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M.A.I.N. Pack
Abstract

For years scientists have been attempting to develop life on Mars, but one of the limiting factors has been the toxic atmosphere. Mars has a couple of toxins, but the main one which can be found almost all over Mars are perchlorates. Perchlorates consist of a single chlorine atom bonded to four oxygen atoms and have an overall negative charge. To filter the toxic perchlorates from the atmosphere the bonds must be broken, but due to the nature of the compound that is not easily achieved without a strongly positive ion such as sodium. With the help of the ion, the compound will be broken down into oxygen and a chloride ion. Using this method, a portable device like a backpack was designed to take in perchlorates from the atmosphere on Mars and convert it to useable oxygen. The backpack consists of a vacuum, ion exchange filter, air compressor, waste tube, heat source, and a storage tank. Theoretically it would work by suctioning in the toxic perchlorates, passing it through the ion exchange resin beads, discarding of the chloride ions, and using the air compressor to push the oxygen into the storage tank; where it can then be taken up and used. The main part of this process is the ion exchange filter which uses positively charged ion exchange resins beads to capture negatively charged perchlorate ion. The perchlorate ion is more strongly attracted to the resin than the resin ion, so the perchlorates should take the place of the resin ions causing the bonds of the molecule to break and oxygen to be released. This filtration method would hopefully provide more oxygen than regular oxygen tanks and reduce the worry of running out. With the M.A.I.N. pack, air gets filtered, humans are provided with oxygen, and the process of colonizing and living on Mars is made easier and more efficient.