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WHAT IS HAPPENING TO OXYGEN AND HYDROGEN?

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All gaseous planets of our system (Jupiter, Saturn, Uranus and Neptune) lack oxygen – except in traces - in their impressive atmospheres.
Oxygen has a melting point at -218,79°C and a boiling point at -182,962°C.

I. The lack of O_2

Composition of **Jupiter**'s atmosphere by volume:
89% ± 2.0% hydrogen (H2)
10% ± 2.0% helium (He)

0.3% ± 0.1% methane (CH4)
0.026% ± 0.004% Ammonia (NH3)
0.0028% ± 0.001% hydrogen deuterium (HD)
0.0006% ± 0.0002% ethane (C2H6)
0.0004% ± 0.0004% water (H2O)
Atmospheric temperature of Jupiter at 1 bar is -108 ° C, at 0.1 bar -161 ° C.

Saturn has a composition of atmospheres by volume:
96.3 ± 2.4% hydrogen (H2)
3.25 ± 2.4% helium (He)
0.45 ± 0.2% methane (CH4)

0.0125 ± 0.0075% ammonia (NH3)
0.0110 ± 0.0058% hydrogen deuterium (HD)
0.0007 ± 0.00015% ethane (C2H6)
Ices:
ammonia (NH3)
water (H2O)
ammonium hydrosulfide (NH4SH)
The saturated atmosphere temperature is -139 ° C (1 bar), -189 ° C (0.1 bar).

Uranus has a composition of atmospheres by volume:
83 ± 3% hydrogen (H2)
15 ± 3% helium (He)
2.3% methane (CH4)

0.009% (0.007-0.015%) hydrogen deuterium (HD)
Ices:
ammonia (NH3)
water (H2O)
ammonium hydrosulfide (NH4SH)
methane hydrate
Uranium atmospheric temperature is -197.2 ° C (1 bar), -220 ° C.

Neptune's atmosphere composition by volume is:
80% ± 3.2% of hydrogen (H2)
19% ± 3.2% helium (He)
1.5% ± 0.5% methane (CH4)

~ 0.019% hydrogen deuterium (HD)
-0.00015% Ethane (C2H6)
Ices:
ammonia (NH3)
water (H2O)
ammonium hydrosulfide (NH4SH)
methane led (?) (CH? 5.75 H 2 O)
The Neptune atmosphere temperature by volume is -201 ° C (1

Titan moon has a chemical composition of atmospheres by volume:
Stratosphere:
98.4% nitrogen (N2),
1.4% methane (CH4),
0.2% hydrogen (H2);
Lower Tropospheres:
95.0% N2,
4.9% CH4;

(97% N2,
2.7 ± 0.1% CH4,
0.1-0.2% H2)
The temperature on Titan (Saturn Moon) is -179.5 ° C.

Science claims there are oceans of water on the moon of **Europa**. The chemical composition of water is H_2O. The existence of water implies the existence of O_2. Europa has no atmosphere (0.1 µPa (10^{-12} bar)).
Surface temperatures on Europa range from -223°C to -125°C (Ø -171,15°C). The average temperature of -171,15°C is above the boiling point of oxygen, which is -182,962°C.
Therefore: if there was O_2 on the moon of Europa, it would be in its atmosphere, notwithstanding the process of removing O_2 from the atmosphere, due to low temperatures (~-223°C) (the melting point of O_2 is -218,79°C and its boiling point is -182,962°C). It goes without saying that all of the free H_2 would remain in the atmosphere because there is no process of removing H_2 (the melting point of H_2 is -259,16°C and its boiling point is -252,879°C).
Jupiter has 89% ± 2.0% of hydrogen (H_2) in its atmosphere, with the pressure of 0,1 bar and the temperature of -161°C.

II. The lack of H_2

„The minimal temperature on Mars is -143°C, while the average and maximal one are -63°C and +35°C respectively. The chemical composition of its atmosphere is:
carbon-dioxide 95,97%;
argon 1,93%;
nitrogen 1,89%;
oxygen 0,146%;
carbon-monoxide 0,0557%,
which in total makes 99,9917% of the elements and compounds, present in its atmosphere. (The geological composition of the Mars surface: Mars is a terrestrial planet, consisting of the minerals of silicon and oxygen, metals and other elements that usually form rocks. The plagioclase feldspar $NaAlSi_3O_8$ to $CaAl_2Si_2O_8$; pyroxenes are silicon-aluminium oxides with Ca, Na, Fe, Mg, Zn, Mn, Li replaced with Si and Al; hematite Fe_2O_3, olivine $(Mg^{+2}, Fe^{+2})_2SiO_4$; Fe_3O_4 ."[4]

Venus has a chemical composition of atmospheres by volume:
96.5% Carbon Dioxide (CO_2)
3.5% nitrogen (N_2)

0.015% sulfur dioxide
0.007% argon
0.002% water vapor
0.0017% carbon monoxide
0.0012% helium
0.0007% neon
trace carbonyl sulfide
a trace of hydrogen chloride
hydrogen fluoride trace
Venus temperature is 462 ° C.

