UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATIONS 2014/2015

TITLE OF PAPER: INTRODUCTORY CHEMISTRY

COURSE NUMBER: C111

TIME ALLOWED: THREE (3) HOURS

INSTRUCTIONS: THERE ARE TWO SECTIONS: SECTION A AND SECTION B. ANSWER ALL THE QUESTIONS IN SECTION A AND ANY TWO QUESTIONS FROM SECTION B.

SECTION A IS WORTH 50 MARKS AND EACH QUESTION IN SECTION B IS WORTH 25 MARKS.

THE ANSWER SHEET FOR SECTION A IS ATTACHED TO THE QUESTION PAPER.GIVE YOUR ANSWERS TO SECTION A QUESTIONS BY CIRCLING THE CORRESPONDING LETTER ON THE ANSWER SHEET.

AT THE END OF THE EXAM,BEFORE YOU LEAVE, PLACE THE ANSWER SHEET INSIDE THE UNISWA ANSWER BOOKLET CONTAINING YOUR ANSWERS TO SECTION B

A PERIODIC TABLE AND A TABLE OF CONSTANTS HAVE BEEN PROVIDED WITH THIS EXAMINATION PAPER.

PLEASE DO NOT OPEN THIS PAPER UNTIL AUTHORISED TO DO SO BY THE CHIEF INVIGILATOR.

SECTION A

1) Vanadium has two naturally occurring isotopes, ^{50}V with an atomic mass of 49.9472 amu and ^{51}V with an atomic mass of 50.9440. The atomic weight of vanadium is 50.9415. The percent abundances of the vanadium isotopes are _____% ^{50}V and _____% ^{51}V.
A) 0.25, 99.75
B) 99.75, 0.25
C) 49, 51
D) 1.0, 99
E) 99, 1.0

2) An unknown element is found to have three naturally occurring isotopes with atomic masses of 35.9675 (0.337%), 37.9627 (0.063%), and 39.9624 (99.600%). Which of the following is the unknown element?
A) Ar
B) K
C) Cl
D) Ca
E) None of the above could be the unknown element.

3) In the periodic table, the elements are arranged in _____.
A) alphabetical order
B) order of increasing atomic number
C) order of increasing metallic properties
D) order of increasing neutron content
E) reverse alphabetical order

4) Elements _____ exhibit similar physical and chemical properties.
A) with similar chemical symbols
B) with similar atomic masses
C) in the same period of the periodic table
D) on opposite sides of the periodic table
E) in the same group of the periodic table

5) Which pair of elements would you expect to exhibit the greatest similarity in their physical and chemical properties?
A) H, Li
B) Cs, Ba
C) Ca, Sr
D) Ga, Ge
E) C, O

12) What is the maximum mass in grams of NH3 that can be produced by the reaction of 1.0 g of N_2 with 3.0 g of H_2 via the equation below?

N_2 (g) + H_2 (g) → NH_3 (g) (not balanced)

A) 2.0
B) 1.2
C) 0.61
D) 17
E) 4.0

13) What is the maximum amount in grams of SO_3 that can be produced by the reaction of 1.0 g of S with 1.0 g of O_2 via the equation below?

S (s) + O_2 (g) → SO_3 (g) (not balanced)

A) 0.27
B) 1.7
C) 2.5
D) 3.8
E) 2.0

14) Solid aluminum and gaseous oxygen react in a combination reaction to produce aluminum oxide:

4Al (s) + 3 O_2 (g) → 2 Al_2O_3 (s)

The maximum amount of Al_2O_3 that can be produced from 2.5 g of Al and 2.5 g of O_2 is _____ g.

A) 9.4
B) 7.4
C) 4.7
D) 5.3
E) 5.0

15) Sulfur and fluorine react in a combination reaction to produce sulfur hexafluoride:

$S\,(s) + 3\,F_3\,(g) \rightarrow SF_6\,(g)$

The maximum amount of SF_6 that can be produced from the reaction of 3.5 g of sulfur with 4.5 g of fluorine is _____ g.

