

**O Level Combined Chemistry Structured**

**Qualitative Analysis Test 2.0**

Q1

4 Study the series of chemical reactions shown in the Fig. 4.1.

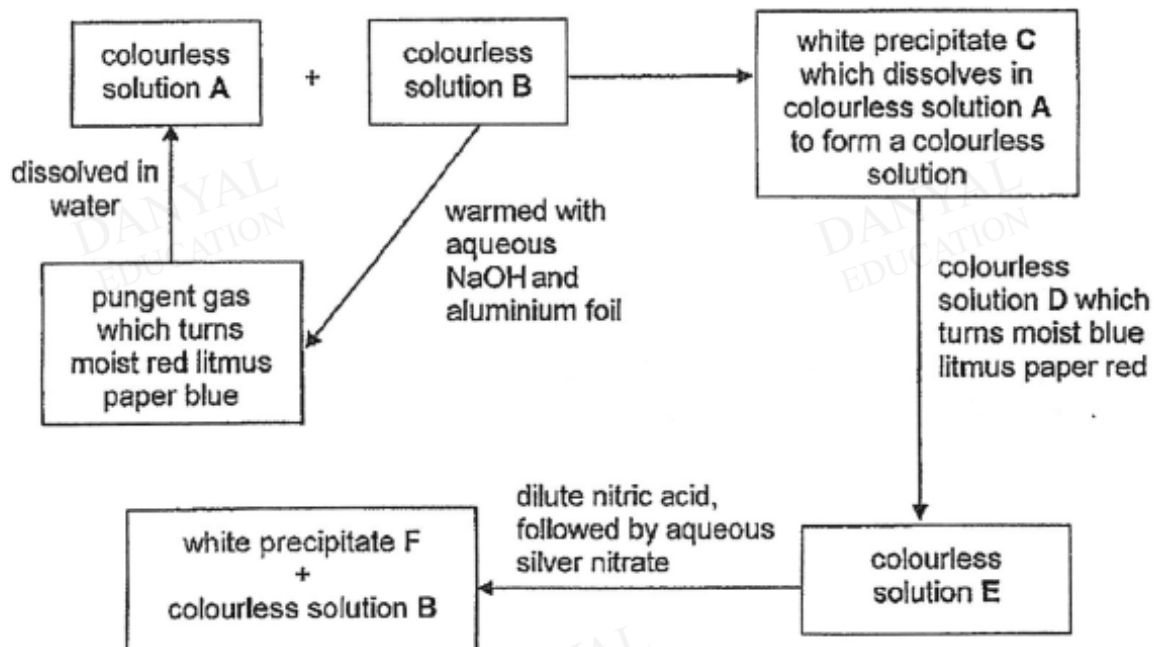


Fig. 4.1

(a) Identify substances A to E.

- A .....
- B .....
- C .....
- D .....
- E .....

[5]

(b) Write the ionic equation for the formation of white precipitate F.

.....[1]

[Total: 6]

Q2

3 A salt solution is prepared by dissolving excess iron(II) oxide in dilute sulfuric acid.

(a) Complete the table to give information about sulfuric acid. [3]

formula	approximate pH	symbol of ion that gives the acid its acidity

(b) Describe a chemical test and state the result that is used to show that the salt solution contains iron(II) ions. [2]

test .....

.....

result .....

.....

(c) Give the ionic equation, with state symbols, for the test in (b). [2]

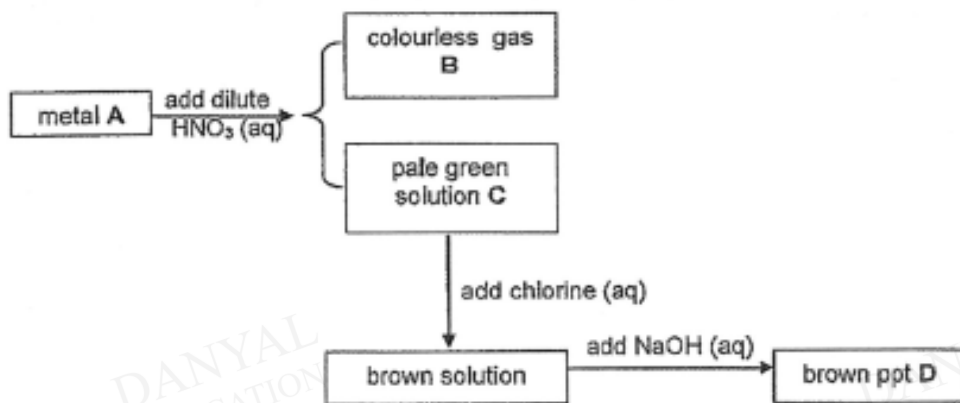
.....

DANYAL  
EDUCATION

DANYAL  
EDUCATION

Q3

9 Study the reaction scheme given in the figure below.



(a) Identify the four substances.

[4]

- A, .....
- B, .....
- C, .....
- D, .....

(b) Describe a chemical test to show the presence of nitrate ions in the brown solution.

[2]

test .....

result .....

