International Journal of Astronomy 2020, 9(1): 3-11
DOI: 10.5923/j.astronomy.20200901.02

The Processes that Determine the Formation and Chemical Composition of the Atmosphere of the Body in Orbit

Weitter Duckss

Independent Researcher, Zadar, Croatia

Abstract The goal of this article is to analyze the formation of an atmosphere on the orbiting planets and to determine the processes that participate in the formation of an atmospheric chemical composition, as well as in determining it. The research primarily analyzes the formation of atmospheres on the objects of different sizes (masses) and at the same or different orbital distances. This paper analyzes the influence of a star's temperature, the space and the orbit's distance to an object's temperature level, as well as the influence of the operating temperature of atoms and chemical compounds to chemical composition and the representation of elements and compounds in an atmosphere. The objects, which possess different masses and temperatures, are able to create and do create different compositions and sizes of atmospheres in the same or different distances from their main objects (Saturn/Titan or Pluto). The processes that are included in the formation of an atmosphere are the following: operating temperatures of compounds and atoms, migrations of hydrogen, helium and the other elements and compounds towards a superior mass. The lack of oxygen and hydrogen is additionally related to the level of temperature of space, which can be classified into internal (characterized by the lack of hydrogen) and the others (characterized by the lack of oxygen).

Keywords Atmosphere, Chemical composition of the atmosphere, Migration of the atmosphere

1. Introduction

The article is based on existing evidence (measurements) for bodies (planets and other bodies) orbiting the Sun, as well as exoplanets. Proper handling of evidence refers to processes that lead to the detection of clear reasons why atmospheres can be made of nitrogen, hydrogen, CO_2, CH_4 and different quantities of other atoms and compounds from body to body. In addition to the star's influence on the atmosphere, other equally important processes are included: migration of atoms and compounds, rotation and tidal locked bodies, space and body temperature, processes that create high body temperatures, degradation of atoms and compounds not only due to the influence of the star. Here, atoms and compounds are observed through their operating temperatures and show why there are or are no specific atoms and compounds in the atmosphere. There is also evidence as to why we are reading atoms and compounds in the atmosphere even though they are not in a gaseous state at body temperature.

Matter is presented in eight tables. These tables represent the relations with some values that cannot be ignored in the analysis of the processes that lead to the creation or the lack of an atmosphere on an object.

All of the objects in the first table are tidally locked and are distanced from 0,016 to 0,16 AU. In the second and third tables there are objects with an independent rotation. The distances of the objects in the second table are from 1,167 to 18 AU and in the third table from 40 to 6 900 AU. Table 4 presents the influence of the speed of rotation to the temperature of an object, which significantly influences on the chemical composition of an atmosphere. Operating temperatures of atoms and compounds are given in Table 5. The existence of such measurements, which point out that there in an atmosphere are atoms and compounds that are in solid state or they disintegrate (at the object's temperature), is related to other, non-atmospheric processes. Table 6 introduces the evidence of complex matter being disintegrated in a natural process. The relation of the lack of atoms and compounds to the decrease of temperature is given in Table 7. The final, eighth table, presents the existence of regions of concentrated matter on every object and star.

* Corresponding author:
wduckss@gmail.com (Weitter Duckss)
Published online at http://journal.sapub.org/astronomy

2. Processes Responsible for the Existence of the Atmosphere and Its Chemical Composition

Observing the existence and chemical composition of the atmosphere will be based on proving the processes that create the atmosphere and determine its chemical composition, based on evidence within our system and exoplanets.

A method of confirmation: Gathering the measurements of mass, temperature, distance (for the orbiting objects) and the mass and temperature of a main star.

Determining, if there are regularities in the same or different orbits for the same or different quantities of mass and providing a relevant overview.

The level of temperature is related to the distance from a main star and to a rotation by using the rotation of stars.

Creating an overview of elements and compounds that are suggested to exist in the atmosphere of an object and determining their abilities to create an atmosphere at different temperatures.

Analyzing the complexity of an object's composition due to the exposure to high temperatures and, above all, pointing out the importance of temperatures above 1 000℃ on a particular distant object as well as in general.

Analyzing the development of a chemical structure on objects with the increase of mass and the distance from its star.

Proving the existence of a certain distance at which matter is concentrated on the objects of our system.

Explaining via the merger of objects the existence of systems that are different to ours and that are created through close or distant binary processes.

Relating the migration of atoms and compounds to different compositions of atmospheres, as well as the lack of oxygen on the objects in the colder parts of the outer space.

The atmosphere of the body in orbit is determined by: body mass, independent rotation of the body, distance from the main star, temperature of the main star, binary effects. The processes of migration of hydrogen, helium (for the atmosphere of Earth it is estimated to be 3 kg/s and the one of helium is 50 g/s. (István Lagzi et al. 2013 [1]) and other elements and compounds determine whether a body will have an atmosphere and its chemical composition (W. Ducks 2017, 2018, 2019 [2]). The process is directly dependent on a body mass. All smaller bodies regardless of the distance from the main star in the atmosphere will have hydrogen and helium below 1% of the total atmosphere. The exception: very distant bodies that don't have larger planets nearby.

