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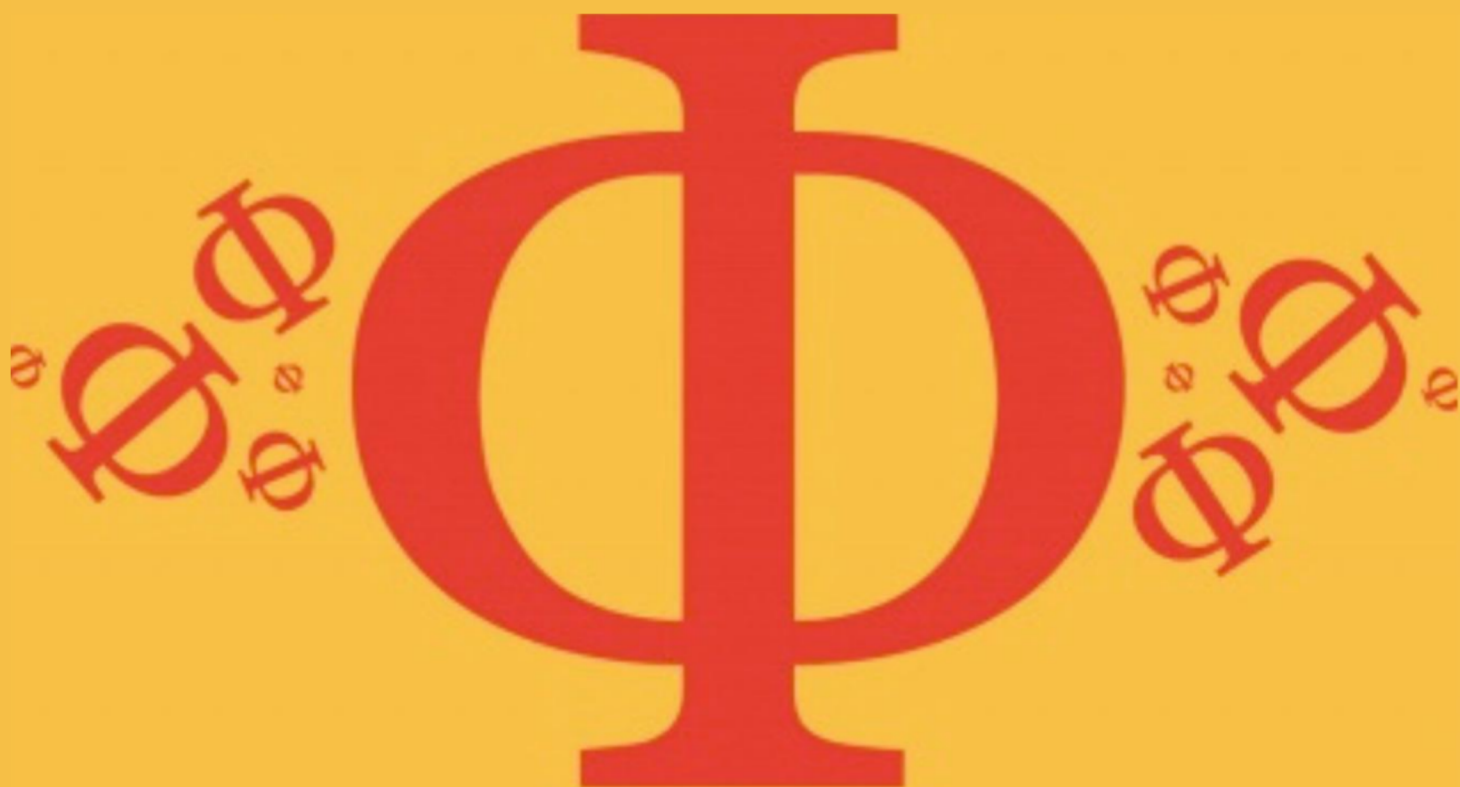Detailed mark scheme

Suitable for all boards

Designed to test your ability and thoroughly prepare you

IB Chemistry: SL

8.2 More About Acids

CHEMISTRY

SL

8.2 More About Acids

Question Paper

Course	DP IB Chemistry
Section	8. Acids & Bases
Topic	8.2 More About Acids
Difficulty	Hard

Time allowed: 20

Score: /10

Percentage: /100

Question 1

If the pH of two acids, X and Y, are pH 1 and pH 2 respectively, which of the following is true?