A) 12
B) 3.2
C) 5.8
D) 16
E) 8.0

16) Solid aluminum and gaseous oxygen react in a combination reaction to produce aluminum oxide:

$4Al\,(s) + 3\,O_2\,(g) \rightarrow 2\,Al_2O_3\,(s)$

In a particular experiment, the reaction of 2.5 g of Al with 2.5 g of O_2 produced 3.5 g of Al_2O_3. The % yield of the reaction is _____.

A) 74
B) 37
C) 47
D) 66
E) 26

17) Sulfur and oxygen react in a combination reaction to produce sulfur trioxide, an environmental pollutant:

$2S\,(s) + 3O_2\,(g) \rightarrow 2SO_3\,(g)$

In a particular experiment, the reaction of 1.0 g S with 1.0 g O_2 produced 0.80 g of SO_3. The % yield in this experiment is _____.

A) 30
B) 29
C) 21
D) 88
E) 48

18) Sulfur and fluorine react in a combination reaction to produce sulfur hexafluoride:

$S(s) + 3F_2(g) \rightarrow SF_6(g)$

In a particular experiment, the percent yield is 79.0%. This means that in this experiment, a 7.90-g sample of fluorine yields _____ g of SF_6.

A) 30.3
B) 10.1
C) 7.99
D) 24.0
E) 0.110

19) Which one of the following is a correct expression for molarity?

A) mol solute/L solvent
B) mol solute/mL solvent
C) mmol solute/mL solution
D) mol solute/kg solvent
E) μmol solute/L solution

20) Which one of the following is <u>not</u> true concerning 2.00 L of 0.100 M solution of $Ca_3(PO_4)_2$?

A) This solution contains 0.200 mol of $Ca_3(PO_4)_2$.
B) This solution contains 0.800 mol of oxygen atoms.
C) 1.00 L of this solution is required to furnish 0.300 mol of Ca^{2+} ions.
D) There are 6.02×10^{22} phosphorus atoms in 500.0 mL of this solution.
E) This solution contains 6.67×10^{-2} mol of Ca^{2+}.

21) A 0.200 M K_2SO_4 solution is produced by _____.

A) dilution of 250.0 mL of 1.00 M K_2SO_4 to 1.00 L
B) dissolving 43.6 g of K_2SO_4 in water and diluting to a total volume of 250.0 mL
C) diluting 20.0 mL of 5.00 M K_2SO_4 solution to 500.0 mL
D) dissolving 20.2 g of K_2SO_4 in water and diluting to 250.0 mL, then diluting 25.0 mL of this solution to a total volume of 500.0 mL
E) dilution of 1.00 mL of 250 M K_2SO_3 to 1.00 L

22) Which solution has the same number of moles of NaOH as 50.00 mL of 0.100*M* solution of NaOH?

A) 20.00 mL of 0.200*M* solution of NaOH
B) 25.00 mL of 0.175*M* solution of NaOH
C) 30.00 mL of 0.145*M* solution of NaOH
D) 50.00 mL of 0.125*M* solution of NaOH
E) 100.00 mL of 0.0500*M* solution of NaOH

23) Which solution has the same number of moles of KCl as 75.00 mL of 0.250*M* solution of KCl?
A) 20.0 mL of 0.200*M* solution of KCl
B) 25.0 mL of 0.175*M* solution of KCl
C) 129 mL of 0.145*M* solution of KCl
D) 50.0 mL of 0.125*M* solution of KCl
E) 100 mL of 0.0500*M* solution of KCl

24) What are the respective concentrations (M) of Fe^{3+} and I^- afforded by dissolving 0.200 mol FeI_3 in water and diluting to 725 mL?
A) 0.276 and 0.828
B) 0.828 and 0.276
C) 0.276 and 0.276
D) 0.145 and 0.435
E) 0.145 and 0.0483

25) What are the respective concentrations (M) of Mg^{+2} and $C_2H_3O_2^-$ afforded by dissolving 0.600 mol $Mg(C_2H_3O_2)_2$ in water and diluting to 135 mL?
A) 0.444 and 0.889
B) 0.0444 and 0.0889
C) 0..889 and 0.444
D) 0.444 and 0.444
E) 4.44 and 8.89

