18.2 Calculations Involving Acids & Bases

Question Paper

Course	DP IB Chemistry
Section	18. Acids & Bases (HL only)
Topic	18.2 Calculations Involving Acids & Bases
Difficulty	Medium

Time allowed: 10

Score: /5

Percentage: /100

Question 1

The table shows the pK_a and K_a values for four acids

Acid	pK_a	K_a
Butanoic Acid	-	1.51×10^{-5}
Nitrous acid	3.1	-
Lactic acid	3.4	-
Phenol	-	1×10^{-10}

Which of the following is the correct order of increasing strength of the acids

A. Phenol < butanoic acid < lactic acid < nitrous acid

B. Nitrous acid < lactic acid < butanoic acid < phenol

C. Nitrous acid < butanoic acid < phenol < lactic acid

D. Phenol < lactic acid < butanoic acid < nitrous acid

[1 mark]

Question 2

Which of the following statements is correct?

A. As temperature increases, the pH value of pure water decreases

B. As temperature decreases, the pH value of pure water decreases

C. The pH of water is unaffected by temperature

D. Pure water is not neutral

[1 mark]

Question 3

Which of the following statements about conjugate acid and base pairs are correct?

I.
If an acid has a pK_a value of 4, its conjugate base will have a pK_b value of 10
II.
$K_a + K_b = K_w$
III.
The conjugate base for ethanoic acid is CH_3COO^-

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 4

What is the correct expression to use to determine the pH of butanoic acid with concentration of 0.75 mol dm^{-3}?

The K_a of butanoic acid at 298 K is 1.51×10^{-5} mol dm^{-3}

A. $-\log_{10}(1.51 \times 10^{-5} \times 0.75)$

B. $-\log_{10}\sqrt{(1.51 \times 10^{-5} \times 0.75)}$

C. $-\log_{10} 0.75$

D. $\frac{0.75}{1.51 \times 10^{-5}}$

[1 mark]

Question 5

What is the correct expression for the base dissociation constant, K_b, for propylamine?

A. $K_b = \frac{[CH_3CH_2CH_2NH_3^+][OH^-]}{[CH_3CH_2CH_2NH_2]}$

B. $K_b = \frac{[CH_3CH_2CH_2NH_3^+][H_2O]}{[CH_3CH_2CH_2NH_2]}$

C. $K_b = \frac{[CH_3CH_2CH_2NH_3^+][OH^-]}{[CH_3CH_2CH_2NH_2][H_2O]}$

D. $K_b = [CH_3CH_2CH_2NH_3^+][OH^-]$

[1 mark]