In our system, Pluto is 10 AU from Neptune and does not retain hydrogen and helium in the atmosphere, but has an atmosphere mainly of nitrogen (and something CH_4 and CO).

Heavier elements migrate from the body in orbit if positioned near the main star or another central body.

The migration of heavier elements and compounds in the internal orbits is in a direct relation to the distance and mass of the body and the star. Achieving a sufficient body mass size, which prevents these processes, depends on the size and speed of rotation of the main body, as well as the existence of an independent rotation of the body or distance required in this relationship to enable the body to rotate.

Mercury has a thin exosphere (0.5 nPa, (0.005 picobars) (NASA, Dr. D. R. Williams 2018. [3]) - an indication that all elements produced by the planet that have arrived in the atmosphere from space in the form of comets and asteroids reside briefly above the surface of the body. The size of Mercury (R 2 439.7 km) is insufficient to retain the atmosphere, like Titan the moon does, which has R 2 574.73 km. Saturn, which takes on the role of the Sun, does not have an attraction force strong enough to remove Titan's atmosphere at a distance of 1 221 870 km, but it successfully removes free hydrogen and helium.

The Sun removes the atmosphere from Mercury at a distance of 57,909,050 km.

We find the migration processes of atoms and compounds in exoplanets HD 209458 b radius 1.35 R_{Jup}, 6 700 000 km (0.045 AU) (David Ehrenreich et al. 2008 [4]), HD 189733 b R_{Jup} 1,138 $R_{Jup,}$ distance 0.03099 AU (4 636 000 ± 90 000 km). (A. Lecavelier et al. 2010 [5]), GJ 436b 4 327 R_{Earth}, 0.028 AU (D. Ehrenreich et al. 2015 [6]).

The impacts of body mass are seen in Iapetus and Rhea moons, which are 1,468 and 1,527 km in diameter and do not create atmospheres, especially Iapetus, which is more distant (3 560 820 km). Rhea (distance: 527 108 km) has a weak migratory exosphere.

Oxygen has a boiling point of -182.96℃, maximum temperatures on Rhea of -174℃ favor the formation of an atmosphere of oxygen, but minimum temperatures of -220℃ crystallize oxygen and remove it from the atmosphere to the surface. CO2 freezes at -56.6℃ and cannot linger for long above the surface of the body with a temperature of -174 to -220℃. (NASA 2010 [7]).

Here it is important to note that, in general, all outer planets have negligible amounts of oxygen in the atmospheres, which suggests that oxygen is not one of the more important elements in the chemical structure of more distant bodies, where space temperatures are as low as the intensity of waves from the main star. (W. Ducks 2019).

The atmospheres are made of hydrogen and helium on planets with a higher mass, while on the other smaller bodies, due to the migration of these elements, a part of the body (Triton, Titan, Pluto - the largest small bodies) in the atmosphere retains N2 with a small amount of CH_4, CO, which mainly crystallize and returns to the surface. Pluto and Triton are colder than Titan and have a more significant removal of N2 from the atmosphere than Titan, due to the existence of temperatures below the tip point N2 and have a less impressive atmosphere.

Exoplanets at all distances can become stars with a fully melted body.

Figure 1 shows the visual notion of the temperature height shown in tables 1, 2 and 3. A body that has a temperature of >1 500°K is melted just as the lava of the Kīlauea volcano, i.e., the body is a classical star that produces and emits its radiation from its processes.

The temperature of Kīlauea lava is about 1 170 - 1 250 degrees Celsius (Hawaiian Volcano Observatory 2018 [8]).

Figure 1. Hawaiian volcano

Figure 1. Credit: The U.S. Geological Survey (USGS)

Bodies that are tidally locked achieve the temperature with their corresponding mass and the strength of the tidal forces of the main star, which are determined by the mass and speed of rotation of the star.

The temperatures of the internal exoplanets in Table 1 are simulations based on theories that did not use the influence of mass on the temperature of the planet. The melted core is found on Mercury, Venus and Earth. They are significantly smaller and are further than the star of the body in Table 1.

The planets in Table 3 are in very distant orbits without a significant tidal force impact from their main star and some of them have masses below 13 M_{Jup}- yet they have temperatures of 1 700 to 2 750°K.

