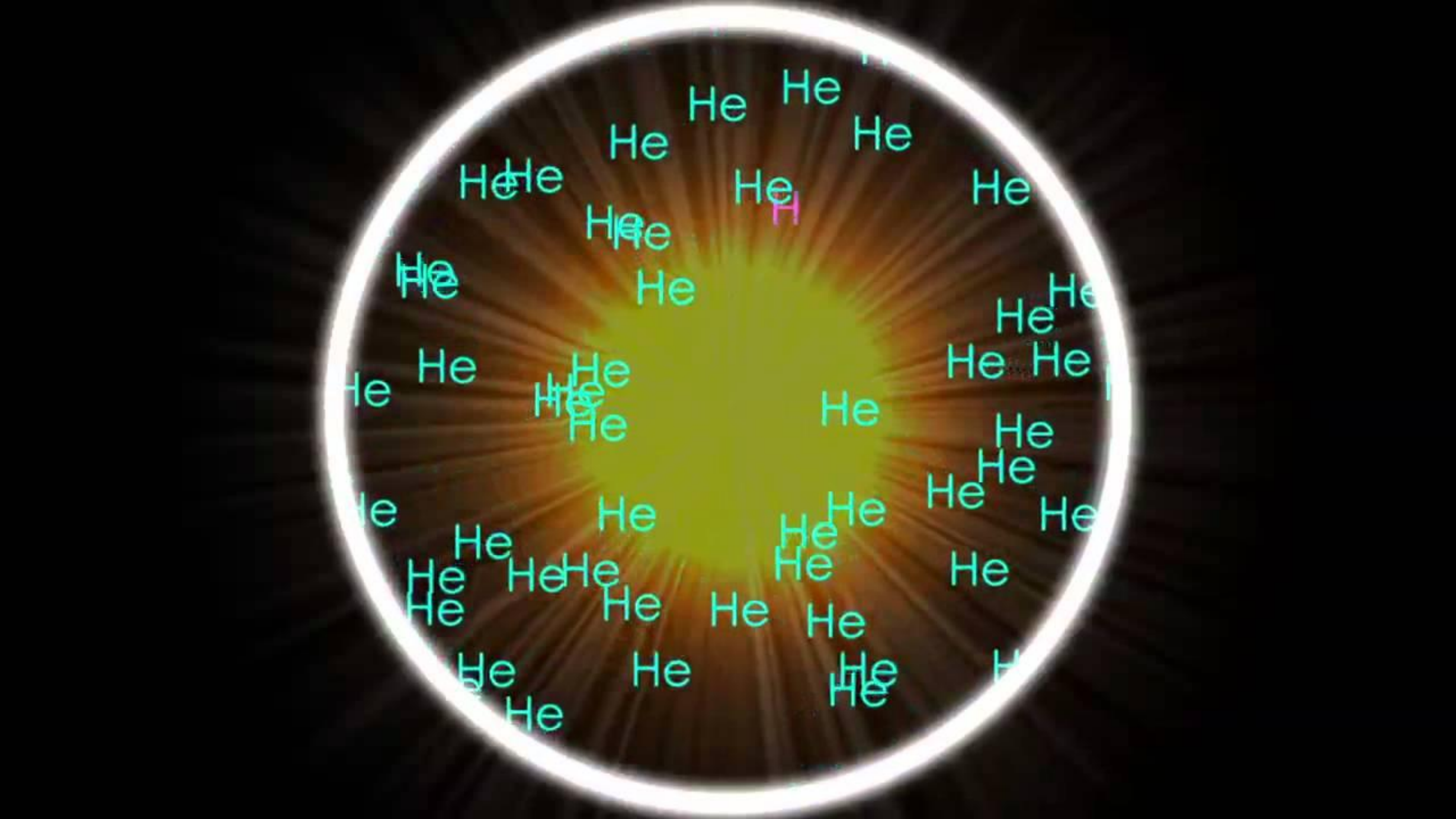
He
H

1
00:00:08,030 --> 00:00:04,010
Music

2
00:00:08,050 --> 00:00:12,040
Narrator: In this demonstration

3
00:00:12,060 --> 00:00:16,060
you'll use balls of clay to explore how stars fuse elements inside their

4
00:00:16,080 --> 00:00:20,080
cores. Each different color represents a different element. Here,

5
00:00:20,100 --> 00:00:24,090
pink represents hydrogen, blue is helium,

6
00:00:24,110 --> 00:00:28,130
purple is carbon, orange

7
00:00:28,150 --> 00:00:32,150
is oxygen, and this tennis ball is neon.

8
00:00:32,170 --> 00:00:36,170
We'll start with hydrogen just like you've in the center of a

9
00:00:36,190 --> 00:00:40,180
young star. The inside of a star is hot and dense and all of these

10
00:00:40,200 --> 00:00:44,210
hydrogen atoms keep bumping together. Often, some of them will stick

11
00:00:44,230 --> 00:00:48,240
together, this is called fusion.

12
00:00:48,260 --> 00:00:52,260
So we squish together four pink balls representing

13
00:00:52,280 --> 00:00:56,270

hydrogen and these form a new element--helium--represented by the blue clay.

14
00:00:56,290 --> 00:01:00,290
The sun's been doing this for nearly five billion years.

15
00:01:00,310 --> 00:01:04,320
Eventually the hydrogen in the center of the star runs low and we've mostly got

16
00:01:04,340 --> 00:01:08,350
a lot of helium jostling together instead. When hydrogen fusion

17
00:01:08,370 --> 00:01:12,380
stops the star is no longer in equilibrium and the core shrinks down.

18
00:01:12,400 --> 00:01:16,400
But this makes things even hotter so the star can start to fuse helium into

19
00:01:16,430 --> 00:01:20,420
carbon. So we squish together three blue helium atoms to make one

20
00:01:20,440 --> 00:01:24,440
purple carbon atom. In the sun this

21
00:01:24,460 --> 00:01:28,460
is where things will end once the helium runs low. But if a star is

22
00:01:28,480 --> 00:01:32,480
much bigger than the sun, the core will shrink again and it will get even hotter at the center.

23
00:01:32,500 --> 00:01:36,500
Now the star can fuse together a carbon and a helium atom creating

24
00:01:36,520 --> 00:01:40,530
oxygen. So we'll squish a blue helium atom and a purple carbon

25
00:01:40,550 --> 00:01:44,560
atom and that turns into one orange oxygen atom. You can

26
00:01:44,580 --> 00:01:48,590
imagine what happens when carbon runs low and fusion stops once more.

27
00:01:48,610 --> 00:01:52,630
The core shrinks, things get hotter, a new fusion can begin again,

28
00:01:52,650 --> 00:01:56,650
helium an oxygen start to fuse into neon. So we squish

29
00:01:56,670 --> 00:02:00,670
a blue helium atom and an orange oxygen atom, and swap that out for a

30
00:02:00,690 --> 00:02:04,700
tennis ball that represents neon. Depending on the size of the star

31
00:02:04,720 --> 00:02:08,720
this process can continue through the periodic table up to the point where iron is formed.

32
00:02:08,740 --> 00:02:12,740
But to fuse iron you need to input energy. With energy going

33
00:02:12,760 --> 00:02:16,770
into fusion instead of coming out of it, the star can never be in equilibrium

34
00:02:16,790 --> 00:02:20,790
again and its day are numbered.