UNIVERSITY OF SWAZILAND

FINAL EXAMINATION – 2013, MAY

TITLE OF PAPER : Introductory Chemistry II

COURSE NUMBER : C112

TIME : Three Hours

INSTRUCTIONS :

1. **Answer all questions in Section A** (Total 40 marks)
2. **Answer any three questions in Section B** (each question is 20 marks)

NB: Non-programmable electronic calculators may be used
A data sheet, a periodic table and answer sheet (for **Section A**) are attached

Useful data and equations:

1 atm = 760 Torr = 760 mmHg

1 atm = 101325 Pa

Arrhenius equation: $k = Ae^{-E_a/RT}$ or $lnk = lnA - \frac{E_a}{RT}$

Van der Walls equation: $P = \frac{nRT}{V-nb} - \frac{n^2a}{V^2}$

This Examination Paper Contains Six Printed Pages Including This Page

You are not supposed to open the paper until permission to do so has been grated by the Chief Invigilator.

Section A

1. Objects can possess energy as _____.

   (a) Endothermic energy
   (b) Potential energy
   (c) Kinetic energy

   A) a only
   B) b only
   C) c only
   D) a and c
   E) b and c

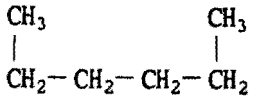
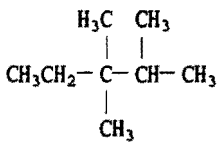
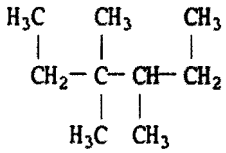
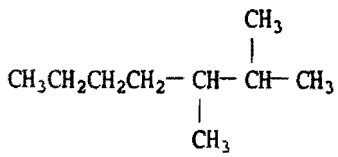
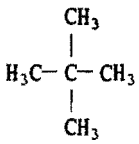
2. Which one of the following will change the value of an equilibrium constant?

   A) Changing temperature
   B) Adding other substances that do not react with any of the species involved in the equilibrium
   C) Varying the initial concentrations of reactants
   D) Varying the initial concentrations of products
   E) Changing the volume of the reaction vessel

3. Which of the following equations shows an incorrect relationship between pressures given in terms of different units?

   A) 1.20 atm = 122 kPa
   B) 152 mm Hg = 2.03×10^4Pa
   C) 0.760 atm = 578 mm Hg
   D) 1.0 torr = 2.00 mm Hg
   E) 1.00 atm = 760 torr

4. The structure of 2,3-dimethylheptane is _____.

   A) 
   B) 
   C) 
   D) 
   E) 

5. Of the following, all are valid units for a reaction rate except _____.

   A) mol/L
   B) M/s
   C) mol/hr
   D) g/s
   E) mol/L-hr

6. The value of K_{eq} for the following reaction is 0.25:

   $$SO_2\,(g) + NO_2\,(g) \longrightarrow SO_2\,(g) + NO\,(g)$$

The value of K_{eq} at the same temperature for the reaction below is _____.

$$2SO_2\,(g) + 2NO_2\,(g) \longrightarrow 2SO_3\,(g) + 2NO\,(g)$$

A) 0.50
B) 0.063
C) 0.12
D) 0.25
E) 16

7. Which one of the following conditions would always result in an increase in the internal energy of a system?

A) The system loses heat and does work on the surroundings
B) The system gains heat and does work on the surroundings
C) The system loses heat and has work done on it by the surroundings
D) The system gains heat and has work done on it by the surroundings
E) None of the above is correct

6. Of the following, _____ is a correct statement of Boyle's law.

A) PV = constant
B) $\frac{P}{V}$ = constant
C) $\frac{V}{P}$ = constant
D) $\frac{V}{T}$ = constant
E) $\frac{n}{P}$ = constant

8. Which statement about addition reactions between alkenes and HBr is false?

A) The addition occurs at the double bond.
B) Bromine attacks the alkene carbon atom possessing a partial positive charge.
C) A hydrogen atom attaches to the alkene carbon atom possessing a partial negative charge.
D) The π bond breaks in the course of the reaction.
E) The proposed mechanism involves radicals.

