ANSWERS: pH calculations using Ka and Kb

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| **2019** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
|  | CH3COOH + H2O ⇌ CH3COO– + H3O+ | Correct process for determining [CH3COOH]. (*correct substitution into formula)*  OR  One correct step | Correct [CH3COOH]. |  |

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| **2018** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
|  |  | Correct process to determine pH. | Correct answer, including significant figures. |  |

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| **2017** | **Evidence** | | | **Achievement** | | **Merit** | **Excellence** | |
| 1. (i)  (ii) | pH = 9.94 p*K*a = 9.24 | | | One step correct. | | Correct answer, with minor error e.g. sig figs | Correct answer, including 3 sig figs | |
| **2016** | | **Evidence** | **Achievement** | | **Merit** | | | **Excellence** |
| (i)  (ii) | | CH3CH2NH2 + H2O  CH3CH2NH3+ + OH–  [H3O+] = √ (*K*a × *K*w ÷ [CH3CH2NH2])  [H3O+] = √ (2.51×10-11 × 1.00×10-14 ÷ 0.109)  [H3O+] = 1.52×10-12molL-1  pH = -log [H3O+] = 11.8 | * Correct equation with equilibrium arrow. * ONE step correct. | | Correct answer, with minor error, e.g. sig. fig. or rounding error. | | | * Correct answer, including significant figures. |

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| **2015** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
|  | [H3O+] = 5.90 × 10–7 mol L–1    pH = –log 5.90 × 10–7 = 6.23 | Correct process. | Correct pH |  |

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| **2014** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
|  | Hydrofluoric acid is a stronger acid/more acidic/dissociates more because it has a smaller p*K*a (larger *K*a) than hypochlorous acid.  So HF will therefore have a higher [H3O+]. As [H3O+] increases, the pH decreases, so HF will have a lower pH than HOCl.  (pH HF = 2.09, HOCl = 4.27) | Any two correct relationships. | Complete comparison. |  |

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| **2013** | **Evidence** | **Achievement** | **Merit** | **Excellence** |
|  |  | Correct process | Correct pH |  |

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