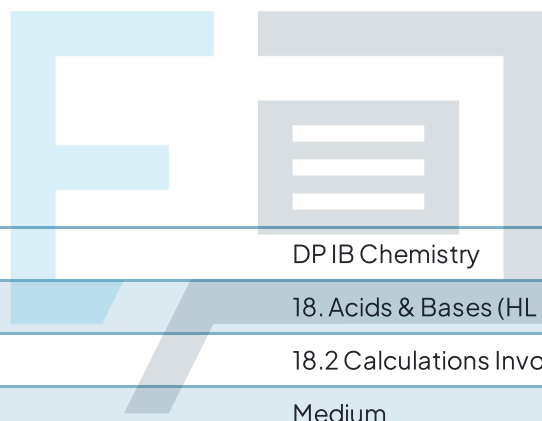




# 18.2 Calculations Involving Acids & Bases

## Question Paper



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

# Exam Papers Practice

To be used by all students preparing for DP IB Chemistry HL  
Students of other boards may also find this useful

### Question 1

The table shows the  $pK_a$  and  $K_a$  values for four acids

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

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  $0.75 \text{ mol dm}^{-3}$ ?

The  $K_a$  of butanoic acid at 298 K is  $1.51 \times 10^{-5} \text{ mol dm}^{-3}$

- 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]



# Exam Papers Practice