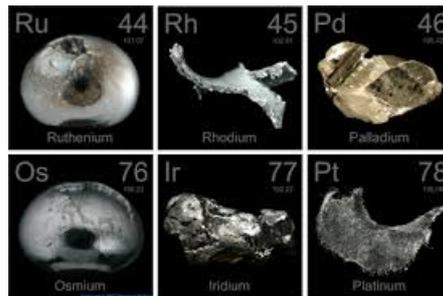


Planetary Resources and Strategic Natural Elements

XR-PRSE Mission



This text is organized in three parts, first we discuss some planetary resources, then we discuss the corresponding Strategic Resources and finally we discuss some questions related to chemical engineering in Space.

Planetary Resources

MAGNETOFLUID-DYNAMICS OF CONDUCTING GASES

This part of plasma physics is considered as the most important section of the behavior of plasma to be applied to Extraterrestrial and Planetary Resources , included mainly giant gaseous planets.

Giant gaseous planets are a considerable source of gases, as well as HELIUM-HYDROGEN-Xenon-Argon.

[Click here to be directed to some information about magnetodynamics of gazes](#)

[Click here to be directed to some information about Magneto Fluid Dynamics MFD](#)

SUN RESOURCES

(quantum energies-particles-dense ejection of matter -nuclear gases)
(patent writing)

This comment is linked with XR-SHIELD

HELIIOTORR STATION CAN BE INSTALLED NEAR THE SUN(station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon).

[Click here to be directed to some information about isotopic abundances in the chemical composition of the sun](#)

[Click here for some related information about He-H2 -Ne -EM-particles and others](#)

Please note for SUN RESOURCES:

It is possible that the behavior of the solar plasma under MHD-MGD has organized a large part of Geo-chemical Genesis for planets far from the sun and which(solar objects) had previously been expelled from the star(the SUN)-to be considered as.(MHD-MGD trace of nucleogenesis spread in the whole solar system).

Solar System in considered as LOCAL COSMIC OBSERVABLE, where the traces are impregnated in each solid nucleus(solid or liquid CORE) of the planets of the solar system.

Expulsion -Scattering of observables from the SUN.

The expelled MHD-MGD field during the GENESIS cycle, pulsed by EM pressure, is sufficiently strong to move forward, to the INITIAL objects and future planets (CORE) BORN in the Sun or near the Sun. (event of objects collisions)

We can consider this GENESIS signal and its traces as "genetic code" in order to rebuilt GEOCHEMISTRY SYSTEM with life or not, in the solar system.

The GENESIS TRACE includes the WATER OH-H spectrum.
It is clear that corona at 5 million miles from the sun reveals OH band spectrum.

OH Hydroxyl radical is part of WATER H₂O molecule, so important for life.

[Click here for related information \(OH and Solar Corona\)](#)

[Here is also some relevant information \(Sun Atmosphere Corona expands more than 5 Million Miles from the Surface\)](#)

The formation of the gas giants Saturn-Jupiter seems to confirm this phenomenon of active relaxation of the MHD, comparisons are to be envisaged with like cold planets.

NUCLEAR CYCLE OF BETHE (Hydrogen-He to heavy elements and C-N-O synthesis)

Related information:

[Click here for Stellar Nucleosynthesis](#)

[Click here for some information about Helium](#)

[Click here for some information about Helium 3](#)

[Click here for some information about the Sun](#)

[Now we discuss some specific Planets resources](#)

[Click here to be directed to some information about the related distances from the Sun](#)

[JUPITER](#)

HELIO TORR- PERT STATION CAN BE INSTALLED NEAR THE PLANET (station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon).

RESOURCES: Giant Gaseous Planet(He- 10% -H₂ -90%)

JUPITER constitute the most important reserve of Hydrogen-Helium-Water- and minerals , with 67 Satellites .

Cell Collision technology with kinetic energy discrimination.

The mix Hydrogen-Helium can be considered as the ideal plasmagene gas, in order to proceed to atomic selection of abundances in space e/m, in the plasma refining engineering of the patent., in addition Helium is naturally present in the gas mixture in order to avoid mass uncertainties and discriminate atomic species.