Table 1. Temperatures and mass of locked bodies

	Planet	Mass of Jupiter	Temperature K	Distance AU	Temperatures of star °K	Mass of star M_{Sun}
1	TOI-1235 b	0,0186	775	0,03826	3 997	0,63
2	TOI-849 b	0,12831	1 800	0,01598	5 375,3	0,929
3	Kepler-32b	4,1	569	0,05	3 900	0,58
4	WASP-120b	5,0	1 890	0,0522	6 450	1,45
5	WASP-162b	5,2	910	0,0871	5 300	0,95
6	WASP-89 b	5,9	1 120	0,0427	4 955	0,92
7	Qatar-4b	6,1	1 385	0,02803	5 215	0,90
8	Kepler-14b	8,4	1 605	0,0771	6 395	1,51
9	HAT-P-2b	8,7	1 540	0,06814	6 380	1,33
10	Kepler-13b	9,28	2 550	0,03641	7 650± 250	1,72
11	Corot-27_b	10,39	1 500	0,0476	5 900	1,05
12	Kepler-39b	20,1	897	0,164	6 350	1,29
13	CoRoT-3b	21,66	1 695	0,05783	-	0,35
14	KELT-1b	27,23	2 423	0,02472	6 516	1,335

Table 1. Distance, mass and temperature tidal locked bodies

Table 2. Bodies that have rotation

	Planet	Mass of Jupiter	Temperature K	Distance AU
1	51 Eridani	2	700	13,2
2	HR 5183 b	3,23	110	18
3	2M 044144 b	9,8	1 800	15
4	EN 8799 c	10	1 200	38
5	HR 8799 d	10	1 300	24
6	HR 8799 e	10	1 150	14,5
7	CFBDSIR J145829+101343 b	10,5	370	2,6
8	Beta Pictoris b	11	1 724	9,1
9	K2-311b	<13	183	4,5
10	HD 22781 b	13,65	167	1,167
11	WISEP J121756.91+162640.2 b	22	450	7.6 (8)

Table 2. Bodies that have rotation, distance 1,167 – 38 AU, mass

Table 3. Planets, large distance orbits, mass/temperature

	Planet	Mass of Jupiter	Temperature K	Distance AU
1.	2M1207b	4 (+6;−1)	1600 ± 100	40
2	GQ Lupi b	1-36 (20)	2650 ± 100	100
3	WD_0806-661	7 - 9	325 - 350	2 500
4	ROXs 42Bb	9	1800-2,600	140
5	HD 106906 b	11	1800	~650
6	CT Chamaeleontis b	10,5-17	2500	440
7	Ross 458 c	11,3	670	1 168
8	DH Tauri b	12	2750	330
9	HD 106906 b	12,3	1 820	654
10	Kappa_Andromedae_b	12,8	1 700	40 – 236
11	HD 44627	13-14	1600-2400	275
12	2MASS J2126-8140	13.3±1.7	1800	6900 (> 4,500)
13	2MASS J02192210-3925225 b	13,9	1 683	156
14	1RXS 1609 b	14	1800	330
15	UScoCTIO 108 b	14	2600	670
16	HIP_79098_(ab)_b	20,5	2 450	345
17	HD 222439	22 (13)	2 040 (1 850)	55 (100)
18	HIP 78530 b	23	2 800	710

Table 3. Planets at a large distance from the stars with high temperatures and different masses. [2]

Planets with very distant orbits can be significantly warmer than bodies of the same mass or larger in Mercury's orbit and significantly closer to the star (TOI-1338 b 30.2 M_{Jup}, distance 0.4491 AU, temperature 724°K vs. ROXs 42Bb 9 $M_{Jup,}$ distance 140 AU with a temperature of 1 800 – 2 600°K and td.); Kepler-32b 4 M_{Jup} in orbit with a radius of 0.0519 AU has T 569°K (the main star has 0.58 $M_{Sun,}$ T 3 900°K), opposite to 2M1207b, which also has 4 M_{Jup} in orbit with a radius of 40 AU but has T 1 600°K with colder and smaller star ~0,025 $M_{Sun,}$ T 2 550°K.

The use of simulations without including the mass values and the speed of rotation of the planet in orbit is visible in Table 2.

Existing simulations of planet HD 22781 b at a distance of 1,167 AU, 13.6 M_{Jup} have a temperature of 167°K (the main star has 0.75 M_{Sun}, T 5 027°K), and the planet 2M 044144 b at a distance of 15 AU, 9.8 M_{Jup} temperature 1 800°K (the main star has 0.20 M_{Sun}, T 3 400°K) (both bodies have independent rotation). A smaller planet, at a 17.5 times larger distance and 2 times smaller, a star that is by 1 350°K cooler has more than 9.58 times higher temperature (1 600 / 167°K).

The atmosphere and chemical composition of the body in an orbit are conditioned, except for the mass and distance from the star and the level of temperature. The level of temperature is directly related to the speed of rotation and the mass of the body regardless of whether it is in an orbit or independent.

There is no measurement that red stars can have rapid rotations, or that blue and white stars have slow rotations. Two bodies, if they have the same mass and have different temperatures, have different rotation speeds.

For the observed exoplanets, which are locked, the mass of planets and the proximity of the orbit of the star, along with the mass and speed of the star's rotation, are the basic parameters for determining the temperature of the body in an orbit.

It cannot be that a body of a larger mass, at a similar distance around a star (similar in mass and temperature), has the same or lower temperature than a smaller planet. Venus is farther away from the Sun than Mercury and has a higher temperature, higher liquefaction and far more significant geological processes.

