Syllabus 1036

Science: Chemistry

Paper 4H

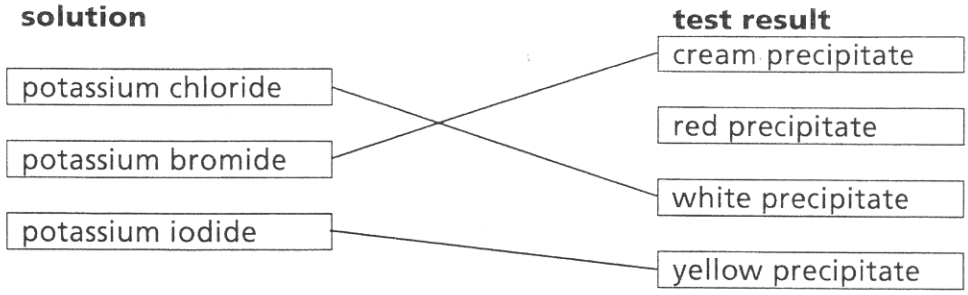
MARK SCHEME – Summer 2002

1.	(a)	(i)	scum/calcium stearate/CaSt;	1
		(ii)	hard;	1
		(iii)	add sodium carbonate/water softener/ pass through ion-exchange/boiling/distilling;	1
		(iv)	**B, C**	1
	(b)	(i)	A description and an explanation to include: 1. scum/precipitate; [Ignore no lather] 2. Ca^{2+} ions/calcium compound/it is hard; [Reject contains calcium]	2
		(ii)	A description and an explanation to include: 1. lather; 2. no Ca^{2+}/Mg^{2+} ions etc/soft water/ Li^{+} ions do not cause hardness; [Reject lithium ions causes softness/ contains Li ions]	2

Total 8 marks

2.	(a)	$AgNO_3(aq) + NaCl(aq) \longrightarrow AgCl(s) + NaNO_3(aq)$ NaCl; (s); 3 × (aq);	3
	(b)	A description to include three from: 1. mix the solutions; 2. filter the mixture; 3. wash precipitate; 4. dry precipitate; [Reject nitric acid/heating before filtering]	3

(c)



3

(d) A description to include:
1. flame test/recognisable description of flame test/ heat **in flame**;
[Reject burn]
2. lilac/mauve/purple flame; 2

Total 11 marks

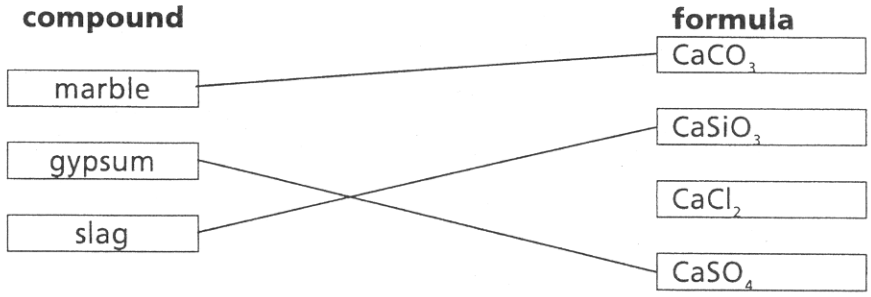
3. (a) (i) A description to include:
1. (some) solid disappears/dissolves;
2. colourless liquid; 2
[Ignore clear]

(ii) A description to include:
1. solid remains/insoluble;
2. white/cloudy liquid; 2

(b) (i) A description and an explanation to include:
1. turns blue/purple;
2. alkaline/pH > 7; 2

(ii) neutralise acidity in soils; 1

(c)



3

Total 10 marks

4. (a) $2H_2S + O_2 \longrightarrow 2H_2O + 2S$ 2
formulae;
balanced;

(b) (i) vanadium ((V)) oxide; 1

(ii) A calculation to include:
1. $SO_2 = 100\ dm^3$;
2. $O_2 = 50\ dm^3$; 2
[Allow ecf if $O_2 = SO_2 \times 0.5$]
[If incorrect units or both units missing, deduct 1 mark]

(iii) **Either** increased yield of SO_3;
plus an explanation to include:
1. fewer molecules on RHS of equation;
2. equilibrium moves towards RHS;

or faster reaction;
plus an explanation to include:
1. molecules pushed closer together;
2. more frequent collisions; 3

(iv) expensive/(possibly) hazardous to create/maintain high pressures; 1

Total 9 marks

5. (a) (i) many/gradual colour change(s); 1

(ii) phenolphthalein/(screened) methyl orange etc; 1

(b) (i) A calculation to include:

1. moles of acid = $\frac{31.5}{1000} \times 0.20$ = 0.00630;
2. moles of NaOH = 0.00630×2 = 0.0126;
3. concentration of NaOH = $\frac{0.0126}{25} \times 1000$ = 0.504 (mol dm^{-3}); 3

(ii) A calculation to include:
1. NaOH = 40;
2. (b)(i) × 40 = 20.16 (g dm^{-3}); 2

(c) (i) A description to include:
1. blue etc;
2. precipitate; 2

(ii) $Cu^{2+}(aq) + 2OH^-(aq) \longrightarrow Cu(OH)_2(s)$ 3
formulae;
balanced;
correct state symbols;

Total 12 marks

6. (a) (i) A calculation to include:

1. moles of CO_2 = $\frac{230}{24000}$ = 0.00958;
2. moles of $CaCO_3$ = 0.00958;
3. mass of $CaCO_3$ = 0.00958 × 100 = 0.958 (g); 3

(ii) A calculation to include:

1. percentage of $CaCO_3$ = $\frac{0.958}{1.00}$;
2. × 100 = 95.8; 2

[If > 100% - 1 mark max]

(iii) gas volume expanded on heating; 1

(b) (i) percentage of $CaCO_3$ = $\frac{0.915}{1.00} \times 100$ = 91.5; 1

(ii) some of the gas dissolved in water; 1

(c) A suggestion to include:
1. heat rock;
2. measure loss in mass; 2

Total 10 marks

TOTAL MARKS 60