Water inside the Jupiter system could represent in itself the considerable reserves for Space Industries and Colonization, considered as the supermarket for Deep Space.

Note: the presence of methane (CH₄), ammonia NH₃/NH₄OH, Sulfur and aliphatic or aromatic hydrocarbons are to be added at the potential resources- in order to supply Agronomy in Deep Space or on several moons or around the Giant gaseous planets SATURN and JUPITER.

JUPITER holds the whole ingredients in order to built organic chemistry industry.

We can consider these giant gaseous planets as prebiotics models will be more rapidly understood, in order to create Algae source for Oxygen or nutrients among others substances.

SATURN

HELIOTORR- PERT STATION CAN BE INSTALLED NEAR THE PLANET (station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon).

RESOURCES: Giant Gaseous Planet He 3 %-H₂ -97%

SATURN constitute one of the most important reserve of Hydrogen-Helium-Water- and minerals and water too, with 62 Satellites.

Cell Collision technology with kinetic energy discrimination.

The mix Hydrogen-Helium can be considered as the ideal plasmagene gas, in order to proceed to atomic selection of abundances in space e/m, in the plasma refining engineering of the patent., in addition Helium is naturally present in the gas mixture in order to avoid mass uncertainties and discriminate atomic species.

Water inside the SATURN system could represent in itself one of the considerable reserves for Space Industries and Colonization, considered as the supermarket for Deep Space.

NEPTUNE

HELIOTORR- PERT STATION CAN BE INSTALLED NEAR THE PLANET (station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon).

RESOURCES: He 25% -H2- 75% - 1% CH4 and icy Giant structure and rings and satellites among them TRITON.

NEPTUNE can be considered as a considerable source of plasmagene gases mixtures and prebiotics matters in order to support colonization.

URANUS

HELIOTORR- PERT STATION CAN BE INSTALLED NEAR THE PLANET (station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon).

RESOURCES: He-15% - H2-83% - CH4-2% and NH3/NH4OH traces , Giant icy planet, organic compounds and Rocky rings and 27 Satellites among them TRITON icy N2 compounds.

The URANUS system could be an important reserve for prebiotics industry.

KUIPER BELT

For some information about what is the Kuiper Belt, [click here](#)

HELIOTORR- PERT STATION CAN BE INSTALLED NEAR THE KUIPER BELT (station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon).

The energy at HELIOTORR PERT would be nuclear, because the sun power is not available.

RESOURCES: icy debris coming from the primitive formation of solar system (H-OH⁻ condensation).

Total weight 200 times of asteroid belt (Jupiter-Mars) !- the Kuiper belt is considered as icy , but solid rocky matter could be confirmed associated to the icy layers and therefore can be mined by plasma tools technologies described in the patents, if the case

was proved, the mining resources of water and minerals would be huge for colonization and good place in order to move forward in other systems with adapted spacecrafts.

PLUTO rocky planet 39 AU (Astronomic Unit)

RESOURCES: mineral resources confirmed. Pluto is a dwarf planet in the Kuiper belt, a ring of bodies beyond Neptune. It was the first Kuiper belt object to be discovered.

MERCURY

HELIOTORR- PERT STATION CAN BE INSTALLED NEAR THE PLANET MERCURY (station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon)

RESOURCES: Telluric planet-mineral composition ("similar to Moon").

The atmosphere of Mercury is constituted with traces of He, H₂, Ne, Na and cannot be mined.

The ground of Mercury could reveals 3He, because Mercury is the nearest planet of Sun (4He-3He ejection from sun plasma at surface).

In addition MERCURY could represent the ideal place in order to load HELIOTORR station.

The HELIOTORR station (built on Moon) would be installed and parked on the Mercury planet, waiting specialized missions (not disclosed) (patent writing).

VENUS

HELIOTORR- PERT STATION CAN BE INSTALLED ON VENUS (station built with new materials coming from ultra-pure elements technologies elaborated in Deep Space or Moon)- but not ideal strategic situation.