The earth has a composition of atmospheres by volume:
78.08% nitrogen (N_2 dry air)
20.95% Oxygen (O_2)
0.930% argon
0.0402% carbon dioxide
~ 1% water vapor (air-variable)
Surface temperature on Earth is -89.2 to 56.9 ° C.

https://en.wikipedia.org/wiki/Comet

In its beginning, every (historic) object is a comet. When an object has made enough number of orbits near a star, it has lost the most of its volatile elements. The objects with a minimum of volatile elements are called asteroids or solid (rocky) objects. Those objects that have not been approaching closer to a star possess the elements' structure of the lower order, which is typical for a cold or colder space. These elements are directly related to the temperature (operating temperature) which exists in the space around and on such objects. Therefore, there are objects that are formed in a cold space without approaching a star and there are objects, the structures of which are formed in the interaction with a star. Within these two types there is the heating of an object, due to the increase of its mass (the forces of pressure) and due to the actions of tidal forces. These objects, which possess a melted interior (Jupiter, Neptune, Earth, Venus), create their broad chemical structure and their heat on their own. Furthermore, chemical complexity is influenced by the rotation around the axis (the temperature differences of day and night), the temperature differences on and off the poles, geological and volcanic activity (cold and hot outbursts of matter), etc. Planets emit more energy than they get in total from their stars (Uranus emits the least (1,06±0,08), Neptune 2,61(1,00 stands for zero emission of its own), while Venus emits the most of its own energy and has the most significant volcanic (hot) activity in our system).
The lack of O_2 points out that extreme cold does not favor the appearance of that element. It gets replaced by N_2. A lack of H_2 points out that an object has been near a star for a long time. The photo above shows the process of removing volatile elements and compounds (those with low operating temperatures) from an object.
The objects closer to a star have an abundance of oxygen in the atmosphere and on the surface. The lack of hydrogen is particularly seen on Mars[4], since there isn't any in the atmosphere or on the surface. The more distant planets have a lack of oxygen and big amounts of hydrogen (on smaller objects, like Titan or Pluto, it gets replaced by N_2 and hydrogen compounds (CH_4, C_xH_x, NH_3, etc.)).

The appearance of O_2 requires relatively higher temperatures (closer to 0°C and higher) and more significant geological activities. Such an example is present on Io, one of the moons of Jupiter.

Io is a small object exposed to strong tidal forces of Jupiter and Europa; it possesses a very thin atmosphere which „ranges from 3.3×10^{-5} to 3×10^{-4} pascals (Pa) or 0.3 to 3 nbar". With 90% of SO_2 in the atmosphere there are also free O_2 (and SO, NaCl). As time goes by, O_2 is going to increase its share because the average temperatures on Io are 20° higher than its boiling point. SO_2 has a melting point at -72°C and the boiling point at -10°C, so the low temperatures (ranging from -180°C to – 140°C) remove it quickly from the atmosphere.

This model needs to be applied to the exoplanets, with a footnote that:
„The objects keep growing all the time (they get bigger). When an object reaches a certain level of mass (<10% of the Solar mass), it grows into a star ("the objects to shine. They start shining when they reach a sufficient mass if they are in a distant orbit or are independent, or when they reach a sufficient mass and the effects of the gravitational forces if they are closer to the central object (the most often, to a star). Earlier, people were taught that for an object to become a star, it would be sufficient to reach 10% of Sun's mass. Now, the ever-improving technology is providing more and more new evidence to change that mass level. That mass level has become even more blurred through the discovery of exoplanets and more detailed observation of brown dwarfs, because the mass level was unable to provide the needed answers") [6]. In the

previous period, such an object still has a crust and develops life (with the obligatory condition of rotation), since for the long period of time, very intensive geological processes take place on such an object, which is not dependent on zones; it could be placed on the distance of Jupiter and Neptune. The evidence to support the claim can be found in the observations of brown dwarfs. According to the new criteria, Earth and Venus are also able to be considered as such objects.” [5]