9. The value of ΔE for a system that performs 111 kJ of work on its surroundings and gains 89 kJ of heat is _____ kJ.

A) -111
B) -200
C) 200
D) -22
E) 22

10. Which of the following expressions is the correct equilibrium-constant expression for the reaction below?

$$(NH_4)_2Se\,(s) \longrightarrow 2NH_3\,(g) + H_2Se\,(g)$$

A) $[NH_3][H_2Se] / [(NH_4)_2Se]$
B) $[(NH_4)_2Se] / [NH_3]^2\,[H_2Se]$

C) $1 / [(NH_4)_2Se]$
D) $[NH_3]^2 [H_2Se]$
E) $[NH_3]_2 [H_2Se] / [(NH_4)_2Se]$

11. Nitrogen dioxide decomposes to nitric oxide and oxygen via the reaction:

$$2NO_2 \rightarrow 2NO + O_2$$

In a particular experiment at 300 °C, $[NO_2]$ drops from 0.0100 to 0.00650 M in 100 s. The rate of disappearance of NO_2 for this period is _____ M/s.

A) 0.35
B) 3.5×10^{-3}
C) 3.5×10^{-5}
D) 7.0×10^{-3}
E) 1.8×10^{-3}

12. What is the general formula for a ketone?

A) R-O-R
B) R-CO-R'
C) R-CO-OH
D) R-OH
E) R-CHO

13. The volume of an ideal gas is zero at _____.

A) 0 °C
B) -45 °F
C) -273 K
D) -363 K
E) -273 °C

14. The equilibrium constant for the gas phase reaction

$$2NH_3 (g) \longrightarrow N_2 (g) + 3H_2 (g)$$

is $K_{eq} = 230$ at 300°C. At equilibrium, _____.

A) Products predominate
B) Reactants predominate
C) Roughly equal amounts of products and reactants are present
D) Only products are present
E) Only reactants are present

The data in the Table below were obtained for the reaction:

$$A + B \rightarrow P$$

Experiment Number	[A] (M)	[B] (M)	Initial Rate (M/s)
1	0.273	0.763	2.83
2	0.273	1.526	2.83
3	0.819	0.763	25.47

15. The rate law for this reaction is rate = _____.

A) k[A][B]
B) k[P]
C) $k[A]^2[B]$
D) $k[A]^2[B]^2$
E) $k[A]^2$

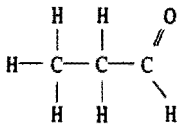
16. The reaction below is exothermic:

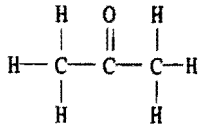
$$2SO_2\,(g) + O_2\,(g) \longrightarrow 2SO_3\,(g)$$

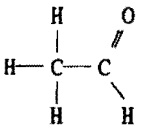
Le Châtelier's Principle predicts that _____ will result in an increase in the number of moles of SO_3 (g) in the reaction container.

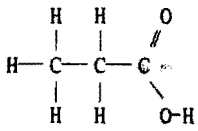
A) Increasing the pressure
B) Decreasing the pressure
C) Increasing the temperature
D) Removing some oxygen
E) Increasing the volume of the container

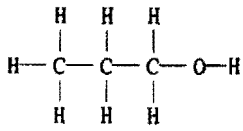
17. Of the compounds below, _____ is an isomer of

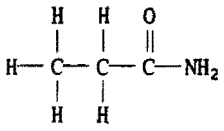


A) 

B) 

C) 

D) 

E) 

18. The magnitude of the rate constant is _____.

A) 38.0
B) 0.278
C) 13.2
D) 42.0
E) 2.21

19. The reaction

$$4Al\,(s) + 3O_2\,(g) \rightarrow 2\,Al_2O_3\,(s) \qquad \Delta H° = -3351\ kJ$$

is _____, and therefore heat is _____ by the reaction.

A) Endothermic, released
B) Endothermic, absorbed
C) Exothermic, released
D) Exothermic, absorbed
E) Thermoneutral, neither released nor absorbed

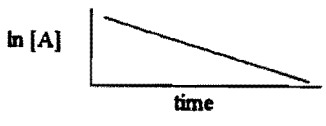
20. As the $[H_3O^+]$ in a solution decreases, the $[OH^-]$

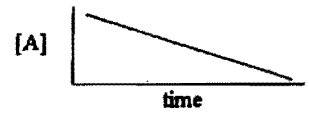
A) Increases and the pH increases.
B) Increases and the pH decreases.
C) Decreases and the pH increases.
D) Decreases and the pH decreases.

