**Answer on Question #71485, Chemistry / General Chemistry**

The space shuttle environmental control system handles excess CO_2 (which the astronauts breathe out; it is 4.0% by mass of exhaled air) by reacting it with lithium hydroxide, LiHO, pellets to form lithium carbonate, Li_2CO_3, and water. If there are eight astronauts on board the shuttle, and each exhales 20. L of air per minute, how long could clean air be generated if there were 27,000 g of LiOH pellets available for each shuttle mission? Assume the density of air is 0.0010 g/mL.

Solution

$2LiOH + CO_2 \rightarrow Li_2CO_3 + H_2O$
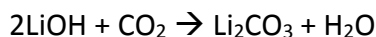
According to the equation 2 moles of LiOH react with 1 mole of CO_2

In other words 48 g of LiOH react with 44 g of CO_2

Find what mass of CO_2 could be fixed by LiOH pellets

$m(CO_2) = \frac{27000 \times 44}{48} = 24\ 750$ (g)

Find what mass of CO_2 all astronauts exhale per minute:

$m(CO_2) = 8 \times 20\ 000 \times 0.001 \times 0.04 = 6,4$ (g)

Find the time of clean air generation:

$t = \frac{24750}{6.4} =$ **3867.2 (min) or 64.5 (h)**

Answer

In each shuttle mission clean air could be generated for **3867.2 minutes or 64.5 hours.**