If Mercury were to orbit around Titan, it would have a similar atmosphere to Titan the moon.

The formation of the atmosphere on the bodies in orbit is directly related to the temperature of space and the planet.

In the atmospheres of the inner smaller planets (up to a few masses of Earth) it is not realistic to expect hydrogen and helium except in traces. The processes of migration of these elements towards the star are dictated by the lack of sufficient mass of the planet. The required mass increases as the distance of the planet decreases. From the measurement we can see that the size of HD 209458 b and the radius of 1.35 R_{Jup} is not sufficient to stop the process of migration of H and He at the distance of the planet of 0.045 AU. The measurements for HD 189733 b, R_{Jup} 1.138 R_{Jup}, distance of 0.03099 AU and Gliese_436_b, radius of 4.327 M Earth, distance of 0.028 AU, confirm this. The measurements of the planet's main stars HD 209458 1.26 M_{Sun}, T 6 071°K; HD 189733 0,846 M_{Sun}, T 4 875°K; Gliese 436 0.41 M_{Sun}, T 3 318°K, indicate that their masses and temperatures are significantly different. For the distance of the body to Mercury's orbit, we measure the migration of hydrogen and helium and other elements and compounds from the body to the star.

Here are the simulations on the existence of atmospheres of TiO, Ti_2O_3, K_2O, NaO, NaO, Na_2S that break down at melting point and do not exist in a gaseous state as suggested by some authors (P. Mollière et al. 2016 [9]).

Table 4. The relation (of the section of main star types) of rotation, mass, radius, temperature and type

Old	Speed of rotation		Maas Sun=1	Temperature K	Type
White Dwarf					
GD 356	115	minutes	0,67	7.510,0	white dwarf
EX Hydrae	67	minutes	0.55 ± 0.15	/	white dwarf
AR Scorpii A	1,95	minutes	0,81 – 1,29	/	white dwarf pulsar
V455 Andromedae	67,62	second	0,6	/	white dwarf
RX Andromedae	200	km/s	0,8	40.000-45.000,0	white dwarf
RX J0648.0-4418	13	second	1,3	/	white dwarf
Pulsar					
PSR J0348+0432	39,123	m. second	2.01 ± 0.04	/	Pulsar
Vela X-1	283	second	1,88	31.500	X-ray pulsar, B-type
Cen X-3	4,84	second	20.5 ± 0.7	39.000	X-ray pulsar
PSR B0943 + 10	1,1	second	0,02	310.000	Pulsar
PSR 1257 + 12	6,22	m. second	1,4	28.856	Pulsar
Wolf-Rayet stars					
HD 5980 B	<400	km/s	66	45.000	WN4
WR 2	500	km/s	16	141.000	WN2-w
WR 142	1.000	km/s	28,6	200.000	WO2
R136a2	200	km/s	195	53.000	WN5h
Normal hot stars					
VFTS 102	600±100	km/s	25, 2014 in Los Angeles.	36,000 ± 5,000	O9:Vnnne
BV Centauri	500±100	km/s	1,18	40,000±1,000	*G5-G8IV-V*
Gamma Cassiopeiae	*432*	km/s	14,5	25.000	B0.5IVe
LQ Andromedae	300	km/s	8,0	40.000-44.000	O4If(n)p
Zeta Puppis	220	km/s	22,5 – 56,6	40.000-44.000	O4If(n)p
LH54-425 O5	250	km/s	28	45.000	O5V
Melnick 42	240	km/s	189	47.300	O2If
BI 253	200	km/s	84	50.100	O2V-III(n)((f*))
Red Dwarf					
Gliese 876	96,6	Days	0,37	3.129 ± 19	M4V
Kepler-42	2.9±0.4	km/s	0.13±0.05	3,068±174	M5V
Kapteyn's star	9,15	km/s	0,274	3,550±50	sdM1
Wolf 359	<3.0	km/s	0,09	2,800 ± 100	M6.5 Ve
Normal cool stars					
HD 220074	3,0	km/s	1.2 ± 0.3	3,935 ± 110	M2II
V Hydrae	11 - 14	km/s	1,0	2.650	C6.3e
β Pegasi	9,7	km/s	2,1	3.689	M2.5II–IIE
Betelgeuse	5	km/s	11,6	3.590	M1–M2 Ia-ab
F Type Star					
Beta Virginis	4,3	km/s	1,25	6.132 ± 26	F9 V
pi3 Orionis	17	km/s	1,236	6.516 ± 19	F6 V
4 Equulei	6.2±1.0	km/s	1,39	6,213±63	F8 V
6 Andromedae	18	km/s	1,30	6.425±218	F5 V

Table 4. The relation (of the section of the main star types) of rotation, mass, radius, temperature and type

