# 18.1 Further Aspects of Acids & Bases

## Question Paper

| | |
|---|---|
| Course | DP IB Chemistry |
| Section | 18. Acids & Bases (HL only) |
| Topic | 18.1 Further Aspects of Acids & Bases |
| Difficulty | Easy |

**Time allowed:** 60

**Score:** /42

**Percentage:** /100

## Question 1a

a)
Define the terms Lewis acid and Lewis base and state the type of bond formed between a Lewis acid and base.

[3]

**[3 marks]**

## Question 1b

b)
Identify which of the following are Lewis acids, Lewis bases or neither:

$NH_3$, $K^+$, $SO_4^{2-}$, $CH_4$, $BCl_3$,

[5]

**[5 marks]**

## Question 1c

c)
Explain why aqueous ions of transition metals can act as Lewis acids.

[2]

**[2 marks]**

## Question 1d

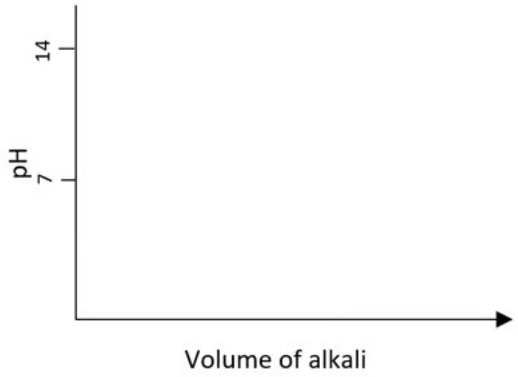
d)
State an alternative name for a species that acts as a Lewis base in organic chemistry mechanisms.

[1]

**[1 mark]**

## Question 2a

a)
On the axes below, draw a sketch graph to show the neutralisation of ethanoic acid by sodium hydroxide:




[2]

**[2 marks]**

## Question 2b

b)
Write an equation for the reaction between ethanoic acid and sodium hydroxide and identify the species acting as a Lewis base in the reaction.

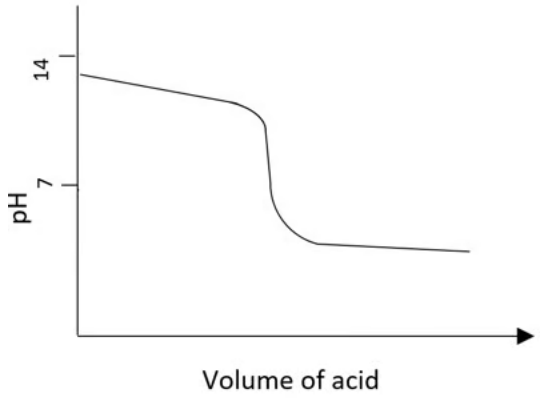
[2]

**[2 marks]**

## Question 2c

c)

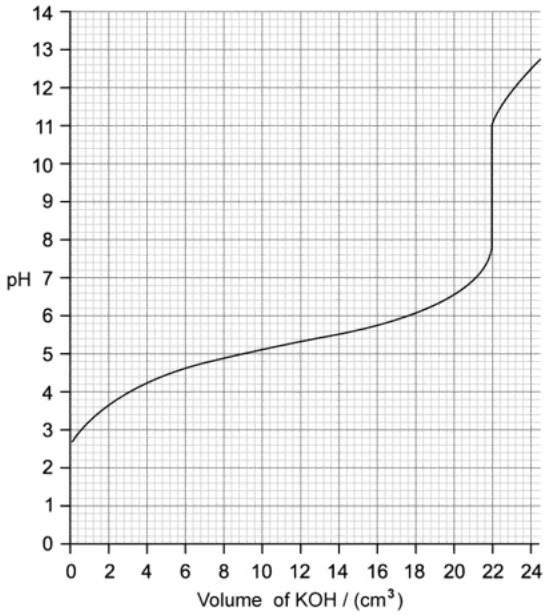
Identify the type of titration taking place from the curve and indicate where the buffer region is found on this curve.




**[2 marks]**

## Question 2d

d)
Identity on the graph the point at which p$K_a$ = pH and find the p$K_a$ of the acid.




[2]

**[2 marks]**

## Question 3a

a)
Explain how an acid-base indicator works.

[3]

**[3 marks]**

## Question 3b

b)
Phenolphthalein, $C_{20}H_{14}O_4$, is an acid-base indicator. State the formula and colour of the conjugate base of phenolphthalein.

[2]

**[2 marks]**

## Question 3c

c)
Explain how suitable indicators are chosen for titrations.

[3]

**[3 marks]**

## Question 4a

a)
Outline what is meant by a buffer solution.

[1]

**[1 mark]**

## Question 4b

b)
Outline how a buffer solution can be made starting from 1.0 mol $dm^{-3}$ ethanoic acid and 1.0 mol $dm^{-3}$ sodium hydroxide.

[2]

**[2 marks]**

## Question 4c

c)
Use suitable equations to explain how the buffer in b) functions when a small quantity of acid is added.

[4]

**[4 marks]**

## Question 4d

d)
State the composition of a basic buffer.

[1]

**[1 mark]**

## Question 5a

a)
Explain what is meant by the term *hydrolysis* in acids and bases.

[1]

**[1 mark]**

## Question 5b

b)
Salts can be acidic, basic or neutral. Explain how you can predict whether a salt is likely to be acidic. Include an equation in your answer.

[3]

**[3 marks]**

## Question 5c

c)
Deduce which of the following salts are acidic, basic or neutral:

$CH_3COONa$; $NH_4Cl$; KCl

[3]

**[3 marks]**