Acids and bases – A2 2022 Chemistry P1&P3

1. June/2022/Paper_7405/1/No.4

0 4 This question is about acids and bases.

0 4 . 1 Calculate the pH of a 0.150 mol dm^{-3} solution of ethanoic acid at 25 °C
Give your answer to 2 decimal places.

For ethanoic acid, K_a = 1.74 x 10^{-5} mol dm^{-3} at 25 °C

[3 marks]

pH _____

0 4 . 2 Strontium is an element in Group 2.

Calculate the pH of a 0.0100 mol dm^{-3} solution of strontium hydroxide at 10 °C
You may assume that strontium hydroxide is completely dissociated in this solution.

At 10 °C the ionic product of water, K_w = 2.93 x 10^{-15} mol^2 dm^{-6}

[3 marks]

pH _____

0 4 . 3 The pH of a barium hydroxide solution is lower at 50 °C than at 10 °C

At 50 °C a 25 cm^3 sample of this barium hydroxide solution was neutralised by 22.45 cm^3 of hydrochloric acid added from a burette.

Deduce the volume of this hydrochloric acid that should be added from a burette to neutralise another 25 cm^3 sample of this barium hydroxide solution at 10 °C

[2 marks]

Circle (⬭) the correct answer.

> 22.45 cm^3 = 22.45 cm^3 < 22.45 cm^3

Explain your answer _____

_____

_____

_____

0 4 . 4 State how a buffer solution can be made from solutions of potassium hydroxide and ethanoic acid.

Give an equation for the reaction between potassium hydroxide and ethanoic acid.

State how this buffer solution resists changes in pH when a small amount of acid is added.

[3 marks]

How buffer solution is made _____

_____

_____

_____

Equation

_____

How buffer solution resists pH change _____

_____

_____

_____

0 4 . 5 A buffer solution is made by adding 2.00 g of sodium hydroxide to 500 cm^3 of 1.00 mol dm^{-3} ethanoic acid solution.

Calculate the pH of this buffer solution at 25 °C

Give your answer to 2 decimal places.

For ethanoic acid, K_a = 1.74 x 10^{-5} mol dm^{-3} at 25 °C

[5 marks]

pH _____

2. June/2022/Paper_7405/3/No.13

Which can **not** function as a Brønsted-Lowry acid?

[1 mark]

A CH_3COO^- ⬭

B HCO_3^- ⬭

C H_3O^+ ⬭

D NH_4^+ ⬭

3. June/2022/Paper_7405/3/No.14

A strong acid H_2X dissociates in aqueous solution.

$$H_2X(aq) \rightarrow 2H^+(aq) + X^{2-}(aq)$$

What is the pH of a 0.020 mol dm^{-3} solution of this acid?

[1 mark]

A 1.00 ⬭

B 1.40 ⬭

C 1.70 ⬭

D 2.00 ⬭

4. June/2022/Paper_7405/3/No.15

Equal volumes of two solutions, each with the same concentration, are mixed together at 298 K

Which two solutions, when mixed, form a solution with a pH >7?

[1 mark]

A HCOOH and HCOOK ⬭

B KOH and CH_3COOH ⬭

C NH_3 and HCl ⬭

D NH_4Cl and KCl ⬭