Understanding Energy Relationships in Near Earth Space,

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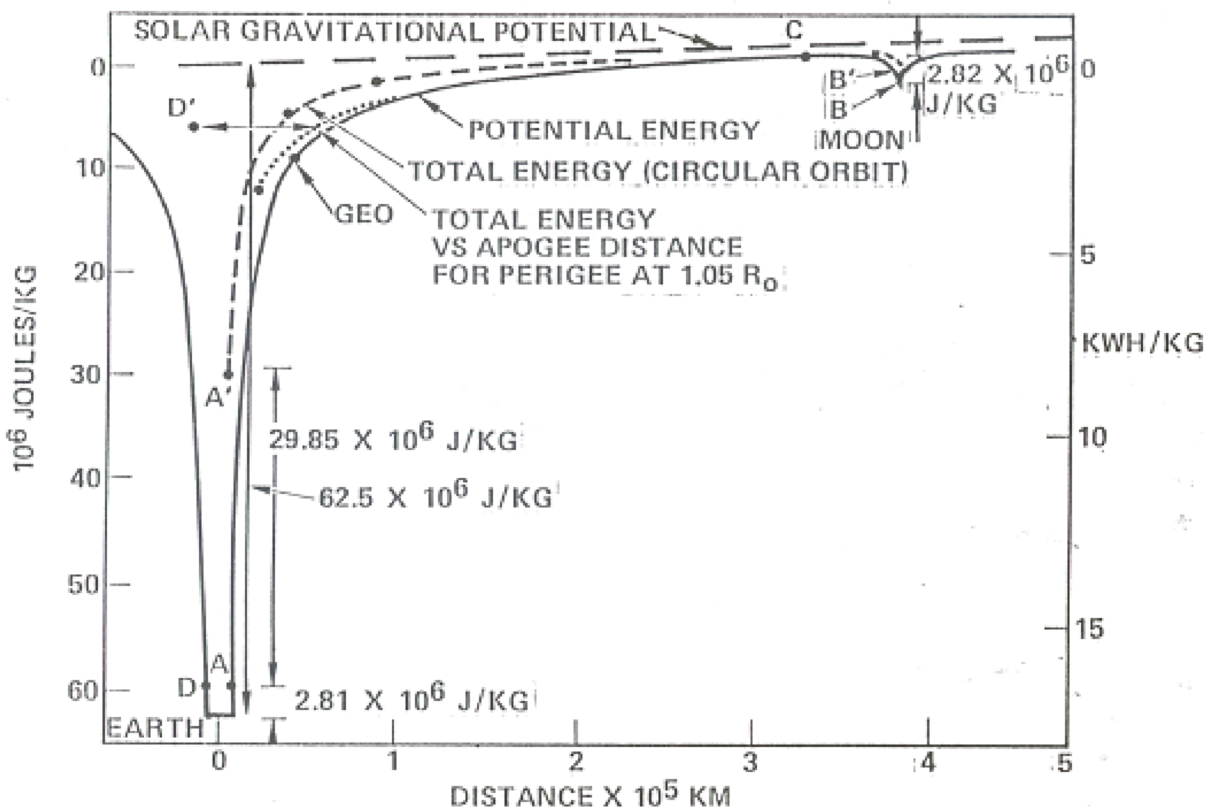
