

**Results key for practical problem I
(10 pts)**

1. Identification of unknown solutions (5 pts)

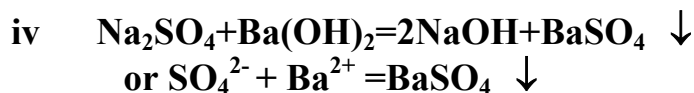
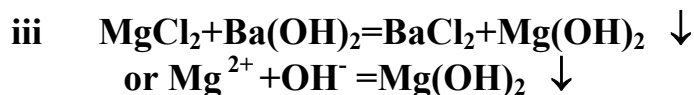
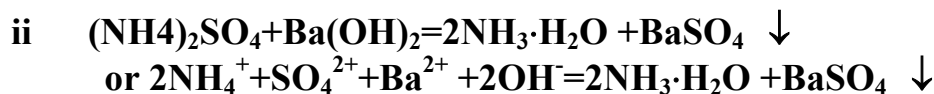
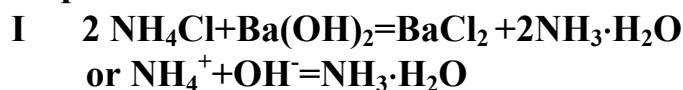
labels of solutions	A	B	C	D	E
chemical formulae					

1 pt for one correct identification

2. Equations for chemical reactions taking place in each experimental step

5 pts

Step one



Step two



5 pts for using Ba(OH)₂ and HCl or Ba(OH)₂ only

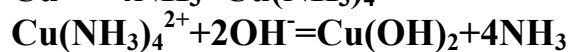
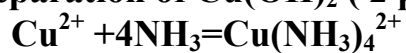
3 pts for using more than these two reagents

for one incorrect equation (-1pt)

**Results key for practical problem II
(12 pts)**

1. Equations for the main chemical reactions having taken place in the

preparation of Cu(OH)₂ (2 pts)



one pt for one correct equation

2. Mass of Cu(gly)₂·xH₂O = (g)

mass ≥ 2.6g (8 pts)

2.6 > mass ≥ 2.2 (6 pts)

2.2 > mass ≥ 1.5 (4 pts)

1.5 > mass ≥ 1.1 (2 pts)

1.0 > mass ≥ 0.5 (1 pt)

dripping (0 pt)

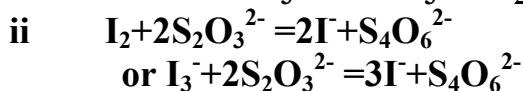
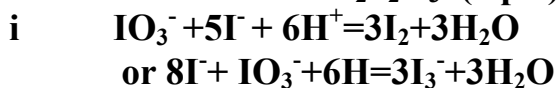
Percent yield

The expression for calculation

Results key for practical problem III (20 pts)

1. Standardization of Na₂S₂O₃ solution (10 pts)

(1) The two equations for chemical reactions taking place during the standardization of Na₂S₂O₃. (2 pts)



1 pt for one correct equation. (incorrect balance -0.5 pt)

(2) Volumes of Na₂S₂O₃ solution (4 pts)

$V_1 =$ cm^3 $V_2 =$ cm^3
 $V_3 =$ cm^3

$V(\text{mean value}) =$ cm^3

1 pt for correct significant figures

3 times of titration (1 pt)

two or one titration (0 pt)

precision $\leq 0.04 \text{ cm}^3$ (2 pts)

(maximum-minimum)

$0.04 \text{ cm}^3 < \text{precision} \leq 0.08 \text{ cm}^3$ (1 pt)

(3) Concentration of Na₂S₂O₃ mol·dm⁻³ (4 pts)

correct significant figures (1 pt)

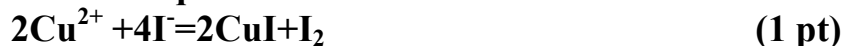
error ± 0.00015 — $\pm 0.00020 \text{ mol}\cdot\text{dm}^{-3}$ (3 pts)

± 0.00021 — $\pm 0.00025 \text{ mol}\cdot\text{dm}^{-3}$ (2 pts)

± 0.00026 — $\pm 0.00030 \text{ mol}\cdot\text{dm}^{-3}$ (1 pt)

2. Determination of Cu(II) in Cu(gly)₂·xH₂O (10 pts)

(1) Chemical equation for the reaction between Cu²⁺ and I⁻



(2) Mass of Cu(gly)₂·xH₂O = g (1 pt)

(3) Volumes of Na₂S₂O₃ (4 pts)

correct significant figures (1 pt)

3 times of titration (1 pt)

precision $\leq 0.04 \text{ cm}^3$ (2pts)

$0.04 \text{ cm}^3 < \text{precision} \leq 0.08 \text{ cm}^3$ (1pt)

(4) Mass % of Cu²⁺ in Cu(gly)₂·xH₂O = 27.66%(Theo.) (1 pt)

mass % >29% or mass % <26% (0 pt pts)

(5) Calculation of x in Cu(gly)₂·xH₂O (4 pts)

$x = 1.00$ (Theo.)

the ranges of x :

1.00±(0.00 — 0.10)	(4 pts)
1.00±(0.11 — 0.15)	(3 pts)
1.00±(0.16 — 0.20)	(2 pts)
1.00±(0.21 — 0.25)	(1 pts)