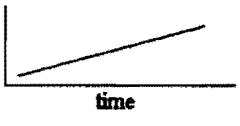
21. _____ could be the formula of an alkene.

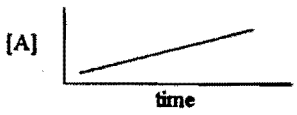
A) C_3H_8
B) C_3H_6
C) C_6H_6
D) $C_{17}H_{36}$
E) CH_8

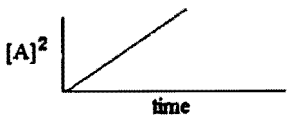
22. Which one of the following graphs shows the correct relationship between concentration and time for a reaction that is second order in [A]?

A) 

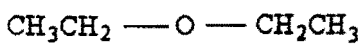
B) 

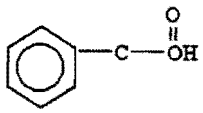
C) 

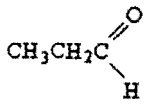
D) 

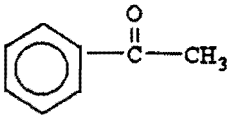
E) 

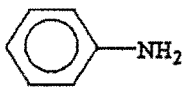
23. Which structure below represents an aldehyde?

A) 

B) 

C) 

D) 

E) 

24. How many moles of gas are there in a 45.0 L container at 25.0°C and 500.0 mm Hg?

A) 0.630
B) 6.11
C) 18.4
D) 1.21
E) 207

25. A sample of calcium carbonate [$CaCO_3$ (s)] absorbs 45.5 J of heat, upon which the temperature of the sample increases from 21.1 °C to 28.5 °C. If the specific heat of calcium carbonate is 0.82 J/g-K, what is the mass (in grams) of the sample?

A) 3.7
B) 5.0
C) 7.5
D) 410
E) 5.0×10^3

26. The hybridization of the central carbon atom in an aldehyde is _____.

A) sp
B) sp^3
C) sp^2
D) d^2sp^3
E) sp^4

27. The effect of a catalyst on an equilibrium is to _____.

A) Increase the rate of the forward reaction only
B) Increase the equilibrium constant so that products are favored
C) Slow the reverse reaction only
D) Increase the rate at which equilibrium is achieved without changing the composition of the equilibrium mixture
E) Shift the equilibrium to the right

28. Hydrocarbons containing only single bonds between the carbon atoms are called _____.

A) Alkenes
B) Alkynes
C) Aromatics
D) Alkanes
E) Ketones

29. One difference between first- and second-order reactions is that _____.

A) The half-life of a first-order reaction does not depend on $[A]_0$; the half-life of a second-order reaction does depend on $[A]_0$
B) The rate of both first-order and second-order reactions do not depend on reactant concentrations
C) The rate of a first-order reaction depends on reactant concentrations; the rate of a second-order reaction does not depend on reactant concentrations
D) A first-order reaction can be catalyzed; a second-order reaction cannot be catalyzed
E) None of the above are true.

30 10.0 grams of argon and 20.0 grams of neon are placed in a 1200.0 ml container at 25.0°C. The partial pressure of neon is _____ atm.

A) 20.4
B) 8.70
C) 0.700
D) 3.40
E) 5.60

31. The decomposition of N_2O_5 in solution in carbon tetrachloride proceeds via the reaction

$$2N_2O_5\,(soln) \rightarrow 4NO_2\,(soln) + O_2\,(soln)$$

The reaction is first order and has a rate constant of $4.82 \times 10^{-3}\ s^{-1}$ at 64°C. The rate law for the reaction is rate = _____.

