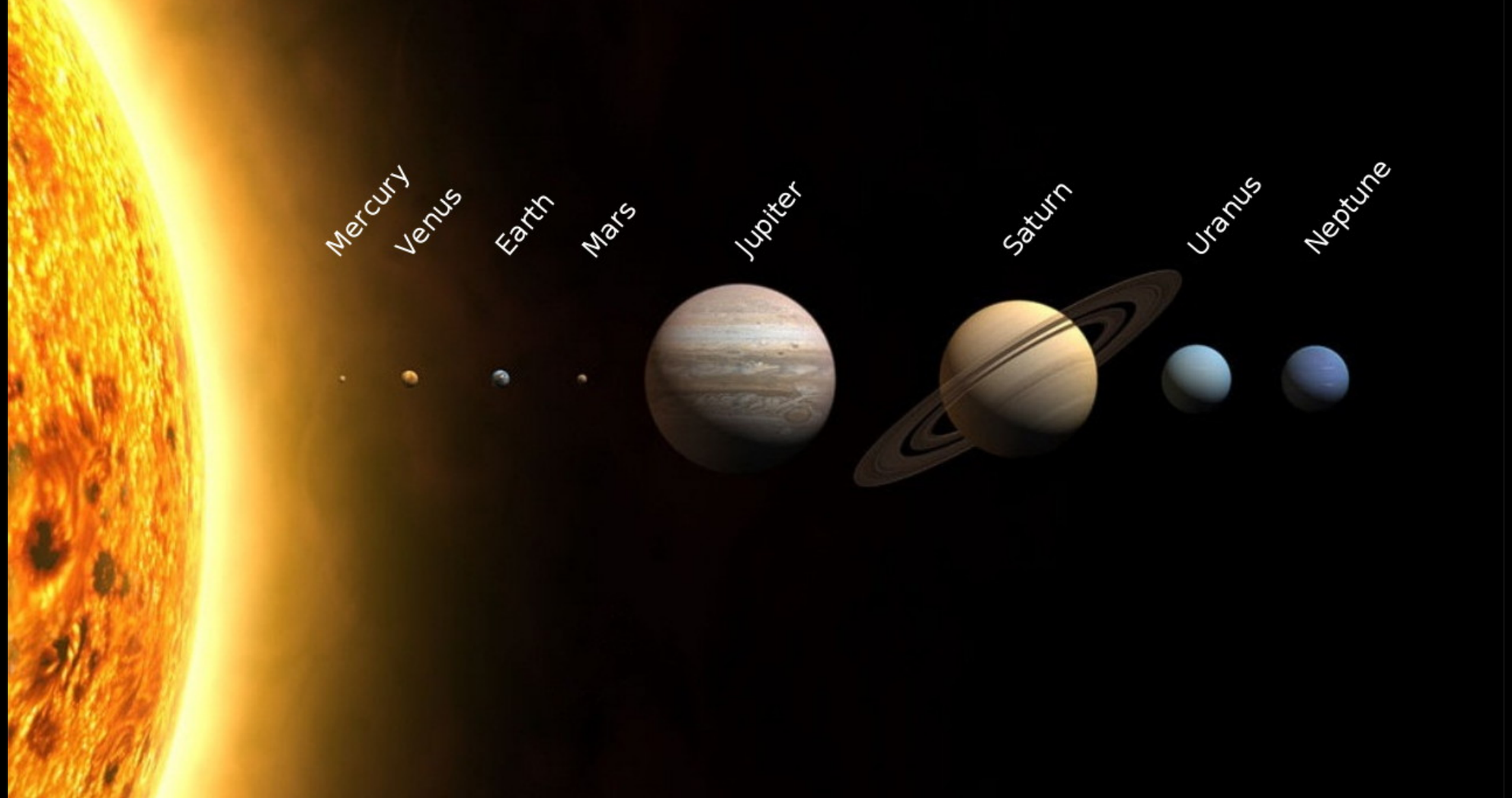
