編號: 96	國立成功大	大學 103 學年	度碩士班招生考試試題		共6頁,第1頁
系所組別:材料科學	學及工程學系				
考試科目:普通化學	字		·		考試日期:0222,節次:2
※考生請注意:本	試題不可使用	計算機。	请於答案卷(卡)作答,於太	本試題紙上作	乍答者,不予計分。
普通化學共 50 題選	擇題,每題答	對得2分,	答錯倒扣 0.5 分;满分 10	10分,倒扣	至0分為止。
1. The"rule of eight"	tells us the info	rmation rega	rding to		
Aatomic weight c	of isotopes (B)	electronic str	ucture of ions $\mathbb O$ ionic bo	onding energ	y Dionic radius
2. According to the N	Aolecular Orbita	al Theory, wh	ich of the following staten	nent is correc	ct?
Athe antibonding	s electrons are i	n higher enei	gy level than the bonding	electrons	
Bthe antibonding	s electrons are i	n lower ener	gy level than the bonding e	electrons	
©the antibonding	; and bonding e	lectrons are o	of the same energy level		
Dthe Molecular C	Orbital Theory d	loes not tell t	he energy difference for e	lectrons.	
3. The HNO ₃ (in wate	er) can be called	i :		<u> </u>	
Ahydrogen nitrat	e ®hydroge	en nitroxide	©hydrogen notro-trioxi	de Dnitr	ic acid
4. A student has set	up an experime	ntal vessel to	investigate the reaction o	of zinc with n	itric acid and acetic
acid. Within the sa	me period of re	eaction time	and the same concentration	on of both ac	ids in separate vessel,
which of the follow	wing statement	s may be the	correct observation?		
(A)acetic acid prod	luce more volur	me of hydrog	en		
Bacetic acid prod	luce the same v	olume of hyc	lrogen as nitric acid		
Othe reaction do	es not produce	hydrogen ga:	5		
Unitric acid prodi	ice more volum	ne of hydroge	en gas		
5 The bailing point (of water under "	1 atmosphore	processo is 100°C Which	of the follow	ving may exhibit
boiling point lowe	r than 100°C2	1 atmosphere	e pressure is 100 C. which	of the follow	ang may exhibit
Alcohol in wate	r colution Bcu	gar in water	solution Ocoffee in wate	r solution (D	milk in water solution
		igai ili watei		1 Solution @	
6. The atomic volum	e of a vacancy i	in an FCC crys	tal with the lattice consta	nt of 0.4 nm	is
A0.8 B1.2	©1.6	$(D)^2 \cdot 2 \times 10^{-1}$	29 m ³ .		
	91.0	92.2 × 10			
7. The lattice consta	nt of a diamond	d crystal with	atomic density of 4.0 x 10	²² atoms/cm ³	is
A0.50 B0.53	3 ©0.58	D0.62 nm			
	000	<u> </u>	-		
8. Ge is a diamond la	attice with atom	nic densitv of	4.42 x 10 ²² atoms/cm ³ . The	e height of a	monolayer for Ge is
A0.12 B0.1	l4 ©0.16	D 0.28 nr	n.	-	-
	-	-			
9. $(dT/dV)_{s} = A - (dP)$	/dS)v	′dP)v © (di	P/dS) _V \textcircled{D} (dS/dP) _v , wher	e d: partial d	erivative, T:
temperature, V: v	olume, P: press	ure, and S: ei	ntropy.		
