
OSCAR

1
00:00:04,880 --> 00:00:02,560
[Music]

2
00:00:06,380 --> 00:00:04,890
trash and waste management on earth

3
00:00:08,419 --> 00:00:06,390
protects public health and the

4
00:00:10,100 --> 00:00:08,429
environment methods include recycling

5
00:00:12,470 --> 00:00:10,110
centers sanitary landfills and

6
00:00:14,150 --> 00:00:12,480
wastewater treatment plants but now with

7
00:00:16,310 --> 00:00:14,160
upcoming artemus missions to the moon

8
00:00:17,900 --> 00:00:16,320
and ultimately missions to Mars waste

9
00:00:20,480 --> 00:00:17,910
concerns are not just limited to our

10
00:00:22,519 --> 00:00:20,490
planet being able to effectively manage

11
00:00:24,109 --> 00:00:22,529
trash is an important consideration when

12
00:00:26,420 --> 00:00:24,119
planning a long-duration space

13
00:00:28,490 --> 00:00:26,430

exploration mission trash takes up

14
00:00:30,169 --> 00:00:28,500
useful spacecraft volume and it develops

15
00:00:33,080 --> 00:00:30,179
a foul odor when place and long-term

16
00:00:35,959 --> 00:00:33,090
storage and here at the end cone we

17
00:00:37,819 --> 00:00:35,969
gather trash understanding that this is

18
00:00:40,310 --> 00:00:37,829
a near-future need for astronauts a

19
00:00:42,170 --> 00:00:40,320
multidisciplinary team made up of early

20
00:00:43,790 --> 00:00:42,180
career researchers at NASA's Kennedy

21
00:00:45,250 --> 00:00:43,800
Space Center in Florida have been

22
00:00:47,690 --> 00:00:45,260
working on a solution to this problem

23
00:00:49,369 --> 00:00:47,700
building upon previous studies the team

24
00:00:52,790 --> 00:00:49,379
developed a prototype reactor we call

25
00:00:55,250 --> 00:00:52,800
Oscar orbital syngas commodity

26
00:00:57,110 --> 00:00:55,260
augmentation reactor or Oscar is an

27
00:00:58,910 --> 00:00:57,120
early career initiative project funded

28
00:01:01,790 --> 00:00:58,920
by nasa's space technology mission

29
00:01:03,529 --> 00:01:01,800
director in 2018 working on oscar has

30
00:01:05,509 --> 00:01:03,539
demonstrated new ways to manage trash

31
00:01:07,850 --> 00:01:05,519
and waste in space by offering new

32
00:01:09,500 --> 00:01:07,860
options for safe disposal and the

33
00:01:12,230 --> 00:01:09,510
potential to transform it into useful

34
00:01:13,580 --> 00:01:12,240
resources methods for handling trash on

35
00:01:15,410 --> 00:01:13,590
the International Space Station today

36
00:01:17,030 --> 00:01:15,420
involve putting waste in bags and

37
00:01:19,340 --> 00:01:17,040
placing them on spacecraft headed to

38
00:01:21,380 --> 00:01:19,350

earth a crew of four astronauts is

39
00:01:23,179 --> 00:01:21,390
expected to generate approximately 5,500

40
00:01:25,760 --> 00:01:23,189
pounds of waste during a one-year

41
00:01:27,469 --> 00:01:25,770
mission in space a crewed Mars mission

42
00:01:29,270 --> 00:01:27,479
could take two or three years and the

43
00:01:32,030 --> 00:01:29,280
technology being developed on Oscar can

44
00:01:34,249 --> 00:01:32,040
help make that mission possible oscar

45
00:01:36,260 --> 00:01:34,259
has a reactor that uses heat oxygen and

46
00:01:38,569 --> 00:01:36,270
steam to turn things like food packaging

47
00:01:40,880 --> 00:01:38,579
old clothing and even human waste into

48
00:01:43,160 --> 00:01:40,890
water and a gas mixture industry calls

49
00:01:45,649 --> 00:01:43,170
this mixture synthetic gas or sin gas

50
00:01:47,149 --> 00:01:45,659
and it is primarily carbon dioxide with

51
00:01:49,460 --> 00:01:47,159