RESOURCES: telluric planet - hot mineral composition surface- (96.5% CO₂- 3.5 %N₂, others)

The escape velocity 10 km/s cannot permit for the moment to easily execute missions with space crafts or probes.

With high temperature of the atmosphere and at the surface of VENUS 500 K- 800 K, the gases mixtures obey to the classical equation $PV=nRT$

[Click here for some information about Venus](#)

[Click here for some information about ideal gases](#)

Strategic Elements

WATER H₂O-D₂O-T₂O



In the space adventure and crusade the most important and strategic resource are water, rare gases. Precious metals come after, indeed gold has taken the leader place because only one stable isotope ¹⁹⁷ (consult dynamic periodic table here) and of its physical properties in cosmic ambiance among strong radiations and associated to Bi (Bismuth) and others (not disclosed).

Gold can protect spacecrafts but also can concentrate quantum energies and radiative transfers - mainly near star systems (Mission XR-SHIELD)

Water is considered by advanced chemists or physicists as the first quantum liquid in the Universe and therefore in our Solar system or in others stars systems.

Water is not only H₂O, this form can be considered as the monomer , but it exists in our biology as polymers mainly in membranes, Nuclei and DNA-RNA structures.

Water is also existing under polymeric structures with different physical constants and properties, this could explain the unique opportunity to generate life from water-minerals-gases associated to magnetic or electrostatic fields under local gravity.

These properties will be used on objects (Moon-planets and their moons- and near Stars) in order to create prebiotics molecules.

Water will be used in plasma chemistry , high-low temperatures catalyzors in space conditions.

A new Chemistry is on its way to be born and several rare molecules will be elaborated only by modifying the gravity conditions, these technologies will be utilized in Space Medicine (Mission XR-MED).

WATER will be extracted from minerals (first stage of Mining and Refining by the means of Plasma tools) from planets-moons-asteroids.

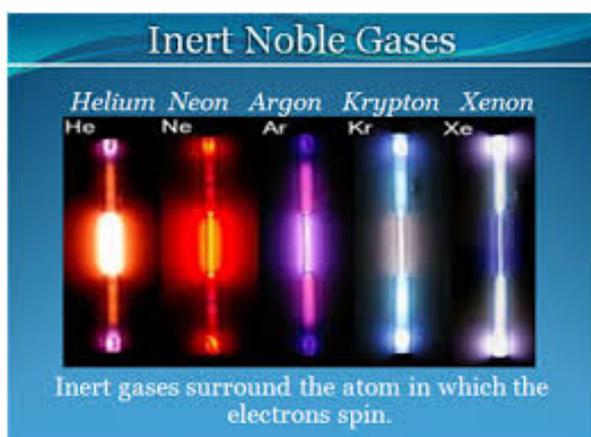
From water spacecrafts will generate H₂ Hydrogen and Oxygen to be used for life, for engine propulsion and electricity power station with fuel cells.

O₂- OXYGEN will be a by-product of the Refining of minerals (Silicates,others).

O₂-Oxygen-Nitrogen N₂ and Helium will be used to air crew support and generally inside the spacecraft.

N₂ could be found easily on Moon after refining minerals with plasma technologies, and liquefied.

RARE GASES



	symbol	electron configuration
helium	He	1s ²
neon	Ne	[He]2s ² 2p ⁶
argon	Ar	[Ne]3s ² 3p ⁶
krypton	Kr	[Ar]3d ¹⁰ 4s ² 4p ⁶
xenon	Xe	[Kr]4d ¹⁰ 5s ² 5p ⁶
radon	Rn	[Xe]4f ¹⁴ 5d ¹⁰ 6s ² 6p ⁶

Rare gases useful for plasma physics-propulsion-and plasma tools are Argon (Ar) and Xenon (Xe) and Neon (Ne)- Helium (4He-3He isotope) for long trip to planets and their moons it will be necessary to have important reserve of rare gases (under liquid state)- but also mainly of Hydrogen.

In Deep Space at present or near future 2025 it does not exist stations to refuel space crafts and it will be important to have on board powerful plasma motors, with RECOVERY TECHNOLOGIES OF ATOMIC SPECIES (heavy ionized atoms) utilized in dense plasma machines and avoid refuel of the spacecraft (patent writing).

