

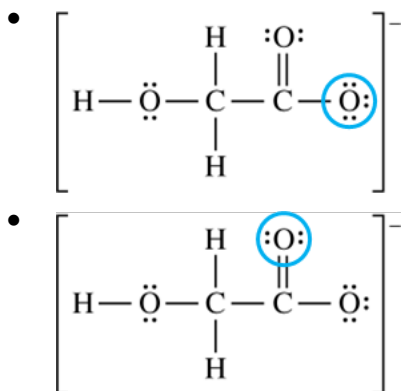
Question 7: Short Answer

4 points

A For a correct circled atom.

Point 01

Accept one of the following:

*(Because of resonance, the two C–O bonds on the right are equivalent.)*

B (i) For the correct calculated value:

Point 02

$$K_b = \frac{[\text{HC}_2\text{H}_3\text{O}_3][\text{OH}^-]}{[\text{C}_2\text{H}_3\text{O}_3^-]} = \frac{(1.3 \times 10^{-5})(1.3 \times 10^{-5})}{(2.5 - 1.3 \times 10^{-5})} \approx \frac{(1.3 \times 10^{-5})^2}{(2.5)} = 6.8 \times 10^{-11}$$

(ii) For the correct calculated value, consistent with part B (i):

Point 03

$$K_a = \frac{K_w}{K_b} = \frac{1.0 \times 10^{-14}}{6.8 \times 10^{-11}} = 1.5 \times 10^{-4}$$

C For the correct answer and a valid justification:

Point 04

Agree. H_3O^+ is consumed in step 1 and regenerated in step 2, which is consistent with the behavior of a catalyst.