Table 5. Operating temperatures of elements and compounds

Element, compound	Melting point C	Boiling point C	Element, compound	Melting point C	Boiling point C
CH_4	-182,5	-161,5	H_2O	0	100
Co	-205,02	-191,5	TiO	1 750	decomposes
CO_2	-56,6	Sublimate -78.5	You_2O_3	2 130	decomposes
SO_2	-72	-10	TiO_2	1 843	2 972
Oxygen (O)	-218,35	--182,96	MgO	2 852	3 600
Nitrogen (N)	-209,86	-195,75	Vo	1 789	2 627
Hydrogen (H)	-259,14	-252,87	H_2S	-82	-60
Helium	-272,20	-298,934	K2O	740	decomposes 300°
Carbon (C)	3 547	4 827	Nao	460	decomposes 675°
Magnesium (Mg)	648,85	1 090	At_2O	1 132	1 950
Sulfur (S)	112,85	444,674	SiO	1 702	1 880
Silicon (Si)	1 410	2 355	SiO_2	1 713	2 950
$(NH_{4)}$ Hs	-	56,6	NH_3	-77,73	-33,34
Argon (Ar)	-189,35	-185,85	KCl	770	1 420
Neon (No)	-248,67	-246,05	At_2S	1 176	decomposes
Krypton (Kr)	-156,55	-152,15	Al_2O_3	2 072	2 977
Xenon (Xe)	-111,85	-107,05	Nacl	800,7	1 465
Iron (Fe)	1 535	2 750	But	-164	-152
Hi	2 613	2 850	N_2O	-90	-88

Table 5. Operating temperatures of elements and compounds

Table 6. Elements and compounds of Earth's crust and mantle

	Melting point ℃	Boiling point ℃	%crust of crust the Earth	(sing) the Earth		Melting point ℃	Boiling point ℃	%crust of crust the Earth	(sing) the Earth
SiO_2	1.713	2.950	60,2	46	You	1.410	2.355	27,7	21,5
Al_2O_3	2.072	2.977	15,2	4,2	Al	660,35	2.467	8,1	2,2
Hi	2.613	2.850	5,5	3,2	Ca	839	1484	3,6	2,3
MgO	2.825	3.600	3,1	37,8	Mg	648,85	1.090	1,5	22,8
FeO	1.377	3.414	3,8	7,5	Fe	1.535	2750	5,0	5,8
At_2O	1.132	1.950	3	0,4	On	97,81	882,95	2,8	0,3
K_2O	740	-	2.8	0,04	K	63,65	774	2,6	0,03
Fe_2O_3	1.539 - 1.565	Not Available	2.5		H	-259,14	-252,87		
H_2O	0	100	1,4 (1,1)		A	-218,35	-182,96	46,6	44,8
CO_2	-56	Sublimation -78.5	1,2		You	1.660	3.287		
TiO_2	1.843	2.972	0,7		Q	44,15	280 (P4)		
P_2O_5	sublimes	360	0,2		He's a very	-272,20	-268,934		
Sun	He 24.85%, H 73.46%, O 0.77%, C 0.29%, other 0.53%								

Table 6. Elements and compounds of Earth's crust and mantle

If these were not present in the planet's atmosphere: processes of migration, decomposition of elements and compounds, at the temperature of 1 890℃K (WASP-120b 0.0522 AU, 5 M_{Jup}), it would contain most elements and compounds in Table 5 in significant quantities.

In parallel with these processes there is a constant incursion of material from space to the body, Earth receives 50 (NASA [10]) to 300 (CORDIS 2017 [11]) tons per day and Moon 5 tons per day (M. Horányi et al. 2015 [12]). The bombardment of this material ejects parts of the planet's mass into the atmosphere and space. This creates a false image of the existence of matter in the atmosphere that does not have the necessary chemical value.

The following cannot exist in the atmosphere of the planet (with a temperature of 1 890℃K): carbon (boiling point at 4 827℃K), iron (2 750℃K), MgO (3 600℃K), VO (2 627℃K), TiO_2 (2972℃K), etc., as suggested by a series of articles (O.D. Turner et al. 2016 [13]).

