

(duration)
15 min

4/10

Day: Saturday

GISA NOA Test

Date: 29/03/2025

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Why does Mercury experience extreme temperature variations despite being the closest planet to the Sun?

Answer:

Introduction

Analysis

- (i) Lack of atmosphere
- (ii) Slow motion
- (iii) Surface composition

Conclusion

∴ Introduction:-

Mercury is fastest and densest planet in our solar system. Its temperature fluctuate from -180°C to 430°C . Mercury one day is equal to 59 Earth days.

∴ Analysis:-

Though Mercury

temperature fluctuate from -180°C to 480°C . The reasons are included:

i) Lack of Atmosphere:

Mercury have not dense atmosphere to regulate temperature.

⇒ The absence of insulating layer prevent retention of heat, cause drastic temperature drop at night.

ii) Slow Rotation:-

Mercury sidereal rotation is 59 Earth days.

⇒ Meaning one hemisphere faces Sun for extend period and other remaining in darkness.

iii) Surface Composition and Albedo:-

Mercury surface is composed of rocky silicate material and with low albedo.

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Due to absence of atmosphere,
heat loss into atmosphere at
night.

∴ **Conclusion:-**

Mercury temper-
ature variation is due
to slow motion, lack of
atmosphere and ^{surface} composition.

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Question NO: 02 (b)

If Mercury has no atmosphere, how does it have a thin exosphere?

Answer:-

Introduction

Analysis

- i) Solar wind sputtering
- ii) Micrometeorites bombardment
- iii) Thermal desorption

Conclusion

Introduction:-

Mercury is an innermost densest terrestrial planet and closest to the sun. The mercury has no dense atmosphere but have exosphere formed by oxygen, sodium, hydrogen, helium and potassium.

Analysis:-**i) Solar wind sputtering:-**

Solar wind particles collide with mercury surface, eject atoms on its surface.

ii) Micrometeorites Bombardment:-

Tiny meteorites impact surface, knocking loose atoms to contribute in exosphere

iii) Thermal Disposition:-

Intense heating create volatile substance on surface rocks to evaporate, forming an exosphere. add more arguments.....

Conclusion:-

Mercury has not a true atmosphere while exosphere formed by solar winds sputtering, meteorites, and thermal disposition.

Question No:- 02 (c)

How does mercury compare with Moon in terms of surface feature and geological activity?

Answer:

Introduction

Analysis

Conclusion

∴ Introduction:-

Mercury is a densest terrestrial planet with lack of atmosphere, big craters and lack of active tectonic plates. It resembles the moon.

Analysis:-

Mercury resembles the moon as key factors are given below.

- i) Both have lack of atmosphere
- ii) Both have lack of active tectonic plates
- iii) Both have big craters

iv) Both have smooth planes.

Differences:-

Moon has no past activity of tectonics, while Mercury have past tectonics activity.

⇒ Mercury has big cliffs, because when it shrank and Moon does not have these.

⇒ Mercury is heavier and massive while Moon is lightly massive and heavier.

⇒ Mercury has ability to hotter and colder more as extreme while Moon have not too cold and extreme hot day.

Conclusion:-

Mercury is resemble the Moon due to some similarities between them. Such as, big craters, lack of atmosphere and have smooth planes.

Question No:- 02 (d)

what is synodic period of Mercury and how does it effect its visibility from Earth?

Answer:

Introduction

Definition

Analysis

Conclusion

Introduction:-

Mercury is innermost and closet terrestrial planet of our solar system. Mercury one solar day is equal to 116 Earth days.

Definition:-

Solar day of a planet is a period it takes ^{time} to reappear at some position from Earth and Sun perspective.

visibility effects from Earth:-

Mercury
is an inferior planet meaning
closest to sun.

→ It is visible from greatest
elongation, meaning far away from
sun.

→ Due to its short synodic
period, it appears and disappears
quickly so, hard to see from
earth.

Conclusion:-

Mercury synodic
period is 116 earth days, so due
to short synodic period visibility
from earth. •

Question NO:-02(c)

Why Explain term Mercurian day and how one day on Mercury is longer than its year.

Answer:-

Introduction

Defination

Analysis

Conclusion

Introduction:-

Mercury innermost and closest of terrestrial planet to the sun. Mercury diameter is 4900 km and one day of Mercury is equal to 243 Earth days.

Defination:-

Mercurian:- It is a period of a planet where a planet complete its one full cycle day and night. It is equal to

176 earth days.

why one day of mercury is longer than year?

i)

It is

due to 3:2 spin-orbit resonance.

3:2 spin-orbit resonance:-

Mercury rotate ^{three times} for '2' orbits around the sun due to strong gravitational effects.

⇒ due to planet's slow rotation and fast movement of orbit around sun, cause of one day

⇒ Orbital Speed vs Rotational Speed:

Mercury complete its orbit around the sun in just 88 Earth days.

⇒ Because of its slow rotation, a single day and night cycle take 176 Earth days.

Conclusion:-

Mercury is unique in its rotation and spinning that's why one day of mercury day and night longer than year.