	• •				
		(背面仍有	題目,請繼續作答)		

 新州祖則: 材料科學及工程學系 考試得里: 普通仁學 (22、年末:2 ※ 考生講注意: 本試題不可使用計算機。 請於答案卷(卡)作答,於不試題紙上作答者,不子計分。 10. Which of the following is a compound? @sugar solution @alpha iron @Vitamin C @stainless steel 11. Addition of a strong acid a solution in which Ag[*], AgCl, Ag(NH3)[*], ammonia and CI are at equilibrium will cause: @more AgCl dissolve @some AgCl precipitate from solution ©more Ag(NH3)[*] form @the concentrations of Ag[*], Ag(NH3)[*] and CI increase 12. Calculate the mole fraction of CCl₄ (MM = 154 g/mol) in a solution prepared by dissolving 32 g of CCl₄ in 75 g of C₆H₆ (MM = 78 g/mol). @0.18 @0.22 @0.30 @0.46 13. Ammonium chloride is used as an electrolyte in dry cells. Which of the following statements about a 0.10 M solution of NH₆Cl is correct? @The solution is neutral. ©The solution is takic. @The solution is acidic. @The values for K₄ and K₆ for the species in solution must be known before a prediction can be made. 14. A pH buffer is best described as a solution containing: @a weak acid. @a mixture of a weak acid and a strong acid. @a mixture of a weak acid and the salt of a weak acid. 15. Which of the following statements is TRUE? @An exothermic process util always be spontaneous. @An exothermic process that is accompanied by an increase will always be spontaneous. @An exothermic process that is accompanied by an increase in the entropy of the system will always be spontaneous. 16. The Nobel Prize in Chemistry this year (2012) was awarded to R. J. Lefkowitz and B. K. Kobilka for: @studies of G-protein-coupled receptors @the discovery of quasicrystals 	編號: 96 國立成功大學 103 學年度碩士班招生考試試題	共 6 頁, 第 2 頁				
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Bthe discovery of quasicrystals	Astudies of G-protein-coupled receptors					
	Bthe discovery of guasicrystals					
©palladium-catalyzed cross couplings in organic synthesis						
Destudies of the structure and function of the ribosome.	Destudies of the structure and function of the ribosome.					

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編號: 96 國立成功大學1	03 學年度碩士班招生考試試題 共 6 頁, 第 3 頁			
系所組別:材料科學及工程學系				
考試科目:普通化學	考試日期:0222,節次:2			
※考生請注意:本試題不可使用計算机	幾。 請於答案卷(卡)作答,於本試題紙上作答者,不予計分。			
17. Fullerene (C60) was identified in 1985	. Their research works were quickly extended to the alternatives of			
the carbon nanotube and the graphen	e. What is the common in fullerene, carbon nanotube, and			
graphene?				
(Asp ² carbons (B)twisted sp ² carbo	ns Csp ³ carbons Dtwisted sp ³ carbons			
18. AgNO ₃ can NOT be used as:				
Aantibacterial agent Bphotograph	ic emulsion ©chlorine ion indicator Dreduction agent			
19. What description about Lewis acid/ba	se is correct?			
(A)a Lewis acid: a substance that dona	tes an electron pair			
(B)a Lewis base: a substance that has a	a vacant valence orbital and can thus accept an electron pair			
©a Lewis acid/base definition is noth	ing to do with protons			
Da Lewis acid is not an electrophile				
20 Mikish description shout much				
20. Which description about m.p., b.p. an	a r.p. is correct?			
Ar.p. stands for fire point	Divolatile solvent has high m.p.			
volatile solvent has low t.p.	widw b.p. solvent is more expensive			
21. For the solid state				
Aceramic and glass are examples of a	amorphous solid.			
Ball kinds of amorphous solid can be	annealed into crystalline solid.			
©the amorphous solid is less stable t	han crystalline solid.			
Damorphous solid is less brittle than crystalline solid.				
22. For the heat capacity,				
(A) it changes with sample weight.				
Bit changes with heating rate.				
©it changes with the occurrence of n	nelting.			
Dthe heat capacity of the amorphou	s solid is conventionally higher than that of crystalline solid.			
23. Which of the following bonding equal	ly shared the pair of bonding electrons?			
ANonpolar covalent bonding.	Blonic bonding.			
©Hydrogen bonding.	DThe bonding between charged atoms.			

(背面仍有題目,請繼續作答)

編勁	虎: 96	國立成功大	:學 103 學年	度碩士班招	生考試	武題	共 6 頁, 第 4 頁
系所組別:材料科學及工程學系							
考詞	试科目:普通化學	短, 子					考試日期:0222,節次:2
*	考生請注意:本	試題不可使用計	│算機。 言	青於答案卷(卡)作答	,於本試題	紙上作答者,不予計分。
24.	Considering the e	electron affinity,	it is known t	that			
	A adding an electron	tron to the oxyg	en atom is fa	avored as a r	esult of l	high affinity.	