I. X and Y could be strong or weak acids

II. The concentration of [H$^+$] ions in X is higher than in Y

III. Acid X is stronger than acid Y

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 2

A student has two flasks containing 150 cm^3 of nitric acid, HNO$_3$ (aq) and ethanoic acid, CH$_3$COOH(aq). She writes the following three statements in her notebook about the acids. Which of them are correct?

I. HNO$_3$ dissociates more than CH$_3$COOH

II. HNO$_3$ conducts electricity better than CH$_3$COOH

III. more NaOH can be neutralized with HNO$_3$ than CH$_3$ COOH

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

[1 mark]

Question 3

Which row shows the correct colours for two common indicators used in acid-alkali titrations?

	phenolphthalein		phenolphthalein	
	colour in acid	colour in acid	colour in acid	colour in alkali
A	pink	colourless	yellow	red
B	colourless	pink	yellow	red
C	pink	colourless	red	yellow
D	colourless	pink	red	yellow

[1 mark]

Question 4

In a titration, the equivalence point is reached when 23.70 cm³ of 0.02 mol dm⁻³ potassium hydroxide reacts with 0.03 mol dm⁻³ of sulfuric acid. What volume of acid is needed?

A. $\dfrac{0.02 \times 23.70}{2 \times 0.03}$

B. $\dfrac{0.03}{2 \times 0.02 \times 23.70}$

C. $\dfrac{0.02 \times 23.70}{0.03}$

D. $\dfrac{0.03 \times 23.70}{2 \times 0.02}$

[1 mark]

Question 5

What is the number of moles of barium hydroxide in a 100 cm³ solution with a pH of 11 at 25 °C?

$$(K_w = 1.00 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6} \text{ at 298 K})$$

A. 1×10^{-11} mol

B. 1×10^{-3} mol

C. 0.5×10^{-3} mol

D. 0.5×10^{-4} mol

[1 mark]

Question 6

What is the pH of a solution made by adding 6.0 g of sodium hydroxide to 1 dm³ of water at 298K? (M_r NaOH = 40.0) ($K_w = 1.00 \times 10^{-14}$ mol² dm⁻⁶ at 298 K)

A. $-\log\left(\dfrac{6.0 \times 10^{-14-14}}{40.0}\right)$

B. $-\log\left(\dfrac{40.0 \times 10^{-13}}{6.0 \times 1000}\right)$

C. $-\log\left(\dfrac{4.0 \times 10^{-15}}{6.0}\right)$

D. $-\log\left(\dfrac{40.0 \times 10^{-13}}{6.0}\right)$

[1 mark]

Question 7

Which values are correct for a solution that contains 0.056 g of KOH (M_r = 56) in 100 cm³ of water?

$$(K_w = 1.00 \times 10^{-14} \text{ mol}^2 \text{ dm}^{-6} \text{ at 298 K})$$

A. $[H^+] = 1.0 \ 10^{-2}$ mol dm^{-3} and pH = 2.00

B. $[OH^-] = 1.0 \ 10^{-2}$ mol dm^{-3} and pH = 2.00

C. $[H^+] = 1.0 \ 10^{-12}$ mol dm^{-3} and pH = 12.00

D. $[OH^-] = 1.0 \ 10^{-12}$ mol dm^{-3} and pH = 2.00

[1 mark]

Question 8

Which of the following statements is **incorrect** about 0.01 mol dm^{-3} CH$_3$COOH?

A. the pH = 2

B. $[H^+]$ << 0.01 mol dm^{-3}

C. [CH$_3$COO] is approximately equal to $[H^+]$

D. CH$_3$COOH is partially ionized

[1 mark]

Question 9

Two flasks contain two different acids labelled as HA and HB. A student measures the pH of each flask, and finds that they are pH 1 and pH 3 respectively. Which of the following statements is true?

A. HA is a stronger acid than HB

B. HB is a stronger acid than HA

C. The $[H_3O^+]$ in the solution of HB is 3 times greater than the $[H_3O^+]$ in the solution of HA.

D. The $[H_3O^+]$ in the solution of HA is 100 times greater than the $[H_3O^+]$ in the solution of HB

[1 mark]

Question 10

Whichofthe following solutions will have the largest amount of H+ ions in moles?

A. 20 cm³ of 2.0 mol dm⁻³ sulfuric acid
B. 10 cm³ of 3.0 mol dm⁻³ nitric acid
C. 80 cm³ of 0.5 mol dm⁻³ hydrochloric acid
D. 40 cm³ of 1.0 mol dm⁻³ ethanoic acid

[1 mark]