26) What are the respective concentrations (M) of Cu^{+2} and Cl^- afforded by dissolving 0.200 mol $CuCl_2$ in water and diluting to 345 mL?
A) 0.200 and 0.200
B) 0.580 and 1.16
C) 0.200 and 0.400
D) 1.16 and 2.32
E) 0.580 and 0.290

27) A tenfold dilution of a sample solution can be obtained by taking _____.
A) 1 part sample and 9 parts solvent
B) 1 part sample and 10 parts solvent
C) 9 parts sample and 1 part solvent
D) 10 parts sample and 1 part solvent
E) 99 parts sample and 1 part solvent

28) Mixing 10.00 mL of an aqueous solution with 10.00 mL of water represents a _____.
A) crystallization
B) neutralization
C) twofold dilution
D) tenfold dilution
E) titration

29) You are given two clear solutions of the same unknown monoprotic acid, but with different concentrations. Which statement is true?
A) There is no chemical method designed to tell the two solutions apart.
B) It would take more base solution (per milliliter of the unknown solution) to neutralize the more concentrated solution.
C) A smaller volume of the less concentrated solution contains the same number of moles of the acid compared to the more concentrated solution.
D) If the same volume of each sample was taken, then more base solution would be required to neutralize the one with lower concentration.
E) The product of concentration and volume of the less concentrated solution equals the product of concentration and volume of the more concentrated solution.

30) A 0.100 M solution of _____ will contain the highest concentration of potassium ions.
A) potassium phosphate
B) potassium hydrogen carbonate
C) potassium hypochlorite
D) potassium iodide
E) potassium oxide

31) The ground-state electron configuration of the element _____ is $[Kr]5s^14d^5$.
A) Nb
B) Mo
C) Cr
D) Mn
E) Tc

32) The ground-state electron configuration of _____ is $[Ar]4s^13d^5$.
A) V
B) Mn
C) Fe
D) Cr
E) K

33) Which one of the following configurations depicts an excited oxygen atom?
A) $1s^2 2s^2 2p^2$
B) $1s^2 2s^2 2p^2 3s^2$
C) $1s^2 2s^2 2p^1$
D) $1s^2 2s^2 2p^4$
E) $[He]2s^2 2p^4$

34) Which one of the following configurations depicts an excited carbon atom?
A) $1s^2 2s^2 2p^1 3s^1$
B) $1s^2 2s^2 2p^3$
C) $1s^2 2s^2 2p^1$
D) $1s^2 2s^2 3s^1$
E) $1s^2 2s^2 2p^2$

35) How many different principal quantum numbers can be found in the ground state electron configuration of nickel?
A) 2
B) 3
C) 4
D) 5
E) 6

36) The valence shell of the element X contains 2 electrons in a 5s subshell. Below that shell, element X has a partially filled 4d subshell. What type of element is X?
A) main group element
B) chalcogen
C) halogen
D) transition metal
E) alkali metal

37) Atomic radius generally increases as we move _____.
A) down a group and from right to left across a period
B) up a group and from left to right across a period
C) down a group and from left to right across a period
D) up a group and from right to left across a period
E) down a group; the period position has no effect

38) Atomic radius generally decreases as we move _____.
A) down a group and from right to left across a period
B) up a group and from left to right across a period
C) down a group and from left to right across a period
D) up a group and from right to left across a period
E) down a group; the period position has no effect

39) Of the following, which gives the correct order for atomic radius for Mg, Na, P, Si and Ar?
A) Mg > Na > P > Si > Ar
B) Ar > Si > P > Na > Mg
C) Si > P > Ar > Na > Mg
D) Na > Mg > Si > P > Ar
E) Ar > P > Si > Mg > Na

40) Of the following, which gives the correct order for atomic radius for Ca, K, As, Ge and Kr?
A) Ca > K > As > Ge > Kr
B) Kr > Ge > As > K > Ca
C) Ge > As > Kr > K > Ca
D) K > Ca > Ge > As > Kr
E) Kr > As > Ge > Ca > K

41) Which one of the following atoms has the largest radius?
A) O
B) F
C) S
D) Cl
E) Ne

42) Of the compounds below, _____ has the smallest ionic separation.
A) KF
B) K_2S
C) RbCl
D) $SrBr_2$
E) RbF