The discussion is not extend to He 3 isotope (as pure source 99.9N) and Deuterium or Tritium.

This matter is reserved for nuclear propulsion (fusion -fission) and EM drive associated with dense seeded plasma.(see XR-PROP)

PRECIOUS METALS GROUP (PMGs)

On Earth the REFINING process for natural elements and isotopes separation (natural abundances) is quite complicated because of the lack of technologies for vacuum.

On the contrary in space we can naturally find ultra vacuum 10^{-12} torr to 10^{-14} torr.

Without presence of contaminants, only cosmic radiations and some atoms per cubic meter of Hydrogen coming from our sun or other galaxies.

DEEP SPACE is ideal medium in order to do Atomic Spectroscopy gF values Plasma Physics -atomic and plasma diagnostics - studies of free atoms- hyper-fine structures- collisions-scattering- studies with Colliders tools-fusion-fission.

The only way seems to be Plasma sources (patent writing) , because at the beginning Scientists Pons and Fleischmann -Bockris generated Electrochemistry plasma in water by the means of electrodes.

The way is electrodeless plasma technologies !

PMGs

Precious metals on the Earth are:

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Pt(Platinum)-Ir(Iridium)-Os(Osmium)-Pd(Palladium)-Rh(Rhodium)-Ru(Ruthenium)-Au(Gold) and Ag(Silver) are assimilated to PMGs
Cu(Copper) and Mercury(Hg) are not fully precious metals.

Even Mercury in Deep Space could have a role in gravity machines and seeded dense plasma (propulsion).

Others metals have to be considered as precious elements as well as Hf(Hafnium)-Re(Rhenium)-Nb(Niobium) because of their specific use in electronics.

With the help of ultra-vacuum conditions in deep space, some metals and their natural isotopes could be reached to prominent place in the casting for Space Industries mainly for quantum machines and propulsion.

One can imagine natural elements with ultra pure grade after recycling two days in toroidal MHD-MGD- e/m separators-Plasma Tools(patents)

Some natural elements(and their isotopic abundances) as well as Si(Silicon) or Fe(Iron) or C (Carbon) considered as commons on Earth could take the prominent ranking for Space Industries and Research , alloys and pure crystals for Quantum machines and large structures(Missions XR-SPACI and XR-COL) and NEURAL-ROBOTICS (Mission XR-IR).

e/m Ultra-Separation for D, T, He, this discussion cannot be disclosed.

LANTHANIDES (Ln^{+3}) or Rare Earths and parents Y(Yttrium)-Sc(Scandium)

Some of 15 natural elements (La Lanthanum to Lu(Lutetium) with Pm(Prometeum) with very short life 2.6 Y

Tc (Technetium) as radioactive elements short life 6 hours, could be an important actor in Fission and Fusion experiments (Plasma Chemistry associated with ultra-pure catalyzors, and mainly water).

[Click here to be directed to some information about Lanthanides, especially the applications section](#)

Thanks to the availability of ultra-pure grade elements under e/m plasma(GlycanSpaceXR Patent)plasma tools, we can imagine powerful applications in Physics , included in the creation of ultra pure Lanthanides Y, Yb, in order to be used with LASERS.

Time-Crystallography will use the quantum properties of Lanthanides in order to create "time-Crystal" of Yb atoms.

The recent discovery of the feasibility of Time Crystals leads to possible very interesting applications.

For interesting comment about Time Crystals, see for example the paper: "Observation of a Discrete Time Crystal" by N. Y. Yao¹, A. C. Potter, I.-D. Potirniche¹ and A. Vishwanath¹, available on Arxiv at the following address <http://arxiv.org/abs/1609.08684>

From our side, we already (1991-1997 Madrid INPI) made some discussion about Time with analogies with matter, as for example a concept of time in particular state of plasma, therefore as physical and quantum observable and not as simple duration of events between two events.

The results of these quantum experiments could lead to Quantum Machines in deep space without decoherence, the targets are numerous included in theoretical quantum physics.

