Turtle Tenacity: Continual Mods

Sort the array in non-decreasing order. Now, assume $a_1 \leq a_2 \leq \ldots \leq a_n$.

If $a_1 \neq a_2$, the minimum is unique. Therefore, place a_1 at the front, and the result after all modulo operations is just $a_1 > 0$. Hence the answer is yes for this case.

If $a_1 = a_2$ and there exists some element a_x such that $a_x \not\equiv 0 \pmod{a_1}$, then a possible solution is rearranging the array to $[a_x, a_1, a_2, \ldots, a_{x-1}, a_{x+1}, \ldots, a_n]$. Since $a_x \bmod a_1 < a_1$, $a_x \bmod a_1$ is the minimum among the other elements and the result after all modulo operations equals $a_x \bmod a_1 > 0$. Hence the answer is yes for this case.

Otherwise (if all elements are multiples of the minimum) the answer is no, because any element modulo the minimum equals 0, and at least one of the minimums must not be the first element. So after passing through two minimums we are guaranteed to get a 0.