43) _____ is isoelectronic with argon and _____ is isoelectronic with neon.
A) Cl^-, F^-
B) Cl^-, Cl^+
C) F+, F^-
D) Ne^-, Kr^+
E) Ne^-, Ar^+

44) Which of the following is an isoelectronic series?
A) B^{5-}, Si^{4-}, As^{3-}, Te^{2-}
B) F^-, Cl^-, Br^-, I^-
C) S, Cl, Ar, K
D) Si^{2-}, P^{2-}, S^{2-}, Cl^{2-}
E) O^{2-}, F^-, Ne, Na^+

45) Which isoelectronic series is correctly arranged in order of increasing radius?
A) $K^+ < Ca^{2+} < Ar < Cl^-$
B) $Cl^- < Ar < K^+ < Ca^{2+}$
C) $Ca^{2+} < Ar < K^+ < Cl^-$
D) $Ca^{2+} < K^+ < Ar < Cl^-$
E) $Ca^{2+} < K^+ < Cl^- < Ar$

46) Of the choices below, which gives the order for first ionization energies?
A) Cl > S > Al > Ar > Si
B) Ar > Cl > S > Si > Al
C) Al > Si > S > Cl > Ar
D) Cl > S > Al > Si > Ar
E) S > Si > Cl > Al > Ar

47) Atomic radius generally increases as we move _____.
A) down a group and from right to left across a period
B) up a group and from left to right across a period
C) down a group and from left to right across a period
D) up a group and from right to left across a period
E) down a group; the period position has no effect

48) Atomic radius generally decreases as we move _____.
A) down a group and from right to left across a period
B) up a group and from left to right across a period
C) down a group and from left to right across a period
D) up a group and from right to left across a period
E) down a group; the period position has no effect

49) Of the following, which gives the correct order for atomic radius for Mg, Na, P, Si and Ar?
A) Mg > Na > P > Si > Ar
B) Ar > Si > P > Na > Mg
C) Si > P > Ar > Na > Mg
D) Na > Mg > Si > P > Ar
E) Ar > P > Si > Mg > Na

50) Of the following, which gives the correct order for atomic radius for Ca, K, As, Ge and Kr?
A) Ca > K > As > Ge > Kr
B) Kr > Ge > As > K > Ca
C) Ge > As > Kr > K > Ca
D) K > Ca > Ge > As > Kr
E) Kr > As > Ge > Ca > K

SECTION B

Question One

a) Determine the volume, in milliliters, of 3.0 *M* H_2SO_4 that is needed to make 450 mL of 0.10 *M* H_2SO_4.

[4]

b) In a titration experiment, 45.7 mL of 0.500 *M* H_2SO_4 is required to neutralize 20.0 mL of NaOH solution. Determine the concentration of the NaOH solution.

[6]

c) The quantity of Cl^- in a municipal water supply is determined by titrating the sample with Ag^+. The precipitation reaction taking place during the titration is

$$Ag^+(aq) + Cl^-(aq) \longrightarrow AgCl(s)$$

The end point in this type of titration is marked by a change in color of a special type of indicator. **(i)** How many grams of chloride ion are in a sample of the water if 20.2 mL of 0.100 *M* Ag^+ is needed to react with all the chloride in the sample? **(ii)** If the sample has a mass of 10.0 g, what percent Cl^- does it contain?

[7]

d) Complete and balance the following equation for oxidation-reduction reaction that occurs in basic solution:

$$NO_2^-(aq) + Al(s) \rightarrow NH_3(aq) + Al(OH)_4^-(aq)$$

[8]

Question Two

a) Write the electron configuration for phosphorus, element 15. How many unpaired electrons does a phosphorus atom possess?

[5]

b) Which family of elements is characterized by an ns^2np^2 electron configuration in the outermost occupied shell? Give symbols for four of the elements in the family.

[4]

c) Based on its position in the periodic table, write the condensed electron configuration for bismuth, whose symbol is Bi. How many unpaired electrons does a bismuth atom have?