A) $k[N_2O_5]^2$

B) $k\frac{[NO_2]^4[O_2]}{[N_2O_5]^2}$

C) $k[N_2O_5]$

D) $k\frac{[N_2O_5]^2}{[NO_2]^4[O_2]}$

E) $2k[N_2O_5]$

32. Cycloheptane has _____ fewer hydrogens than n-hexane.

A) 0
B) 1
C) 2
D) 3
E) 4

33. For which one of the following reactions is $\Delta H°_{rxn}$ equal to the heat of formation of the product?

A) $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

B) $(1/2)\,N_2(g) + O_2(g) \rightarrow NO_2(g)$

C) $6C(s) + 6H(g) \rightarrow C_6H_6(l)$

D) $P(g) + 4H(g) + Br(g) \rightarrow PH_4Br(l)$

E) $2C(g) + 11H_2(g) + 11O(g) \rightarrow C_6H_{22}O_{11}(g)$

33. Of the following gases, _____ will have the greatest rate of effusion at a given temperature.

A) NH_3
B) CH_4
C) Ar
D) HBr
E) HCl

34. In the energy profile of a reaction, the species that exists at the maximum on the curve is called the _____.

A) product
B) Activated complex
C) Activation energy
D) Enthalpy of reaction
E) Atomic state

35. Alkenes have the general formula _____.

A) C_nH_{2n}.
B) C_nH_{2n-2}.
C) C_nH_{2n+2}
D) C_nH_n.
E) $C_{2n}H_n$.

36. Fuel values of hydrocarbons increase as the H/C atomic ratio increases. Which of the following compounds has the highest fuel value?

A) C_2H_6
B) C_2H_4
C) C_2H_2
D) CH_4
E) C_6H_6

37. An ideal gas differs from a real gas in that the molecules of an ideal gas _____.

A) Have no attraction for one another
B) Have appreciable molecular volumes
C) Have a molecular weight of zero
D) Have no kinetic energy
E) Have an average molecular mass

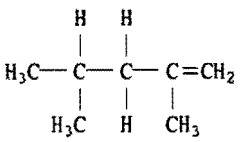
38. Of the following, _____ will lower the activation energy for a reaction.

A) Increasing the concentrations of reactants
B) Raising the temperature of the reaction
C) Adding a catalyst for the reaction
D) Removing products as the reaction proceeds
E) Increasing the pressure

39. Which of the following statements about gases is false?

A) Gases are highly compressible.
B) Distances between molecules of gas are very large compared to bond distances within molecules.
C) Non-reacting gas mixtures are homogeneous.
D) Gases expand spontaneously to fill the container they are placed in.
E) All gases are colourless and odourless at room temperature.

40. What is the name of the compound below?



A) 2,4-methylbutene
B) 2,5-dimethylpentane
C) 2,4-ethylbutene
D) 2,4-dimethyl-1-pentene
E) 2,4-dimethyl-4-pentene

Section B

Question 1

a) What is the conjugate base of $HClO_4$, H_2S, PH_4^+, HCO_3^-? (2)

b) What is the conjugate acid of CN^-, SO_4^{2-}, H_2O, HCO_3^-? (2)

c) The hydrogen sulfite ion (HSO_3^-) is amphiprotic. Write an equation for the reaction of HSO_3^- with water (4)

i) In which the ion acts as an acid and

ii) In which the ion acts as a base.

(In both cases identify the conjugate acid–base pairs)

d) Calculate the concentration of $OH^-(aq)$ in a solution in which (4)

i) $[H^+] = 2 \times 10^{-6}\ M$;

ii) $[H^+] = 100 \times [OH^-]$.

e) A sample of freshly pressed apple juice has a pOH of 10.24. Calculate $[H^+]$. (3)

f) A 0.100 M solution of an unknown weak acid, HX, has a pH of 1.414. What is the K_a for HX? (5)

Question 2

a) Is a C_4H_6 a saturated hydrocarbon or not? Explain your answer. (1)

b) Write the condensed structural formula for 3-ethyl-2-methylpentane. (1)

c) Draw all the structural and geometric isomers of pentene, C_5H_{10}, that have an unbranched hydrocarbon chain. (3)

d) Indicate whether each of the following molecules is capable of geometrical (cis-trans) isomerism. For those that are, draw the structures: (8)

i) 1,1-dichloro-1-butene

ii) 2,4-dichloro-2-pentyne

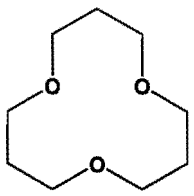
iii) 1-chloro-1-pentene

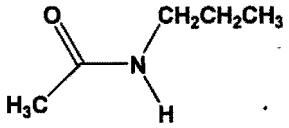
iv) 4,5-dimethyl-2-pentyne

e) What is the difference between a substitution reaction and an addition reaction (1)

f) Identify the functional groups in each of the following compounds:

i) $CH_3—CH_2—OH$ (1)

ii)  (1)

iii)  (2)

g) Predict the product of the reaction of 6-ethyl-3-decene which HBr. (2)

