
science @ NASA

1
00:00:11,110 --> 00:00:06,550
a breath of fresh air in the orion

2
00:00:12,789 --> 00:00:11,120
nebula presented by science at nasa

3
00:00:14,549 --> 00:00:12,799
take a deep breath

4
00:00:16,310 --> 00:00:14,559
you just filled your lungs with about a

5
00:00:17,830 --> 00:00:16,320
thousand billion billion oxygen

6
00:00:19,830 --> 00:00:17,840
molecules

7
00:00:21,510 --> 00:00:19,840
there are oxygen bars in california

8
00:00:22,950 --> 00:00:21,520
where you can actually pay for a deep

9
00:00:25,029 --> 00:00:22,960
breath of o2

10
00:00:27,109 --> 00:00:25,039
but in most places on earth molecular

11
00:00:29,429 --> 00:00:27,119
oxygen is free and abundant

12
00:00:31,109 --> 00:00:29,439
the gas makes up almost 21 percent of

13
00:00:32,630 --> 00:00:31,119

our planet's atmosphere and is

14
00:00:34,229 --> 00:00:32,640
ubiquitous

15
00:00:36,150 --> 00:00:34,239
astronomers have just announced the

16
00:00:38,150 --> 00:00:36,160
discovery of this same gas in outer

17
00:00:40,229 --> 00:00:38,160
space

18
00:00:42,950 --> 00:00:40,239
here on earth oxygen was discovered in

19
00:00:44,790 --> 00:00:42,960
the 1770s says paul goldsmith of the jet

20
00:00:46,709 --> 00:00:44,800
propulsion laboratory

21
00:00:48,470 --> 00:00:46,719
early chemists called it fire air

22
00:00:50,950 --> 00:00:48,480
because of its combustible properties

23
00:00:53,270 --> 00:00:50,960
but it has taken us more than 230 years

24
00:00:55,350 --> 00:00:53,280
to finally say with certainty that this

25
00:00:56,790 --> 00:00:55,360
very simple molecule also exists in

26
00:00:58,869 --> 00:00:56,800
space

27
00:01:00,790 --> 00:00:58,879
goldsmith led a team of astronomers who

28
00:01:02,950 --> 00:01:00,800
used the european space agency's

29
00:01:04,630 --> 00:01:02,960
herschel space telescope to search for

30
00:01:06,950 --> 00:01:04,640
signs of molecular oxygen in

31
00:01:09,270 --> 00:01:06,960
star-forming clouds

32
00:01:11,190 --> 00:01:09,280
herschel senses far infrared radiation

33
00:01:12,950 --> 00:01:11,200
invisible to the human eye

34
00:01:14,789 --> 00:01:12,960
it just so happens that the molecular

35
00:01:16,310 --> 00:01:14,799
oxygen can be seen at these long

36
00:01:18,230 --> 00:01:16,320
wavelengths

37
00:01:20,390 --> 00:01:18,240
goldsmith's team found the telltale

38
00:01:22,230 --> 00:01:20,400

signs of o2 near the core of the great

39
00:01:24,950 --> 00:01:22,240
orion nebula

40
00:01:27,749 --> 00:01:24,960
the 2 in o2 is crucial the oxygen we

41
00:01:29,830 --> 00:01:27,759
breathe on earth is diatomic that is two

42
00:01:31,910 --> 00:01:29,840
oxygen atoms joined together to form a

43
00:01:33,830 --> 00:01:31,920
dumbbell shaped molecule

44
00:01:36,469 --> 00:01:33,840
single atoms of oxygen are highly

45
00:01:38,149 --> 00:01:36,479
reactive and can even be corrosive

46
00:01:41,190 --> 00:01:38,159
but when you put two oxygen atoms

47
00:01:45,030 --> 00:01:43,429
it's a breath of fresh air

48
00:01:47,109 --> 00:01:45,040
astronomers have long known that the

49
00:01:48,870 --> 00:01:47,119
reactive atomic form of oxygen is

50
00:01:50,950 --> 00:01:48,880
abundant in the universe

51
00:01:53,109 --> 00:01:50,960
it is found in gaseous nebula the

52
00:01:55,749 --> 00:01:53,119
atmospheres of stars and many other

53
00:01:57,510 --> 00:01:55,759
places this new discovery by herschel

54
00:02:00,789 --> 00:01:57,520
shows at long last that the familiar

55
00:02:02,950 --> 00:02:00,799
diatomic form of oxygen is out there too

56
00:02:05,109 --> 00:02:02,960
curiously the oxygen found by

57
00:02:07,830 --> 00:02:05,119
goldsmith's team is not a free-floating

58
00:02:09,669 --> 00:02:07,840
gas it appears to be mixed up in an icy

59
00:02:11,270 --> 00:02:09,679
frosting which coats grains of space

60
00:02:13,030 --> 00:02:11,280
dust in the nebula

61
00:02:15,110 --> 00:02:13,040
this explains where some of the oxygen

62
00:02:16,790 --> 00:02:15,120
might be hiding says goldsmith but we

63
00:02:18,309 --> 00:02:16,800

didn't find large amounts of it and

64
00:02:20,630 --> 00:02:18,319
still don't understand what is so

65
00:02:23,510 --> 00:02:20,640
special about the spots where we find it

66
00:02:25,430 --> 00:02:23,520
the universe still holds many secrets

67
00:02:27,750 --> 00:02:25,440
star-forming clouds tend to be dusty

68
00:02:29,030 --> 00:02:27,760
places so there could be lots more o2

69
00:02:30,710 --> 00:02:29,040
hiding out there

70
00:02:32,470 --> 00:02:30,720
goldsmith says the team plans to

71
00:02:34,550 --> 00:02:32,480
continue their hunt for this familiar

72
00:02:35,589 --> 00:02:34,560
gas in other clouds beyond the orion

73
00:02:37,670 --> 00:02:35,599
nebula

74
00:02:40,150 --> 00:02:37,680
out there he knows is an elusive whiff

75
00:02:42,710 --> 00:02:40,160
of earth among the stars