

cluster chemistry paper3 marking scheme

Term 2 2018

1a) Table.....4mks

Complete table with 6 readings.....1mk

Incomplete with 4-5 readings.....½mk

Incomplete table with less than 4 readings.....0mk

Decimal place.....1mk

(Either a whole number or to 1dp consistently, if answer is given to 1dp it must be .0 or .5 used consistently otherwise penalise fully)

Accuracy.....1mk

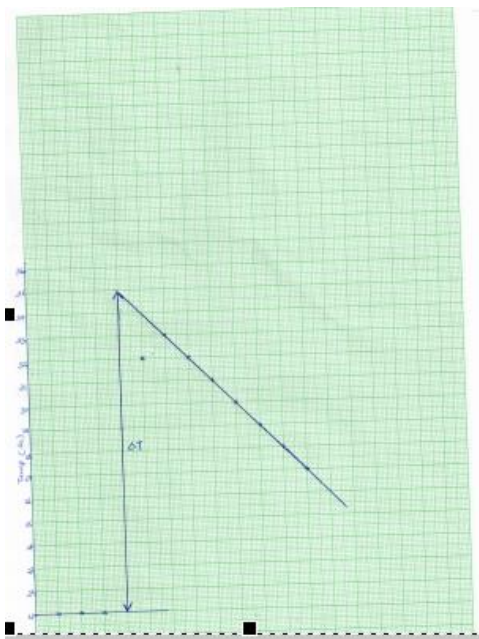
(tied to the 1st temp reading. ±2 of the schools value otherwise penalise Δfully for accuracy)

Trend.....1mk

Constant up to 1½ min then either rises up to a maximum then falls

1	
1	
1	
1	
4	

GRAPH.....3MKS



Labelling of axes..... $\frac{1}{2}$
 Scale..... $\frac{1}{2}$
 Plotting.....1mk
 Line.....1mk
 (Constant temp from initial $\frac{1}{2}$ mk, for continuous drop with
 extrapolation $\frac{1}{2}$ mk)

$$\begin{array}{r}
 \frac{1}{2} \\
 \frac{1}{2} \\
 1 \\
 1 \\
 \hline
 3
 \end{array}$$

Calculations

b) ΔT must be from a correct graph.....1mk
 c) $.50 \times 4.2 \times \text{Ans in (b) above}$ $\frac{1}{2}$
 = correct Ans $\frac{1}{2}$

d)

$$\frac{252}{\text{Ans}} \text{ in (c) above in kJ} \times 1 \checkmark \frac{1}{2}$$

=correct Ans $\checkmark \frac{1}{2}$

e) **PROCEDURE 2**

Complete table1MK

Decimal point1mk

(Burette read to 1dp or to 2 dp consistently. If given to 2dp the second dp must 5 or 0)

Accuracy.....1mk

(Tied to school value. If within ± 1 , award 1mk, if outside ± 0.1 but within ± 0.2 , award $\frac{1}{2}$ mk otherwise penalise fully)

Averaging.....1mk

(Values to be averaged must be within ± 0.2 of each other)

Final accuracy.....1mk (tied to the school value. Compare the students average titre value with the school value. If within ± 0.1 award 1mk, if outside ± 0.1 but within ± 0.2 award $\frac{1}{2}$ a mark otherwise penalise fully for final accuracy)

ii) Moles of NaOH

$$\text{average titre} \frac{\text{volume}}{1000} \times 0.7 \checkmark \frac{1}{2}$$

=correct Ans $\checkmark \frac{1}{2}$

iii) Moles of sulphuric (VI) acid

Mole ratio $\text{H}_2\text{SO}_4:\text{NaOH}=1:2$

$$=\text{ans in e(ii) above} \times 1/2 \checkmark \frac{1}{2}$$

=correct Ans $\checkmark \frac{1}{2}$

Comment [WU1]: Oles of sulphuric

iv) Molarity of sulphuric acid

(Ans in e(iii) above* $250/25 \checkmark^{1/2}$ + (ans in d procedure 1 $\checkmark^{1/2}$ correct A) $\times$
 $1000/50 \checkmark^{1/2}$

= Correct A $\checkmark^{1/2}$ ns

2. You are provided with solid C Carry out the following tests and write your observations and inferences in the spaces provided

a) Place a spatulaful of solid C in a boiling tube. Heat it gently then strongly. Test the gas produced if any using moist litmus papers

Observations	inferences
<i>Droplets of a colourless liquid form on cooler parts of boiling $\checkmark^{1/2}$ tube; red litmus turns blue blue litmus remains blue $\checkmark^{1/2}$ 1mk</i>	<i>C is hydrated, /contains water of crystallisation $\checkmark^{1/2}$ NH_4^+ 1mk $\checkmark^{1/2}$</i>

c.) put the rest of solid C in a boiling tube .Add 10cm^3 of distilled water and shake. Divide the resulting solution into four portions

i) To the first portion add sodium hydroxide drop wise till in excess then warm and test any gas given off using moist pH indicator paper

Observations	inferences
<i>White ppt $\checkmark^{1/2}$ soluble in excess $\checkmark^{1/2}$ pH 10 $\checkmark^{1/2}$ 2mk</i>	<i>$Zn^{2+}, Al^{3+}, Pb^{2+} \checkmark 1$ Gas given out is weakly basic $\checkmark 1$.....2mk</i>

ii) To the second portion add ammonia solution drop wise till in excess

observations	inferences
<i>White ppt $\checkmark^{1/2}$ insoluble in excess $\checkmark^{1/2}$</i>	<i>Pb^{2+}, Al^{3+} present Zn^{2+} absent $\checkmark 1$mk</i>

iii) To the third portion add a few drops of lead (ii) nitrate and warm

observations	inferences
White ppt ✓ $\frac{1}{2}$ insoluble on warming ✓ $\frac{1}{2}$ mk	Cl ⁻ absent ✓ $\frac{1}{2}$ /SO ₄ ²⁻ , SO ₃ ²⁻ ✓1mk

iv) To the fourth portion add dilute nitric (V) acid followed by barium nitrate

observations	inferences
White ppt, ✓ No effervescence 1mk	So ₄ ²⁻ 1mk ✓

3-you are provided with solid z carry out the tests described below and record your observations and inferences in the spaces provided'

a) Ignite half a spatulaful of Z on a non luminous flame

observation	inference
Burns with a yellow/luminous flame ✓1mk	=C=C=, -C≡C- ✓1mk

b) Place the remaining solid in boiling tube and 6cm³ of water and shake. Divide the resulting mixture into 3 portions

c) To the first portion add acidified potassium manganate(vii) and warm

Observation	inferences
Purple colour of acidified KMnO ₄ turns colourless/decolorized ✓1mk	=C=C=, -C≡C- ✓ $\frac{1}{2}$ and R-OH ✓ $\frac{1}{2}$

d) To the second portion add acidified potassium dichromate (VI) and warm.

observations	inferences
Orange colour of acidified potassium dichromate (VI) persists/does not turn green ✓1mk	R-OH absent ✓1mk

- e) Using the remaining portion and the unused reagent, describe a procedure that can be used to test whether the solid is an organic acid and give expected observations if test is positive

description	observations
Add NaHCO_3 to the third portion ✓ (1mk)	Effervescence ✓ (1mk)

- f) carry out the test you have described in e) above and record your observations and inferences in the spaces provided

observations	inferences
No effervescence	R-COOH absent