

Morgan Phillips

Question 2

Potential choice one would be to use plastic to store the beer, this material will be water tight and able to keep the liquid and gases trapped inside. Plastic is a light material and could save on weight making transport of the beer cheaper as its not as heavy as conventional cans and bottles. Plastic can be easily decorated with paint or printing onto it making it suitable for eye catching designs. The problem with plastic is the environmental ~~obligation~~ factor; the excess use of plastic in todays world has become a problem for the environment. As plastic doesn't biodegrade for hundreds of years it ~~stay~~ causes alot of harm too wildlife. Sea pollution has increased rapidly and the main pollution is plastics and they are causing wildlife and coral reefs to die, which has a chain reaction causing harm to other environment factors. So there is chance to use a good cheap material to store the beer but it is going to have a big impact if not disposed correctly and potentially give the company a bad image.

Second choice of material would be aluminium cans, these are traditionally used all over the world so could be readily available and save on lead time waiting for them which could ~~be~~ save money. Like the plastic aluminium cans will keep all the liquid and gases inside the container. The aluminium can is strong and light making it ideal for beers and help reduce

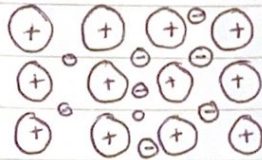
Shipping costs. The aluminium cans will be able to withstand the cold ~~and~~ temperatures of the fridge without any deformation. The aluminium cans could be added with a paper label which will have the eye catching designs on, the use of paper labels will mean that the whole can could be recycled and have less impact on the environment. The cost of the processes might be more expensive than the plastic bottles but it gives the product a more premium feel and have less of an impact on the environment.

Third choice of packaging could be glass bottles, this is found to be the best way to keep beer fresher for longer, but not clear glass it has to be coloured glass. Clear glass allows the sun rays to penetrate the bottle and ruin the beer, so colour glass would have to be used to ~~per~~ prevent UV rays. Glass is also able to withstand the pressure of the beer and the temperatures making an ideal solution, when it comes to the eye catching designs the bottles can be ~~etched~~ etched with design so the buyer can see and also feel the design or logo. This process is more expensive than just adding a label but it makes the product more desirable.

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Third Exam Question.

- c) metallic bonding is a type of bonding that is formed from negative electrons and positively charged metal ions



Metals with a valency of 2 are stronger than 1 because they are trying to complete the outer orbit,

- b) BCC - Body centre cubic

- c) Face - centred cubic

$$= \frac{\pi\sqrt{2}}{6} = 0.74048048$$

Body centre cubic

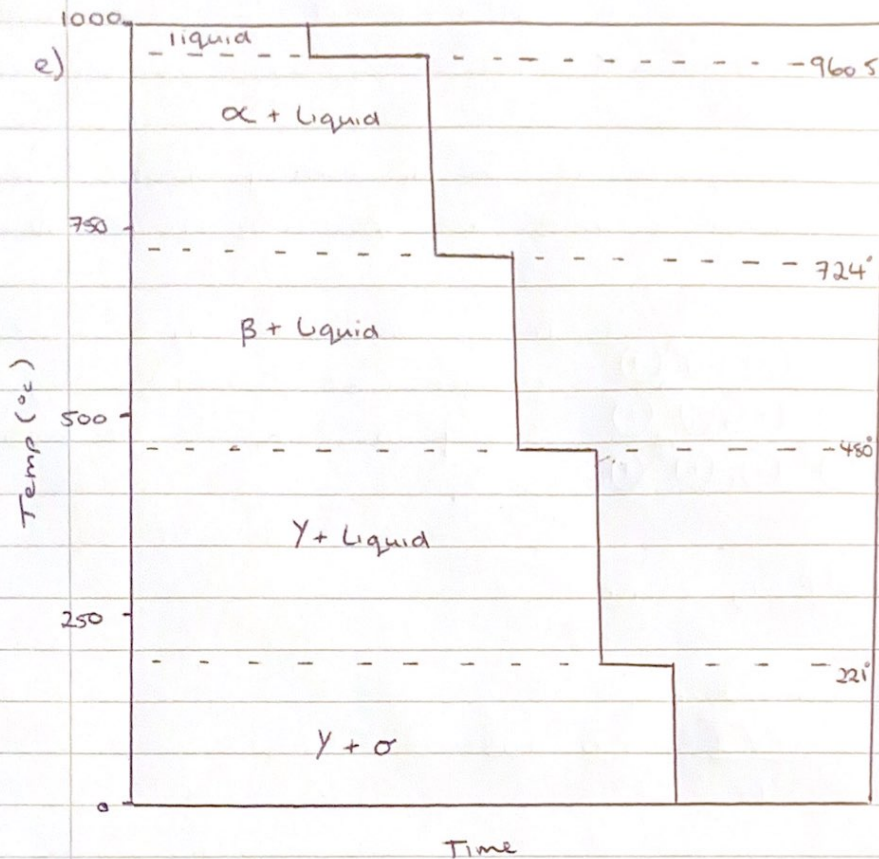
$$= \frac{\pi\sqrt{3}}{8} = 0.680174762$$

Hexagonal ~~close~~ close - packed

$$= \frac{\pi}{3\sqrt{2}} = 0.74048048$$

- d) The state of the ~~the~~ mixture is liquid

At 420°C the material starts to turn just from a liquid to a liquid with Austenite (γ) which is also known as the gamma phase with a FCC structure. This state remains the same down till 221°C where the ~~austenite~~ austenite and ferrite phase combine and become FCC structure



Question 4

- a) According to the material selection map the classes which should be considered in application will be metals and technical ceramics. I have chosen these two groups as they have the highest density and young's modulus on the graph. Within these groups there is a lot of individual materials which have different properties to select the most appropriate there is guidelines for minimum mass design which would help get the best strength to weight ratio.
- b) The class which I wouldn't consider would be foams even though they are light which would be essential on space travel to reduce weight so

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b) wouldn't require as much energy to thrust the rocket. The young's modulus is just too low in that class and there would be a very high probability that the part would break. The materials wouldn't even be able to survive the harsh temperatures of space and would become brittle. Trying to make the part to a precise tolerance with forms ~~is~~ would also be very difficult.

c) Fabricating the camera mounting would be down to the selected material, if it was going to some sort of metal ^{or alloy} it would first have to cast and get rid of any impurities and then depending on the design would be the next process. It could be turned or milled with CNC's to achieve the precise dimensional tolerances need on the Mars rover. Problems to look out for in the casting stage would be to make sure all impurities are moved and test the sample to make sure it meets specification such as carbon content. ~~With~~ With the metal then being turned or milled the part would have to go through ~~et~~ certification to make sure it meets the dimensional tolerances.

End of Mock