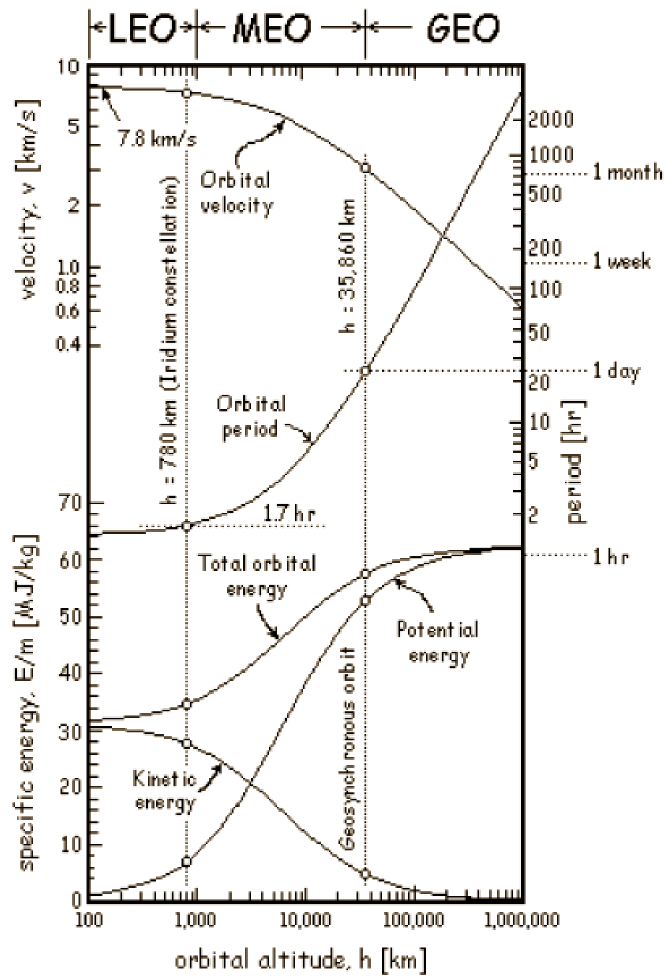
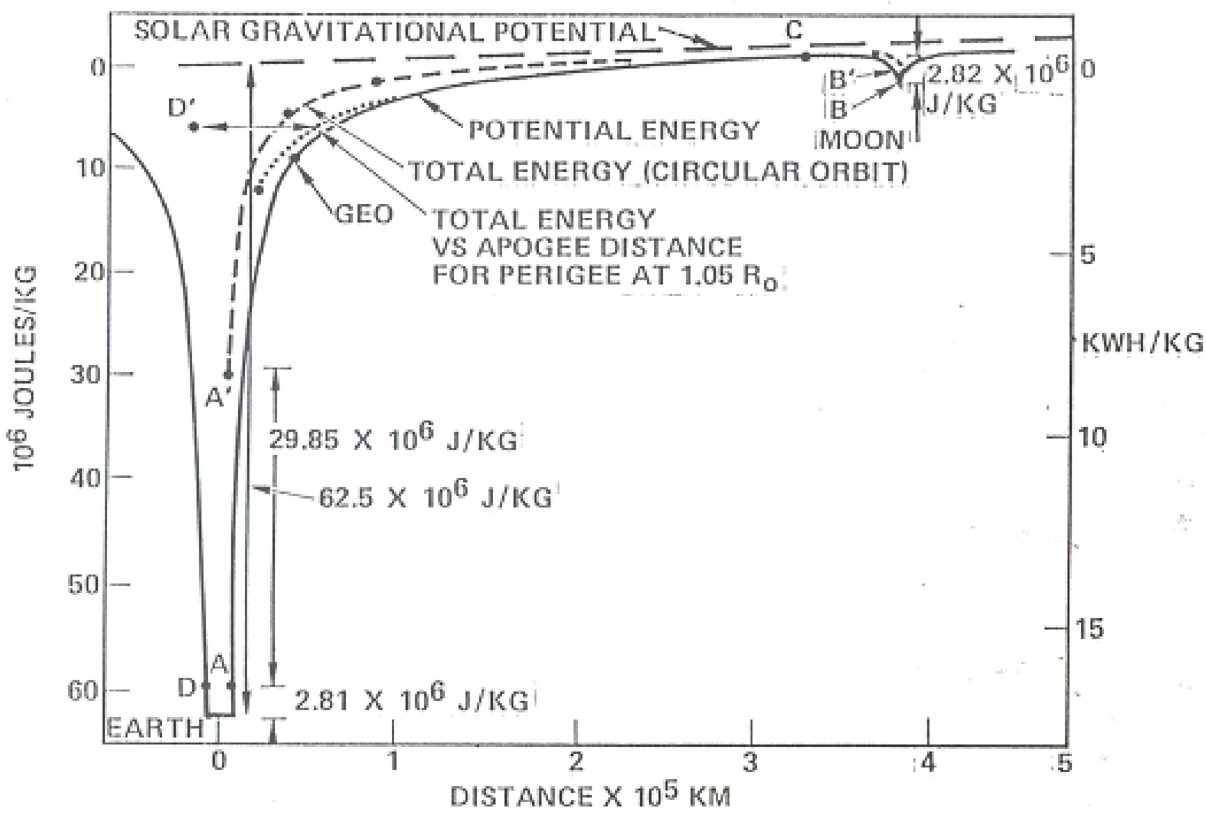
Potential / Kinetic Energies, Velocities & Periods