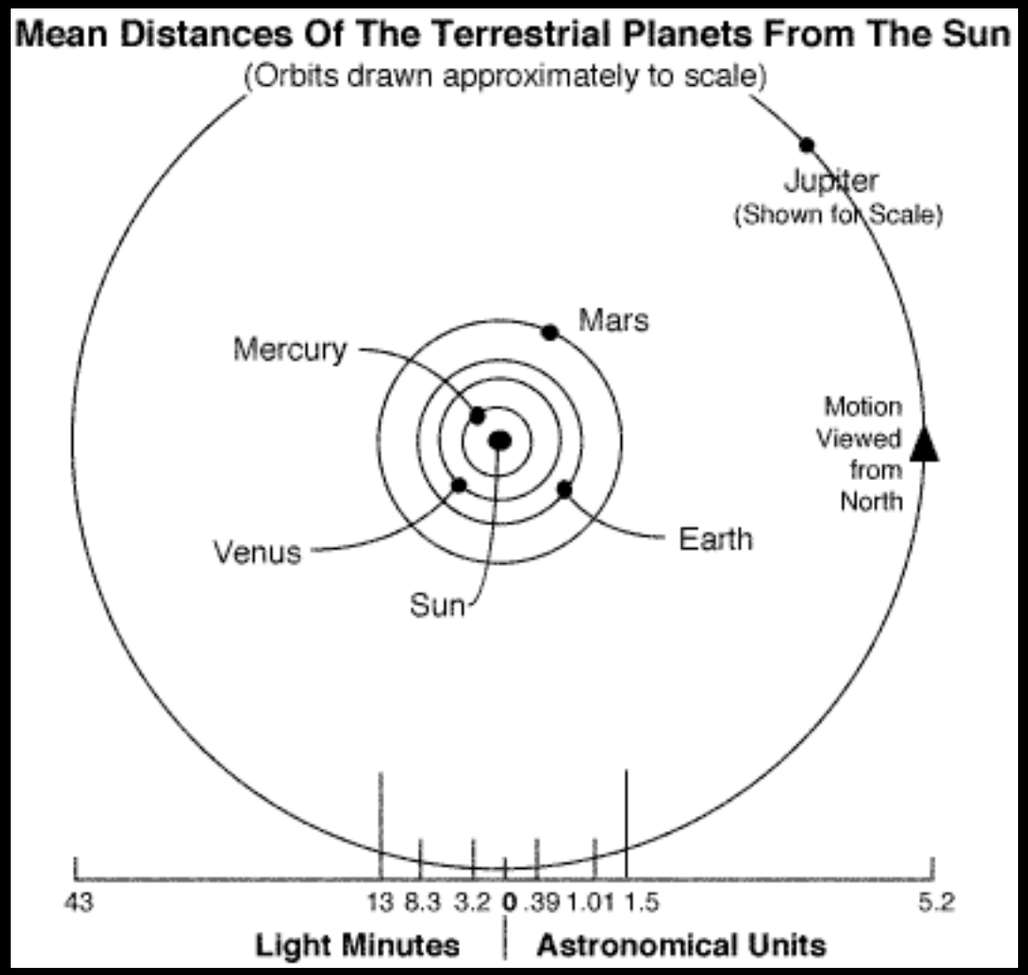


