

Self-assessment questions for *An Introduction to the Solar System*

Question 1

For detail to the following answers refer to Sections 1.1.2, 2.5.4, 3.3.3 and 3.4.4 and Appendix A (p.389)

- (a) Any lander design will have to contend with ensuring the safe delivery of the instrument package to the surface; this would require slowing/braking of the package's descent through the atmosphere.
The composition of the upper atmosphere is highly corrosive and passage through the clouds of Venus's atmosphere would allow exposure to these, so the lander package would need to be resistant to droplets of sulfuric acid.
Instruments would also require protection from impact with an uneven and rocky surface.
Once delivered, the package would need to withstand the high pressures (c. 92.1 bar, OR more than 90 times the pressure experienced on Earth;
The instrumentation would also need to withstand the high temperatures c. 733 K or 460 °C that characterize the conditions on the surface of Venus.
- (b) *A good answer would include most of the following*
There would be an absence of any water (surface conditions are too hot), so the surface would be rock.
Since there is no water, there would be no life.
The surface is too hot for aqueous chemistry, so aqueous corrosion is unlikely (i.e. 'rusting').
However, the action of components in the atmosphere has are likely to have given rise to some degree of weathering/alteration, whilst wind action will have caused some erosion.
Therefore, some sediment or regolith may be discernable as well as rock fragments, for instance, as seen on Venera lander images (e.g Figure 1.7).
The surface of Venus is characterized by numerous major, and innumerable small volcanoes, so it is possible that part of one or more of these would be in view. The surface is also predominantly covered by extensive lava flows, and there may be a covering of pyroclastic material.
The relatively young surface (500 Ma) means there are likely to be fewer impact craters (than compared with the Moon or Mercury), whilst a thick atmosphere would have prevented smaller meteorites reaching the surface so there are likely to be few small impact craters.
However, depending on the landing site, a larger impact basin may be present.
Due to the thick atmosphere, the Sun may not be visible, and the surface would be illuminated with a diffused light.
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