(c) Explain, in term of electron transfer, why chlorine is said to act as an oxidising agent in one of the reactions. Include a suitable ionic equation in your answer.

[2]

.....  
.....  
.....

(d) When pieces of magnesium were added to solution C, the solution turned colourless and a grey deposit was formed.

[2]

Explain why these changes have occurred.

.....  
.....  
.....  
.....

Q4

Fig. 3.1 describes reactions involving a white solid, J.

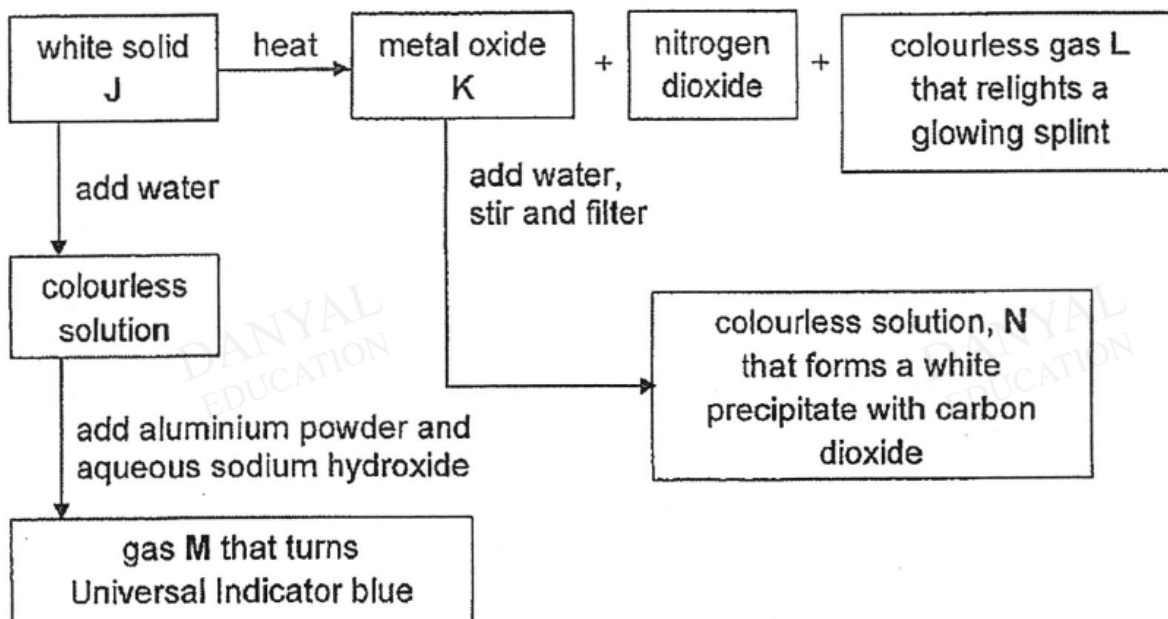


Fig. 3.1

(a) Identify substances J, K, L, M and N.

- (i) J : ..... [1]
- (ii) K : ..... [1]
- (iii) L : ..... [1]
- (iv) M : ..... [1]
- (v) N : ..... [1]

(b) Write an equation for any one of the changes described in Fig. 3.1.

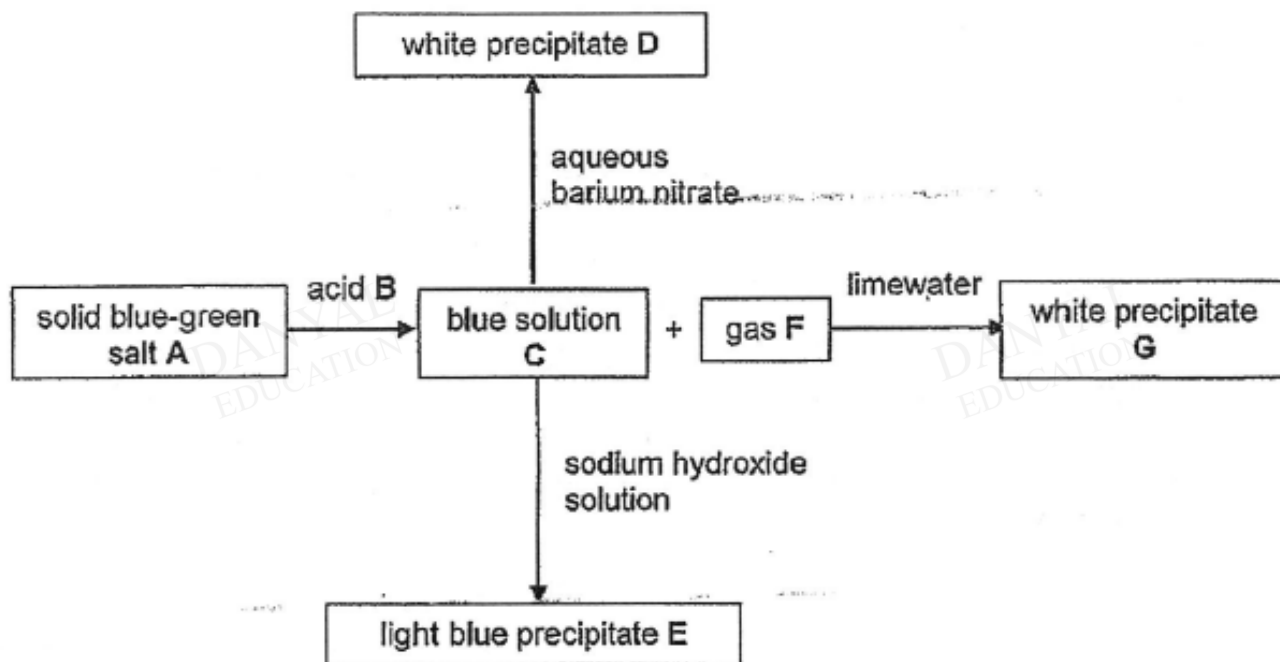
..... [2]