	Bthe oxygen ato	om become less s	stable by acc	quiring an el	ectron.		
	\mathbb{C} the chlorine at	om intends to lo	se an electr	on.			
	D the energy bar	ndgap between g	ground state	and excited	state is t	he origin.	
25.	Considering the i	onization energy	Ι,				
	Ait increases gra	adually across th	e period of t	ransition ele	ements.		
	${}^{\textcircled{B}}$ it decreases gr	adually across th	ne period of	inner transit	tion elem	ents.	
	${\mathbb C}$ a higher value	means that an e	lectron is ea	isier to be re	moved.		
	$\textcircled{\sc D}$ it is related to	the relaxation of	f an electron	from excite	ed state t	o ground sta	te.
26.	Which form of el	ectromagnetic ra	adiation has	the longest	wavelen	gth?	
	Agamma rays	B microw	aves	\mathbb{C} radio wav	/es	Dx-rays	
27.	For a reaction fo	r which the activ	ation energi	es of the for	ward and	d reverse dir	ections are equal in value,
	(A) the stoichiom	etry is the mecha	anism (B) ∆H=0	C	∆S=0	Dthe order is 0
			.				
28.	When a fluorine	atom forms the	fluoride ion,	it has the sa	ame char	ge as the	ion.
	Asulfite	Bnitrite	Cammon	ium	Uphosp	hate	
20	The earborate a	fuubich alkali ma	tolic used in		ofmonio	doproceivo	illnors?
29.		Du:		mc	or manic	uepressive	1111622 :
	Aina	BLI	C K	DCS			
20							
30.	Which one of the	- following vitam	in ic water a	alubla			
	Which one of the	e following vitam	in is water s	oluble?			
	Which one of the AD	e following vitam BE	in is water s ©A	oluble? DB			
21	A fuel cell use He	e following vitam BE (g) as the fuel ar	in is waters $\mathbb{C}A$	oluble? DB	N/hat is t	half cell r	eaction at cathode?
31.	A fuel cell use H	e following vitam	in is waters $\bigcirc A$ $nd O_2(g)$ as the set of $H^+ + 2e^{-1}$	soluble?	What is ti → Ha	ne half cell r	eaction at cathode? $T + 4e^{-} \rightarrow 4OH^{-}$
31.	Which one of the \bigcirc D A fuel cell use H ₂ \bigcirc 2H ₂ + O ₂ = 2H ₂	e following vitam BE $\underbrace{(g)}_{2}$ as the fuel ar $\underbrace{(g)}_{2} 2$	nin is water s ©A nd O₂(g) as th H ⁺ +2e ⁻	oluble? DB he oxidant. \ ©2H ⁺ + 2e ⁻	What is the \rightarrow H ₂	ne half cell r $\mathbb{D}O_2$ +2H ₂ 0	eaction at cathode? $D + 4e^- \rightarrow 4OH^-$.
31.	Which one of the \bigcirc D A fuel cell use H ₂ \bigcirc 2H ₂ + O ₂ = 2H ₂ Is H ₂ (g) canable of	e following vitam	in is waters $\bigcirc A$ and $O_2(g)$ as the $H^+ + 2e^-$ $a_0)^2$	oluble? DB he oxidant. \ ©2H⁺ + 2e ⁻	What is ti → H₂	the half cell r $(DO_2 + 2H_2)$	eaction at cathode? $O + 4e^- \rightarrow 4OH^-$.
31. 32.	Which one of the $\widehat{A}D$ A fuel cell use H_2 $\widehat{A}2H_2 + O_2 = 2H_2$ Is $H_2(g)$ capable of $\widehat{A}ves$	e following vitam BE $\underbrace{(g)}_{2}$ as the fuel ar $\underbrace{(g)}_{2}$ $\textcircled{BH}_{2} \rightarrow 2$ $\underbrace{(g)}_{2}$ $\underbrace{(g)}_{2}$ $\underbrace{(g)}_{2}$ $\underbrace{(g)}_{2}$	nin is waters ©A nd O2(g) as ti H ⁺ +2e ⁻ nq)? ©both	ioluble? DB he oxidant. \ C2H ⁺ + 2e ⁻	What is the the of the set of th	ne half cell r DO ₂ +2H ₂ 0 above.	eaction at cathode? D + 4e⁻ → 4OH⁻.
