- During physical activity, lactic acid forms in the muscle tissue and is responsible for muscle soreness. Elemental analysis shows that it contains by mass 40.0% C, 6.71% H and 53.3% O. Determine the empirical formula of lactic acid. **4**

	C	**H**	**O**
amount in 100 g	**40.0**	**6.71**	**53.3**
ratio (divide by atomic mass)	$\frac{40.0}{12.01} = 3.33$	$\frac{6.71}{1.008} = 6.66$	$\frac{53.3}{16.00} = 3.33$
divide by smallest	$\frac{3.33}{3.33} = 1.00 \sim 1$	$\frac{6.66}{3.33} = 2.00 \sim 2$	$\frac{3.33}{3.33} = 1.00$

The simplest possible ratio of C:H:O is thus 1:2:1 and the empirical formula is CH_2O.

Answer: **CH_2O**

Given that lactic acid has a molar mass of 90.08 g mol^{-1}, determine its molecular formula.

The molecular formula is $(CH_2O)_n$ so the molar mass is:

molar mass = n × (12.01 (C) + 2 × 1.008 (H) + 16.00 (O))
= 30.026n = 90.08 so n = 3

The molecular formula is thus $(CH_2O)_3$ or $C_3H_6O_3$

Answer: **$C_3H_6O_3$**