Potential / Kinetic Energies



Reading this chart

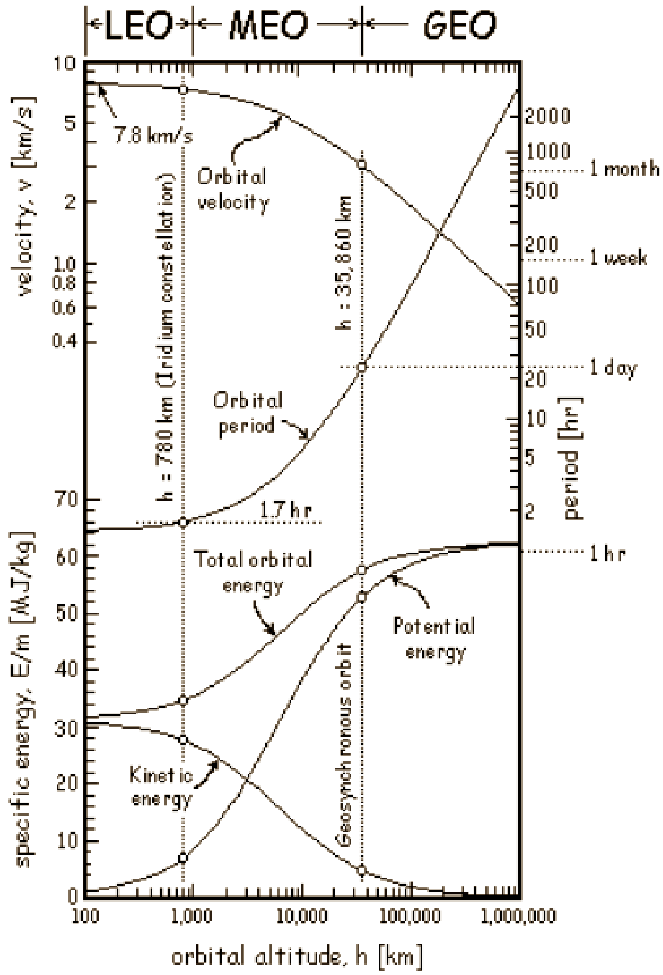
1. Large dashed line is the Sun's gravitational well
2. The solid line is the Earth's and the Moon's gravitational well
3. Potential energy is referenced to the solar potential
4. Energy to get to solar orbit from Earth's surface is 62.5 MJ/Kg
5. Energy to get to GEO orbit from Earth's surface is 60 MJ/Kg
6. Energy to get to GEO from Lunar surface is ~ 8 MJ/Kg
7. Energy to get to the solar potential from L1 © is ~ 0.9
8. Energy to get to LEO altitude (2.81) is ~ 1/10th the energy required to stay there (29.8)
9. Energy requirements are in Joules and Kilowatt Hours per kilogram

Velocities & Periods

Orbital velocity decreases with altitude

Orbital period at LEO is slightly more than 1 hour while at GEO it is 1 day

At LEO, the total energy is partioned between kinetic and potential energy with > 90 % being kinetic.



