

Acids, Bases and Buffers (MCQ)

1. 20 cm³ of 0.10 mol dm⁻³ hydrochloric acid is added to 10 cm³ of 0.10 mol dm⁻³ sodium hydroxide.

What is the pH of the resulting mixture?

- A 1.00
- B 1.18
- C 1.30
- D 1.48

Your answer

[1]

2. Phosphoric acid is a tribasic acid.

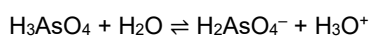
What is the mass of Ca(OH)₂ that completely neutralises 100 cm³ of 0.100 mol dm⁻³ phosphoric acid?

- A 0.49 g
- B 0.74 g
- C 1.11 g
- D 2.22 g

Your answer

[1]

3. The equation shows the dissociation of the acid H₃AsO₄ in water.



Which pair is a conjugate acid–base pair?

- A H₃AsO₄ and H₂O
- B H₂AsO₄⁻ and H₃O⁺
- C H₃AsO₄ and H₃O⁺
- D H₃O⁺ and H₂O

Your answer

[1]

4. A buffer solution is prepared by mixing 200 cm^3 of 2.00 mol dm^{-3} propanoic acid, $\text{CH}_3\text{CH}_2\text{COOH}$, with 600 cm^3 of 1.00 mol dm^{-3} sodium propanoate, $\text{CH}_3\text{CH}_2\text{COONa}$.

$$K_a \text{ for } \text{CH}_3\text{CH}_2\text{COOH} = 1.32 \times 10^{-5} \text{ mol dm}^{-3}$$

What is the pH of the buffer solution?

- A 4.58
- B 4.70
- C 5.06
- D 5.18

Your answer

[1]

5. **HA** and **HB** are two strong monobasic acids.
 25.0 cm^3 of 6.0 mol dm^{-3} **HA** is mixed with 45.0 cm^3 of 3.0 mol dm^{-3} **HB**.

What is the $\text{H}^+(\text{aq})$ concentration, in mol dm^{-3} , in the resulting solution?

- A 1.9
- B 2.1
- C 4.1
- D 4.5

Your answer

[1]

6. A $0.040 \text{ mol dm}^{-3}$ solution of a weak monobasic acid is 1.0% dissociated.

What is the value of K_a for the acid?

- A $2.0 \times 10^{-7} \text{ mol dm}^{-3}$
- B $4.0 \times 10^{-6} \text{ mol dm}^{-3}$
- C $4.0 \times 10^{-4} \text{ mol dm}^{-3}$
- D $4.0 \times 10^{-2} \text{ mol dm}^{-3}$

Your answer

[1]

7. Which statement is correct for a neutral solution at any temperature?

- A. $K_w = 1.00 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6}$
- B. The solution contains only H_2O
- C. $[\text{H}^+] = [\text{OH}^-]$
- D. $\text{pH} = 7$

Your answer

[1]

8. A buffer solution is based on methanoic acid, HCOOH ($K_a = 1.70 \times 10^{-4} \text{ mol dm}^{-3}$) and methanoate ions, HCOO^- .

In the buffer solution, the HCOOH concentration is half the HCOO^- concentration.

What is the pH of the buffer solution?

- A. 2.47
- B. 3.07
- C. 3.47
- D. 4.07

Your answer

[1]

9. A solution of propanoic acid, $\text{CH}_3\text{CH}_2\text{COOH}$, has a pH of 2.89 at 25°C .

What is $[\text{H}^+]$ in this solution?

- A. $1.7 \times 10^{-6} \text{ mol dm}^{-3}$
- B. $4.6 \times 10^{-4} \text{ mol dm}^{-3}$
- C. $1.3 \times 10^{-3} \text{ mol dm}^{-3}$
- D. 0.46 mol dm^{-3}

Your answer

[1]

END OF QUESTION PAPER

Mark scheme – Acids, Bases and Buffers (MCQ)

Question			Answer/Indicative content	Marks	Guidance
1			D	1 (AO 2.2)	
			Total	1	
2			C	1 (AO 2.2)	
			Total	1	
3			D	1 (AO 1.2)	
			Total	1	
4			C	1 (AO 2.6)	<p><u>Examiner's Comments</u></p> <p>This relatively difficult pH calculation was readily done successfully by higher ability candidates, but lower ability candidates found it difficult, with answer B proving a popular choice.</p>
			Total	1	
5			C	1	ALLOW 4.1 in the box
			Total	1	
6			B	1	
			Total	1	
7			C	1	
			Total	1	
8			D	1	
			Total	1	
9			C	1	
			Total	1	