

## Scientists extract bio fertilizer from human hair

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New Delhi, January 30 (India Science Wire): Every year, about 300,000 tons of human hair is treated as waste and is being discarded as such. Although human hair is biodegradable, its accumulation in waste streams due to uncontrolled disposal leads to clogging, and poses serious environmental problem. Scientists from Central Salt and Marine Chemicals Research Institute (CSMCRI) have come up with a solution to fix this problem. They have developed an integrated process through which they have extracted bio fertilizer from waste human hair. They have also isolated melanin and keratin from it.

The market value of keratin is Rs 15000-20000 per kilogram, while melanin is more expensive than gold and sold around Rs 4000-5000 per gram. Melanin has been used for various cancer therapies whereas keratin is used in cosmetic industry.

They have used a hydrated ionic liquid to isolate melanin and keratin. This liquid can completely solubilise human hair. It is basically 60 per cent aqueous solution and 40 per cent liquid salt at room temperature. "The common salt we use is solid at room temperature but this is a different kind of salt that is liquid at normal room temperature. This is been used to solubilise solids," told Dr Kamlesh Prasad, CSMCRI, Bhavnagar, Gujarat.

For lab purpose, 50 grams of human hair samples were taken. To remove shampoo, dirt and oil traces, the hair was thoroughly washed with a specialized solution. These were then stirred for nine hours in hydrated ionic liquid to dissolve human hair in it, leaving behind a black solution. When hydrochloric acid was added to this solution, black melanin emerged as precipitate. After extracting melanin, addition of acetone to the left-over solution led to the extraction of keratin. "The hydrated ionic liquid is found to completely solubilise 20-25% of waste human hair. Melanin and keratin with 10-22% and 36-38% yield, respectively, were isolated from the solution" said Dr Prasad.

Subsequent to the extraction of melanin and keratin, the remaining waste liquid can be used as fertilizer, with seaweed fertilizer in the proportion of 50:50. Dr Prasad estimated that 1 kilogram of human hair can give 200 gram of melanin, 360 gram of keratin, and 300 millilitres of ionic liquid, which can be used as a fertilizer.

"We have extracted the crude form of melanin. If we further refine it to make it free of sulphur, it can be more expensive and valuable" said Dr Prasad.

India is one of the major exporters of human hair and during 2011-12, the Tirumala temple alone has auctioned human hair worth US \$2 billion. Dr Prasad told that considering the abundance, easy resourcing, excellent biocompatibility, immune-friendly nature upon transplantation, favourable cellular interaction activity and biodegradability, etc., keratin from human hair may emerge as an alternative biomaterial for a number of applications. (India Science Wire)

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