Table 7. More significant atmospheres of our system

Atmosphere, composition by volume (Wiki)			
Venus, T_{mean} 464℃	**Earth,** T -89.2 to 56.9℃	**Mars,** T -143 to 35℃	**Jupiter,** T_{mean} -108 to -161 ℃
96.5% carbon dioxide 3.5% nitrogen 0.015% sulfur dioxide 0.0070% argon 0.0020% water vapour 0.0017% carbon monoxide 0.0012% helium 0.0007% neon Trace carbonyl sulfide **Trace** hydrogen chloride **Trace** hydrogen fluoride	78.08% nitrogen (N2; dry air) 20.95% oxygen (O2) ~ 1% water vapor (climate variable) 0.9340% argon 0.0408% carbon dioxide 0.00182% neon 0.00052% helium 0.00017% methane 0.00011% krypton **0.00006% hydrogen**	95.97% carbon dioxide 1.93% argon 1.89% nitrogen 0.146% oxygen 0.0557% carbon monoxide 0.0210% water vapor 0.0100% nitrogen oxide 0.00025% neon **0.00008% hydrogen** deuterium oxide 0.00003% krypton 0.00001% xenon	**89%±2.0% hydrogen** (H2) 10%±2.0% helium (He) 0.3%±0.1% methane (CH4) 0.026% ammonia (NH3) 0.0028% hydrogen deuteride (HD) 0.0006% ethane (C2H6) 0.0004% water (H2O) Ices: ammonia (NH3) water (H2O) ammonium hydrosulfide (NH4SH)
Titan, T -211 [15] to -179℃	**Pluto,** T -240 to -218℃	**Sun,** T 2700 [16] to 5499℃ photosphere	**Neptune,** T -218 to – 201℃
Stratosphere: 98.4% nitrogen (N2), 1.4% methane (CH4), **0.2% hydrogen (H2);** Lower troposphere: 95.0% N2, 4.9% CH4; (97% N2, 2.7±0.1% CH4, **0.1–0.2% H2**)	The atmosphere of Pluto is the tenuous layer of gases Surrounding Pluto. It consists mainly of nitrogen (N2), with minor amounts of methane (CH4) and carbon monoxide (CO), all of which are vaporized from their ices on Pluto's Surface.	**Hydrogen 73.46%** Helium 24.85% Oxygen 0.77% Carbon 0.29% Iron 0.16% Neon 0.12% Nitrogen 0.09% Silicon 0.07% Magnesium 0.05% Sulphur 0.04%	**80%±3.2% hydrogen** (H2) 19%±3.2% helium (He) 1.5%±0.5% methane (CH4) ~0.019% hydrogen deuteride (HD) ~0.00015% ethane (C2H6) Ices: ammonia (NH3) water (H2O) ammonium hydrosulfide (NH4SH) methane (CH4·5.75H2O)

Table 7. More significant atmospheres of our system

If there are spectroscopic data and readings of these elements and compounds, they are there temporarily, due to the effects of impacts of external bodies or geological processes; they are not gases at this temperature and are not a part of an atmosphere. The atmosphere is made of elements and compounds that are in a gaseous state at the temperature of a planet or another body. Measuring elements and compounds that do not make a part of the atmosphere is an indication that it has no atmosphere or it is very thin when it allows measurements of non-atmospheric material.

In parallel with the process of continuous growth or incoming material from the space to the body, we have a constant degradation of compounds and elements due to prolonged exposure to high temperatures, a crystallization of gases due to the decrease in temperatures below the boiling point with the increasing distance from the surface, a decomposition of compounds and elements due to constant high-intensity waves (Demtröder, Wolfgang 2006 [14]), the mergers of elements and formation of compounds, which after connection have more valuable points than body temperature and crystallize and fall to the surface.

By comparing the chemical composition of the crust and mantle of Earth, we can see that the composition of the mantle is significantly simplified. Reducing the complexity of the elements and the absence of compounds is especially noticeable in the photosphere of Sun. High temperatures break down the compounds and complex elements to the less complex ones. The representation of complex elements with over 90% (Earth, Mercury, Venus and Mars) drops to below 2% (a photosphere of stars (Sun) including the constant incursion of space material.

The display of the atmosphere (and photospheres of Sun) in our system shows that there are two types of atmospheres.

The first is tied to the inner, the second to the outer body and the star. Both types indicate that body size is crucial for the existence of an atmosphere in which H and He prevail. All smaller bodies, without exception, show the processes of the formation of these elements and their migration towards larger bodies.

With the increasing distance from the star, the chemical composition of the body decreases. The reason for this is that chemical complexity is directly related to the body's relationship with the star and the speed of rotation of the body in an orbit. More intense binary effects favorably affect the formation of complex elements and compounds in significant quantities. A smaller body mass and a smaller orbit distance from the central body contribute to the removal of heavier elements and atoms from the atmosphere of smaller bodies. All of these processes are directly related to the mass of the central body and the mass of the body in orbit. The smaller mass of a central body allows the bodies in an orbit to retain more and more elements and compounds as the mass of the body in orbit grows.

Bodies in the outer colder space do not produce oxygen in significant quantities. Most likely, the reason is that the cold and reduced binary effects do not favor the process of oxygen formation, which is in large quantities on the inner warmer bodies.

On bodies that have elements and compounds that have a higher hot spot than the temperature of space and the body, the process of crystallization and return to the surface (Io moon SO_2, Titan, Triton, Pluto CO, CH_4 and N_2, Mars CO_2) takes place. The more atmospheric and its layers are farther away from the surface, the more exposed they are to the powerful influence of temperature reduction and more powerful wave surges, which cause the complexity of the atmosphere to decrease, the collapse and crystallization of the compounds and elements, as well as the reason that the heavier atoms and molecules of attractive force retain closer to the surface and prevent their escape.