[4]

d) Use the periodic table to write the condensed electron configuration for (i) Co ii) Te

[4]

e) Write the electron configuration for (i) Ca^{2+}, (ii) Co^{3+}, and (iii) S^{2-}.

[8]

Question Three

a) Which of the following atoms and ions is largest: S^{2-}, S, O^{2-}? [2]

b) Arrange the ions K^+, Cl^-, Ca^2+, and S^{2-} in order of decreasing size. [3]

c) Which has the lowest first ionization energy, B, Al, C, or Si? Which has the highest? [2]

d) Write the balanced chemical equation for the reaction of solid tetraphosphorus hexoxide, P_4O_6, with water. [2]

e) Which substance do you expect to have the greatest lattice energy, MgF_2, CaF_2, or ZrO_2? [3]

f) Describe the electron-domain geometry and molecular geometry of XeF_2.

[5]

g) The cyanate ion, NCO^-, has three possible Lewis structures. **(i)** Draw these three structures and assign formal charges in each. **(ii)** Which Lewis structure is dominant?

[8]

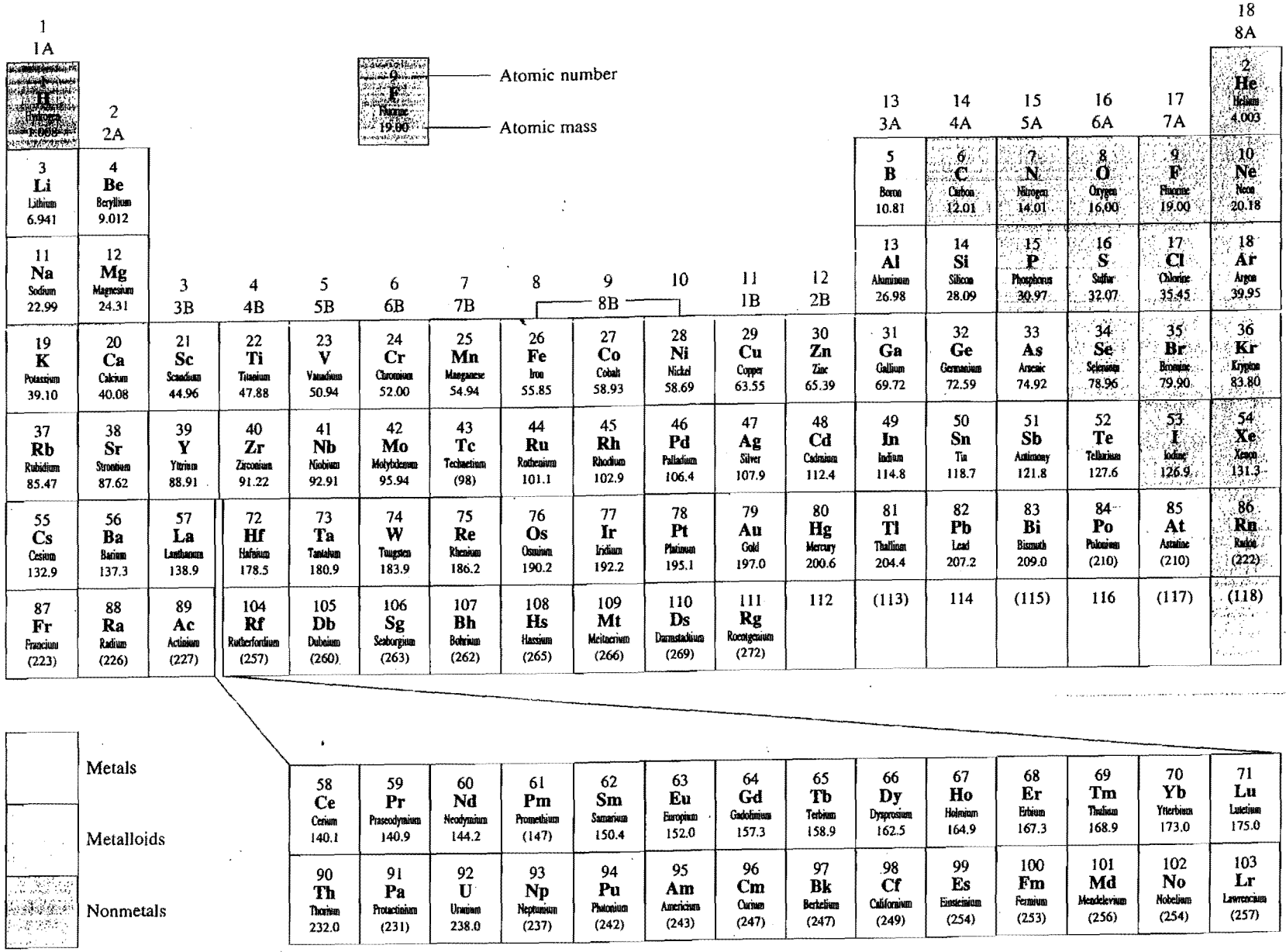
UNIVERSITY OF SWAZILAND

C111 - SUPP EXAMINATION ANSWER SHEET	DATE: JULY 2015
Course Title: Introductory Chemistry **ANSWER SHEET FOR SECTION A OF EXAM**	**Stud.** **ID No.**

INSTRUCTION: Place an X over the "box" corresponding to the correct answer

Q. No.							
1	A	B	C	D	E		
2	A	B	C	D	E		
3	A	B	C	D	E		
4	A	B	C	D	E		
5	A	B	C	D	E		
6	A	B	C	D	E		
7	A	B	C	D	E		
8	A	B	C	D	E		
9	A	B	C	D	E		
10	A	B	C	D	E		
11	A	B	C	D	E		
12	A	B	C	D	E		
13	A	B	C	D	E		
14	A	B	C	D	E		
15	A	B	C	D	E		
16	A	B	C	D	E		
17	A	B	C	D	E		
18	A	B	C	D	E		
19	A	B	C	D	E		
20	A	B	C	D	E		
21	A	B	C	D	E		
22	A	B	C	D	E		
23	A	B	C	D	E		
24	A	B	C	D	E		
25	A	B	C	D	E		

Q. No.							
26	A	B	C	D	E		
27	A	B	C	D	E		
28	A	B	C	D	E		
29	A	B	C	D	E		
30	A	B	C	D	E		
31	A	B	C	D	E		
32	A	B	C	D	E		
33	A	B	C	D	E		
34	A	B	C	D	E		
35	A	B	C	D	E		
36	A	B	C	D	E		
37	A	B	C	D	E		
38	A	B	C	D	E		
39	A	B	C	D	E		
40	A	B	C	D	E		
41	A	B	C	D	E		
42	A	B	C	D	E		
43	A	B	C	D	E		
