

淡江大學 108 學年度碩士班招生考試試題

系別：化學學系

科目：普通化學

5-1

考試日期：3 月 10 日(星期日) 第 2 節

本試題共 10 大題，2 頁

本試題雙面印刷

[可以用計算機]

- How many significant figures does each value have? (Each 2%)
(a) 1.611 g (b) 1.60 g (c) 0.001611 kg (d) 5×10^2
- (a) An isotope of cobalt (Co, $Z = 27$) is used in radiation therapy for cancer. This isotope has 33 neutrons in its nucleus. What is its nuclear symbol? (4%)
(b) Bromine has two naturally occurring isotopes: Br-79 (78.92 amu) and Br-81 (80.92 amu). What is the abundance of the heavier isotope? (8%)
- Acetylsalicylic acid, $C_9H_8O_4$, is the active ingredient of aspirin. (Avogadro's number is 6.022×10^{23})
How many molecules of $C_9H_8O_4$ are there in 12.00 g of acetylsalicylic acid? (5%)
How many carbon atoms? (5%)
- Predict the formula of the ionic compound:
(a) formed by barium with iodine. (2%)
(b) containing a transition metal with a 1+ charge in period 4 and Group 11 and oxide ions. (3%)
Name the following ionic compounds:
(c) CaS (2%)
(d) $FeCl_2$ (3%)
- (a) Write a net ionic equation for each of the following reactions in dilute water solution.
Hypochlorous acid (HClO) and calcium hydroxide. (5%)
(b) Balance the following redox reactions.
 $Fe^{2+}(aq) + NO_3^-(aq) \rightarrow Fe^{3+}(aq) + NO(g)$ (basic solution) (5%)
- A sealed 15.0-L steel tank is used to deliver propane (C_3H_8) gas. It is filled with 24.6 g of propane at $27^\circ C$. The pressure gauge registers 0.915 atm. (Assume that the expansion of steel from an increase in temperature is negligible.)
(a) If the tank is heated to $58^\circ C$, what is the pressure of propane in the tank? (5%)
(b) The tank is fitted with a valve to open and release propane to maintain the pressure at 1.200 atm. Will heating the tank to $58^\circ C$ release propane? (5%)
- (a) What is the capacity for electrons of an s sublevel? A p sublevel? A d sublevel? An f sublevel? (4%)
(b) Using only the periodic table, arrange each of the following sets of atoms and ions in order of increasing size. Mg, Al, Ca (6%)
- (a) Draw Lewis structures of the hypochlorite ion, OCl^- . (5%)
(b) Give the hybridization of carbon in CH_3Cl . (5%)
- (a) Given $2H_2(g) + O_2(g) \rightarrow 2H_2O(l)$, $\Delta H = -571.6 \text{ kJ}$, calculate ΔH for the equation
 $H_2O(l) \rightarrow H_2(g) + 1/2 O_2(g)$ (5%)
(b) Predict whether ΔS is positive or negative for each of the following processes: taking dry ice from a freezer where its temperature is $-80^\circ C$ and allowing it to warm to room temperature. (5%)

淡江大學 108 學年度碩士班招生考試試題

系列：化學學系

科目：普通化學

25-2

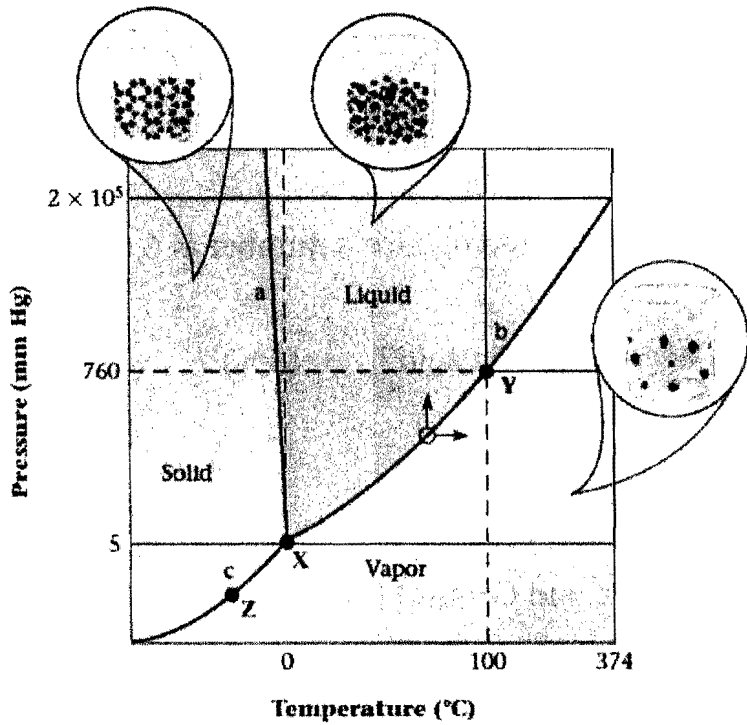
考試日期：3月10日(星期日) 第2節

本試題共10大題，2頁

10. Consider a sample of H₂O at point X in the following figure.

(a) What phase(s) is (are) present? (5%)

(b) If the temperature of the sample were reduced at constant pressure, what would happen? (5%)



[附件：元素週期表]

PERIODIC TABLE OF THE ELEMENTS

IA 1 H 1.0079																	VIIIA 2 He 4.0026	
IIA 3 Li 6.941												IIIA 5 B 10.811	IVA 6 C 12.011	VA 7 N 14.007	VIA 8 O 15.999	VIIA 9 F 18.998	10 Ne 20.180	
11 Na 22.990		12 Mg 24.305	IIIB 21 Sc 44.956	IVB 22 Ti 47.867	VB 23 V 50.942	VIB 24 Cr 51.996	VIIB 25 Mn 54.938	VIII 26 Fe 55.845	27 Co 58.933	28 Ni 58.693	IB 29 Cu 63.546	IIB 30 Zn 65.39	31 Ga 69.723	32 Ge 72.64	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.468		38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc (98)	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91		56 Ba 137.33	57-71 La-Lu Ac-Lr	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po (209)	85 At (210)	86 Rn (222)
87 Fr (223)		88 Ra (226)	89-103 Ac-Lr	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)	108 Hs (277)	109 Mt (268)	110 Uun (281)	111 Uuu (272)	112 Uub (286)	114 Uuq (289)	116 Uuq (289)	118 Uuq (289)	120 Uuq (289)	122 Uuq (289)	124 Uuq (289)
57 La 138.91	58 Ce 140.12	59 Pr 140.91	60 Nd 144.24	61 Pm (145)	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21
89 Ac (227)	90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np (237)	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (264)