecule is equivalent to the water outside the molecule. This mixture of water and crystals turns into a gel like substance. In fact, a pound of crystals can absorb about 50 gallons of water. (Lam, 2012)

To avoid company bias, amazon.com had three hundred and fifty consumers review disposable diapers and rank them according to absorbency. The ranking score ranged from 1 to 5. A score of one indicated poor absorbency and a score of 5 indicated high absorbency. Their feedback indicated the following:

Pampers brands are the clear customer favorite, with versions of the Swaddlers and Pampers Baby Dry attracting 4.7 stars out of 5 (on average). Luvs Premium Stretch diapers also fare well, receiving an average of 4.5 stars. In general, most diaper brands are rated favorably, with Seventh Generation Chlorine Free diapers, Huggies Overnites, Huggies Snug & Dry and Huggies Supreme rated an average of 4 stars or better, but with fewer reviews. (Fields and Fields, 2010).

Based on the above research, our hypothesis was that **if newborn Pampers are used, then they will be more absorbent than newborn Luvs or newborn Huggies because Pampers earned a 4.7 absorbency ranking while Luvs received a 4.5 absorbency ranking and Huggies received a ranking of 4.**

Variables

- **Independent Variable** - Brand of diaper
- **Dependent Variable** - Volume of water absorbed in milliliters (mL)
- **Control Variables** - Same size disposable diaper (new born, 8-10 lbs); same size area tested (7 cm x 7 cm); test area is from the same location in diaper (center of the diaper); diapers are at the same temperature, water is at the same temperature.

Materials:

- 3 CVS brand newborn - use as control (7 cm x 7 cm piece)
- 3 newborn Pampers (7 cm x 7 cm piece) crotch region
- 3 newborn Luvs (7 cm x 7 cm piece) crotch region
- 3 newborn Huggies (7 cm x 7 cm piece) crotch region
- 100 mL glass graduated cylinder
- 250 mL glass beaker
- tap water - room temperature (23°C)
- 1 metric ruler
- 1 stop watch
- 1 pair of scissors
- 1 pair of safety goggles

Procedure:

From each type of newborn diaper, three pieces were cut to a size of 7 cm x 7 cm from the crotch region. A graduated cylinder was filled with 100 mL of room temperature tap water, and the water was poured into a 250 mL glass beaker. One piece of diaper was placed it into the glass beaker containing the water. A stop-

watch was started, and timed for 30 seconds. At the end of 30 seconds, the diaper section was lifted slowly out of the water (by a corner) and excess water was allowed to drip back into the beaker. The diaper section was held over the beaker until the water stopped dripping. The diaper section was then discarded into a garbage can.

The water that remained in the beaker was poured back into the graduated cylinder. The volume of water that was absorbed was recorded in mL. To calculate the volume absorbed by the diaper, the volume remaining in the beaker was subtracted from the starting volume of 100 mL. The same procedure was repeated until three trials have been performed for each newborn diaper brand.

