

## Astronaut pee could help build moon bases

1st April, 2020



New materials could be used to make buildings on the Moon. Scientists from Holland, Italy, Norway and Spain say a new kind of concrete could be made with moon dust and the urine passed by astronauts. The scientists said there is a chemical compound

in human urine called urea. This could help things stick together to make a kind of concrete. Scientists would use 3D printers to create the construction material. Three of the world's main space agencies could start using this technique to make buildings for a permanent moon base. NASA, the European Space Agency (ESA) and the China National Space Administration are all interested in colonizing the Moon with research stations.

Using astronaut pee and moon dust could save scientists a lot of money. It costs about \$10,000 to transport 0.45kg of materials from Earth to the Moon. The urine and moon dust alternative would be a much cheaper way of constructing things. A scientist said: "We have seen that a waste product, such as the urine of the personnel who occupy the moon bases, could be used." She added: "The actual water in the urine could be used for the mixture, together with [water] that can be obtained on the Moon, or a combination of both." Scientists say another source of water on the Moon is in the ice that exists in some areas. The scientists say they need to do more tests to find the best building material.

Sources: [eurasiareview.com](http://eurasiareview.com) / [cnet.com](http://cnet.com) / [eurekaalert.org](http://eurekaalert.org)

### Writing

Moon bases will be very, very, very important in the future. Discuss.

### Chat

Talk about these words from the article.

materials / buildings / concrete / astronauts / chemical / printers / technique / moon / a lot of money / transport / moon dust / waste / combination / water / building material

### True / False

- a) Scientists from the US said urine could be used in concrete on the Moon. T / F
- b) The scientists said human urine contains a chemical called rine. T / F
- c) Scientists would use 3D printers on the Moon to make concrete. T / F
- d) A space agency in China is interested in colonizing the Moon. T / F
- e) Using urine to make concrete would help to save money. T / F
- f) It costs \$10,000 to transport 45kg of materials to the Moon. T / F
- g) A scientist said water from moon ice could be added to the concrete. T / F
- h) Scientists say they have finished testing for the best building material. T / F

### Synonym Match

(The words in **bold** are from the news article.)

- |                        |                |
|------------------------|----------------|
| 1. <b>kind</b>         | a. occurs      |
| 2. <b>compound</b>     | b. building    |
| 3. <b>stick</b>        | c. substitute  |
| 4. <b>construction</b> | d. settling on |
| 5. <b>colonizing</b>   | e. mixture     |
| 6. <b>transport</b>    | f. staff       |
| 7. <b>alternative</b>  | g. type        |
| 8. <b>personnel</b>    | h. got         |
| 9. <b>obtained</b>     | i. fasten      |
| 10. <b>exists</b>      | j. take        |

### Discussion – Student A

- a) What do you think about what you read?
- b) What do you think water on the Moon is like?
- c) What would a moon town be like?
- d) What kind of people become astronauts?
- e) What do astronauts do every day?
- f) What three things would you take to a moon base?
- g) What buildings do you think will be on the Moon one day?
- h) What questions would you like to ask the scientists?

## Phrase Match

- |                                       |                        |
|---------------------------------------|------------------------|
| 1. New materials could be used        | a. compound            |
| 2. a chemical                         | b. of water            |
| 3. help things stick                  | c. dust                |
| 4. make buildings for a permanent     | d. to make buildings   |
| 5. interested in                      | e. things              |
| 6. moon                               | f. moon base           |
| 7. a much cheaper way of constructing | g. more tests          |
| 8. a combination                      | h. colonizing the Moon |
| 9. another source                     | i. of both             |
| 10. scientists say they need to do    | j. together            |

## Discussion – Student B

- What do you think of the new idea?
- Would you like to live on a moon base?
- Do you think concrete made with pee would smell?
- Why do scientists want to build moon bases?
- What would you do on the Moon?
- What do you know about NASA?
- What challenges are there with building on the Moon?
- What other things could be used to make concrete on the Moon?

## Spelling

- a new kind of necoterc
- the iuren passed by astronauts
- there is a cecmhial compound
- create the nucstoirtcno material
- using this tiequcneh to make buildings
- ozinclnigo the Moon
- save iesitnscst a lot of money
- the Inopensre who occupy the moon bases
- inucntogstcr things
- a wstea product
- a otbnaomiinc of both
- another orsecu of water on the Moon

### Answers – Synonym Match

1. g	2. e	3. i	4. b	5. d
6. j	7. c	8. f	9. h	10. a

## Role Play

### Role A – Gym

You think a gym is the most important thing to have on a moon base. Tell the others three reasons why. Tell them what is wrong with their things. Also, tell the others which is the least useful of these (and why): library, swimming pool or hotel.

### Role B – Library

You think a library is the most important thing to have on a moon base. Tell the others three reasons why. Tell them what is wrong with their things. Also, tell the others which is the least useful of these (and why): gym, swimming pool or hotel.

### Role C – Swimming Pool

You think a swimming pool is the most important thing to have on a moon base. Tell the others three reasons why. Tell them what is wrong with their things. Also, tell the others which is the least useful of these (and why): library, gym or hotel.

### Role D – Hotel

You think a hotel is the most important thing to have on a moon base. Tell the others three reasons why. Tell them what is wrong with their things. Also, tell the others which is the least useful of these (and why): library, swimming pool or gym.

## Speaking – Buildings

Rank these with your partner. Put the most important buildings to have on a moon base at the top. Change partners often and share your rankings.

- |            |                 |
|------------|-----------------|
| • Gym      | • Kitchen       |
| • Hospital | • Swimming pool |
| • Library  | • Hobby room    |
| • Hotel    | • Restaurant    |

### Answers – True False

a	F	b	F	c	T	d	T	e	T	f	F	g	T	h	F
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Answers to Phrase Match and Spelling are in the text.