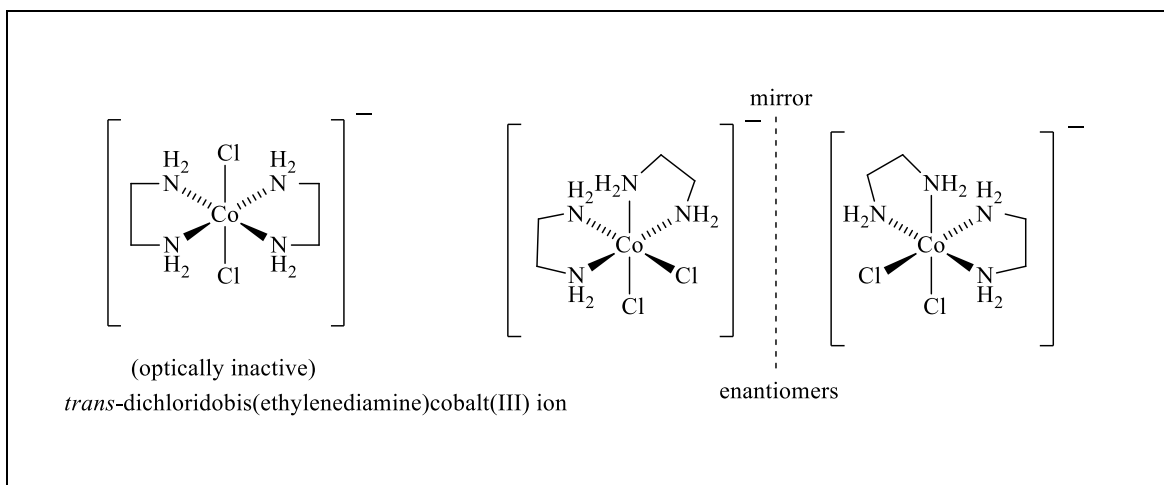


- Draw all stereoisomers of the complex ion of  $[\text{CoCl}_2(\text{en})_2]\text{Cl}$ . Label the non-optically active isomer with its systematic name.  
(en = ethylenediamine = 1,2-ethanediamine =  $\text{NH}_2\text{CH}_2\text{CH}_2\text{NH}_2$ )

Marks  
4



- What is a dative bond and does it differ from a covalent bond? Use examples from coordination chemistry and elsewhere to illustrate your answer.

2

**Dative bonds are similar to covalent bonds, but both electrons in the bond are donated by one atom.**

**They are typically found in coordination complexes where the lone pair on the ligand forms a bond with the metal ion. See the above Co(III) complexes for examples and the  $\text{BF}_3$ -ether adduct below for a different type of example. In general, dative bonds are weaker, longer and less directional than covalent bonds.**