Greater exposure to the planet's stronger star radiation does not affect the abundant existence of hydrogen in the atmosphere of these bodies (e.g., Liang et al 2003 [17]), because the atmospheres of Mercury, Venus, Earth and Mars deny this. Only with the achievement of sufficient mass, which is closely related to the distance of the orbit, does the body begin to retain the heavier and more easily elements and compounds, until it reaches the atmosphere of small red stars (N. Madhusudhan et al. 2016 [18]). The increase in mass and temperature also takes place and the rapid degradation of complex atoms and molecules into the less complex ones.)

Growth is dependent on the arrival of material from a space that is mostly hydrogen. Helium is coming from its migration from smaller bodies but also by the formation of concentrated hydrogen. The ratio of materials in space is recognizable in the chemical composition of nebulae: hydrogen 90%, 10% helium and other elements (maximum 2%) (britannica.com [19]). It is also the chemical composition of the Milky Way (Ken Croswell 1996 [20]).

Table 8. Belts where denser matter is concentrated

Sun system	Jupiter system	Saturn (main belt)	Uranus	Neptune
5,2 to 30,11 AU	0,4217 to 1,883 M km	0,527 to 3,561 M km	0,129 to 0,584 M km	0,118 to 5,514 M km
Jupiter	Io	Rhea	Miranda	Proteus
Saturn	Europa	Titan	Ariel	Triton
Uranus	Ganymede	Hyperion	Umbriel	Nereid
Neptune	Callisto	Iapetus	Titania	
			Oberon	

Table 8. The largest bodies in orbit are within a belt rich in matter

Depending on the speed of rotation of the body and the presence of material in space, belts are formed around the body that is richer in matter. In these belts, the body growth is significantly larger than the body in front of and behind that or these belts. This is very visible in our system.

Observing the overall picture of the body, one or more bands are visible in the orbit of individual bodies. If there are more of them as in Saturn, one is the main one that is comparable and similar to the only belt of other bodies. A larger amount of matter, which collects in the belt, directly affects the speed of rotation of the body if they are not tidal bodies (natural satellites).

Attractive forces can form a wide range of possibilities of forming a system with two or more bodies. A body of greater mass becomes a central body. This association may vary significantly in terms of mass, rotation and temperature as well as distances which may be small (Pluto / Charon) or very distant (Ross 458 c 1 168 AU; 2MASS J2126-8140 6 900 (> 4 500) AU; WD_0806−661 2 500 AU). The system can be formed by two or more bodies of similar masses (2M1207 25 / 4.6 M_{Jup} distance 40,6 AU etc.) (James B. Kaler 2013 [21]). This type of association is very common, but in essence does not differ significantly from the classical formation, when a larger body gathers smaller bodies that gradually grow. Gradual growth excludes the possibility that we have bodies of large mass in the inner orbits because their growth is outside the zones of concentration of matter or belts. These processes contribute to the formation of the atmosphere in a different course.

3. Conclusions

Observation of the atmosphere on bodies in orbit depends on the processes of migration of hydrogen, helium and other elements and compounds, which are in the gaseous state, towards the central body, body mass, distance from the central body, whether in inner or outer orbit, the action of binary effects, the rotation of the body in an orbit, the position of the body in and out of the gas and dust concentration zone, whether the bodies formed around a central body or merged into a system.

The atmosphere is different with the internal from distant orbits. In the atmosphere, there are also non-gaseous particles of elements and compounds that got there through geological processes or the impact of other smaller bodies that arrived from space.

The size of the body and space temperature determines which elements are in the gaseous state and how much of this material is present on the body.

All these processes depend on the mass and the speed of rotation of the central body.

REFERENCES

[1] http://www.eltereader.hu/media/2014/04/Atmospheric_Chemistry_READER.pdf „Atmospheric Chemistry“ István Lagzi; Róbert Mészáros; Györgyi Gelybó; Ádám Leelőssy, Copyright © 2013 Eötvös Loránd University.

[2] https://bircu-journal.com/index.php/birex/article/view/474, http://www.IntellectualArchive.com/files/Ducksss.pdf, http://www.sciencepublishinggroup.com/journal/paperinfo?journalid=301&doi=10.11648/j.ajaa.20180603.13, https://www.ijsciences.com/pub/pdf/V82019021908.pdf, https://www.ijsciences.com/pub/pdf/V82019072115.pdf, Http://www.globalscientificjournal.com/researchpaper/WHAT-IS-HAPPENING-TO-OXYGEN-AND-HYDROGEN.pdf, http://www.globalscientificjournal.com/researchpaper/WHY-ATMOSPHERES-OF-STARS-LACK-METALS.pdf 2017, 2018, 2019 W. Ducksss, Project „The Universe is rotating, after all“.

[3] https://nssdc.gsfc.nasa.gov/planetary/factsheet/mercuryfact.html NASA 2018 „Mercury Fact Sheet“ Dr. David R. Williams.