small amounts of hydrogen carbon

52
00:01:50,990 --> 00:01:49,470
monoxide and methane molecules from

53
00:01:53,149 --> 00:01:51,000
syngas can be used as building blocks

54
00:01:55,069 --> 00:01:53,159
for beneficial products like propellants

55
00:01:56,470 --> 00:01:55,079
for the spacecraft the crew can also

56
00:01:59,680 --> 00:01:56,480
vent these gases for

57
00:02:01,150 --> 00:01:59,690
trash disposal in December 2019 Oscar

58
00:02:02,950 --> 00:02:01,160
reached a major milestone when it

59
00:02:05,170 --> 00:02:02,960
launched on a Blue Origin new Shepard

60
00:02:06,220 --> 00:02:05,180
rocket this suborbital flight added

61
00:02:08,770 --> 00:02:06,230
around 3 minutes of valuable

62
00:02:10,630 --> 00:02:08,780
microgravity performance data to Oscars

63
00:02:11,950 --> 00:02:10,640

previous data from lab and drop tests

64
00:02:13,750 --> 00:02:11,960
during the flight

65
00:02:15,520 --> 00:02:13,760
Oscar is able to inject trash into the

66
00:02:17,650 --> 00:02:15,530
high-temperature reaction chamber and

67
00:02:19,120 --> 00:02:17,660
collect targeted product gases while

68
00:02:20,680 --> 00:02:19,130
Oscar was in microgravity it

69
00:02:21,520 --> 00:02:20,690
successfully achieved turning trash into

70
00:02:23,650 --> 00:02:21,530
gas

71
00:02:25,420 --> 00:02:23,660
this included initiation of combustion

72
00:02:27,310 --> 00:02:25,430
and smouldering of the waste though

73
00:02:29,230 --> 00:02:27,320
oscar can perform a variety of thermal

74
00:02:31,420 --> 00:02:29,240
degradation processes such as steam

75
00:02:34,240 --> 00:02:31,430
reforming oxygen and rich combustion

76
00:02:35,680 --> 00:02:34,250
incineration and pyrolysis sustaining

77
00:02:37,960 --> 00:02:35,690
the thermal reaction of gas collection

78
00:02:40,270 --> 00:02:37,970
all performed well in microgravity the

79
00:02:41,950 --> 00:02:40,280
team is quantifying the gases Oscar

80
00:02:43,690 --> 00:02:41,960
collected as well as analyzing the

81
00:02:45,580 --> 00:02:43,700
remaining trash and charm of the reactor

82
00:02:48,460 --> 00:02:45,590
to investigate how it may have burned

83
00:02:50,230 --> 00:02:48,470
differently been in gravity the team is

84
00:02:51,850 --> 00:02:50,240
using the data gathered over the life of

85
00:02:54,870 --> 00:02:51,860
the project to evaluate the performance

86
00:02:57,580 --> 00:02:54,880
of the reactor to inform future designs

87
00:02:59,050 --> 00:02:57,590
through the early career initiative NASA

88
00:03:01,300 --> 00:02:59,060

encourages innovation through

89
00:03:03,040 --> 00:03:01,310
collaboration with organizations outside

90
00:03:04,660 --> 00:03:03,050
of the agency as well as giving

91
00:03:07,180 --> 00:03:04,670
employees an opportunity to participate

92
00:03:09,070 --> 00:03:07,190
directly in technology development with

93
00:03:11,199 --> 00:03:09,080
the potential to enhance / enable future

94
00:03:12,910 --> 00:03:11,209
missions the Oscar project not only

95
00:03:15,280 --> 00:03:12,920
worked on developing technologies to

96
00:03:17,710 --> 00:03:15,290
enable humans to explore deeper into

97
00:03:19,210 --> 00:03:17,720
space than ever before but it developed

98
00:03:22,180 --> 00:03:19,220
the next generation of scientists and

99
00:03:23,710 --> 00:03:22,190
engineers we are proud of what her has

100
00:03:25,780 --> 00:03:23,720
accomplished over the last two years

101
00:03:27,729 --> 00:03:25,790
including going to space and we hope