(c) What type of oxide is nitrogen dioxide?

..... [1]

Q5

The figure below describes reactions involving a blue-green salt, A.



(a) Name the substances A to G.

[7]

- A \_\_\_\_\_
- B \_\_\_\_\_
- C \_\_\_\_\_
- D \_\_\_\_\_
- E \_\_\_\_\_
- F \_\_\_\_\_
- G \_\_\_\_\_

(b) Write a chemical equation, with state symbols, for the reaction between A and B.

[2]

\_\_\_\_\_

**Answers**

**Qualitative Analysis Test 2.0**

Q1

(a)	A: aqueous ammonia/ ammonia/ NH <sub>3</sub> ; B: zinc nitrate/ Zn(NO <sub>3</sub> ) <sub>2</sub> ; C: zinc hydroxide/ Zn(OH) <sub>2</sub> ; D: hydrochloric acid/ HCl;	[1] each
	E: zinc chloride/ ZnCl <sub>2</sub> ; F: silver chloride/ AgCl; R: ammonium hydroxide/ ammonia hydroxide/ NH <sub>4</sub> OH	
(b)	Ag <sup>+</sup> (aq) + Cl <sup>-</sup> (aq) → AgCl(s)  A: no state symbols R: partial state symbols, wrong state symbols	[1]

Q2

(a)	H <sub>2</sub> SO <sub>4</sub> // 1 or 2 // H <sup>+</sup>	[3]
(b)	Test: add aqueous sodium hydroxide/ aqueous ammonia to the solution.  Result: green precipitate formed (insoluble in excess)	[2]
(c)	Fe <sup>2+</sup> (aq) + 2OH <sup>-</sup> (aq) → Fe(OH) <sub>2</sub> (s)  1 mark for all correct formulae 1 mark for all correct balancing and state symbols; award only when all formulae are correct.	[2]

Q3

(a)	A: Iron B: hydrogen C: iron(II) nitrate D: iron(III) hydroxide	[4]
(b)	Test: Add aluminium foil and aqueous sodium hydroxide to the brown solution and warm. [1m]  Result: Ammonia gas which turns damp red litmus paper blue will be produced. [1m] ; Allow 'ammonia gas will be produced'	[2]
(c)	Chlorine causes iron(II) ions to lose an electron each to become iron(III) ions. [1m]/ Chlorine gains electrons  $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+} + \text{e}$ [1m] $2\text{Cl}^- \rightarrow \text{Cl}_2 + 2\text{e}$ $2\text{Fe}^{2+} + \text{Cl}_2 \rightarrow 2\text{Fe}^{3+} + 2\text{Cl}^-$	[2]
(d)	Magnesium is more reactive than iron. [1m]  It displaces iron from the solution as the grey deposit and form a colourless solution of magnesium nitrate. [1m]	[2]

DANYAL  
EDUCATION

DANYAL  
EDUCATION

Q4

(a)	(i)	Calcium nitrate / $\text{Ca}(\text{NO}_3)_2$	[1]
	(ii)	Calcium oxide / $\text{CaO}$	[1]
	(iii)	Oxygen / $\text{O}_2$	[1]
	(iv)	Ammonia / $\text{NH}_3$	[1]
	(v)	Calcium hydroxide or limewater / $\text{Ca}(\text{OH})_2$	[1]
(b)	$2 \text{Ca}(\text{NO}_3)_2 \rightarrow 2 \text{CaO} + 4 \text{NO}_2 + \text{O}_2$ OR $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}(\text{OH})_2$ [1] for correct chemical formula [1] for balanced chemical equation **If state symbol is included, deduct [1] for incorrect state symbols.		[2]
(c)	Acidic oxide		

Q5

- (a)
- A copper(II) carbonate
  - B sulfuric acid
  - C copper(II) sulfate
  - D barium sulfate
  - E copper(II) hydroxide
  - F carbon dioxide
  - G calcium carbonate
- [one mark each – total 7]
- (b)  $\text{CuCO}_3 (\text{s}) + \text{H}_2\text{SO}_4 (\text{aq}) \rightarrow \text{CuSO}_4 (\text{aq}) + \text{CO}_2 (\text{g}) + \text{H}_2\text{O} (\text{l})$   
 [formula:1, state symbol:1]