We can consider in Space Fe(Iron)- Si(Silicon)-Bi(Bismuth)-C(Carbon) as strategic elements (new crystal-synthesis in Deep space) thermal and radiative transfer protection.

Others elements as well as W(Tungsten) and Rn(Radon) could play an important role in plasma chemistry and seeding of plasma and for Large structures to be built in Space, for Stations or Spacecrafts.

Extraterrestrial chemical engineering

Preliminary remark: this is to make the reader aware that Synthesis of Terrestrial Chemistry was naturally built on known bases of the natural elements Mendeleeff table (also valid for extraterrestrial space), but according to standard conditions STD, that are different in Space.

On earth and entropy reigns in all synthetic chemical systems - Entropy and Thermal Equilibrium - (TE) THERMODYNAMICS.

ENTHALPY and ENTROPY of EARTH are linked because Earth receive energy from the sun.

The CORE of EARTH(inner core (solid) - outer core (liquid), inner layer (magma)) provides energy to upper layers of mantle, and lithosphere and atmosphere therefore EARTH loose Energy (Entropy).

The movement of cores and magma are to be considered as of Magneto-Fluids providing to Earth Magnetic Field (SHIELD) opposed to Cosmic and Solar radiations.

When the movement of core and magma will stop, the Earth will become with no atmosphere and no life, as the Moon

-LTE- Local Thermal Equilibrium

-NLTE-Non Local Thermal Equilibrium

-PLTE -Partial Local Thermal Equilibrium

These states will be present in the extraterrestrial chemistry that GlycanSpaceXR Agency proposes in Plasma Chemistry.

The entities are variables that direct the organometallic life of planet Earth, human intervention seems limited in order to correct the Entropic character by the application (to invent) of the Negentropy in its system. (see also Mission XR-GENESIS OF ATMOSPHERES)

CHEMISTRY ON EARTH

PRELIMINARY INFORMATION

The Chemistry on Earth, has been established under STD (Standard Conditions) temperature range (-40°C)-(+70 °C) and pressure range (700mbar to 1100 mbar)-for atmospheric matter (water-gases-microparticles or nanoparticles)-and for water 1°C to 35°C oceans and rivers.

SYNTHESIS CHEMISTRY

The chemistry since decades in Laboratories has developed huge capabilities in order to construct organic molecules and inorganic molecules and also semi-organic molecules, the catalyst substances are mainly metals for organic chemistry Sabatier -Lenderens- Grignard, others.

THERMODYNAMICS ON EARTH

EARTH IS UNDER THE LAW OF ENTROPY

Here is an excerpt of the paper "*A basic introduction to the thermodynamics of the Earth system far from equilibrium and maximum entropy production*" by A. Kleidon

The paper is available at:

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2871909/>

ABSTRACT: "*The Earth system is remarkably different from its planetary neighbours in that it shows pronounced, strong global cycling of matter. These global cycles result in the maintenance of a unique thermodynamic state of the Earth's atmosphere which is far from thermodynamic equilibrium (TE). Here, I provide a simple introduction of the thermodynamic basis to understand why Earth system processes operate so far away from TE. I use a simple toy model to illustrate the application of non-equilibrium thermodynamics and to classify applications of the proposed principle of maximum entropy production (MEP) to such processes into three different cases of contrasting flexibility in the boundary conditions. I then provide a brief overview of the different processes within the Earth system that produce entropy, review actual examples of MEP in environmental and ecological systems, and discuss the role of interactions among dissipative processes in making boundary conditions more flexible. I close with a brief summary and conclusion.*"

SUMMARY AND CONCLUSION: "*This article started with the simple question why the Earth system is maintained in a state so far away from TE despite the natural direction towards mixing matter and depleting sources of free energy. A simple toy model was used to demonstrate that the exchange of energy and/or mass with the surroundings is a critical component that allows systems to evolve away from TE without violating the second law of thermodynamics. The application of the proposed principle of MEP was classified into three cases with contrasting levels of flexibility in the boundary conditions. As the flexibility of the boundary conditions increases, the state of MEP also typically corresponds to the state of lowest entropy of the system that is furthest away from TE. The evolutionary direction of the Earth systems away from TE can thus be understood as a consequence of the MEP principle.*"

"I then explained the irreversibility of a range of the Earth system processes, provided a brief overview of the Earth's entropy budget, and discussed how the dissipative activities of processes interact and affect the boundary conditions of other processes. This mostly qualitative discussion hopefully provides a perspective for the future that demonstrates that non-equilibrium thermodynamics and MEP provide a theoretical framework for understanding the vast range of the Earth system processes."

