

# Ch 24.3 The Sun

## Structure of the Sun

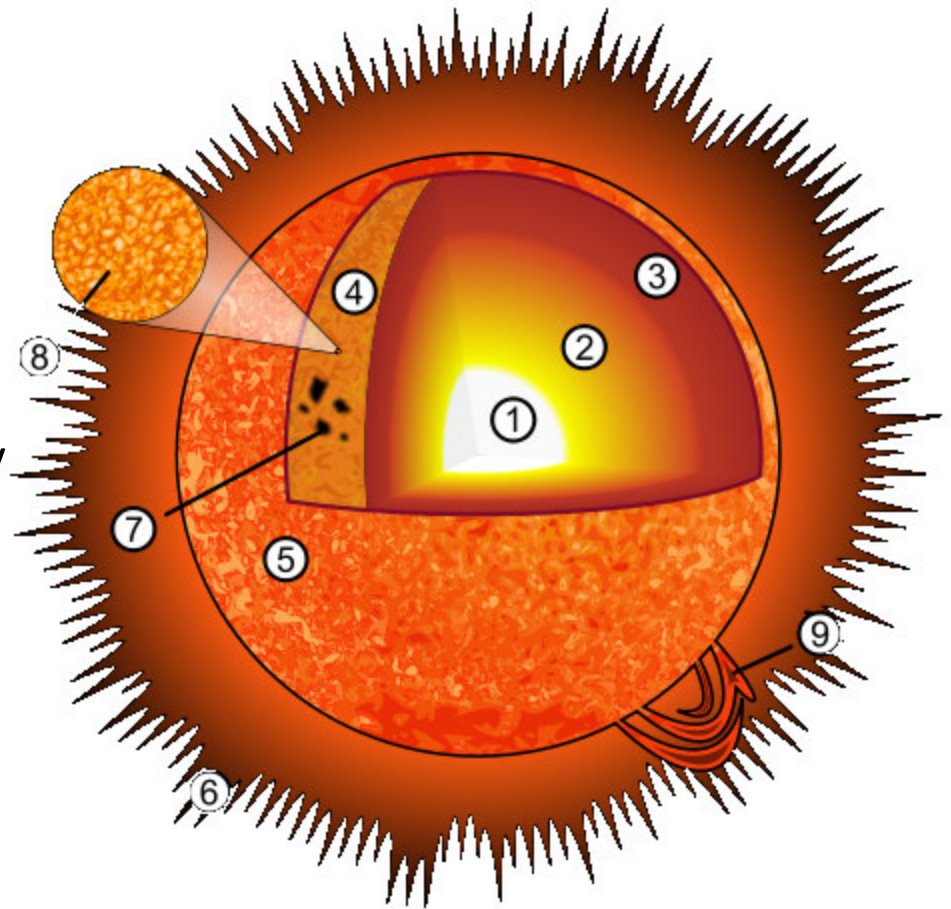
- The sun is made of gas and by itself it accounts for about 98.6% of the Solar System's mass.
- The Sun consists of hydrogen, helium, and trace quantities of other elements, such as iron and nickel.

### 1. The Core

- Almost all the fusion in the sun takes place in the core.
- Nuclear fusion has gradually changed the core's contents.

### 2. Radiative zone

- The radiative zone gets its name from the fact that energy travels through it mainly by radiation.
- Photons emerging from the core pass through stable layers of gas. But they scatter from the dense particles of gas so often that an individual photon may take 1,000,000 years to pass through the zone.



### **3. Convection zone**

- The highest level of the solar interior, the convection zone extends from the radiative zone to the sun's surface.
- This zone consists of the "boiling" convection cells.

### **4. Photosphere**

- The lowest layer of the sun's atmosphere. Emits the light that we see.
- The photosphere consists of numerous granules.

### **5. Chromosphere**

- The main characteristic of this zone is a rise in temperature, which reaches about 10,000 K in some places and 20,000 K in others.

### **6. Corona**

- Corona is the part of the sun's atmosphere whose temperature is greater than 500,000 K. The corona consists of such structures as loops and streams of ionized gas.

### **7. Sunspots**

- Sunspots are dark, often roughly circular features on the solar surface. They form where denser bundles of magnetic field lines from the solar interior break through the surface.

### **8. Granules**

- Grainy texture of the photosphere. Millions of relatively small (for the sun), bright markings which are the tops of granulation cells.

### **9. Prominence**

- Anchored to the Sun's surface in the photosphere, and extend outwards into the Sun's corona. Consists of extremely hot ionized gases, known as plasma.

## Nuclear Fusion

- The process by which the sun gives off energy is called **nuclear fusion**.
- Every second deep in the sun's core, 700 million tons of hydrogen are converted to helium, and in the process, 5 million tons of energy are produced.
- The conversion of just one pinhead's worth of hydrogen to helium generates more energy than burning thousands of tons of coal.
- Only a small percentage of the hydrogen in the nuclear reaction is actually converted to energy, an estimated over 600 million tons of hydrogen each second.
- As hydrogen is consumed, the byproduct – helium – forms the solar core which continually grows in size.
- This reaction causes four protons or hydrogen nuclei to fuse together to form one alpha particle or helium nucleus.

