

## Chapter 17. Adding It Up: Formation of the Solar System

**Note.** In this section we discuss the beginning of the solar system.

**Note.** The solar system condensed out of a cloud of dust and gas. The composition of the Sun reflects the composition of this cloud. The initial collapse was triggered by some shock wave, probably the explosion of a nearby supernova. As the cloud collapsed, it started to rotate. This forced the cloud into a disk shape. The entire system is now called the *solar nebula*. After about one million years from the start of the collapse, nuclear reactions started in the *protosun*.

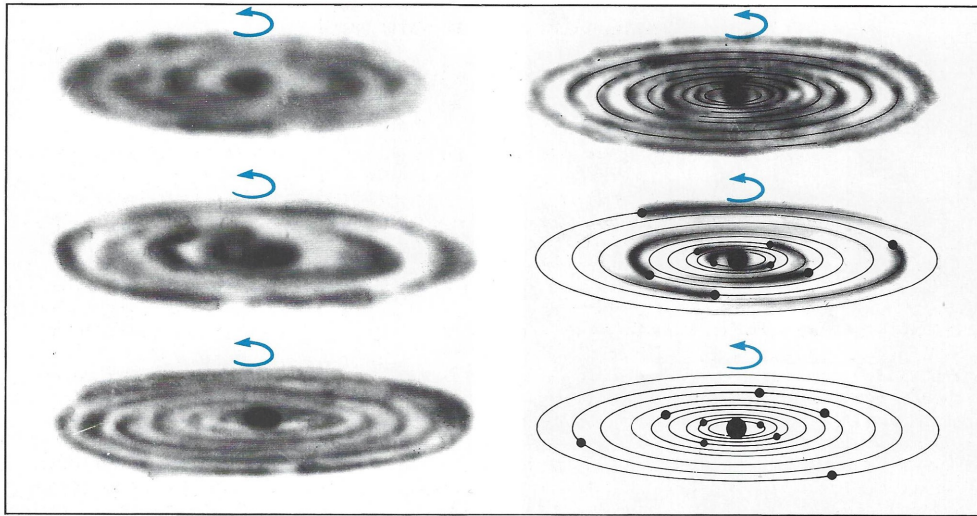
**Note.** The elements that condense easily are called *refractory elements*. In the inner solar system, these were the first to condense, forming the “rocky” terrestrial planets. There are two stages to terrestrial planet formation: (1) formation of planetesimals from refractory elements, and (2) accretion of planetesimals to form the planet. In the outer solar system, the planetesimals contained more volatile elements, explaining the composition of the gaseous giants. The “leftover” dust and gas after planet formation was removed by the solar wind. See Figure 17.8 below.

**Note.** It is reasonable to suppose that there are planets around other stars. There are three observational types of evidence for this:

1. “wobble” in the proper motion of a star,

2. “wobble” detected by changes in Doppler shift, and

3. infrared observations.



**Figure 17.8.** Steps in the Sun's formation.

*Revised: 2/18/2021*