

In class review November 28 and 29 (Transition Metals)

Question 1

Calculate the oxidation state of the transition metal in the following coordination complexes.

Coordination complex	Oxidation state
$[\text{Co}(\text{NH}_3)_4(\text{NO}_2)_2]\text{Cl}$	
$\text{K}_2 \left[\begin{array}{c} \text{Cl} \\ \\ \text{Cu} \begin{array}{l} \nearrow \text{Cl} \\ \searrow \text{Cl} \end{array} \\ \\ \text{Cl} \end{array} \right]$	
potassium hexacyanomanganate(II)	

Question 2 What is the *lanthanide contraction*?

Question 3

Provide the systematic name for the following two coordination compounds.

$[\text{Co}(\text{en})_3]^{3+}$	$[\text{Co}(\text{NH}_3)_6]\text{Cl}_2$
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Question 4

How many valence d-electrons are there in each of the following ions?

Ion	Number of d electrons
Y^{3+}	
Cu^+	
Ru^{3+}	
Zr^0	
Fe^{2+}	

Question 5

Which of the following octahedral complexes should have the largest crystal field splitting energy? Show or explain why.

$[\text{Cr}(\text{NH}_3)_6]^{3+}$
$[\text{Cr}(\text{CN})_6]^{3-}$
$[\text{Cr}(\text{en})_6]^{3+}$ (en = ethylenediamine)
$[\text{Cr}(\text{SCN})_6]^{3-}$
$[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$

Question 6

Which of the following ligands is most likely to form a low-spin octahedral complex with iron(III)? Show or explain why.

Br^-	SCN	en	OH^-	CO
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Question 7

Which of the following ions is most likely to form colored compounds? Show or explain why.

Sc^{3+}	Cu^+	Zn^{2+}	Cr^{3+}	Ca^{2+}
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Question 8

Fill out the table by providing the following information for the two coordination complexes.

	diamminedichloroplatinum(II)	$\text{Na}_2 \left[\begin{array}{c} \text{O} \quad \text{O} \\ \diagdown \quad \diagup \\ \text{N} \\ \\ \text{Zn} \\ / \quad \backslash \\ \text{NC} \quad \text{CN} \\ \quad \quad \text{CN} \end{array} \right]$
Oxidation state		
Coordination number		
Shape		
Draw isomers indicated	The pair of possible geometric isomers	A linkage isomer of the above complex