# 233/3 CHEMISTRY PAPER 3 MS

# (PRACTICAL)

# 2 ¼ HOURS

**FOR EXAMINER'S USE**

| Question | Maximum score | Candidate's Score |
|---|---|---|
| 1 | 13 | |
| 2 | 11 | |
| 3 | 16 | |
| TOTAL SCORE | 40 | |



**Question 1.**

**Table 1.....5mks distributed as follows**

**i. Complete table with 18 correct entries.....2mks**

**incomplete table with 15-18 correct entries....1 ½ mk**

**incomplete table with 12-14 entries..... 1mk**

**penalize ½ mk for initial temperature above 40 or below 10**

**ii. Use of decimals .....1mk ( either whole number consistently used or 1 d.p of .0 or .5 consistently used or 2d.p of .00 or .25 or .50 or .75)**

**iii. Accuracy .....1mk (tied to initial teacher temperature)**

**If within $\pm o.1$ of teacher value... 1mk**

**If outside $\pm o.1$ but within $\pm o.2$ ... ½ mk**

**iii) Trend.....1mk( a rise followed by a drop or a rise, constant then a drop)**

**b) GRAPH.....3mks distributed as follows**

**i) Labeling.....1/2 mk (where both axes are labelled, axes not inverted and correct units or no units are given)**

**ii) Scale.. ½ mk ( use of at least 6 boxes in vertical axes and 9 boxes in horizontal axes or half no of boxes in each axes). mark for scale even when axes are inverted.**

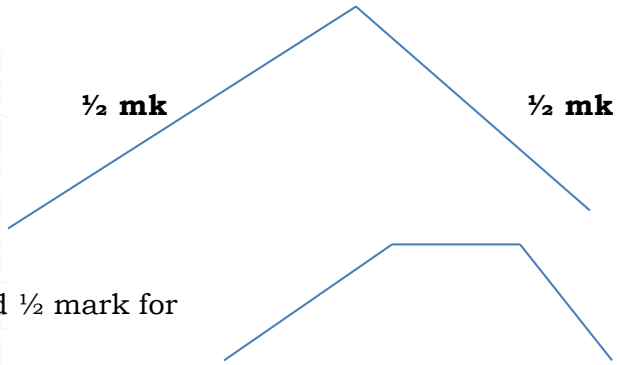
**iii) Plots.... 1mk**

**6 correct plots....1mk**

**4-5 correct plots .... ½ mk**

**iv. Shape.....1mk**

**Two straight lines extrapolated each line passing through two correct plots**




award ½ mark for

**(b)**From the graph determine the volume of solution Z which gave the maximum change in temperature (1mark)

-Reading from graph 1mk

**(c)**Determine the volume of solution R that reacted with the volume of solution Z.(1mark)

30-answer in b ½ mk

=correct ans ½ mk

**(d)**Calculate;

(i)The ratio between volume of solution Z and R that neutralized one another. (1mark)

$\frac{answ\ in\ b}{smaller\ ans}$: $\frac{answer\ in\ c}{smaller\ ans}$ ½ mk

=correct ratio ½ mk ( -1/2 mk if answer is not 1:1)

**(ii)**The concentration in moles per litre of the acid in solution Z. (Assume that the volume ratio is the same as the mole ratio) (2marks)

moles of R=$\frac{2X\ ans\ in\ C}{1000}$ ½ mk =answer ½ mk

$\frac{answer\ X1000}{Answer\ in\ b}$ ½ mk = answer ½ mk

## QUESTION 2

Table 2..... 5mks

complete table…….2mks ( all times filled… 2mks, 3-4 times…1 ½ mk, 2 times…1mk)

decimals…..1mk( all whole numbers or any number of consistent decimal points)

accuracy…1mk (compare the first candidate value with the teacher value and if within $\pm$ 2 $sec$ award 1mk)

trend….1mk (continuous rise in time )

GRAPH….3mks

**i) Labeling…..1/2 mk (where both axes are labelled, axes not inverted and correct units or no units are given)**

**ii) Scale.. ½ mk ( use of at least 6 boxes in vertical axes and 9 boxes in horizontal axes or half no of boxes in each axes). mark for scale even when axes are inverted.**

