東海大學 104 學年度碩士班招生考試試題

應考系組: 化學化學、化學化生 科目代碼: 22011

考試科目:普通化學

考試日期:104年	-03月8日 第	5 1 節	使用計算機:可	共	÷3頁,第1页
I. Choose the most	appropriate an	swer (60%; 3%	for each one)		
1. Which of the fo	ollowing comp	ounds is a strong	electrolyte?		
A) H ₂ O	(T)) O ₂	C) H ₂ SO ₄	D) $C_6H_{12}O_6$	
2. The SI prefixes	milli and mega	a represent, resp	ectively:		
	100	175 and 175 an	C) 10^3 and 10^{-1}	6. D) 10^{-3} and	10 ⁹ .
3. Based on the so	lubility rules,	which one of the	following compour	nds should be insolubl	e in water?
A) NaCl	В) MgBr ₂	C) FeCl ₂	D) AgBr	
A) 12 pro C) 12 pro	otons and 10 electons and 13 electons and 13 electons	ectrons. E	3) 24 and 12, respecti 3) 24 protons and 26 3) 12 protons and 14 3) rmed by calcium ion C) Ca ₂ NO ₃	electrons.	•
6. The correct nam	ne for NH ₄ NO ₃	is			
A) ammoniu	ım nitrate.	В) ammonium nitroge	en trioxide.	
C) ammonia	nitrogen oxide	e. D)	hydrogen nitrogen	oxide.	20
coefficients. Do	n't forget to co	200-200	of one. The sum of t	he coefficients is D) 13.	l together the
8. Which of the fol	llowing is the b	est reducing age	ent?	¥ *	
$Cl_2 + 2e$	$\rightarrow 2C1^{-}$	E°	= 1.36 V		
$Mg^{2+} + 2e^- \rightarrow Mg$			=-2.37 V	(4)	
$2H^{+} + 2$	$2e^- \rightarrow H_2$	E°	= 0.00 V		
A) Cl ₂	B) H ₂	C)]	Mg	D) Mg^{2+}	

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9. Identify the oxidizing agent in the following	ng chemical reaction	n.					
$2MnO_4^- + 5H_2SO_3 \rightarrow$	$2Mn^{2+} + 5SO_4^{2-}$	$+4H^{+}+3H_{2}O$					
A) MnO_4 B) H_2SO_3	C) Mn ²⁺	D) SO ₄ ²⁻					
10. Which of the following is an example of a							
A) $2C_2H_6(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)$		$1) + Cl2(g) \rightarrow 2KCl(aq)$	00				
C) $2H_2O_2(aq) \rightarrow 2H_2O(1) + O_2(g)$	D) CaBr ₂ (ac	$q) + H_2SO_4(aq) \rightarrow CaS$	$SO_4(s) + 2HBr(g)$				
11. Define the following term: endothermic pr	ocess.						
A) The study of heat change in chem	ical reactions						
B) The process of transferring therm	The process of transferring thermal energy from a system to the surroundings.						
C) The process of transferring therm	The process of transferring thermal energy from the surroundings to a system.						
D) The transfer of thermal energy be	tween two bodies th	nat are at different tem	peratures.				
12. Which of the following represents a <i>precip</i>	nitation reaction?						
A) $2H_2(g) + O_2(g) \rightarrow 2H_2O(1)$		$) + Cl_2(g) \rightarrow 2KCl(aq)$) + Br ₂ (1)				
C) $2KNO_3(s) \rightarrow 2KNO_2(s) + O_2(g)$, , ,	D) CaBr ₂ (aq) + H ₂ SO ₄ (aq) \rightarrow CaSO ₄ (s) + 2HBr(g)					
0)211103(0) , 211102(0) 02(8)		1)2	(8)				
13. Give the values of the quantum numbers as	ssociated with the 5	d subshell.					
A) $n=5, l=0, m_l=0$	B) $n = 5, l = 1$	B) $n = 5$, $l = 1$, $m_l = -1$, 0, 1					
C) $n=5, l=2, m_l=-2, -1, 0, 1, 2$	D) $n = 5, l = $	$=3, m_l=-3, -2, -1, 0$, 1, 2, 3				
14. O ²⁻ is isoelectronic with							
	C) CI	D) Ar					
2)22	,, 0.						
15. Which of the following compounds contain	ns a lone pair of elec	ctrons?					
A) BH_3 B) NH_3	C) CH ₄	D) AlH ₃					
16 Consideration and A(D)	A		. dimention?				
16. Consider the process $A(l) \iff A(s)$.			i direction?				
A) neither B) More information is no	eded. C) to the rig	gnt D) to the left					
17. How many electrons are transferred in the	following reaction?	!					
$2Cr_2O_7^{2-} + 14H^+ + 6Cl^- \rightarrow 2$	$2Cr^{3+} + 3Cl_2 + 7H_2C$)					
A) 2 B) 4	C) 6	D) 8					
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考試科目:普通化學 應考系組: 化學化學、化學化生 科目代碼:22011 考試日期:104年03月8日第1節 共3頁,第3頁 使用計算機:可 18. From the following list of observations, choose the one that most clearly supports the conclusion that electrons have wave properties. A) the emission spectrum of hydrogen B) the photoelectric effect C) the scattering of alpha particles by metal foil D) diffraction 19. Atoms having greatly differing electronegativities are expected to form A) ionic bonds. B) polar covalent bonds C) nonpolar covalent bonds. D) no bonds. 20. What is the hybridization of the central atom in ICl₅? D) d^2sp^3 A) sp^2 $B) sp^3$ C) dsp^3 II. For the reaction in which A and B react to form C, the following initial rate data were obtained. $[A]_0$ $[B]_0$ Initial Rate of Formation of (mol/L) (mol/L) \mathbf{C} $(mol/L \cdot s)$ 0.200 0.200 2.80 0.200 0.700 0.100 0.400 0.100 1.40 What is the rate law for the reaction? Rate = (10%)III. How many milliliters of 12.4 M HNO₃ are needed to prepare 360.6 mL of 0.20 M HNO₃? (10%)IV. Consider the following reaction: $2 \operatorname{CH}_4(g) \rightleftharpoons \operatorname{C}_2 \operatorname{H}_2(g) + 3 \operatorname{H}_2(g)$ A reaction mixture at 1700 °C initially contains [CH₄] = 0.115 M. At equilibrium, the mixture contains $[C_2H_2] = 0.035$ M. What is the value of the equilibrium constant? (10%)V. Gold can be plated out of a solution containing Au³⁺ according to the half-reaction: $Au^{3+}(aq) + 3e^{-} \longrightarrow Au(s)$ (1 mol = 96485 C; Au = 196.97 g/mol)

(10%)

What mass of gold (in grams) is plated by a 25-minute flow of 5.5 A current?