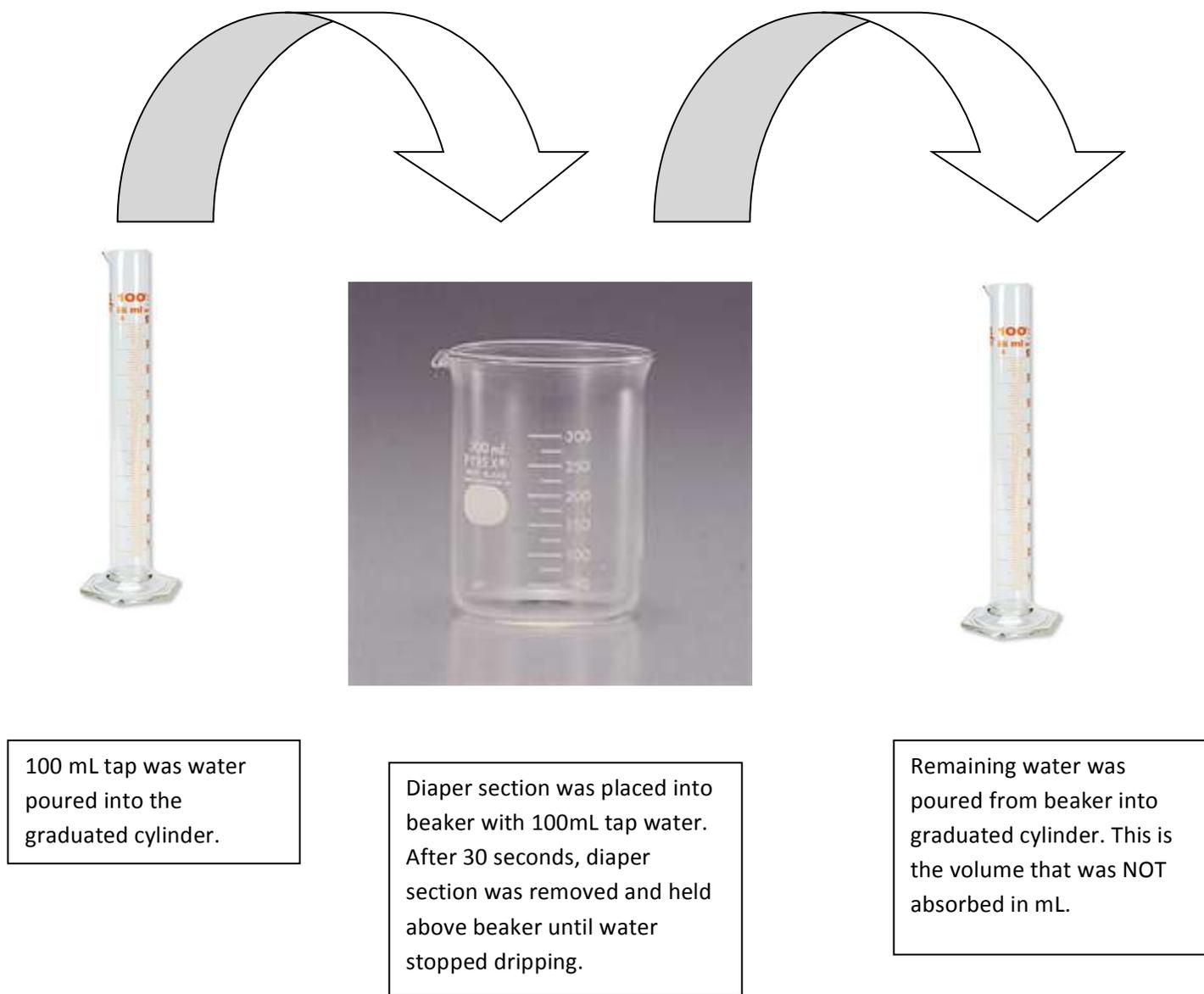
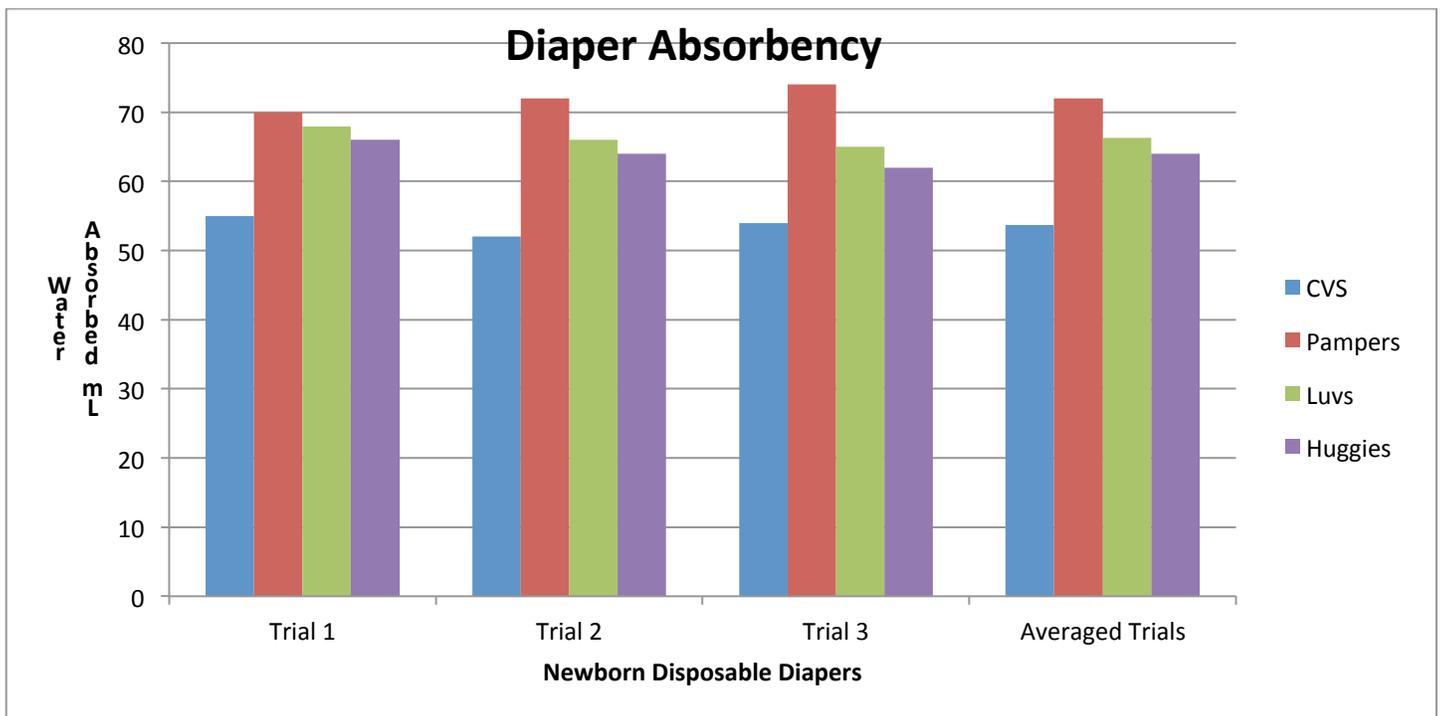