**iii) Plots…. 1mk**

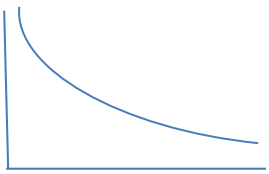
**5 correct plots….1mk**

**3-4 correct plots …. ½ mk**



**iv. Shape……1mk**

**a curve via at least 3 correct plots and not extrapolated beyond last plots**



**(b)** From the graph determine the time taken for the ribbon to react completely if 3cm³ water was used. **(1mks)**

**12-3 =7cm$^3$**

**read graph at volume of 7cm$^3$ ½ mk**

**= correct answer ½ mk**

**c) Explain the shape of the graph (2mk)**

-decrease in concentration of V( decrease in volume) results to increase in time taken. 1mk

-as the concentration decreases, the rate of colliding particles decreases hence less successful collisions and more time taken for a reaction to take place. 1mk

## QUESTION 3

3. You are provided with solids M, N and P. Carry out the following tests and write your observations and interferences in the spaces provided.

a) Place all of solid M in the boiling tube. Add about 10 $cm^3$ of distilled water and shake until all the solid dissolves to obtain Solution M.

i). To about 2 $cm^3$ of Solution M in a test tube, add 2M sodium hydroxide solution drop wise until in excess.

| OBSERVATION (1mk) | INFERENCES (2mk) |
|---|---|
| -white ppt ½ mk soluble in excess ½ mk | -$Zn^{2+}$ $Al^{3+}$, $Pb^{2+}$<br>All the three 2mk<br>Only two 1 ½ mk<br>Penalize ½ mk for each contradictory ion to max of 2mk |

ii). To about 2 $cm^3$ of Solution M in a test tube, add 2M ammonium hydroxide solution drop wise until in excess.

| OBSERVATIONS (1MK) | INFERENCES(1MK) |
|---|---|
| -White ppt ½ mk insoluble in excess ½ mk | $Al^{3+}$ ½ mk, $Pb^{2+}$ ½ mk present ( to scorethe ions must have been correctly inferred in I above)<br>-penalize ½ mk for each contradictory ion to a maximum of 1mk |

iii) To about 2 $cm^3$ of Solution M in the test tube, add 4 drops of 2M sulphuric (VI) acid.

| OBSERVATION (1mk) | INFERENCES(1mk) |
|---|---|
| -white ppt ½ mk<br>-no bubbles ½ mk | -$Pb2^+$ present ½ mk( penalize fully for any contradictory cation)<br>-$SO_3^{2-}$,$CO_3^{2-}$ absent ½ mk (penalize ½ mk for each contradictory anion to a maximum of ½ mk) |

iv) To about 2 $cm^3$ of solution M in a test tube, add 2 drops of potassium iodide solution.

| OBSERVATION (1mk) | INFERENCES (1mk) |
|---|---|
| -yellow ppt | $Pb^{2+}$ confirmed ( penalize fully for each contradictory ion) |

b). Place solid P into boiling tube. Add about 10$cm^3$ of distilled water and shake well to obtain solution P .Use this solution for the following tests.

i) Place about 2$cm^3$ of solution P in a test tube and determine its pH.

| METHOD ( 1 ½ mk) | OBSERVATION ( ½ mk) | INFERENCES (1mk) |
|---|---|---|

| | | |
|---|---|---|
| -Add drops of universal indicator/ dip universal indicator paper ½ mk<br>-Match the colour with a pH chart ½ mk<br>- Read the Ph ½ mk | pH= 1or 2 or 3 ½ mk | -strongly acidic 1mk |

ii). To about $2cm^3$ of solution P made in (ii) above, add 3 drops of acidified potassium manganate (vii) solution.

| OBSERVATIONS (1mk) | INFERENCES (1mk) |
|---|---|
| -purple MMnO4 changes to colourless 1mk<br>Or KMnO4 is decolourised | =C=C= or -C ≡ C- ½ mkor ROH present ½ mk |

iii). To the remaining solution P in the boiling tube, add the other half of solid N.

| OBSERVATIONS (1mk) | OBSERVATIONS (1mk) |
|---|---|
| Effervescence /bubbles/fizzing 1mk | N contains $CO_3^{2-}$,or $HCO_3^-$ 1mk |