44	A	B	C	D	E		
45	A	B	C	D	E		
46	A	B	C	D	E		
47	A	B	C	D	E		
48	A	B	C	D	E		
49	A	B	C	D	E		
50	A	B	C	D	E		



1 1A	2 2A	3 3B	4 4B	5 5B	6 6B	7 7B	8	9 8B	10	11 1B	12 2B	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A
												5 B Boron 10.81	6 C Carbon 12.01	7 N Nitrogen 14.01	8 O Oxygen 16.00	9 F Fluorine 19.00	2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012																10 Ne Neon 20.18
11 Na Sodium 22.99	12 Mg Magnesium 24.31											13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulfur 32.07	17 Cl Chlorine 35.45	18 Ar Argon 39.95
19 K Potassium 39.10	20 Ca Calcium 40.08	21 Sc Scandium 44.96	22 Ti Titanium 47.88	23 V Vanadium 50.94	24 Cr Chromium 52.00	25 Mn Manganese 54.94	26 Fe Iron 55.85	27 Co Cobalt 58.93	28 Ni Nickel 58.69	29 Cu Copper 63.55	30 Zn Zinc 65.39	31 Ga Gallium 69.72	32 Ge Germanium 72.59	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80
37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.91	40 Zr Zirconium 91.22	41 Nb Niobium 92.91	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.1	45 Rh Rhodium 102.9	46 Pd Palladium 106.4	47 Ag Silver 107.9	48 Cd Cadmium 112.4	49 In Indium 114.8	50 Sn Tin 118.7	51 Sb Antimony 121.8	52 Te Tellurium 127.6	53 I Iodine 126.9	54 Xe Xenon 131.3
55 Cs Cesium 132.9	56 Ba Barium 137.3	57 La Lanthanum 138.9	72 Hf Hafnium 178.5	73 Ta Tantalum 180.9	74 W Tungsten 183.9	75 Re Rhenium 186.2	76 Os Osmium 190.2	77 Ir Iridium 192.2	78 Pt Platinum 195.1	79 Au Gold 197.0	80 Hg Mercury 200.6	81 Tl Thallium 204.4	82 Pb Lead 207.2	83 Bi Bismuth 209.0	84 Po Polonium (210)	85 At Astatine (210)	86 Rn Radon (222)
87 Fr Francium (223)	88 Ra Radium (226)	89 Ac Actinium (227)	104 Rf Rutherfordium (257)	105 Db Dubnium (260)	106 Sg Seaborgium (263)	107 Bh Bohrium (262)	108 Hs Hassium (265)	109 Mt Meitnerium (266)	110 Ds Darmstadtium (269)	111 Rg Roentgenium (272)	112	(113)	114	(115)	116	(117)	(118)

