Q1.		(a)	State what is meant by each of the following terms.	
		(i)	Ligand	
		(ii)	Complex ion	
		(iii)	Co-ordination number	
				(3)
	(b)	Usi C <sub>2</sub> (	ng complex ions formed by $Co^{2+}$ with ligands selected from $H_2O$ , $NH_3$ , $Cl^-$ , $O_4^{2-}$ and $EDTA^{4-}$ , give an equation for each of the following.	
		(i)	A ligand substitution reaction which occurs with no change in either the co-ordination number or in the charge on the complex ion.	
		(ii)	A ligand substitution reaction which occurs with both a change in the co-ordination number and in the charge on the complex ion.	
		(iii)	A ligand substitution reaction which occurs with no change in the co-ordination number but a change in the charge on the complex ion.	
		(iv)	A ligand substitution reaction in which there is a large change in entropy.	
				(8)

	(c)	An aqueous solution of iron(II) sulphate is a pale-green colour. When aqueous sodium hydroxide is added to this solution a green precipitate is formed. On standing in air, the green precipitate slowly turns brown.					
		(i)	Give the formula of the complex ion responsible for the pale-green colour.				
		(ii)	Give the formula of the green precipitate.				
		(iii)	Suggest an explanation for the change in the colour of the precipitate.				
			(4) (Total 15 marks)				
Q2.	(	(a)	<b>P</b> and <b>Q</b> are oxides of Period 3 elements.				
		Oxide <b>P</b> is a solid with a high melting point. It does not conduct electricity when solid but does conduct when molten or when dissolved in water. Oxide <b>P</b> reacts with water forming a solution with a high pH.					
			e <b>Q</b> is a colourless gas at room temperature. It dissolves in water to give a on with a low pH.				
		(i)	Identify <b>P</b> . State the type of bonding present in <b>P</b> and explain its electrical conductivity. Write an equation for the reaction of <b>P</b> with water.				
		(ii)	Identify <b>Q</b> . State the type of bonding present in <b>Q</b> and explain why it is a gas				

at room temperature. Write an equation for the reaction of **Q** with water.

- (b) **R** is a hydroxide of a Period 3 element. It is insoluble in water but dissolves in both aqueous sodium hydroxide and aqueous sulphuric acid.
  - (i) Give the name used to describe this behaviour of the hydroxide.
  - (ii) Write equations for the reactions occurring.
  - (iii) Suggest why **R** is insoluble in water.

(Total 15 marks)