MATERIAL CYCLES and WASTE MANAGEMENT RESEARCH

Vol. 33 No.4 August, 2022

Abstracts

【Special Issues: Disposable Diapers】

1. A Comprehensive Overview of Used Disposable Diapers

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Abstract

As Japan's elderly population increases, a corresponding increase in the amount of used disposable diapers being generated year by year can be seen. In some cases, used disposable diapers are recycled, however, they are more often being incinerated. This paper provides an outline on the current status of used disposable diapers, both quantitatively and qualitatively. The paper gives an overview of domestic and international initiatives related to managing the disposal of used disposable diapers and presents case studies of the environmental impacts related to used disposable diaper recycling using LCA. Finally, the paper introduces application cases showing information and communication technologies for collection systems that are recently being considered for introduction due to their improved convenience and efficiency and lower environmental impact.

Keywords: used disposable diapers, recycle, environmental load, information and communication technology

2. Composition of Used Disposable Diapers and their Impact on Waste Incineration

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Abstract

In this paper, we first investigate product composition of used disposable diapers, and the three components, chemical composition, and other areas involved in initiating recycling over incineration for disposal. Supported by analytical results of the three components, elemental composition, heating value, and biomass content, we came to understand that the composition of used disposable diapers is a mixture of pulp, plastic, and SAP containing about 2-4 times more urine-derived water and Cl.

The paper then estimates the impact of used disposable diapers on waste incineration by the year 2050, taking into account increasing use of adult diapers and by comparison, showing the current expected reduction of plastics and kitchen waste that is mainly progressing. Even if the ratio of used disposable diapers increases, the impact as a waste quality deterioration and Cl source can be ignored, and it was considered that incineration treatment should be remained committed from the viewpoint of the risk of becoming infectious waste. However, in areas where population is declining and the rate of aging is on the increase, the contribution ratio of Na and fossil CO_2 derived from used disposable diapers to the total waste is expected to increase by up to 50% and 23%, respectively. In such areas, material recycling is also suggested as one of the possible options.

Keywords: used disposable diaper, super absorbent polymer (SAP), solid waste incineration, lower heating value, biomass content

3. Efforts to Recycle Used Disposable Diapers

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Abstract

Due to Japan's aging population, consumption of disposable diapers in the country has seen an increase with each year. While the majority of used disposable diapers are incinerated, some regions are engaging in efforts to retrieve recyclable materials from used disposable diapers or to make RPF after sanitizing. In March 2020, the Ministry of the Environment released its Guidelines regarding the recycling of used disposable diapers in order to provide information to local governments that may be considering the installation of equipment for recycling. After the release of the Guidelines, local governments and private businesses have been holding demonstration programs and conducting reviews aimed at introducing such recycling equipment. As a result, interest in recycling has risen, along with an increased involvement in the possibility that disposable diapers can be recycled. However, in order to popularize the concept of disposable diaper recycling, it will be important to create successful model cases that are following those local governments which have implemented advanced initiatives. To further make diaper recycling more commonplace, we will continue to support the promotion of recycling of used disposable diapers.

Keywords: disposable diapers, resource circulation, carbon neutral, microplastic

4. Recent Trends in Disposable Diapers Comprised of Eco-friendly Materials

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Abstract

Disposable diapers are indispensable to childcare and nursing care but most municipalities are incinerating these in spite of the fact that they contain large amounts of water, and this may cause a large environmental impact in terms of carbon dioxide emissions. An alternative disposal method recommends the water-absorbing portion of the diaper that consists of water-absorbing paper, pulp, and superabsorbent polymer would be designed to be separated after use and flushed down the toilet. The remaining diaper body, which hardly contains any water, could then easily be incinerated. To achieve this, it is necessary to make the superabsorbent polymer biodegradable. This paper outlines the research and development status of biodegradable superabsorbent polymers and briefly describes some specific examples based on polyamino acids and polysaccharides.

Keywords: disposable diaper, incineration, environmental load, superabsorbent polymer, biodegradable

5. Initiative to Recycle Used Disposable Diapers for the Promotion of Local Resource Circulation at the Municipality Level

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Abstract

Since Shibushi City has no incineration facilities of its own all waste is sent for disposal at a landfill site, the final disposal site for general waste, in collaboration with the neighboring town of Osaki. In order to reduce landfill waste at the final disposal site, the city has been conducting separate collection for 27 waste items which are recycled, based on the policy that “Mixed waste remains just waste, but sorted waste can be a resource.” While the overall amount of landfill waste has been decreasing, used disposable diapers still account for about 20% of landfill composition, and the idea of recycling these has become an issue. A demo-test for the recycling of used disposable diapers through a public-private partnership was initiated in 2016 to address the problem of used diapers, and we have also been working on promotion of consumption of local resources within municipalities. This initiative works to resolve local problems while also contributing to extension-of-life for the final disposal site and reduction of carbon dioxide emissions globally.

Key words: diaper, recycle, Shibushi City, town of Osaki, local resource circulation

6. Current Situation and Issues concerning Handling of Soiled Diapers at Childcare Facilities : Looking at On-site or Carry-home Perspectives

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Abstract

The purpose for conducting of this study is to clarify the current situation regarding how soiled diapers at childcare facilities are disposed of since, to date, there are no clear rules established by the government or local authorities.

The results of a questionnaire revealed that 26.5% (22/83) of childcare facilities request parents to carry home soiled diapers for disposal. On the plus side, putting an end to the system of taking home diapers would eliminate the burden of nursery teachers as well as parents, however, the problem arises that parents would not have a way of monitoring their child's urination and defecation throughout the day and would require childcare facilities to cover the costs involved with on-site waste disposal, storing of diapers, and deodorizing/maintaining hygiene standards. Meanwhile, a contamination status survey showed that changing diapers contaminates the surrounding area regardless of whether soiled diapers are carried home or not. It is therefore suggested that there is a need for the diaper changing procedure to be standardized at all childcare facilities and a manual of rules and guidelines be prepared.

As a result of this study, the issues surrounding the handling and disposal of diapers at childcare facilities have been raised. In order to solve the issues going forward, further studies are required to gain more information and perspective on both waste disposal and infection control.

Keywords: diaper, nursery, waste disposal, infection control, manual

7. Reducing Use of Less Disposable Diapers to Improve Quality of Life for the Elderly

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Abstract

In our super-aged society, the number of elderly people with lower urinary tract symptoms who require nursing care is increasing, and the demand for disposable diapers is high. Disposable diapers are used not only for urinary incontinence but for various other lower urinary tract symptoms. Although diapers have excellent absorbency, they are extremely likely to cause discomfort and damage to one's self-esteem when worn, being a detriment to the daily quality of life of the person wearing it. While efforts to stop the use of diapers have been reported, they have not been very far reaching. In this study, hospitalized elderly patients with cranial nerve disease were first assessed to monitor whether they could stop using diapers. Subsequently, comprehensive urinary care was conducted, including toilet guidance, replacing disposable diapers with underwear and liners, rehabilitation, and defecation control. As a result, all of the targeted elderly patients were able to stop wearing disposable diapers. It was found that making the decision to stop using diapers during the period of hospitalization while implementing urinary care in a multidisciplinary and collaborative manner did help to prevent patients from needing to wear diapers after discharge from the hospital. This directly reduces the number of diapers being used.

Keywords: elderly people, quality of life, disposable diapers, stopping the use of diapers, continence care