Question 3

a) Recall that density is mass per volume. What happens to the density of a gas as (3)

i) the gas is heated in a constant-volume container;

ii) the gas is compressed at constant temperature;

iii) Additional gas is added to a constant-volume container?

(Your answer should be increase, decrease or no change)

b) Tennis balls are usually filled with either air or N_2 gas to a pressure above atmospheric pressure to increase their bounce. If a tennis ball has a volume of 144 cm^3 and contains 0.33 g of N_2 gas, what is the pressure inside the ball at 24 °C? (4)

c) The pressure in a natural-gas tank is maintained at 2.20 atm. On a day when the temperature is –15 °C, the volume of gas in the tank is 3.25×10^3 m^3. What is the volume of the same quantity of gas on a day when the temperature is 31 °C? (5)

d) A 0.50-mol sample of oxygen gas is confined at 0°C and 1.0 atm in a cylinder with a movable piston. The piston compresses the gas so that the final volume is half the initial volume and the final pressure is 2.2 atm. What is the final temperature of the gas in degrees Celsius? (3)

e) In the first step in the industrial process for making nitric acid, ammonia reacts with oxygen in the presence of a suitable catalyst to form nitric oxide and water vapor:

$$4\ NH_{3(g)} + 5\ O_{2(g)} \rightarrow 4\ NO_{(g)} + 6H_2O_{(g)}$$

How many liters of $NH_{3(g)}$ at 850 °C and 5.00 atm are required to react with 1.00 mol of $O_2(g)$ in this reaction? (5)

Question 4

a) For the standard enthalpy of formation of a substance, $\Delta H°_f$: (3)

i. Define and state its S.I. units

ii. Illustrate it with an example without giving its actual value

iii. What is its value for an element in its thermochemical standard state?

b) What does Hess's Law state? (2)

c) Given the following standard enthalpy changes of formation, calculate the standard enthalpy change of combustion of silane, SiH_4 at 298 K: (4)

$SiH_4(g) + 2O_{2(g)} \quad SiO_{2(g)} + 2H_2O_{(l)}$

Substance	$SiH_{4(g)}$	$SiO_{2(g)}$	$2H_2O_{(l)}$
$\Delta H°_f$ (KJ/mol)	+34.0	-910.9	-285.8

d) From the following equations and their corresponding standard enthalpy changes, calculate the $\Delta H°_{rxn}$, for the following reaction at 298 K. (5)

$C_{(s)} + 2H_{2(g)} \longrightarrow CH_{4(g)}$

Given:							$\Delta H°$ (KJ)
$C_{(s)}$	+	$O_{2(g)}$	$\longrightarrow$	$CO_{2(g)}$			-393.5
$H_{2(g)}$ +		½ $O_{2(g)}$	$\longrightarrow$	$H_2O_{(l)}$			-285.8
$CO_{2(g)}$	+	$2H_2O_{(l)}$	$\longrightarrow$	$CH_{4(g)}$	+	$2O_{2(g)}$	+890.3

e) Given the following reaction:

$2Ba_{(s)} + O_{2(g)} \longrightarrow 2BaO_{(s)}$ $\Delta H° = -1107.0$ KJ

How many KJ of heat are released when:

i. 4.62 g of $BaO_{(s)}$ is produced (3)

ii. 13.94 g of $Ba_{(s)}$ reacts completely with oxygen to form BaO(s)? (3)