	Planet	D(A.U.)	Orbital Pd. (yr)	Rot. Pd.	Discovered	Rings	T/J	Bode–Titus Rule
Inner SS	Mercury	0.39	0.24	58^{d}	–	N	T	0.3
	Venus	0.72	0.62	243^{d}	–	N	T	0.7
	Earth	1.00	1.00	24^{h}	–	N	T	1.0
	Mars	1.52	1.88	25^{h}	–	N	T	1.6
	(minor planets = asteroids)				1801			2.8
Outer SS	Jupiter	5.20	11.86	9.8^{h}	–	Y	J	5.2
	Saturn	9.54	29.46	10^{h}	–	Y	J	10.0
	Uranus	19.18	84.01	15^{h}	1781	Y	J	19.6
	Neptune	30.06	164.79	17^{h}	1846	Y	J	38.8
	Pluto/ Charon	39.44	247.70	6.4^{d}	1930	N	T	77.2

The Sun contains 99.85% of all the matter in the Solar System. The planets, which condensed out of the same disk of material that formed the Sun, contain only 0.135% of the mass of the solar system. Jupiter contains more than twice the matter of all the other planets combined.

The four primary terrestrial worlds are the innermost planets in the solar system, Mercury, Venus, Earth and Mars. There are an additional 8 other terrestrial worlds; the Moon, Io, Europa, Ganymede, Callisto (the four Galilean moons), Titan (a moon of Saturn), Triton (a moon of Neptune) and Pluto.

