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## Are The Elon Musk's Plans To Colonize Mars Realistic?

Elon Musk is an engineer, technological entrepreneur and founder, CEO and lead designer of SpaceX, as well as the CEO of Tesla. He has amassed a net worth of over 20 billion USD and is at the forefront of technological advancement on Earth. Musk has laid out a plan to construct spacecraft able to transport up to 100 people each to Mars in order to colonize the Red Planet, estimating that it may even be doable by 2028. Musk's plan is ambitious from practically every way you look at it, and there are many differing opinions of whether Musk will succeed. Are Musk's plans realistic, or are they just the creative rambling of a mad scientist?

The idea stems from Musk's realization that "It's important to get a self-sustaining base on Mars because it's far enough away from Earth that in the event of a war it's more likely to survive than a moon base". Musk made this statement just a few days after Donald Trump announced plans to meet Kim Jong Un in an attempt to decrease the rising nuclear tension between their two Nations. However most experts on the subject have agreed that colonizing Mars would be a good idea, the main reason people are challenging Musk is on whether his plans are scientifically feasible. Musk's idea relies on being able to access space cheaply. One of the more recent papers on Musk's plans state that the cost of these trips to Mars must be lowered by up to "five million percent". An essential part of lowering the cost will be reusable space technology, which is a brilliant idea Musk has already put to practice with extremely impressive landings of rockets back on Earth. However this reusable technology won't be all that useful when it comes to lowering the price if Musk isn't able to set up fuel stations on Mars, which will prove to be a very difficult task. Experiments working towards this goal of self-sustaining fuel stations on Mars are already underway. The MOXIE experiment on the Nasa 2020 rover will look into whether we're able to make oxygen from CO<sub>2</sub> found in the atmosphere of Mars, which could definitely be possible.

Up to this point, everything seems reasonably feasible, however there's still much, much more to this. Musk intends to launch huge spaceships into orbit around Earth which will be refuelled numerous times utilizing boosters launched from Earth while waiting to be sent to Mars. Each of these spaceships will be designed for 100 passengers and Musk intends to send 1,000 of these ships into space over the next 40 to 100 years, allowing up to a million people to leave Earth. Musk even plans to set up interplanetary fuelling stations on celestial bodies such as Enceladus, Europa and even Titan, one of Saturn's moons which may have, or have had life on it. The ethics of this particular part of the plan have been questioned as many do not agree with contaminating a planet which could potentially have alien life on it. Despite all this sounding quite impressive, one expert in the field has dismissed Musk, saying that "he hasn't actually explained how anything will be done, he's just throwing out ideas left and right without much actual scientific planning behind them". Others have stated that Musk hasn't actually accounted for many of the problems he will find on Mars, for example one of the most obvious problems is the extremely low temperature on Mars. The temperature is usually around 0°C in the day and drops down to almost -120°C at night. Operating in such low temperature is already a problem for the small rovers that have been on Mars, though it has been solved with heaters in the design of the ExoMars 2020 Rover this would likely be a huge issue for the self-sustainable city Musk envisions due to the sheer power that would be involved. All Musk said on the matter was that "It is a little cold, but we can warm it up.". This further shows that the whole

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idea might not have been thought out to the level needed for such a huge project, and even if Musk is able to “warm it up”, Mars’ atmosphere has been leaking slowly for the past 3.8 million years, meaning that any meaningful heat increase would likely be lost into space overtime.

Another problem that Musk hasn’t really addressed is the radiation past Earth’s magnetic cocoon. The journey towards the Red Planet, and life on it would be susceptible to dangerous radiation through deadly cosmic rays and solar flares. Solar flares could even strike us on Earth and would cause catastrophic amounts of damage to all electrical devices on our Planet, and are just more likely to strike Mars. As far as the radiation problem goes, just one trip to and from Mars would expose anyone making the journey to up to four times the advised career limits for astronauts with the best shielding technology we have today.

Overall I think that Musk may not be able to colonize Mars quite so quickly as he has predicted. However, shooting high generally means that we will gain something from his endeavours, even if it isn’t quite the same reality he was initially wishing for, it will certainly still massively benefit technological advancement and space exploration as a whole.

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