[4] https://arxiv.org/abs/0803.1831 „New observations of the extended hydrogen exosphere of the extrasolar planet HD209458b“ 2008 David Ehrenreich, Alain Lecavelier des Etangs, Guillaume Hébrard, Jean-Michel Désert, Alfred Vidal-Madjar, John C. McConnell, Christopher D. Parkinson, Gilda E. Ballester.

[5] https://ore.exeter.ac.uk/repository/bitstream/handle/10871/16083/Lecavelier.2010.A&A.HD189733.ACS. Escaping.Atmo.pdf;jsessionid=945C83018AA29438EB7AB09310143E93?sequence=2 2010 "Evaporation of the planet HD 189733b observed in H I Lyman-α" A. Lecavelier des Etangs, D. Ehrenreich, A. Vidal-Madjar, G. E. Ballester, J.-M. Désert, R. Ferlet, G. Hébrard, D. K. Sing, K.-O. Tchakoumegni, and S. Udry.

[6] https://ui.adsabs.harvard.edu/abs/2015Natur.522..459E/abstract „A giant comet-like cloud of hydrogen escaping the warm Neptune-mass exoplanet GJ 436b „ Ehrenreich, David; Bourrier, Vincent; Wheatley, Peter J.; Lecavelier des Etangs, Alain; Hébrard, Guillaume; Udry, Stéphane; Bonfils, Xavier; Delfosse, Xavier; Désert, Jean-Michel; Sing, David K.; Vidal-Madjar, Alfred.

[7] https://www.nasa.gov/mission_pages/cassini/whycassini/cassini20101126.html 2010 „Thin Air - Cassini Finds Ethereal Atmosphere at Rhea“ Jet Propulsion Laboratory, Pasadena, Calif.

[8] https://www.usgs.gov/faqs/how-hot-a-hawaiian-volcano?qt-news_science_products=0#qt-news_science_products 2018 „How hot is a Hawaiian volcano?“ Hawaiian Volcano Observatory.

[9] https://arxiv.org/abs/1611.08608 2016 "Observing transiting planets with JWST -- Prime targets and their synthetic spectral observations" Paul Mollière, Roy van Boekel, Jeroen Bouwman, Thomas Henning, Pierre-Olivier Lagage, Michiel Min.

[10] https://solarsystem.nasa.gov/asteroids-comets-and-meteors/meteors-and-meteorites/overview/?page=0&per_page=40&order=id+asc&search=&condition_1=meteor_shower%3Abody_type NASA „What is a Meteor Shower?“.

[11] https://cordis.europa.eu/project/rcn/102627/reporting/en „Cosmic Dust in the Terrestrial Atmosphere“ CORDIS 2017.

[12] https://www.nature.com/articles/nature14479 2015 „A permanent, asymmetric dust cloud around the Moon“ M. Horányi, J. R. Szalay, S. Kempf, J. Schmidt, E. Grün, R. Srama & Z. Sternovsky.

[13] https://arxiv.org/pdf/1509.02210.pdf „WASP-120 b, WASP-122 b and WASP-123 b: Three newly discovered planets from the WASP-South survey“ 2016 O.D.Turner, D. R. Anderson, A. Collier Cameron, L. Delrez, D. F. Evans M. Gillon, C. Hellier, E. Jehin, M. Lendl, P. F. L. Maxted, F. Pepe, D. Pollacco, D. Queloz, D. S´egransan, B. Smalley, A. M. S. Smith, A. H. M. J. Triaud, S. Udry, R. G. West.

[14] https://en.wikipedia.org/wiki/Muon#Muon_sources Demtröder, Wolfgang (2006). Experimentalphysik. 1 (4 ed.). Springer. p. 101. ISBN 978-3-540-26034-9.

[15] https://www.europlanet-society.org/titan-experiences-dramatic-seasonal-changes/ 2016. NASA and ESA, „Wintery effects have led to a temperature drop of 40 degrees Celsius in the southern polar stratosphere over the last four years.“

[16] https://image.gsfc.nasa.gov/poetry/workbook/sunspot.html 1998 suorce P. Brandt, G. Scharmer, D. Shine „Sunspots“

[17] https://iopscience.iop.org/article/10.1086/392509/fulltext/17958.text.html 2003 Mao-Chang Liang, Sara Seager, Christopher D. Parkinson, Anthony Y.-T. Lee, Yuk L. Yung https://ui.adsabs.harvard.edu/abs/2003ApJ...596L.247L/abstract.

[18] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5207327/ 2016 „Exoplanetary Atmospheres—Chemistry, Formation Conditions, and Habitability,- Gravitation“ Nikku Madhusudhan, Marcelino Agúndez, Julianne I Moses, Yongyun Hu, Madingley Road.

[19] https://www.britannica.com/science/nebula John S. Mathis University of Wisconsin, Madison „Nebula“.

[20] http://www.kencroswell.com/alchemy.html Ken Croswell 1996 „The alchemy of the Heavens!“.

[21] http://stars.astro.illinois.edu/sow/star_intro.html 2013 James B. Kaler „The natures of stars“ Brown Dwarfs.