

Name _____ Date _____

End of Chapter 19 test

This test and its sample answers have been written by the authors. IB may award marks differently.

- 1 In which of the following reactions is water not produced?
 - A zinc carbonate + nitric acid
 - B copper oxide + sulfuric acid
 - C magnesium + ethanoic acid
 - D barium hydroxide + hydrochloric acid

- 2 Which of the following is an acid–base conjugate pair?
 - A $\text{CH}_3\text{NH}_2 / \text{CH}_3\text{NH}_3^+$
 - B H^+ / OH^-
 - C $\text{H}_2\text{CO}_3 / \text{CO}_3^{2-}$
 - D $\text{HCOOH} / \text{CH}_3\text{COOH}$

- 3 Which two species are the Brønsted–Lowry acids in the following reactions?

$$\text{CO}_3^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HCO}_3^- + \text{OH}^-$$
 - A HCO_3^- and OH^-
 - B H_2O and OH^-
 - C CO_3^{2-} and HCO_3^-
 - D H_2O and HCO_3^-

- 4 Which of the following 1 mol dm^{-3} solutions will have the lowest electrical conductivity?
 - A lithium hydroxide
 - B sulfuric acid
 - C ammonia
 - D sodium chloride

- 5 HA is a weak acid. What is the pH for a 0.1 mol dm^{-3} HA solution if it has $K_a = 1.6 \times 10^{-4}$?
 - A 0.4
 - B 1.4
 - C 2.4
 - D 3.4

- 6 Pure water has an ion product constant of 4.0×10^{-14} at 45 °C. What is its pH?
- A 5.7
B 6.0
C 6.7
D 7.0
- 7 Aqueous equimolar solutions of a strong acid and a weak acid can be distinguished using some of the following methods. Which methods are they?
- I Comparing how fast gas bubbles are formed when MgCO_3 is added to each solution.
II Comparing the pH of the solutions using a pH meter and a data logger.
III Comparing the volume of NaOH required for neutralisation using phenolphthalein as an indicator.
- A II only
B I and II only
C I and III only
D I, II and III
- 8 What is the pH of a solution containing 0.40 mol dm^{-3} of KOH at 25 °C?
- A 2.5
B 11.0
C 12.6
D 13.6
- 9 100 cm^3 of 0.60 mol dm^{-3} KOH are mixed with 400 cm^3 of 0.40 mol dm^{-3} HNO_3 , what is the pH of the resulting solution?
- A 0.20
B 0.70
C 1.7
D 7.0

10 Given the following pK_b values, which of the following bases has the strongest conjugate acid?

CN^- : $pK_b = 4.70$

NH_3 : $pK_b = 4.75$

CH_3NH_2 : $pK_b = 3.34$

$C_6H_5NH_2$: $pK_b = 9.13$

A CN^-

B NH_3

C CH_3NH_2

D $C_6H_5NH_2$

11 The indicator bromocresol green has a pH range of 3.8 to 5.4. This indicator is most suitable for the titration of

I a strong acid and a weak base

II a weak acid and a strong base

III a strong acid and a strong base.

A **III** only

B **I** and **II** only

C **I** and **III** only

D **I**, **II** and **III**

12 Which of the following compound dissolves in water to form a basic solution?

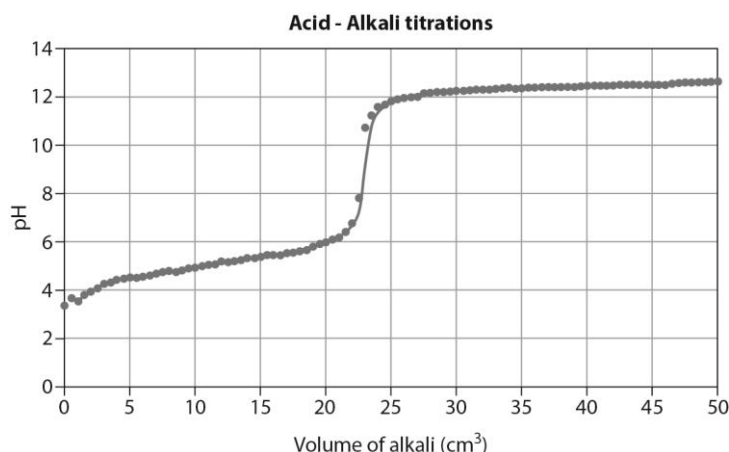
A calcium carbonate

B zinc nitrate

C ammonium sulfate

D potassium methanoate

13 The graph shows the pH change for



- A** an excess of $0.10 \text{ mol dm}^{-3} \text{ NaOH(aq)}$ is added to a $0.10 \text{ mol dm}^{-3} \text{ CH}_3\text{COOH(aq)}$ solution.
- B** an excess of $0.10 \text{ mol dm}^{-3} \text{ NH}_3\text{(aq)}$ is added to a $0.10 \text{ mol dm}^{-3} \text{ HCl(aq)}$ solution.
- C** an excess of $0.10 \text{ mol dm}^{-3} \text{ CH}_3\text{COOH(aq)}$ is added to a $0.10 \text{ mol dm}^{-3} \text{ NaOH(aq)}$ solution.
- D** an excess of $0.10 \text{ mol dm}^{-3} \text{ NH}_3\text{(aq)}$ is added to a $0.10 \text{ mol dm}^{-3} \text{ CH}_3\text{COOH(aq)}$ solution.
- 14 Which of the following combinations will make a buffer solution?
- I** 1 mol of $\text{NH}_3\text{(aq)}$ and 1 mol of HCl(aq)
- II** 1 mol of $\text{CH}_3\text{COOH(aq)}$ and 2 mol of NaOH(aq)
- III** 1 mol of Mg(s) and 2 mol of $\text{CH}_3\text{COOH(aq)}$
- A** III only
- B** I and II only
- C** I and III only
- D** I, II and III
- 15 A titration is carried out by adding excess NaOH into a 50 cm^3 of 0.01 mol dm^{-3} solution of a monoprotic weak acid HA . At half equivalence point, the pH of the solution is 4.20. What is the K_a value of the acid?
- A** 7.9×10^{-3}
- B** 4.2×10^{-4}
- C** 2.1×10^{-4}
- D** 6.3×10^{-5}

END OF TEST