

## Chemistry

## Section I – Part B (continued)

Marks

## Question 19 (7 marks)

Name ONE type of cell, other than the dry cell or lead–acid cell, you have studied. Evaluate it in comparison with either the dry cell or lead–acid cell, in terms of chemistry and the impact on society. Include relevant chemical equations in your answer.

7

~~primary~~ <sup>lithium</sup> ~~but~~ ~~button~~ cell and oxy. cell lithium cells have a great impact on society, as it has a very long shelf life and it is rechargeable, the energy voltage released is higher than that of a dry cell where its size is much larger and ~~has~~ is not rechargeable. Dry cells are used in radios and toys where the longer life lithium cell can be used in mobile phones and ~~is more~~ ~~has~~ has great impact on society because rechargeable ability. It makes batteries much more economical and environmentally friendly. Dry cell uses  $\text{NH}_4^+$  and  $\text{MnO}_2$  as electrolytes and the ~~equation for the reaction~~ <sup>but this stage of cells are still expensive</sup>

$\text{NH}_4^+ +$

**Question 20** (4 marks)

A  $0.1 \text{ mol L}^{-1}$  solution of hydrochloric acid has a pH of 1.0, whereas a  $0.1 \text{ mol L}^{-1}$  solution of citric acid has a pH of 1.6.

- (a) State ONE way in which pH can be measured.

1

..... using a pH metre .....

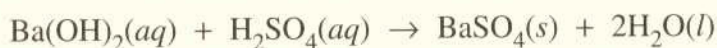
- (b) Explain why the two solutions have different pH values.

3

..... hydrochloric acid is a strong acid  
..... which means that it is completely ionised  
..... whereas citric acid is a weak acid  
..... which means it is only partly ionised  
..... and thus is not as strong as HCl,  
..... thus having a higher pH.  
.....

## Question 21 (4 marks)

Barium hydroxide and sulfuric acid react according to the following equation:



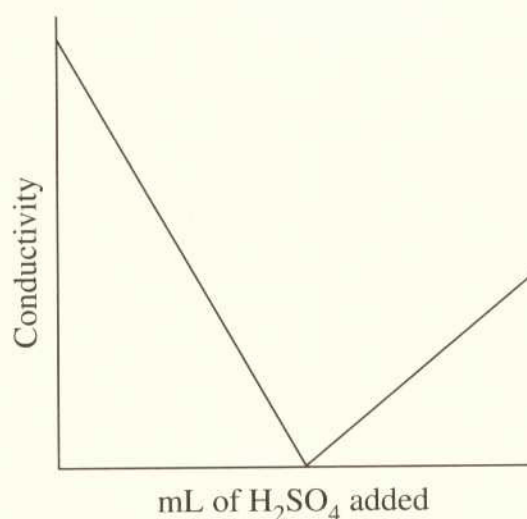
- (a) Name this type of chemical reaction.

1

.....neutralisation.....

- (b) A 20 mL sample of barium hydroxide was titrated with  $0.12 \text{ mol L}^{-1}$  sulfuric acid. The conductivity of the solution was measured throughout the titration and the results graphed, as shown.

3



Explain the changes in conductivity shown by the graph.

The conductivity decreased as more  $\text{H}_2\text{SO}_4$  was added, as the solution was beginning to be neutralised. The base (Barium Hydroxide) was being neutralised by the acid ( $\text{H}_2\text{SO}_4$ ). The pH was decreasing, becoming more neutral, - as this happens, the solution had less ions, and ~~it~~ becomes a less-effective conductor. The conductivity reached zero when the the base was fully - neutralised. As more acid was added, the solution became more acidic and better ionised, conducting and becoming more conductive.