ESS 100 (Stapleton)
Life Cycles of Very Massive Stars

Name: B 5/6

1. For these notes, "very massive" means...

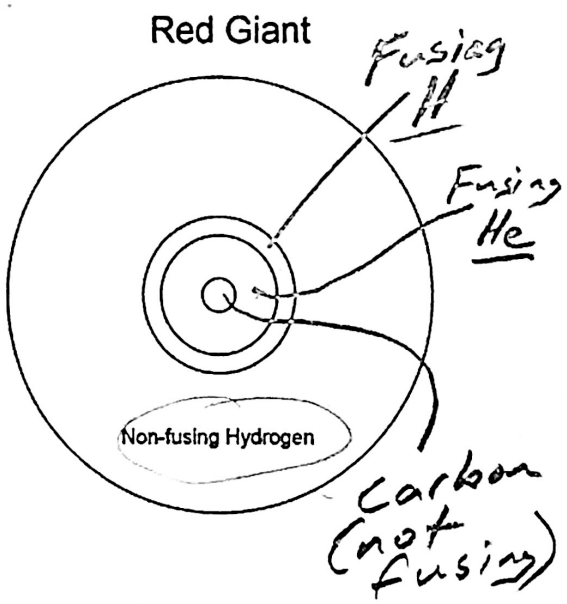
20 times the Sun's mass

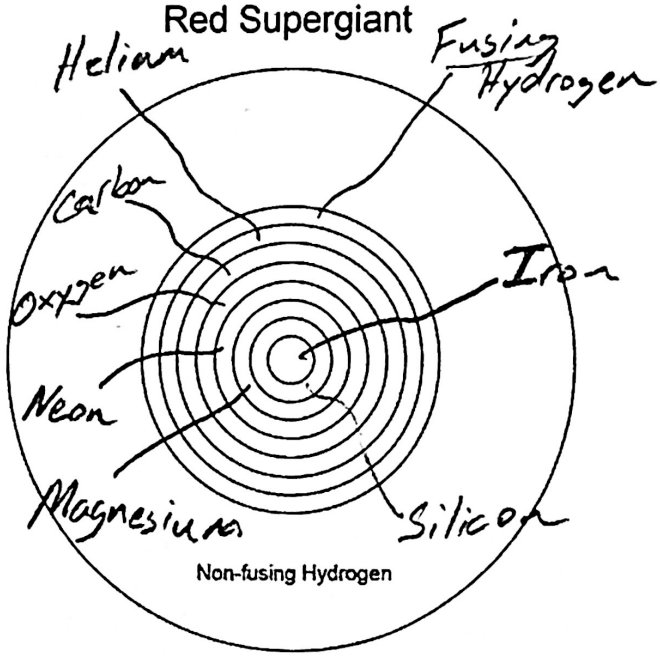
2. List the life stages of a very massive star.

Nebula ⇒ Protostar ⇒ Main Sequence ⇒ Red Supergiant ⇒ Supernova

Supernova → Neutron Star
Supernova → Black Hole
Supernova → Material Blasted into Space and recycled → Nebula

3. Show how nuclear fusion in a very massive star is different than fusion in a medium star like our Sun?

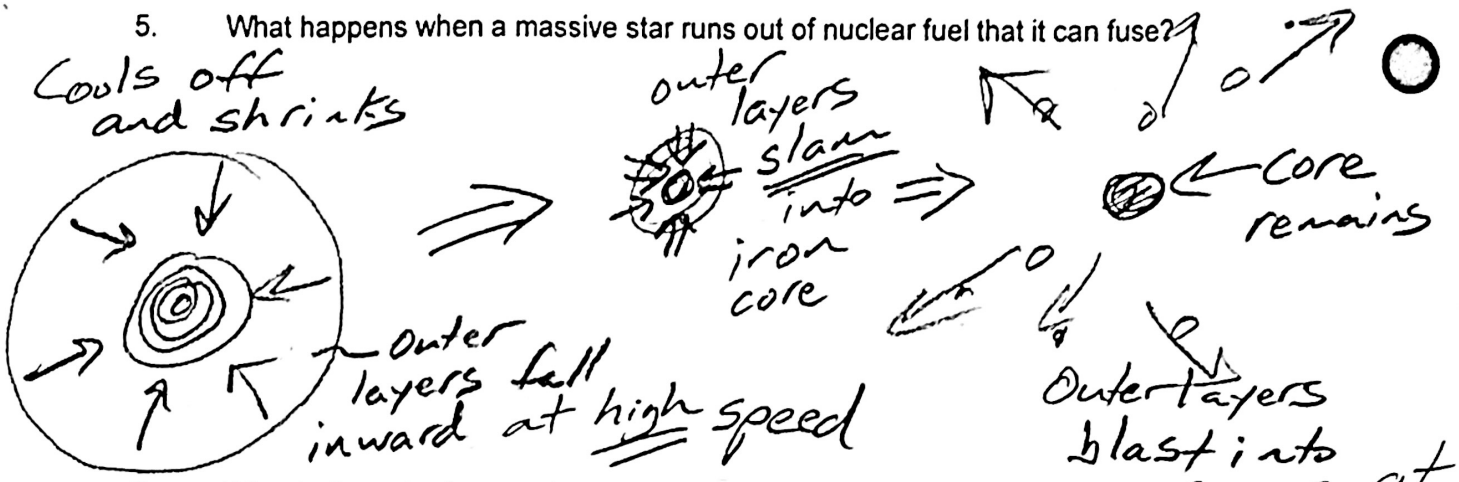




4. What is the heaviest element that can be made by nuclear fusion in a star?

Iron

5. What happens when a massive star runs out of nuclear fuel that it can fuse?



6. Why do the outer layers of an exploding supernova fly away so fast?

They take all of the falling material momentum, and pack it into a small mass.

7. Give one reason that we should be thankful for supernovas.

Supernovas created everything heavier than iron (e.g. gold), and they scattered it through the Universe.

8. What happens to the star material after a supernova?

a) Some material gets blasted out into space. This material...

can be recycled (incorporated into a new solar system and new life)

b) A black hole can form if...

the remaining core is 3 times the sun's mass

c) A neutron star can form if...

The core is less than 3x the sun's mass

9. Some neutron star facts:

- One teaspoonful weighs as much as 900 great pyramids
- Fastest spins 700x per second
- So hot they give off x rays, so mostly invisible to humans.