Fig. 1 Shows procedure for measuring absorbency.

Quantitative Data

Table 1. Absorbency of Diapers

	Volume of Water Absorbed (mL)			
Diaper Brand - newborn	Trial 1	Trial 2	Trial 3	Averaged Volume of Trials
CVS	55	52	54	53.7
Pampers	70	72	74	72
Luvs	68	66	65	66.3
Huggies	66	64	62	64



Qualitative Data

After 30 seconds of immersion in the tap water the following observations were made:

- CVS brand dripped for the longest period of time followed by Huggies, followed by Luvs followed by Pampers. Pampers dripped the least and CVS(control) dripped the most.
- CVS brand appeared to deteriorate somewhat -- edges stretched out and material in the middle began to pull apart. No deterioration observed in the other brands.
- Pampers diaper section “plumped-up” the thickest followed by Luvs followed by Huggies followed by CVS brands.
- Water was poured back into the graduated cylinder from the beaker very cautiously and none was spilled during any of the trials. Volumes of water obtained can be read in the data table above.

Conclusion:

The problem examined the brand of disposal diapers in order to determine which one was most absorbent. The hypothesis stated that Pampers newborn disposable diapers would be the most absorbent brand compared to Luvs and Huggies. The CVS newborn brand was used as a control. Following three trials, the averaged volume of water absorbed shows that the control absorbed 53.7 mL of water, Huggies absorbed 64 mL of water, Luvs absorbed 66.3 mL of water and Pampers absorbed 72 mL of water. The data supports the hypothesis and the hypothesis has been accepted. Each data set from each trial also shows that Pampers was more absorbent than Luvs and Luvs was more absorbent than Huggies. In each trial, the control was least absorbent.

Examination of the bar graph demonstrates this same pattern for each trial. That is, absorbency is greatest in Pampers and least in Huggies, excluding the control. The overall trend when all trials are averaged shows that Pampers is the most absorbent followed by Luvs followed by Huggies. The results from repeated trials show the same outcome for the most absorbent brand and the least absorbent brand. Repeated trials have

shown replication of the data. This means the data obtained is likely only due to the brand of diaper and not due to another factor that could have influenced the experimental results. All control variables were maintained and held the same throughout the experiment in order to increase the validity of the data.

In regards to experimental error, the only source of error may have come from some droplets of water remaining on the walls of the beaker that were not measured. To eliminate this error, the starting volume of water could be massed (100mL of water has a mass of 100g) and then the mass of water absorbed (after dripping had ceased) could be measured on an electronic balance. This would account for all water absorbed by the disposable diaper section.

New problems to investigate may be to determine the mass of sodium polyacrylate in each diaper brand or to examine the variations in thickness of this polymer in various locations of the diaper or perhaps examine how storage temperature affects the effectiveness of this polymer after the diaper is manufactured.

References

- Consumer News. (2009). *Cloth vs. disposable diapers: getting started*. Retrieved from <http://news.consumerreports.org/baby/2009/07/cloth-vs-disposable-diapers-getting-started.html>
- Fields, D. & Fields, A. (2010). *Diapers*. Retrieved from <http://www.consumersearch.com/diapers/reviews>
- Lam, N. (2012). *How do disposable diapers absorb?* Retrieved from <http://ezinearticles.com/?How-Do-Disposable-Diapers-Absorb?&id=458706>
- Mish, F. (1997). Merriam-Webster Dictionary. Springfield: Merriam-Webster Inc.
- Ruth, J. (2012). *How to test the absorbency of different brands of diapers*. Retrieved from http://www.ehow.com/how_4475257_test-absorbency-different-brands-diapers.html