SERIES 3 EXAMS

CHEMISTRY PRACTICAL
PAPER 3
MARKING SCHEME

QUESTION 1

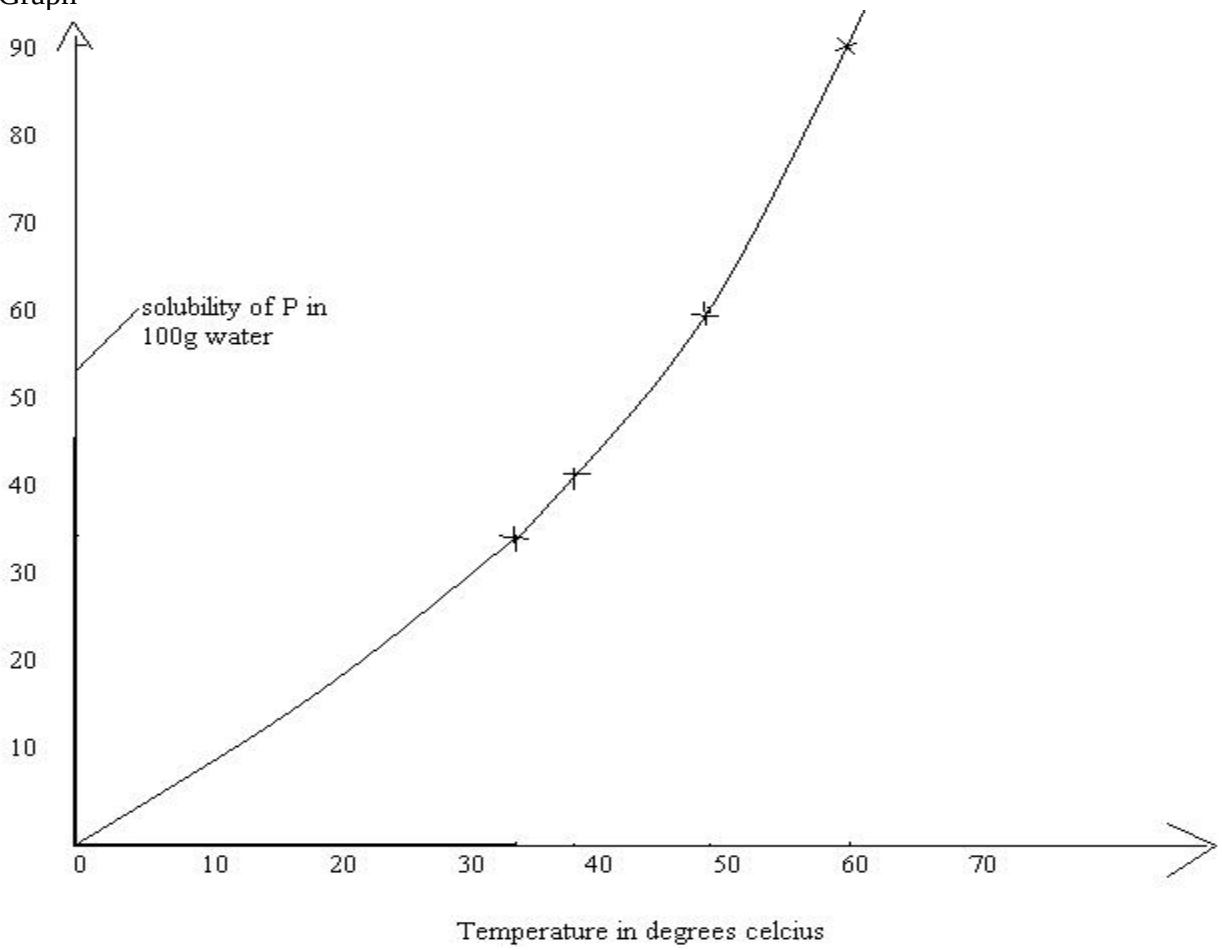
1. P is oxalic acid ($H_2C_2O_4.2H_2O$)

Q1. i) Marking scheme

Volume of distilled water	Crystallization temp. ^oc	Solubility of P in 100g H_2O
4	60	$\frac{3.6}{4}$ x 100 = 90
6	48	$\frac{3.6}{6}$ x 100 = 60
8	38	$\frac{3.6}{8}$ x 100 = 45
10	34 (½mk each)	$\frac{3.6}{3}$ x 100 = 36