31. 32.	Which one of the A D A fuel cell use H ₂ A 2H ₂ + O ₂ = 2H ₂ Is H ₂ (g) capable of Ayes	e following vitam BE $(g) as the fuel ar _2O \textcircled{B}H_2 \rightarrow 2of reducing Ag+(aB$ no	nin is water s ©A nd O₂(g) as ti H ⁺ +2e ⁻ aq)? ©both	ioluble? DB he oxidant. \ C2H ⁺ + 2e ⁻ Dnor	What is the \rightarrow H ₂	ne half cell r DO2 +2H20 above.	eaction at cathode? D + 4e ⁻ → 4OH ⁻ .
31.	Which one of the A D A fuel cell use H ₂ A fuel cell use H ₂ A 2H ₂ + O ₂ = 2H ₃ Is H ₂ (g) capable of Ayes What mass of by	e following vitam (g) as the fuel ar (g) as the fuel ar (g) $BH_2 \rightarrow 2$ of reducing Ag ⁺ (a (a) (a) (a) (b) (c) (c) (c) (c) (c) (c) (c) (c	nin is water s ©A nd O₂(g) as th H ⁺ +2e ⁻ nq)? ©both roduced in P	oluble? DB he oxidant. \ ©2H ⁺ + 2e ⁻ Dnor HCl solution	What is the \rightarrow H ₂ the of the if 15A of	ne half cell r DO2 +2H20 above.	eaction at cathode? $D + 4e^- \rightarrow 4OH^-$.
31. 32. 33.	Which one of the \bigcirc D A fuel cell use H ₂ \bigcirc 2H ₂ + O ₂ = 2H ₂ . Is H ₂ (g) capable o \bigcirc yes . What mass of hy \bigcirc 36.5 g	e following vitam BE (g) as the fuel ar O BH ₂ → 2 of reducing Ag ⁺ (a Bno vdrogen can be p B18.3 g	in is water s ©A nd O₂(g) as th H ⁺ +2e ⁻ aq)? ©both roduced in H ©0 56 g	soluble? DB he oxidant. \ C2H ⁺ + 2e ⁻ Dnor HCI solution Dn 2	What is the \rightarrow H ₂ the of the if 15A of 28g.	ne half cell r DO ₂ +2H ₂ above. current is pa	eaction at cathode? $D + 4e^- \rightarrow 4OH^-$. assed for 1.0 h?
31. 32. 33.	Which one of the A D A fuel cell use H ₂ A 2H ₂ + O ₂ = 2H ₂ Is H ₂ (g) capable of Ayes What mass of hy A36.5 g	e following vitam BE (g) as the fuel ar Q BH ₂ → 2 of reducing Ag ⁺ (a Bno vdrogen can be p B18.3 g	in is water s ©A nd O ₂ (g) as th H ⁺ +2e ⁻ aq)? ©both roduced in H ©0.56 g	ioluble? DB he oxidant. \ C2H ⁺ + 2e ⁻ Dnor HCI solution D0.2	What is the \rightarrow H ₂ the of the if 15A of 28g.	ne half cell r DO2 +2H20 above. current is pa	eaction at cathode? $D + 4e^{-} \rightarrow 4OH^{-}$. assed for 1.0 h?

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*	考生請注意:本語	試題不可使用計算	章機。 請於答	案卷(卡)	作答,於本試題紙上作	F答者,不予計分。
34.	Which element ha	as the following el	ectron configura	tion: 1s ² 2	2s ² 2p ⁶ 3s ² 3p ⁴ ?	
	(A)O	BP	©s	۵Se.		
35.	For a certain reac	tion process, the a	ctivation energy	is greate	r for the forward reacti	on than for the
	reverse reaction.	The Gibbs free en	ergy change for t	his forwa	ard reaction is	
	(A)negative	Bpositive	©zero	Dnone	of the above.	
36.	Which of the follo	wing metals has t	he lowest meltir	g point?		
	Atungsten	®iron	\mathbb{C} copper	Dtin.		
