SERIES 50 EXAMS

231/3
CHEMISTRY
PAPER 3
MARKING SCHEME
1.

Vol. of sltn. A	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0	50.0
Temp °C	26.5	28.5	30.5	31.0	32.0	32.5	32.5	32.0	31.5	31.0	30.5

award of marks
complete table -2mks
trend /up then down -2mks
accuracy -1 mk
(comparable to s.v)
realistic values -1 mk
6mks

(a) graph
labeling of axes -1 mk
plotting -1 mk
smoothness of curve -1 mk

b) value obtained from extrapolation; evident in graph = $28cm^3$ (lmk)

(c) Moles of NaOH that reacted = $100cm^3$— 1 mole
$50cm^3 = 50 \times \frac{1}{1000}$
$= 0.05$moles

$NaOH + HC1_{(aq)} \rightarrow NaCl_{(aq)} + H_20_{(l)}$
From mole ration of 1:1
Moles of HC1 = 0.05moles

$28cm^3$ 0.O5moles
$100cm^3$ $\frac{1000 \times 0.005}{28} = 1.785M$

$=1.79M$

(d) Maximum temperature rise = 32.5 -26.5= 6°C ✓1

(e) Heat evolved = $MC\nabla T$
Mass of solution = (50 + 28) = $78cm^3$
Temp. change= 6k
Heat evolved = $0.078Kg \times 4.2KJKg^{-1} K^{-1} \times 6k$
$= 1.9656KJ$
When one mole of HC1 is neutralized
0.05mol. 1.9656KJ
l mol $\frac{1 \times 1.9656}{0.05} = 39.3l2KJmol^{-1}$

2. (a)

Observation	Inference
Solid partly dissolve to give colourless solution and white suspensions / residue	- Coloured ions Fe^{2+} , Fe^{3+} Cu absent. -Mixture of soluble & insoluble salt.

(b)

Observation	Inference
A white precipitate is formed which is insoluble in excess $NaOH_{(aq)}$	Mg^{2+} , Ca^{2+}, or Ba^{2+} present

(c)

Observation	Inference
A white precipitate is formed	Ca^{2-}_{3} ,So^{2-}_{4} HCO^{-}_{3} present

(d)

Observation	Inference
A white precipitate is formed precipitate is insoluble upon addition of $HNO_{3(aq)}$	SO^{2-}_{4} present

(e)

Observation	Inference
No white precipitate is formed	Mg^{2+} present

(f)

Observation	Inference
(i)Effervescence of colourless gas that turns moist blue litmus paper red is formed (ii)White precipitate soluble in excess $NaOH_{(aq)}$ (iii) White ppt formed precipitate (iv) Yellow precipitate formed	CO^{2-}_{3} , HCO^{-}, SO^{2-}_{3} present Pb^{2+},Al^{3+} or Zn^{2+} present $Al^{3+}_{(aq)}$ or Pb^{2+} present Pb^{2+} present

3. (a)

Observation	Inferences
-Melting to form brown liquid burns with a sooty yellow flame✓ ½ -Black residual✓ ½	-Presence of long chained hydrocarbon✓1 or -High hydrogen : carbon ratio✓1 or -Presence of unsaturated hydrocarbons✓

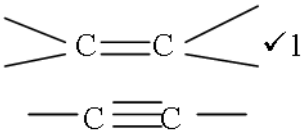
(b) (i)

Observation	Inferences
-P^H of 7✓ (½ mk)	-Neutral solution✓ (½ mk)

(ii)

Observation	Inferences
-Orange colour of potassium dichromate persists / remains.	-Absence of ROH **NB** : Penalize fully for any contradictory ions.

(iii)

Observation	Inferences
-Colour of bromine water persists✓1	-Absence of ROH  ✓1

(iv)

Observation	Inferences
-Decolorizes acidified $KMnO_4$ solution or pink colour decolorized✓1 (1mk)	-Presence of oxalic acid, aldehydes✓1 **NB**: Penalize fully for any contradictory ions. (1mk)