What is the empirical formula and molecular formula for lactic acid if the percent composition is 40.00% C, 6.71% H, 53.29% O, and the approximate molar mass is 90 g/mol?

Solution:

W(C)=40.00%; W(H)=6.71%; W(O)=53.29%;

$$\nu(C): \nu(H): \nu(O)= \frac{W(C)}{M(C)}:\frac{W(H)}{M(H)}:\frac{W(O)}{M(O)} = 3.33 : 6.71 : 3.33 = 1 : 2 : 1;$$

CH_2O (the empirical formula);

$M(CH_2O)$=30 g/mol; $M(C_xH_yO_z)$ = 90 g/mol;

$C_3H_6O_3$ (the molecular formula);

Answer: CH_2O (the empirical formula); $C_3H_6O_3$ (the molecular formula).