

INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI Department of Chemistry CH-101 (B.Tech. 1st Semester), Quiz-2

Name: Pradnesh P. Kajkar Roll No: 190123046 Tutorial Gr: T18 Signature of Invigit	ator
Duration: 8.00 - 8.45 AM Full marks: 15 Date: 05/11/2019 (Tues day Answer all the questions and write the answers inside the box. Only fully correct answers will accepted and there will be no partial marks.	
1. The angle between the two hybridized orbitals $\Psi_{1} = 0.45\Psi_{2s} + 0.71\Psi_{2p_{y}} + 0.55\Psi_{2p_{z}}$ $\Psi_{1} = 0.45\Psi_{2s} - 0.71\Psi_{2p_{y}} + 0.55\Psi_{2p_{z}}$ is, (25 Mar	and
(Tick inside the appropriate box) $(A) 104.5^{0} \qquad ; \qquad (B) 109^{0} \qquad ; \qquad (C) 120^{0} \qquad ; \qquad (D) 180^{0}$	
2. The two hybridized orbitals of C-atom (sp ²) are $h_1 = (1/3)^{1/2} \{s - (3/2)^{1/2} p_x - (1/2)^{1/2} p_y\}$, and $h_2 = (1/3)^{1/2} p_x - (1/2)^{1/2} p_y\}$. The expression for the third orbital (h ₃) would be, (Tick inside the appropriate box)	
(A) $(1/3)^{1/2} \{s + 2^{1/2}p_y\}$ (B) $(1/3)^{1/2} \{s - (1/2)^{1/2}p_x - (3/2)^{1/2}p_y\}$	\neg
(C) $(1/3)^{1/2} \{s - 2^{1/2}p_x\}$ (D) $(1/3)^{1/2} \{s + (3/2)^{1/2}p_x + (1/2)^{1/2}p_y\}$	-
3. The respective ground state term for $[CuCl_4]^{2-}$ and $[Cu(H_2O)_6]^{2+}$ are (2.5 Mark	s)
(Tick inside the appropriate box)	
(A) 2E and $^2T_{2g}$; (B) 2E_g and 5T_2 ; (C) 2T_2 and 2E_g ; (D) 5T_2 and 5E_g	
4. Which of the following has the correct order with the complexes arranged in the increasing order of their CO stretching frequencies. (2.5 Marks)	
(Tick inside the appropriate box)	
(A) $Ti(CO)_6^{2-} < V(CO)_6^{-} < Cr(CO)_6 < Mr(CO)_6^{+} $ and $Fe(CO)_4^{2-} < Co(CO)_4^{-} < Ni(CO)_4$	
(b) $VIII(CO)_6 < CI(CO)_6 < V(CO)_6 < TI(CO)_2$ and $Fe(CO)_2 < Co(CO)_5 < TI(CO)_6$	
(C) $V(CO)_6 < T_1(CO)_6 < C_1(CO)_6 < M_1(CO)_6 + and Fe(CO)_6 < C_1(CO)_7 < N_1(CO)_7 < N_2(CO)_7 < N_2(CO)_7$	
(D) $Ti(CO)_6^2 < V(CO)_6^- < Cr(CO)_6 < Mn(CO)_6^+ \text{ and } Fe(CO)_4^2 < Ni(CO)_4 < Co(CO)_4^-$	

