	度硕士班	戈功 大學 招生考討	(1)	上學研究	系所	無	機化學	學	試;	題	共第	7	J
					4	•							
					:								
				•									
. How man	y spherical	(radial) noc	des does 5	s orbital h	ave?								
. How many s. Select the	y angular no better choic	odes does 3 ce and exnl	f_{xyz} orbital	have?	riefly								
(i). Higher	r ionization	energy: M	g or Al		iichy.								
	er electron a												
. Draw the	molecular s	tructure of	the follow	ing speci	ės.								
(i). SNF ₃ ((S is central	(i	ii). SeOCl4	(Se is)							
	ne point grou			ecies:			///\ 						
(1). D31431.	H ₆ (planar)	(1	ii). N ₂ H ₄				(iii). B	rF ₅					
	· · · /												
	D _{4h} charact												
. Determine	D _{4h} charact e the order o	of the group											
. Determine . Verify tha	D_{4h} characte the order of the E_g irre	of the group ducible rep	resentatio	n is ortho O stretch	gonal t	to the E	u irredu	ucible	represen	tatio	n.		
DetermineVerify thaDetermineDetermine	D_{4h} characte the order of the E_g irrect the number of the types of	of the group ducible rep er of Ramar	oresentation active C-	O stretch	ing vib	rations	for tra	ins-[Fe	e(CO) ₄ Br	٦].		2	
Determine Verify tha Determine	D_{4h} characte the order of the E_g irrect the number of the types of	of the group ducible rep er of Ramar	oresentation active C-	O stretch	ing vib	rations	for tra	ins-[Fe	e(CO) ₄ Br	٦].		T)	
Determine Verify tha Determine Determine	D_{4h} characte the order of the E_g irrect the number of the types of	of the group educible reper of Ramar of hybridiza	presentation active Cation possi	O stretch ble for a [ing vib [PtCl ₄]	rations ²⁻ comp	for <i>tra</i> lex (co	ins-[Fo onside:	e(CO) ₄ Br	٦].		ס	
Determine Verify that Determine Determine bonding o $\frac{D_{4h}}{A_{Ig}}$	D_{4h} characte the order of the E_g irrect the number of the types of	of the group ducible reper of Ramar of hybridiza $\frac{C_2}{1}$	presentation active C- ation possion $\frac{C_2'}{1}$	O stretch ble for a [ing vib [PtCl ₄] 2S ₄	orations $\frac{\sigma_{l}}{\sigma_{l}}$	for tra	ins-[Fe	e(CO) ₄ Br	٦].		5	
Determined Verify that Determined Determined bonding of $\frac{D_{4h}}{A_{Ig}}$	D_{4h} character the order of at the E_g irrest the number of the types conly). $\frac{E}{1} = \frac{2C_4}{1}$	of the group ducible reper of Ramar of hybridiza $\frac{C_2}{1}$	presentation active C-nation possion C_2	O stretch ble for a [i l	ing vib PtCl ₄] 2S ₄ I I	orations $\frac{\sigma_h}{1}$	for <i>tra</i> lex (co	$\frac{2\sigma_d}{1}$	e(CO) ₄ Br	used $\begin{bmatrix} x^2 + y \end{bmatrix}$	I in (z^2, z^2)	.	
Determine Verify that Determine Determine bonding of $\frac{D_{4h}}{A_{1g}}$ $\frac{A_{2g}}{B_{1g}}$	D_{4h} character the order of the E_g irrest the number of the types conly). $\frac{E}{1} = \frac{2C_4}{1}$ $\frac{1}{1} = \frac{1}{1}$	of the group ducible reper of Ramar of hybridiza C2 20 1 1 1	presentation active C-ation possion C_2	O stretch ble for a [i l 1	ing vib [PtCl ₄] 2S₄ I I -1	σ_{l} comp $\frac{\sigma_{l}}{l}$	for trace $\frac{2\sigma_v}{1}$	$\frac{2\sigma_d}{1}$ -1	e(CO) ₄ Br r hybrids	used $\begin{bmatrix} x^2 \\ x^2 + y \\ x^2 - y \end{bmatrix}$	I in (z^2, z^2)		
Determined Verify that Determined Determined bonding of $\frac{D_{4h}}{A_{Ig}}$ $\frac{D_{2g}}{A_{2g}}$ $\frac{B_{Ig}}{B_{2g}}$	D_{4h} character the order of the E_g irrest the number of the types of types of the types of types of the types of the types of the types of types of the types of the types of types o	of the group ducible reper of Ramar of hybridization $\frac{C_2}{1}$	presentation active C-nation possion C_2	O stretch ble for a [ing vib [PtCl ₄] 2S ₄ 1 1 -1 -1	σ_h	for traveled for $traveled for traveled for$	$\frac{2\sigma_d}{1}$ -1	e(CO) ₄ Br r hybrids	x ² +y x ² -y xy	l in c		
Determined Verify that Determined Determined bonding of D_{4h} A_{1g} A_{2g} B_{1g} B_{2g}	D_{4h} character the order of the E_g irrest the number of the types conly). $\frac{E}{1} = \frac{2C_4}{1}$ $\frac{1}{1} = \frac{1}{1}$	of the group ducible reper of Ramar of hybridization $\frac{C_2}{1}$ of $\frac{2C_2}{1}$ of $\frac{1}{1}$ o	presentation active C-ation possion C_2	O stretch ble for a [i 1 1 1 1 2	ing vib PtCl ₄] 2S ₄ 1 1 -1 -1 0	σ _h 1 1 1 1 -2	for trailex (cooler for $trailex$) lex (cooler for $trailex$) 1 -1 1 -1 0	$\frac{2\sigma_d}{1}$ -1 -1 0	e(CO) ₄ Br r hybrids	used $\begin{bmatrix} x^2 \\ x^2 + y \\ x^2 - y \end{bmatrix}$	l in c		
Determine Verify that Determine bonding of D_{4h} A_{1g} A_{2g} B_{1g} B_{2g} E_{g} A_{1u}	D_{4h} character the order of the E_g irresponds the types conly). $ \frac{E}{1} = \frac{2C_4}{1} $ $ \frac{1}{1} = \frac{1}{1} $ $ \frac{1}{2} = 0 $	of the group ducible report of Ramar of hybridization of hybridization of the following the followin	presentation active C-nation possion C_2	O stretch ble for a [ing vib PtCl ₄] 2S ₄ 1 1 -1 -1 0 -1	rations 2- comp σ _i 1 1 1 1 -2 -1	for tradelex (collection) for $\frac{2\sigma_v}{1}$ for $\frac{2\sigma_v}{1}$ for $\frac{1}{1}$ for $\frac{1}{1$	$\frac{2\sigma_d}{1}$ -1 -1 -1	Rz (Rx,Ry)	x ² +y x ² -y xy	l in c		
Determined Verify that Determined Determined bonding of D_{4h} A_{1g} A_{2g} B_{1g} B_{2g} E_{g} A_{1u} A_{2u}	D_{4h} character the order of the E_g irrest the number only). $ \frac{E}{1} = \frac{2C_4}{1} $ $ \frac{1}{1} = \frac{1}{1} $ $ \frac{1}{2} = \frac{1}{2} $ $ \frac{1}{2} = \frac{1}{1} $	of the group ducible report of Ramar of hybridization of hybridization of the following the followin	presentation active C-nation possion C_2	O stretch ble for a [i 1 1 1 2 -1 -1	ing vib PtCl ₄] 2S ₄ 1 1 -1 -1 0	σ _h 1 1 1 -2 -1	for trablex (co	$\frac{2\sigma_d}{1}$ -1 -1 1 0 -1 1	e(CO) ₄ Br r hybrids	x ² +y x ² -y xy	l in c		
Determined Verify that Determined Determined Determined bonding of D_{4h} A_{1g} A_{2g} B_{1g} B_{2g} E_{g} A_{1u} A_{2u} B_{1u}	D_{4h} charactee the order of the E_g irrelet the number only). $ \begin{array}{cccc} E & 2C_4 \\ \hline 1 & 1 \\ 1 & -1 \\ 1 & -1 \\ 2 & 0 \\ 1 & 1 \\ 1 & 1 \end{array} $	of the group ducible report of Ramar of hybridization of	presentation active C-ation possion C_2	O stretch ble for a [i 1 1 1 2 -1	ing vib PtCl ₄] 2S ₄ 1 1 -1 -1 0 -1	rations 2- comp σ _i 1 1 1 1 -2 -1	for tradelex (collection) for $\frac{2\sigma_v}{1}$ for $\frac{2\sigma_v}{1}$ for $\frac{1}{1}$ for $\frac{1}{1$	$\frac{2\sigma_d}{1}$ -1 -1 -1	Rz (Rx,Ry)	x ² +y x ² -y xy	l in c	·	