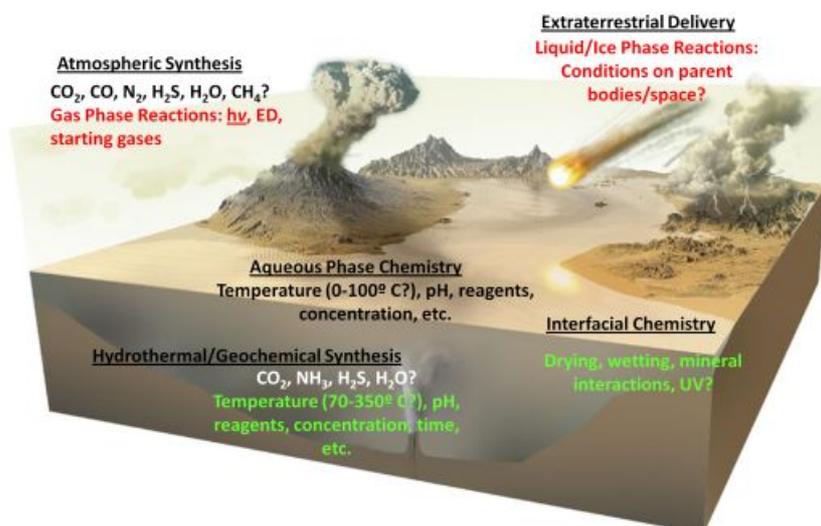
"Two examples were discussed for which the MEP principle should be highly relevant. First, MEP should provide us with a holistic, quantitative theory of Earth system functioning that should allow us to better understand the functioning of different Earth systems, reconstruct their past evolution, and to better formulate the impacts of human

modifications for the future evolution of the Earth system. Second, MEP ought to be the recipe to get better parameterizations of unresolved details for large- to planetary scale descriptions of Earth system processes. In fact, it should give us the best parameterizations possible given the constraints that are explicitly resolved in such descriptions. In this sense, MEP is not just an interesting idea, but should be highly relevant for a better understanding and prediction of the Earth system dynamics."

End of quotation.

PLEASE TURN PAGE

EXTRATERRESTRIAL CHEMISTRY



Key Trends in the Periodic Table

Typical Number of Bonds										Multiple Bonds?	Allows Hypervalent Molecules?
3	4	3	2	1	1	None	No				
B Boron	C Carbon	N Nitrogen	O Oxygen	F Fluorine	He Helium	None	No				
Al Aluminum	Si Silicon	P Phosphorus	S Sulfur	Cl Chlorine	Ne Neon	Strong	No				
Zn Zinc	Ga Gallium	Ge Germanium	As Arsenic	Se Selenium	Br Bromine	Ar Argon	Weak or None	Yes			
Cd Cadmium	In Indium	Sb Antimony	Te Tellurium	I Iodine	Kr Krypton	Xe Xenon					

Highlighted Trends:

- Forms Four Bonds
- Strong Multiple Bonds But No Hypervalent Molecules
- Forms Long Chains

CARBON CHEMISTRY ON EARTH:

NEW FRONTIER WILL BE SILICON CHEMISTRY ON SEVERAL PLANETS OF THE SOLAR SYSTEM

MARS

Extraterrestrial Chemistry will necessarily be different from Earth Chemistry.

Indeed the standard conditions STD which rule on the other planets of the solar system are very different for Mars for example: The minimum temperature on the surface is -143°C , the average temperature is -63°C and the maximum temperature is 35°C .

Atmosphere CO_2 - Argon, others.