General data and fundamental constants

Quantity	Symbol	Value
Speed of light	c	$2.997\,924\,58 \times 10^{8}$ m s^{-1}
Elementary charge	e	$1.602\,177 \times 10^{-19}$ C
Faraday constant	$F = N_A e$	9.6485×10^{4} C mol^{-1}
Boltzmann constant	k	$1.380\,66 \times 10^{-23}$ J K^{-1}
Gas constant	$R = N_A k$	8.314 51 J K^{-1} mol^{-1}
		$8.205\,78 \times 10^{-2}$ dm^3 atm K^{-1} mol^{-1}
		6.2364×10 L Torr K^{-1} mol^{-1}
Planck constant	h	$6.626\,08 \times 10^{-34}$ J s
	$\hbar = h/2\pi$	$1.054\,57 \times 10^{-34}$ J s
Avogadro constant	N_A	$6.022\,14 \times 10^{23}$ mol^{-1}
Atomic mass unit	u	$1.660\,54 \times 10^{-27}$ Kg
Mass		
electron	m_e	$9.109\,39 \times 10^{-31}$ Kg
proton	m_p	$1.672\,62 \times 10^{-27}$ Kg
neutron	m_n	$1.674\,93 \times 10^{-27}$ Kg
Vacuum permittivity	$\varepsilon_0 = 1/c^2\mu_0$	$8.854\,19 \times 10^{-12}$ J^{-1} C^2 m^{-1}
	$4\pi\varepsilon_0$	$1.112\,65 \times 10^{-10}$ J^{-1} C^2 m^{-1}
Vacuum permeability	μ_0	$4\pi \times 10^{-7}$ J s^2 C^{-2} m^{-1}
		$4\pi \times 10^{-7}$ T^2 J^{-1} m^3
Magneton		
Bohr	$\mu_B = e\hbar/2m_e$	$9.274\,02 \times 10^{-24}$ J T^{-1}
nuclear	$\mu_N = e\hbar/2m_p$	$5.050\,79 \times 10^{-27}$ J T^{-1}
g value	g_e	2.002 32
Bohr radius	$a_0 = 4\pi\varepsilon_0\hbar/m_e e^2$	$5.291\,77 \times 10^{-11}$ m
Fine-structure constant	$\alpha = \mu_0 e^2 c/2h$	$7.297\,35 \times 10^{-3}$
Rydberg constant	$R_\infty = m_e e^4/8h^3 c\varepsilon_0^2$	$1.097\,37 \times 10^{7}$ m^{-1}
Standard acceleration of free fall	g	9.806 65 m s^{-2}
Gravitational constant	G	$6.672\,59 \times 10^{-11}$ N m^2 Kg^{-2}

Conversion factors

1 cal	=	4.184 joules (J)	1 erg	=	1×10^{-7} J
1 eV	=	$1.602\,2 \times 10^{-19}$ J	1 eV/molecule	=	96 485 kJ mol^{-1}

Prefixes

f	p	n	μ	m	c	d	k	M	G
femto	pico	nano	micro	milli	centi	deci	kilo	mega	giga
10^{-15}	10^{-12}	10^{-9}	10^{-6}	10^{-3}	10^{-2}	10^{-1}	10^{3}	10^{6}	10^{9}

PERIODIC TABLE OF ELEMENTS

GROUPS

PERIODS	1 IA	2 IIA	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 IIIA	14 IVA	15 VA	16 VIA	17 VIIA	18 VIIIA
1	1.008 H 1																	4.003 He 2
2	6.941 Li 3	9.012 Be 4											10.811 B 5	12.011 C 6	14.007 N 7	15.999 O 8	18.998 F 9	20.180 Ne 10
3	22.990 Na 11	24.305 Mg 12											26.982 Al 13	28.086 Si 14	30.974 P 15	32.06 S 16	35.453 Cl 17	39.948 Ar 18
4	39.098 K 19	40.078 Ca 20	44.956 Sc 21	47.88 Ti 22	50.942 V 23	51.996 Cr 24	54.938 Mn 25	55.847 Fe 26	58.933 Co 27	58.69 Ni 28	63.546 Cu 29	65.39 Zn 30	69.723 Ga 31	72.61 Ge 32	74.922 As 33	78.96 Se 34	79.904 Br 35	83.80 Kr 36
5	85.468 Rb 37	87.62 Sr 38	88.906 Y 39	91.224 Zr 40	92.906 Nb 41	95.94 Mo 42	98.907 Tc 43	101.07 Ru 44	102.91 Rh 45	106.42 Pd 46	107.87 Ag 47	112.41 Cd 48	114.82 In 49	118.71 Sn 50	121.75 Sb 51	127.60 Te 52	126.90 I 53	131.29 Xe 54
6	132.91 Cs 55	137.33 Ba 56	138.91 *Ln 57	178.49 Hf 72	180.95 Ta 73	183.85 W 74	186.21 Re 75	190.2 Os 76	192.22 Ir 77	195.08 Pt 78	196.97 Au 79	200.59 Hg 80	204.38 Tl 81	207.2 Pb 82	208.98 Bi 83	(209) Po 84	(210) At 85	(222) Rn 86
7	223 Fr 87	226.03 Ra 88	(227) **Ac 89	(261) Rf 104	(262) Ha 105	(263) Unh 106	(262) Uns 107	(265) Uno 108	(266) Une 109	(267) Uun 110								