School values ± 1

ii) Graph



Scale X – ½ mk
Y - ½ mk

Labeling X – ½ mk
Y – ½ mk

Plotting points - all 4 – 1mk
3 points – ½ mk
Less than 3 – 0

Smooth curve - 1mk

Total (4mks)

iii) Read the value from the student graph (1mk)

iv) 30g – 50g H_2O
? - 100g

= 60g (½mk) read temperature from the students graph at which solubility of P is 60g per 100g water. (½mk)

Question 2

Table 1- 5 marks
Marks distribution
- complete table ✓1mk
Penalize ½ mk for inverted table
Penalize ½ mk for wrong arithmetic
If only 2 titrations are done give ½ mk and penalize accordingly.
- Decimal points
- Consistently 1 decimal
- if 2 dp. Then the 2nd decimal should be 5 or 0
Else award '0' mks
- accuracy✓ 1mk
± 0.1 of school value ✓1mk
± 0.2 of school value ✓ ½ mk
Else award '0' mks

(a) Average✓1mk
Value averaged must be shown and consistent i.e within ± 0.2 from each other
Notes
-3 consistent values averaged ✓1mk
- inconsistency value average 0 mks
Final answer ✓ 1mk
- tied to correct average
- 3 dp

NB: CT – 1, DP – 1, A – 1, AU – 1, final ans 1

(ii) Equation

$HCl_{(aq)} + Na_2CO_{3(aq)} \longrightarrow NaCl + CO_{2(g)} + H_2)_{(l)}$

Balanced equation ✓ 1mk

State symbols ✓ 1mk

(b) (i) Molarity of Y

Conc g/l = molarity xRFM

RFM HCl = 36.5

Molarity = $\frac{g/l}{RFM} = \frac{7.3}{36.5} = 0.2M$ ✓ ½ ✓ ½

(ii) Molarity of Y_2

Moles of HCl = molarity x vol. in litres

$\frac{0.2 \times 25}{1000} = 0.005mol$ ✓ ½ mk

Mole ratio = 2: 1

∴moles of Na_2CO_3 = ½ x 0.005 = 0.0025mol✓ ½

$25cm^3$ = 0.0025mol

$1000cm^3$= ?✓ ½

$\frac{1000 \times 0.0025}{25} = 0.1M$ ✓ ½ mk

Or

$\frac{1000 \times 0.0025}{answer \quad a}$ ✓ 3mks

(iii) Relative formula mass of salt Y_2

Conc = mol x RFM

RFM = $\frac{conc\ g/l}{molarity}$ ✓ ½

14.3 dissolved in $500cm^3$

? = 1000

$\frac{1000 \times 14.3}{500}$ ✓ ½ = 28.6 g/l

(iv) Value of x in Y

RFM = $\frac{28.6}{0.1} = 286$ ✓ ½

RFM Na_2CO_3 x H_2O = 286

106 + 18x = 286

18x = 180

X = 10 ✓ ½

Question 3

Table III

Solid	**Colour of Flame**
Sodium Chloride	Yellow ✓
Potassium Chloride	Light T ✓ Light Blue
Calcium Chloride	Orange + Red ✓
Barium Chloride	Pale Green ✓
Solid G	Yellow ✓

½ Mark for each

What is the cation present in solid G? Na^{+}✓ ½

b)

Observation	**Inferences**
i) – Colourless gas ✓ - Gas with irritating smell✓ - Gas turns blue litmus red ✓ - White residue ✓ (2mks for 4 correct observations)	Acidic gas ✓ 1
ii) – Solid dissolves to form colourless solution ✓ 1	Soluble solid ✓ 1
iii) I No white precipitate formed	Ca^{2+}, Mg^{2+}, Pb^{2+}, Al^{3+}, Zn^{2+} Absent ✓ 1
II White precipitate formed ✓ ½ Soluble in dilute HCl acid ✓ ½	SO_3^{2-}✓ CO^{2-}_3✓ 1 suspected
III Purple acidified $KMnO_4$ Solution ✓ changes to colourless (decolourised)	SO^{2-}_3 confirmed ✓ 1