

**Q1.** (a) State what is meant by the term *co-ordinate bond*.

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.....

(2)

(b) Define the terms *Brønsted–Lowry acid* and *Lewis acid*.

*Brønsted–Lowry acid* .....

*Lewis acid* .....

(2)

(c) State what is meant by the term *bidentate ligand*.

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(2)

(d) State how the co-ordination number of cobalt(II) ions in aqueous solution changes when an excess of chloride ions is added. Give a reason for the change.

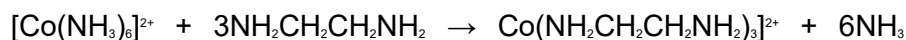
*Change in co-ordination number* .....

*Reason for change* .....

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(2)

(e) Suggest why the enthalpy change for the following reaction is close to zero.



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(2)

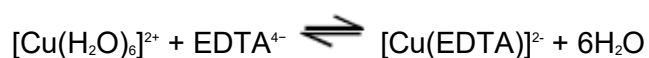
(f) Deduce the formula of the compound formed when ethane-1,2-diamine is treated

with an excess of hydrochloric acid.

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(1)  
(Total 11 marks)

**Q2.** Which one of the following statements about the reaction below is **false**?



- A**  $[\text{Cu}(\text{EDTA})]^{2-}$  is a more stable complex than  $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$
- B** Both  $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$  and  $[\text{Cu}(\text{EDTA})]^{2-}$  are octahedral complexes.
- C** There is an increase in entropy when the reaction occurs.
- D** There is a redox reaction.

(Total 1 mark)

**Q3.** Which one of the following statements is true?

- A** A blue solution containing the ion  $[\text{CoCl}_4]^{2-}$  turns pink when added to an excess of water.
- B** A purple solution is formed when chlorine is bubbled into aqueous sodium bromide.
- C** A yellow precipitate is formed when aqueous silver nitrate is added to aqueous sodium chloride.
- D** A green solution containing the ion  $[\text{CuCl}_4]^{2-}$  turns blue when added to an excess of concentrated hydrochloric acid.

(Total 1 mark)