Orbital period at ~ 1,000,000 Km is ~ 6,000 hours.

This scale is reading orbital period.

Orbital period at ~ 1,000,000 Km is ~ 6,000 hours.

The Moon Facilitates the Construction of Massive Near Space Infrastructure

The Moon is an excellent place to get resources for near space infrastructure

1. Highest cost of chemical processing, comminution, is already done.
2. Water and reagents are already there in more than sufficient quantities
3. Energy requirements to GEO are less that 1/7th that required from Earth
4. Energy to solar potential is 2.8 MJ/Kg
5. Energy to L1 is 2 MJ/Kg
6. PV and thermal energy in sunlit areas to support space manufacturing and launch operations is essentially unlimited
7. Navy is already building mass driver technology
8. Heavy metal ion fuels are readably available
9. We have a database of material phenomenon to enable material handling and transportation system design.

Lunar Power Sources
Specific Energy and Power

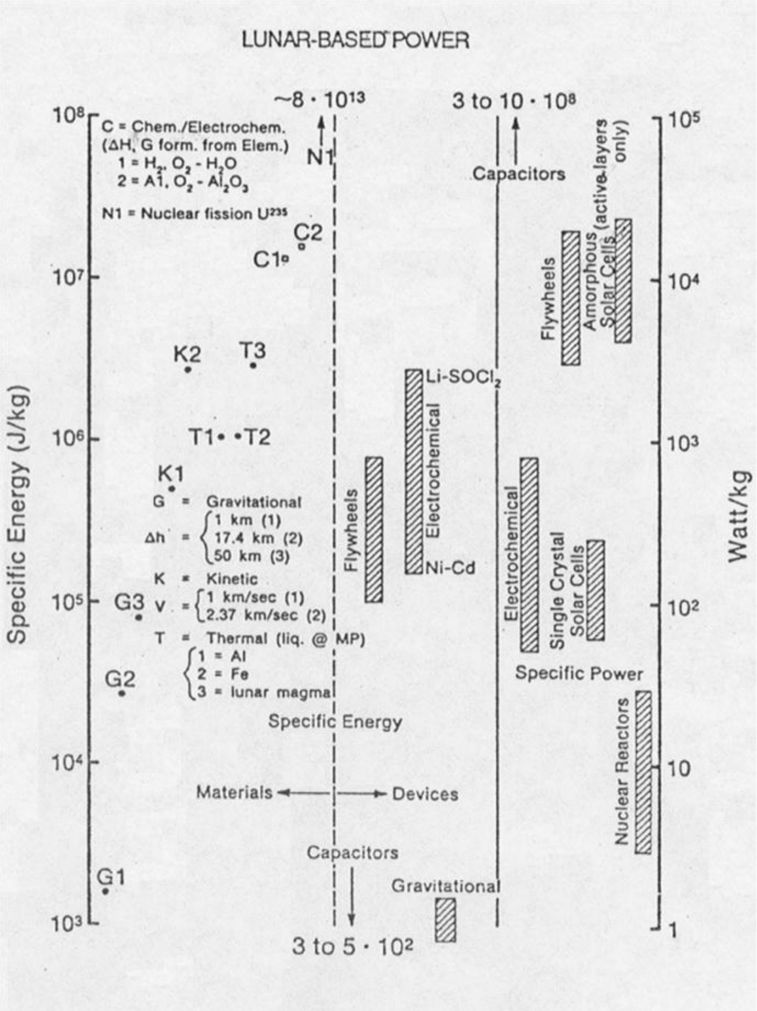
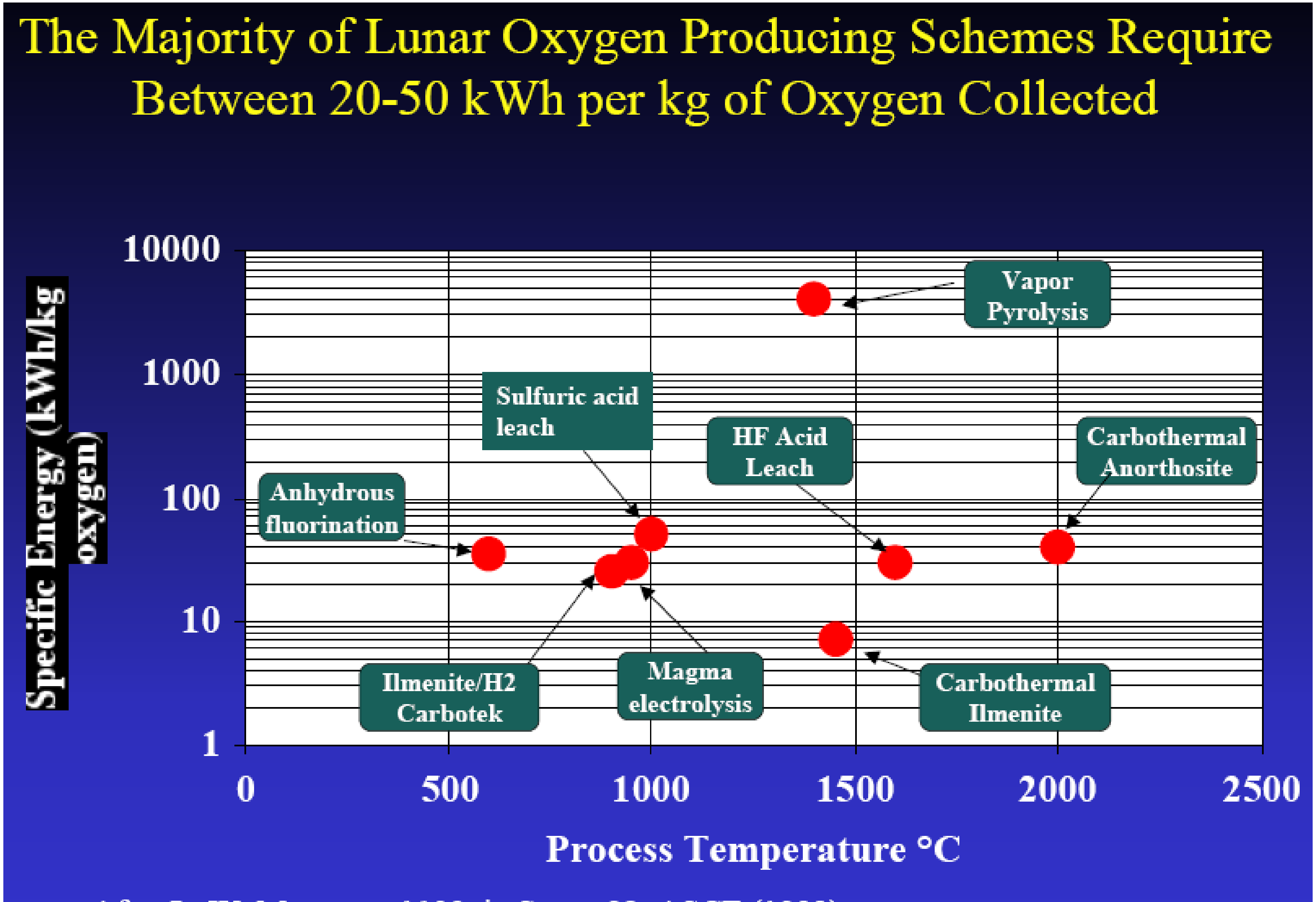


Fig. 2. Comparision of Specific Energy and Power

Many Suitable Lunar Chemical Processes Have Been Demonstrated In The Lab



After L. W. Mason, p. 1139, in Space 92, ASCE (1992)

LCROSS Results

The Moon is an excellent place to get resources for near space infrastructure

1. All previous issues related to reagents are resolved
2. All previous issues relating to wet chemistry processes are resolved