They are called terrestrial because they have a compact, rocky surface like the Earth's and are spherical in shape. The other moons are not spherical and are more asteroid-like (i.e. irregular). Venus, Earth, Mars and Titan have significant atmospheres, the rest have little to zero.



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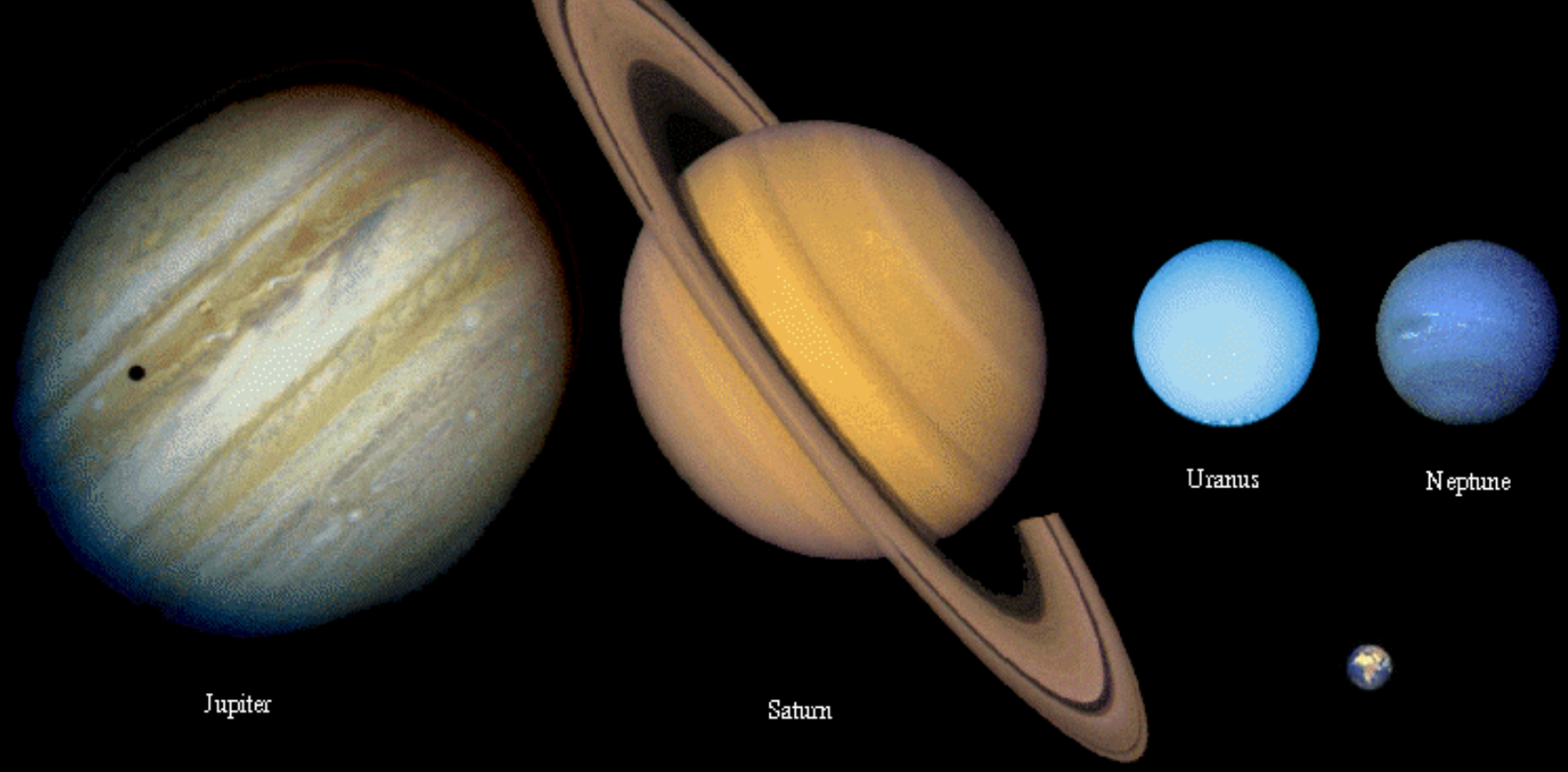
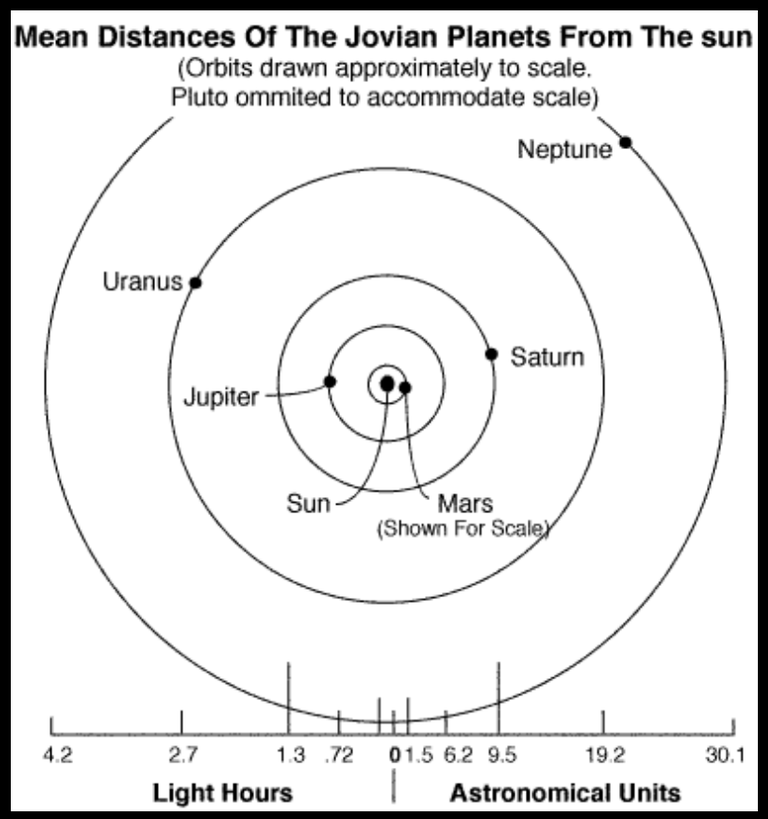