(背面仍有題目,請繼續作答)

Calculate the *emf* for $Cu(OH)_2 \rightarrow Cu$ in 1 M base. b. Calculate the ideal ratio of r_M/r_X for cation-anion and anion-anion contact for an octahedral

arrangement of anions around a cation. (Hint: the NaCl structure)

5%

國立成功大學 5 90 學年度 頁 化學研究 無機化學 試題 碩士班招生考試 2 頁 6.a. Determine the number of unpaired electrons and calculate the magnetic moment for the spin-only contribution and the LFSE for [Ru(NH₃)₆]³⁺. 6% b. For which d'' configurations would no Jahn-Teller splitting be expected for the tetrahedral case 4% (ignore possible low-spin cases)? $(n = 1 \sim 10)$ 7.a. Identify the ground-state terms with the spin multiplicity for Fe²⁺ in the following cases: 6% (i) a free ion (ii) an high-spin octahedral complex (iii) a low-spin octahedral complex b. Show the number of d-d transition bands in terms of spectrum terms for [Ni(H₂O)₆]²⁺.

Half-lives greater than 1 day

 $[Fe(CN)_6]^{4-}$

cytochrome c

8.a. Consider the half-lives (in minutes) toward substitution of the pair of complexes:

Explain the differences in half-lives in terms of the electronic structures.

9.a. Classify the following species as closo, nido, arachno or hypho structure type.

10. Predict the transition metal-containing products of the following reactions:

c. cis-Re(CH₃)(PEt₃)(CO)₄ + 13 CO \rightarrow (show all expected products, percent of each)

b. Activation volume (ΔV) for acid hydrolysis of cis-[PtCl₂(NH₃)₂] is -9.5 (at 45°C) cm³/mol.

How is the value consistent with what you know about the mechanism for square-planar

(iii) Rh₆(CO)₁₆

coenzyme B₁₂

Half-lives less than 1 minute

[Fe(H₂O)₆]³⁺

chlorophyll a

(ii) $C_4B_2H_6$

b. Which of the following enzymes contains Fe?

a. trans-Ir(CO)Cl(PPh₃)₂ + H₂ \rightarrow

b. $W(CO)_6 + C_6H_6Li \rightarrow$

substitution?

(i) $B_{10}H_{14}$

hemoglobin

4%

6%

4%

6%

4%

2%

2%

6%