**Term 2 - 2022**

**CHEMISTRY (233/3)**

**PAPER 3**

**FORM FOUR (4)**

**Time: 2**¼ **Hours**

**MARKING SCHEME**

***(a)***

 ***Table 1***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ***Piece of Magnesium added*** | ***1*** | ***2*** | ***3*** | ***4*** | ***5*** | ***6*** |
| ***Length of Magnesium added (cm)*** | ***2*** | ***4*** | ***6*** | ***8*** | ***10*** | ***12*** |
| ***Time taken t (second)*** | ***150*** | ***190*** | ***225*** | ***295*** | ***430*** | ***500*** |
| ***Reciprocal of time 1 (S-)*** ***t***  | ***0.00667*** | ***0.00526*** | ***0.00444*** | ***0.0033*** | ***0.00233*** | ***0.002*** |

*Marking points*

 *Complete Table – 1*

*Decimal point – 1*

*Accuracy – 1*

*Trend – 1*

***Graph:***

*Straight line graph of best fit*

*Label of axis = ½*

*Scale = ½*

*Plotting = 1*

*Line = 1*

 ***(ii) 1 = 0.00510 √½ From the graph and must be shown. Showing. √½***

 ***t***

 ***t = 1 √½ = 196.5 seconds. √½***

 ***0.00510***

 ***(iii) Mg(s) + H2SO4(aq)  MgSO4(s) + H2(g) √½***

 ***1 : 1 With correct physical state.***

 ***(iv) Moles of Mg = 0.12 √½ = 0.005 moles √½***

1. ***1mk***

 ***Moles of H2SO4 used = 0.005 moles (1 : 1)***

 ***(v) Increase in length of M of ribbon results in decrease in 1***

 ***t √½***

 ***This is done to gradual decrease in the concentration of the acid. √½***

***Table II***

|  |  |  |  |
| --- | --- | --- | --- |
| ***Titration***  | ***I*** | ***II*** | ***III*** |
| ***Find burette reading (cm3)*** | ***15.3*** | ***30.5*** | ***45.7*** |
| ***Initial burette reading*** | ***0.0*** | ***15.3*** | ***30.5*** |
| ***Volume of solution B used (cm3)*** | ***15.3*** | ***15.2*** | ***15.2*** |

 ***CT = 1***

 ***D = 1***

 ***AC = 1***

 ***PA = 1***

 ***TA = 1***

 ***5***

 ***(c) (i) T1 + T2 + T3 √½ = C.A √½ 1 fall are consistent***

 ***3***

 ***OR***

 ***i.e 15..3 + 15.2 + 15.2 √½ = 15.233 cm3 √½***

 ***3***

 ***(ii) Moles of sodium hydroxide = 15.233 x 0.5 = 0.007617***

 ***1000***

 ***i.e. Ans in c (i) x 0.5 √½ = C.A. √½***

 ***1000 1 mk***

 ***(d) (i) Ans in c (ii) √½ = C.A. √½ i.e. 0.007617 = 0.003809 moles***

 ***2 1 mk***

 ***(ii) Ans. in d (i) x 4 = C.A.***

 ***i.e o.003809 x 4 = 0.015236 moles. 1 mk***

 ***(e) Ans in b (iv) + Ans. d(ii) √½ = C.A***

 ***0.005 + Ans. d (ii) = C.A***

 ***i.e. 0.005 + 0.015235 = 0.020236 moles. 1 mk***

 ***(f) Ans. in e x 1000 cm3 = C.A.***

 ***50 cm3***

 ***i.e. 0.020236 x 1000 = 0.40472 M***

 ***50***

***2. (a)Observations Inferences***

 ***Dissolves to form colourless solution . √½ Soluble salt or absence of coloured irons***

 ***i.e Fe3+, Fe2+, Cu2+ √½***

 ***( ½ mrk) (1 mrk)***

 ***(b) (i) Observations Inferences***

 ***No white ppt. √½ Pb2+, Al3+ or Mg2+ absent***

 ***(½ mk) Or (1 mk)***

 ***NH+4, Na+, or K+ may be present. √½***

 ***(ii) Observations Inferences***

 ***No white ppt. √½ NH+4, Na+ √½ or K+ possibly present. √½***

 ***Or (1 mk)***

 ***Pb2+ Al3+, Zn2+ absent 1 mks***

 ***(iii) Observations Inferences***

 ***White ppt. formed. √1 CO32-, SO42- Or Cl-  present. √1***

 ***(1 mrk) (1 mk)***

 ***(iv) Observations Inferences***

 ***White ppt. √ ½ dissolves in excess Cl-1 present. √1***

 ***ammonia √ ½ solution to form***

 ***colourless solution. (1mk) (1 mk)***

 ***(v) Observations Inferences***

 ***Golden yellow flame. √1 Na+ present. √1***

 ***(1 mk) (1 mk)***

***3. (a) Observations Inferences***

 ***Burns with yellow flame - Long chain hydrocarbon***

 ***sooty /smoky flame. √½ - Unsaturated organic compound. √½***

 ***Or***

* ***organic compound with high C – H ratio***

***or***

 ***C = C or***

 ***C ≡ C***

 ***(b) Observations Inferences***

***Dissolves to form Polar organic compound/ soluble salt/ soluble compound √1***

 ***colourless solution. √1***

 ***(1 mk) (1 mk)***

 ***(c) (i) Observations Inferences***

 ***Effervescence /bubbles Presence of H+ / H3O+ , R- COOH. √½***

***/fizzing. √½***

 ***(½ mk)***

 ***1 mk***

 ***(ii) Observations Inferences***

 ***Orange colour remains Absence of R –OH. √½***

 ***the same / persists i.e***

 ***does not change green. √½***

 ***(1 mk)***

 ***1 mk***

 ***(iii) Observations Inferences***

 ***KMnO4 decolourized i.e***

 ***changes from C ═ C Or - C ≡ C −***

 ***purple to colourless√1 Or***

 ***Unsaturated organic compound. √1***

 ***(1 mk) (1 mk)***