

CHEM 191: The Thin Atmosphere Workshop

Name: _____

Instructions: Complete this assignment in small groups. Every student must turn in this sheet before the end of class. Show all work for credit.

Grading: This assignment counts 15 points toward your workshop grade.

1. Mars has a radius of roughly 3400 km^2 , about half the size of Earth. The surface pressure on Mars is 0.636 kPa , or about 0.5% the atmospheric pressure on Earth. Remember, g (the acceleration due to gravity) is much lower on Mars, about 3.7 m/s^2 . Use this information to approximate the mass of Mars' entire atmosphere.
2. Venus has a radius of roughly 6051 km^2 , only slightly smaller than Earth. The surface pressure on Venus is 9.2 MPa , or about 90 times the atmospheric pressure on Earth! Remember, g (the acceleration due to gravity) is slightly lower on Venus, about 8.9 m/s^2 . Use this information to approximate the mass (in kg) of Venus' entire atmosphere.
3. Both Mars and Venus have atmospheres are roughly $95\% \text{ CO}_2$ (carbon dioxide). CO_2 is known to cause a strong greenhouse affect in planetary atmospheres, and is implicated in global climate change on Earth. As expected, Venus has a very high average surface temperature of 462°C , yet Mars has an average temperature of -63°C . Why isn't the greenhouse effect stronger on Mars? (You may use the back of this sheet if you need to.)