The temperature may be suitable for basic operations of physical or catalytic chemistry - gravity being 2.6 lower than on earth, it will be necessary to readjust the parameters of the chemical reactors (rates of different reactions and choice of the best catalysts) which is not a real problem.

As far as the synthesis chemistry of SABATIER-LENGERENS is concerned, contrary to what is often found on the Internet, in the field of spatial conquest, namely that on an active catalyst bed and a CARBON promoter, hydrogen may generate methane CH₄.

Unfortunately, this reasoning is not consistent with catalytic chemistry.

The temperatures should be between 250 ° C. and 500 ° C. with yields of 98.8% CH₄ to 50% CH₄.

The local temperature on the ground is at best 35 ° C., the carbon bed (C) must be heated constantly, important thermal energy input.

It will be essential to find sources of fossil Carbon (the soil of Mars on the surface does not seem to possess, perhaps CURIOSITY ROBOT will find).

It will, however, be possible to remove the Carbon from the Silicates or from the Mars atmosphere (CO₂) - an important external energy input.

The source of Hydrogen (H₂O) will certainly be found in depth (ice lakes) and in polar regions (S-N).

In conclusion for the planet MARS, it will be possible to practice local chemistry, subject to possessing (nuclear) energy sources in order to carry out these vital industrial operations.

We consider that the plasma tools can replace all or part of this conventional chemistry.

For the other planets of the solar system, there must be considerable improvements in conventional terrestrial chemistry and the application of plasma chemistry proposed.

SOURCES OF METHANE (CH₄) aliphatic short chain IN THE SOLAR SYSTEM

Regarding the source of methane CH₄, TITAN could be huge resources for ORGANIC CHEMISTRY or semi-organic chemistry.

INDIRECTLY MARS could produce a huge quantity of CH₄ Methane as a by-product of photolysis conversion of CO-CO₂ in presence of H₂ giving CH₄ and H₂O- Fischer-Tropsch reaction, the plasma tools would be applied, better than natural photolysis from the Sun radiation., CH₄ in presence of H₂O will provide methyl radical -CH₃, promoting immediately semi-organic catalyst compounds.

[Click here to download a paper by Andrés Guzmán-Marmolejo and Antígona Segura about Methane in the Solar System](#)

But methane CH₄ is not the only raw material for organic chemistry, AROMATIC CYCLIC CHAINS will be also elaborate using aliphatic chains- methane-ethane...or other double bonds chains.

CASES OF ASTEROIDS(free or bound (belts))

It will not be possible to exploit asteroids on site with terrestrial chemistry and to separate precious or common metals! only we could dig and perhaps extract the minerals from the mines.

Only on sites high temperature chemistry could be applied as well as refining using Agency techniques.

Even asteroids of type M or rarely X can not be exploited or refined in Deep space with classical chemistry.

The repatriation of mining products to the Earth must be considered unrealistic at the moment.

Even ignoring the financial cost of returning mining products to land, space-saving re-entry technologies do not yet exist, only a proven disruptive technology might be appropriate to avoid the danger but these motors do not exist yet.

The return to the Moon or Mars solution might be suitable and refined on site, but there is as yet no moon mining industry base that can accommodate the spacecrafts of ore carriers and the application of technologies.

Moon refining can not be done as it is, only high temperature chemistry methods could be applied (just as for Mars and others).

There are several other situations depending on the location of asteroid extraction or capture, but for the capture of asteroids, some important problems have to be solved, DE-ORBITING, stabilization, operational safety, embedded energy, Robotics, communications...

This interesting issue is not part of this presentation

CONCLUSION:

It seems that before any hunt for asteroids and their future exploitation it may be crucial to create the conditions for storage of the future ores

on MARS or the Moon and to install refining stations on Mars and Moon or elsewhere, nearest areas to Asteroids (belts) - and test robotics and protection for human expeditions on these celestial objects, facing the danger of EM-particles-Solar and cosmic radiations, but also to improve the spacecrafts and engines necessary for the return of shipments and refining products in a reasonable manner keeping the equilibrium of the stock exchange on the Earth, not to be upset, by contributions of enormous mineral wealth.