#### Mark scheme 5070/3 – Practical Test November 2001

### **Question 1** (22 marks)

(a) Temperature Readings (12 marks)

For each of the first six temperature differences: 2 marks for a value within 0.5 °C of the Supervisor's value. 1 mark for a value within 1.0 °C of the Supervisor's value. Up to two marks lost for subtraction errors.

### (b) Graph (3 marks)

1 mark for the correct plotting of all the points (tolerance one small square). Two marks for two intersecting curves or straight lines which fit the results as plotted. The first curve must pass through the origin.

(c) and (d) Temperature and Volume readings (2 marks)

One mark for the correct temperature from the graph (tolerance 0.2  $^{0}$ C). One mark for the corresponding volume (tolerance 1 cm<sup>3</sup>) from the graph

(e) Concentration of sodium hydroxide (2 marks)

Assuming a value of 27 cm<sup>3</sup>

$$conc of NaOH = \frac{27 \times 2.0}{50} \tag{1}$$

$$=$$
 1.1 (correct to 0.1) (1)

(f) Temperature change with base  $\mathbf{R}$  (2 marks)

2 marks for a value within  $0.5^{\circ}$  C of the Supervisor's value. 1 mark for a value within  $1.0^{\circ}$  C of the Supervisor's value.

(g) pH of solutions (1 mark)

Assuming that the temperature rise in (f) is less than the value given in (d) one mark for ticking pH  $\mathbf{Q} = 14$  and pH  $\mathbf{R} = 11$ .

This is marked consequentially on the candidate's results.

### Question 2 (18 marks)

T is nickel sulphate

Test	Acceptable alternatives	<b>Unacceptable alternatives</b>
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Test 1 $T + NaOH$		
2 marks		
2 marks		
green ppt	shades of green	blue
	both green and ppt	
	required.	substance, particles,
	allow solid, suspension,	deposit, residue, sediment,
+ excess NaOH	powder	gelatinous, insoluble etc
no change		partially soluble, partially
no change		insoluble
	green ppt, ppt remains etc	
T. (2 T. ) MI		
Test $2 T + NH_3$ 4 marks		
4 marks		
blue ppt		green
+ excess NH <sub>3</sub>		
ppt dissolves		
blue solution	violet	
	forms a blue solution (2)	
	solution turns blue (1)	
Test 3 $T + Ba(NO_3)_2$		
3 marks		
white ppt		See Test 1
+ HNO.		
$+HNO_3$		
insoluble	white ppt, no change,	partially soluble, partially
	does not dissolve, etc.	insoluble
	milky/cloudy = (0)	
	but milky/cloudy remains =	
	(1)	

Test 4 T + NaClO 6 marks green ppt		Green solution
ppt turns black	Black solution (1)	
effervesces	bubbles, fizzes, gas vigorously evolved	gas evolved
gas bleaches litmus	gas must be implied	
chlorine	to score chlorine mark test must be at least partially correct	
Test $5 + H_2O_2$ 5 mark		
ppt dissolves	Partially soluble	
green solution	forms a green solution (2) turns green (1)	
effervesces	bubbles, fizzes, gas vigorously evolved	gas evolved
gas relights a glowing splint oxygen	gas must be implied to score oxygen mark test must be at least partially correct	

## **Conclusion** (1 mark)

The anion is Sulphate or  $SO_4^{2-}$ 

To score  $SO_4$  <sup>2-</sup> a candidate needs a ppt that must not dissolve in Test 5.

# [Any 18 marks to score]