58 Ce Cerium 140.1	59 Pr Praseodymium 140.9	60 Nd Neodymium 144.2	61 Pm Promethium (147)	62 Sm Samarium 150.4	63 Eu Europium 152.0	64 Gd Gadolinium 157.3	65 Tb Terbium 158.9	66 Dy Dysprosium 162.5	67 Ho Holmium 164.9	68 Er Erbium 167.3	69 Tm Thulium 168.9	70 Yb Ytterbium 173.0	71 Lu Lutetium 175.0
90 Th Thorium 232.0	91 Pa Protactinium (231)	92 U Uranium 238.0	93 Np Neptunium (237)	94 Pu Plutonium (242)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (249)	99 Es Einsteinium (254)	100 Fm Fermium (253)	101 Md Mendelevium (256)	102 No Nobelium (254)	103 Lr Lawrencium (257)

The 1–18 group designation has been recommended by the International Union of Pure and Applied Chemistry (IUPAC) but is not yet in wide use. In this text we use the standard U.S. notation for group numbers (1A–8A and 1B–8B). No names have been assigned for elements 112, 114, and 116. Elements 113, 115, 117, and 118 have not yet been synthesized.

PHYSICAL CONSTANTS

Speed of light in a vacuum	c_0	2.99792458×10^{8} m s^{-1}
Permittivity of a vacuum	ϵ_0	$8.854187816 \times 10^{-12}$ F m^{-1}
	$4\pi\epsilon_0$	1.11264×10^{-10} c^2 N^{-1} m^{-2}
Planck constant	h	$6.6260755(40) \times 10^{-34}$ J s
Elementary charge	e	$1.60217733(49) \times 10^{-19}$ C
Avogadro constant	N_A	$6.0221367(36) \times 10^{23}$ mol^{-1}
Boltzmann constant	k	$1.380658(12) \times 10^{-23}$ J K^{-1}
Gas constant	R	8.314510(70) J K^{-1} mol^{-1}
Bohr radius	a_0	$5.29177249(24) \times 10^{-11}$ m
Rydberg constant	R_∞	$1.0973731534(13) \times 10^{7}$ m^{-1} (infinite nuclear mass)
	✔ R_H	1.096777×10^{7} m^{-1}
Bohr magneton	μ_B	$9.2740154(31) \times 10^{-24}$ J T^{-1}
	π	3.14159265359
Faraday constant	F	$9.6485309(29) \times 10^{4}$ C mol^{-1}
Atomic mass unit	m_u	$1.6605402(10) \times 10^{-27}$ kg
Mass of the electron	m_e	$9.1093897(54) \times 10^{-31}$ kg or $5.48579903(13) \times 10^{-4}$ m_u
Mass of the proton	m_p	1.007276470(12) m_u
Mass of the neutron	m_n	1.008664904(14) m_u
Mass of the deuteron	m_d	2.013553214(24) m_u
Mass of the triton	m_t	3.01550071(4) m_u
Mass of the α-particle	m_α	4.001506170(50) m_u