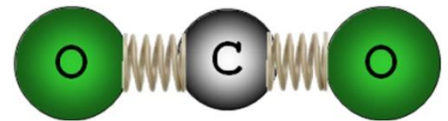


1. Describe the three mechanisms of thermal energy transfer.
2. The sun radiates energy at a rate of 3.90×10^{26} W. What is the rate at which energy from the sun reaches Mercury if its orbital radius is 57,900,000 km?
3. Define albedo and the factors that determine it. What is Earth's overall albedo?
4. Describe the greenhouse effect. (Include diagrams to aid your explanation)

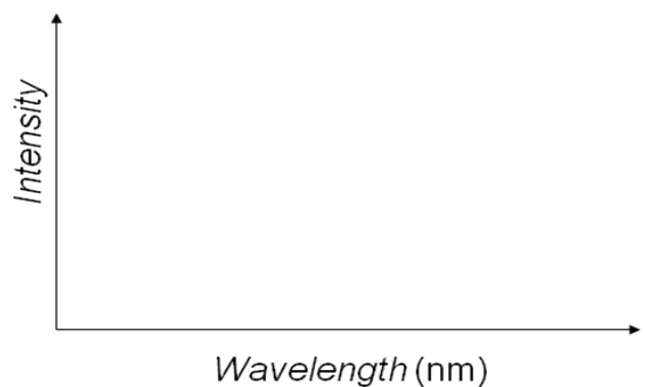
The following questions are about the greenhouse gases.



5. Explain the four molecular mechanisms by which greenhouse gases absorb infrared radiation.
6. Rank (from highest to lowest in importance) the main five greenhouse gases which absorb thermal (IR) radiation.

The following questions are about black-body radiation and the Wien displacement law.

7. Sketch and label two black-body curves on the graph:
One for violet light and one for green light.



8. What is the wavelength of the maximum intensity radiation emitted by a black-body that is at a temperature of 3750 K?

A sphere of radius 2.50 m is heated up to a temperature of 3750. K.

9. Find the rate at which it should be emitting black-body radiation.

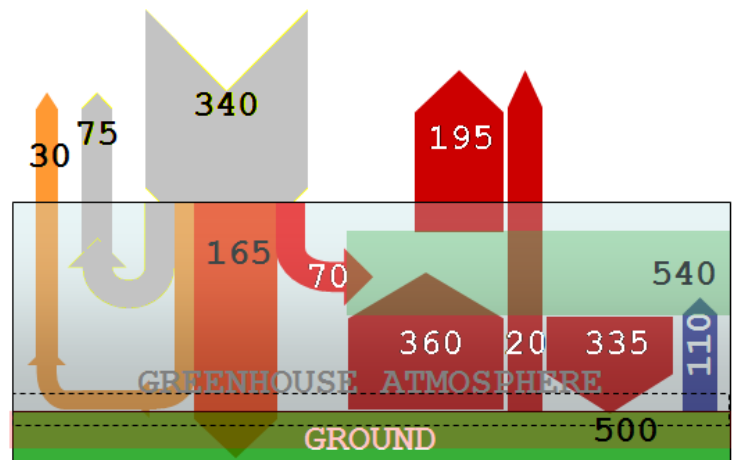
10. If the emissivity of the sphere is 0.750, what is the actual power being radiated by it?

An object is absorbing heat at a rate of 1500 W and radiating it at a rate of 1200 W.

11. What is its emissivity?

The following questions refer to this energy model .
The units are $W m^{-2}$.

12. Does this model show a stable, or an unstable temperature. What evidence is there to justify your choice



13. What is the intensity of all reflected radiation?

14. What is the intensity of the radiation scattered (absorbed and released) by just the atmosphere?

15. What is the intensity of the radiation into space having the greenhouse gases as the source?

16. What is the intensity of the radiation absorbed from the greenhouse gases by the ground?