Atomic mass → 10.811
Symbol → B
Atomic No. → 5

TRANSITION ELEMENTS

*Lanthanide Series	140.12 Ce 58	140.91 Pr 59	144.24 Nd 60	(145) Pm 61	150.36 Sm 62	151.96 Eu 63	157.25 Gd 64	158.93 Tb 65	162.50 Dy 66	164.93 Ho 67	167.26 Er 68	168.93 Tm 69	173.04 Yb 70	174.97 Lu 71
**Actinide Series	232.04 Th 90	231.04 Pa 91	238.03 U 92	237.05 Np 93	(244) Pu 94	(243) Am 95	(247) Cm 96	(247) Bk 97	(251) Cf 98	(252) Es 99	(257) Fm 100	(258) Md 101	(259) No 102	(260) Lr 103

( ) indicates the mass number of the isotope with the longest half-life.

UNIVERSITY OF SWAZILAND

C112 SECTION A ANSWER SHEET

STUDENT ID NUMBER:_____

Correct answer must be indicated by putting a circle around the letter for that answer on the answer sheet provided. If you change your answer, please cancel the wrong answer with a cross and then put a circle around the correct one. If more than one option has a circle around it a zero will be given for that question.

1.	(A)	(B)	(C)	(D)	(E)		21.	(A)	(B)	(C)	(D)	(E)
2	(A)	(B)	(C)	(D)	(E)		22	(A)	(B)	(C)	(D)	(E)
3	(A)	(B)	(C)	(D)	(E)		23	(A)	(B)	(C)	(D)	(E)
4	(A)	(B)	(C)	(D)	(E)		24	(A)	(B)	(C)	(D)	(E)
5	(A)	(B)	(C)	(D)	(E)		25	(A)	(B)	(C)	(D)	(E)
6	(A)	(B)	(C)	(D)	(E)		26	(A)	(B)	(C)	(D)	(E)
7	(A)	(B)	(C)	(D)	(E)		27	(A)	(B)	(C)	(D)	(E)
8	(A)	(B)	(C)	(D)	(E)		28	(A)	(B)	(C)	(D)	(E)
9	(A)	(B)	(C)	(D)	(E)		29	(A)	(B)	(C)	(D)	(E)
10	(A)	(B)	(C)	(D)	(E)		30	(A)	(B)	(C)	(D)	(E)
11	(A)	(B)	(C)	(D)	(E)		31	(A)	(B)	(C)	(D)	(E)
12	(A)	(B)	(C)	(D)	(E)		32	(A)	(B)	(C)	(D)	(E)
13	(A)	(B)	(C)	(D)	(E)		33	(A)	(B)	(C)	(D)	(E)
14	(A)	(B)	(C)	(D)	(E)		34	(A)	(B)	(C)	(D)	(E)
15	(A)	(B)	(C)	(D)	(E)		35	(A)	(B)	(C)	(D)	(E)
16	(A)	(B)	(C)	(D)	(E)		36	(A)	(B)	(C)	(D)	(E)
17	(A)	(B)	(C)	(D)	(E)		37	(A)	(B)	(C)	(D)	(E)
18	(A)	(B)	(C)	(D)	(E)		38	(A)	(B)	(C)	(D)	(E)
19	(A)	(B)	(C)	(D)	(E)		39	(A)	(B)	(C)	(D)	(E)
20	(A)	(B)	(C)	(D)	(E)		40	(A)	(B)	(C)	(D)	(E)