According to the prevailing core instability model, giant planets begin their
growth by the accumulation of small solid bodies, as do terrestrial planets.
However, unlike terrestrial planets, the growing giant planet cores become
massive enough that they are able to accumulate substantial amounts of gas
before the protoplanetary disk dissipates. Models predict that rocky planets
should form in orbit about most stars. It is uncertain whether or not gas

giant planet formation is common, because most protoplanetary disks may
dissipate before solid planetary cores can grow large enough to
gravitationally trap substantial quantities of gas. Ongoing theoretical
modeling of accretion of giant planet atmospheres, as well as observations of
protoplanetary disks, will help decide this issue. Observations of extrasolar
planets around main sequence stars can only provide a lower limit on giant
planet formation frequency. This is because after giant planets form,
gravitational interactions with material within the protoplanetary disk may
cause them to migrate inwards and be lost to the central star. The core
instability model can only produce planets greater than a few jovian masses
within protoplanetary disks that are more viscous than most such disks are
believed to be. Thus, few brown dwarves (objects massive enough to
undergo substantial deuterium fusion, estimated to occur above ~ 13 jovian
masses) are likely to be formed in this manner. Most brown dwarves, as
well as an unknown number of free-floating objects of planetary mass, are
probably formed as are stars, by the collapse of extended gas/dust clouds
into more compact objects.