37.	The addition of no	onvolatile solute ir	nto water will no	rmally ca	use the freezing point	
	(A)to increase	Bto decrease	©to remain the	e same	Dnone of the above.	
38.	Which element h	as the highest elec	tronegativity?			
	(A)F	(B)Cl	©Вг	DI.		
				.		
39.	Which is the most	t abundant eleme	nt (mass percent	in huma () Doubt	an body?	
	Acarbon	Bhydrogen	Coxygen	Unit	rogen.	
10	Identify the reduc	ing agant in the f	llowing reaction	-1000 Cm^{2+1}	$1 + 7n/c \rightarrow Cu/c + 7n^{+}$	20)
40.	$(\Delta C_{1})^{2+}$	(Danie)			$() + 2n(s) \rightarrow Cu(s) + 2n(s)$	aq)
	Acu (aq)	(D)ZN(S)	©cu(s)	۳	i (ay).	
41	When the isoelec	tronic species. K ⁺ .	Ca ²⁺ , and CL, are	e arrange	d in order of increasing	radius, what is the
	correct order?	() () () () () () () () () () () () () (2 411 411 80		, .
	(A)K ⁺ , Ca ²⁺ , Cl ⁻	[®] K⁺, Cl⁻, Ca²⁺	©Cl⁻, Ca²+,	K⁺ D	Ca ²⁺ , K ⁺ , Cl [−]	
42.	When ionic hydrid	des react with wat	er, the products	are		
	\triangle acidic solutions	s and hydrogen ga	s ®a	acidic solu	utions and oxygen gas	
	${\mathbb C}$ basic solutions	and hydrogen gas	. DI	basic solu	tions and oxygen gas.	
43.	How many moles	of Na ⁺ ions are in	20 mL of 0.40 M	I Na₃PO₄?)	
	(A)0.0080	B 0.024	©0.050		D 0.20	
44	. Which solid react	s with dilute hydro	ochloric acid at 2	25 °C to p	roduce a gas that is mo	re dense than air?
	(A)Zn	®Pb(NO3)₂	©NaBr		DNaHCO₃	
45	. The molar mass o	of a gas with a den	sity of 5.8 g·L ^{-1} a	nt 25 °C ai	nd 740 mm Hg is closes	t to
	(À10 g·mol ^{−1}	B20 g·mol ^{−1}	©150 g·n	nol ⁻¹	D 190 g·mol ^{−1}	
	(背面仍有題目,請繼續作答)					

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編號: 96	國立成功大學 103 學年	度碩士班招生考試試題	共 6 頁, 第 6 頁
系所組別:材料科學及	工程學系		
考試科目:普通化學			考試日期:0222,節次:2
※ 考生請注意:本試題	夏不可使用計算機。 訪	青於答案卷(卡)作答,於Z	本試題紙上作答者,不予計分。
46. In what form would y	ou expect glycine (H ₂ NCl	H ₂ COOH) to exist in basic s	solution?
(A)H ₂ NCH ₂ COO ⁻	[®] H₂NCH₂COOH	©H₃NCH₂COOH⁺	$\textcircled{D}H_2NCH_2COOH^+$
47. What are the charact	eristic bond angles about	t the carbon-carbon triple	bond in an alkyne?
(A)60°	B 120°	©180°	Dcannot determine.
48. Give the number of a	l electrons associated wit	th the central metal in [V(I	$NH_3)_3Cl_3$ complex.
(A)1	(B)2	©4	D 3.
10. Des dist und stand and	(:
49. Predict what predom	mantly properties will be	e exhibited by the $Cu_2 O$ ox	
Aneutral	Bcannot determine		Wbasic.
EQ. Complete and helen	o the following equation	· · · · · · · · · · · · · · · · · · ·	
		$(\bigcirc 2C \cup (a) + 2O_2 (g) \rightarrow (a) \rightarrow (a) + (a) \rightarrow (a) + (a) \rightarrow (a) + (a) \rightarrow (a)$	
$(A) 2 CuO(s) + SO_2(g)$	(b) $CuO(s) + SO_2(g)$	$\bigcirc 2Cu (s) + 3O_4 (g)$	\square Cu (s) + SO ₄ (g)