Jupiter, Saturn, Uranus, and Neptune are known as the Jovian (Jupiter-like) planets, because they are all similar in size and structure, i.e. gigantic compared with Earth (Earth is in the lower right corner above) and having a non-solid, gaseous nature.

The Jovian planets are also referred to as the gas giants, although all of them might have small semi-solid cores below their thick atmospheres.

A planet revolves around the Sun. A moon or satellite revolves around a planet. The term planet or moon is not selected by mass or size of the body (for example, Titan, a moon of Saturn, is bigger than Mercury).
The period of revolution of a planet is determined by timing and astrometry (the science of measuring stellar and planetary positions).

Periods of rotation are determined by either

timing surface features
timing clouds and atmospheric features
reflected sunlight (light curves)
Doppler radar measurements of planet limb

Note that timing atmospheric features reveals that Jovian planets have differential rotation (meaning their equators rotate faster than the pole regions, i.e. the planet is not solid).

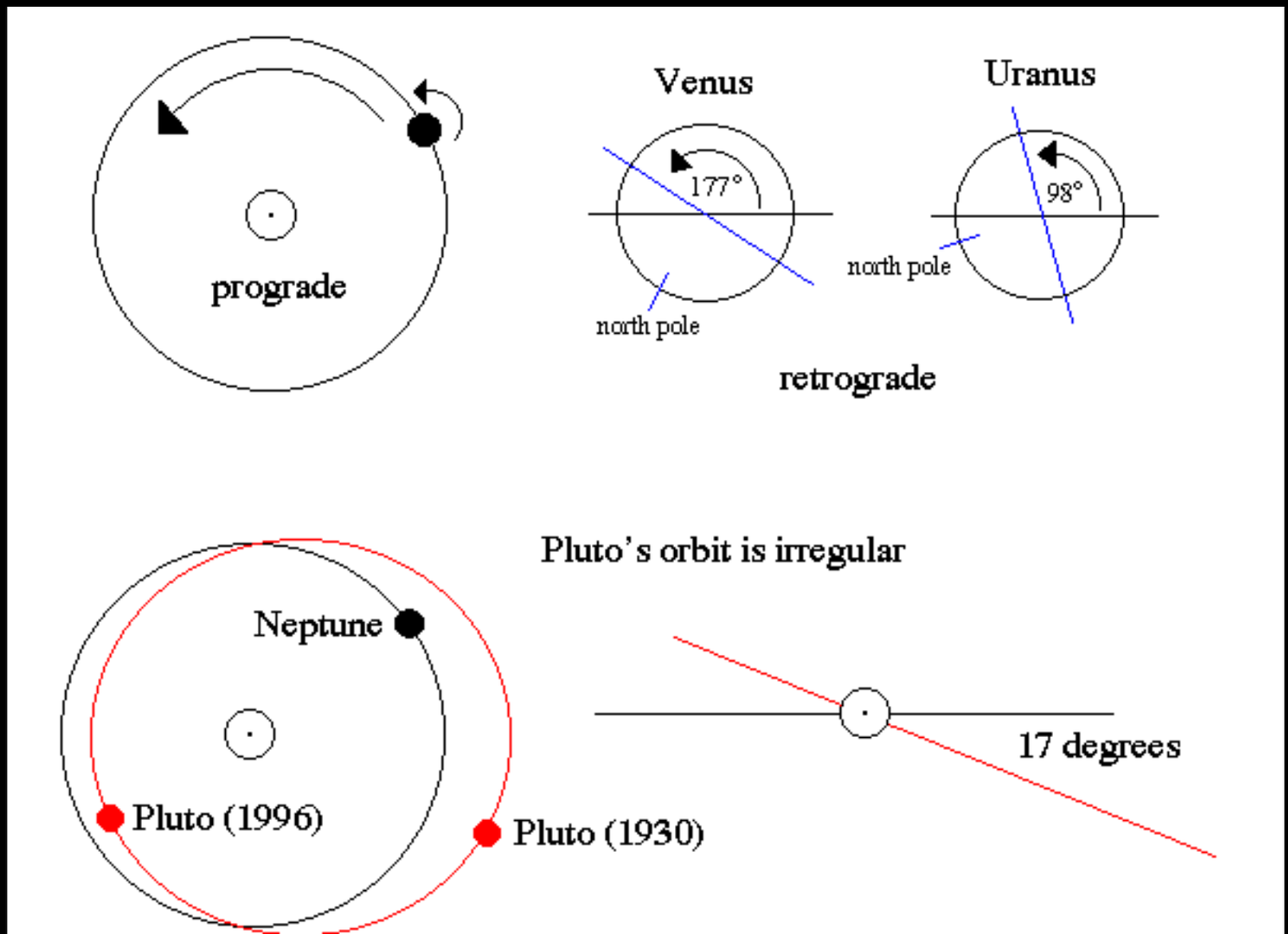
Information about the planets is obtained by:

photometry -> temperatures, surface features, albedo
spectroscopy -> chemical composition
radar mapping -> surface topology
space probes -> analyze, survey, sample, magnetic fields

Solar System Formation:

Any model of Solar System formation must explain the following facts:

1) All the orbits of the planets are prograde (i.e. if seen from above the North pole of the Sun they all revolve in a counter-clockwise direction).
2) All the planets have orbital planes that are inclined by less than 6 degrees with respect to each other (i.e. all in the same plane).
3) All the planets have low eccentricities.
4) All planets have prograde rotation except Venus and Uranus.



	Terrestrial Planets	Jovian Planets
Distance	0 to 5 A.U.'s	5 to 40 A.U.'s
Mass	0.1 to 1.0 $M_\oplus$	80 to 120 $M_\oplus$
Radius	0.6 to 1.0 $R_\oplus$	4 to 10 $R_\oplus$
Density (g/cm^3)	5.0 (rock)	1.2 (water)
mean T (°K)	~ 100° K	~ 10° K
atmosphere	thin (CO_2, N_2, O_2)	thick (H_2, He, CH_4, NH_3)
surface	solid	none
interior	iron, silicates	liquid H
satellites	few	many
rings	N	Y

Common elements in the Solar System

gaseous materials	icy materials	rocky materials
Hydrogen (H)	Water (H_2O)	Iron (Fe)
Helium (He)	Methane (CH_4)	Iron Sulfide (FeS)
Neon (Ne)	Ammonia (NH_3)	Olivine ($Mg/FeSiO_4$)
	Carbon Dioxide (CO_2)	Pyroxene ($CaMgSi_2O_6$)
gases @ 10° K	100's° K	5000's° K

if element is a gas then it can escape into space. Must be a solid to coalesce.
cosmic or primordial abundance of Universe

94.2% H
5.7% He
0.1% everything else <– note that this is not true on Earth and must also be explained by any formation theory