C

King Abdulaziz University

Faculty of Science - Chemistry Department
Chem-110, Second Exam
Thursday 01 /08 /1438 H
Time: 90 minutes

Name:	Number:	Section:

•Useful information:

Speed of light,	$C = 3.0\times10^{8}$ m/s
Planck's const.,	$h = 6.626\times10^{-34}$ J.s
Avogadro's No.,	$N_{av} = 6.022\times10^{23}$ mol^{-1}
Rydberg const. for H atom	$R_H = 2.18\times10^{-18}$ J
Mass of the electron,	$m_e = 9.11\times10^{-31}$ kg
Gas constant,	$R = 0.082$ L atm K^{-1} mol^{-1}

PERIODIC TABLE

Key: 12 C Carbon 6 — Relative atomic mass to nearest whole number; Symbol; Atomic number

1A												3A	4A	5A	6A	7A	8A
1 H Hydrogen 1	2A																4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4											11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Flourine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12											27 Al Aluminum 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	63.5 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	72.5 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85.5 Rb Rubidium 37	86 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	(96) Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Cesium 55	137 Ba Barium 56	139 La Lanthanum 57	178.5 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Pletinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	(210) Po Polonium 84	(210) At Astatine 85	(222) Rn Radon 86
(223) Fr Francium 87	(226) Ra Radium 88	(227) Ac Actinium 89	(261) Rf Rutherfordium 104	(262) Db Dubnium 105	(266) Sg Seaborgium 106	(264) Bh Bohrium 107	(265) Hs Hassium 108	(268) Mt Meitnerium 109									

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	145 Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162.5 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	231 Pa Protactinium 91	238 U Uranium 92	237 Np Neptunium 93	244 Pu Plutonium 94	(243) Am Americium 95	(247) Cm Curium 96	(247) Bk Berkelium 97	(251) Cf Californium 98	(252) Es Einsteinium 99	(257) Fm Fermium 100	(258) Md Mendelevium 101	(259) No Nobelium 102	(262) Lr Lawrencium 103

C

Choose the correct answer

C-1 What process will be observed in a hydrogen atom when its electron drops from the n = 6 state to the n = 3 state.

a) A photon with energy 3.53×10^{-19} J will be absorbed.
b) A photon with energy 3.53×10^{-19} J will be emitted.
c) A photon with energy 1.82×10^{-19} J will be absorbed.
d) A photon with energy 1.82×10^{-19} J will be emitted

C-2 What set of quantum numbers is most likely to be associated with the last electron in Aluminum element?

a) $n=3, l=0, m_l=0, m_s=½$ b) $n=3, l=2, m_l=1, m_s=½$ c) $n=3, l=0, m_l=1, m_s=½$ d) $n=3, l=1, m_l=-1, m_s=½$

C-3 Which of the following elements is a representative element?

a) Nd b) Pd c) Au d) S

C-4 Which element exists as a diatomic gas?

a) P b) Ca c) He d) N

C-5 The element with the electronic configuration $[Ne]3s^2\ 3p^4$ is

a) S b) P c) N d) Ar

C-6 Which of the following statements is the best definition of valence electrons?

a) The electrons those are unpaired.
b) The electrons occupying the highest energy (outermost) level.
c) The electrons that are paired.
d) The electrons in the p orbitals

C-7 _____ is the energy liberated when an atom forms a negative ion.

a) Ionization energy b) Electronegativity c) Electron affinity d) Covalent bond

C-8 Which one of the following elements is a *gas* under normal atmospheric conditions?

a) Cs b) Be c) Si d) N_2

C-9 A gaseous compound has a density of 4.7 g/L at 373 K and 750 torr. The molar mass of this compound is:

a) 48.6 g/mol b) 97.1 g/mol c) 145.7 g/mol d) 194.2 g/mol

C-10 200 mL of a gas at 303 K and 710 torr is compressed to a volume of 145 mL and the temperature is raised to 400 K. What is the new pressure of the gas?

a) 1500 torr b) 1389 torr c) 1293 torr d) 1209 torr

C

C-11 Which one of the following atoms is a p-block element?

a) Li b) Ag c) Ge d) Gd

C-12 When acting as central atom, which of the following could be an example of incomplete octet?

a) Si b) Be c) F d) C

C-13 A polar covalent bond would form in :

a) Na—Be b) K—Br c) Li—Li d) H—O

C-14 For a mixture of N_2 (3 moles) and O_2 (2 moles) in 20L container at 298K, what is the total pressure?

a) 2.4 atm b) 24.57 atm c) 6.12 atm d) 10.24 atm

C-15 "The distance between identical points on successive waves." is the definition of:

a) The Pauli exclusion principle. b) Wavelength
c) Wave d) Frequency

C-16 Which of the following elements has the smallest first ionization energy?

a) Br b) Ga c) Kr d) As

C-17 What is the total number of valence electrons in NF_3

a) 18 b) 26 c) 24 d) 20

C-18 How many resonance structure for NF_3

a) 0 b) 4 c) 2 d) 1

C-19 How many lone pair around the nitrogen atom in NF_3

a) 2 b) 1 c) 0 d) 6

C-20 The formal charge on the nitrogen atom in NF_3

a) -1 b) +1 c) 0 d) +2

C-21 Which of the following is an example of diamagnetic element?

a) Al b) Na c) Xe d) P

C-22 What is the maximum number of electrons in a atom that can have the following set of quantum numbers? $n = 4$ $l = 1$ $m_s = +1/2$

a) 3 b) 16 c) 6 d) 1

C

C-23 What is the volume occupied by 3 mole of HCl gas at STP?

a) 22.4 L b) 67.2 L c) 0.67 L d) 44.8 L

C-24 What is the energy of radiation that has a frequency of 7.34×10^{13} s^{-1}?

a) 4.86×10^{-20} J b) 3.76×10^{-19} J c) 2.3×10^{-16} J d) 2.07×10^{23} J

C-25 Calculate the wavelength associated with a $^{23}Na^{+}$ ion moving at a velocity of 2.0×10^{5} m/s. The mass of $^{23}Na^{+}$ ion is 3.82×10^{-23} g.

a) 3.2×10^{-11} m b) 8.7×10^{-14} m c) 1.0×10^{-12} m d) 9.7×10^{12} m

C-26 In what group of the periodic table is the element with the electron configuration: $[Ar]4s^2 3d^{10} 4p^5$?

a) 2A b) 3A c) 5A d) 7A

C-27 The only compound that will not conduct electricity as a liquid is:

a) LiCl b) NaCl c) MgF_2 d) PCl_3

C-28 Ar is an isoelectronic with

a) P b) He c) Cl^{-1} d) F

C-29 What type of orbital is occupied by an electron with the quantum numbers: n = 4, l = 0?

a) s b) p c) d d) f

C-30 How many unpaired electrons does a ground-state atom of N have?

a) 5 b) 3 c) 0 d) 2

C

absorb	يمتص	isoelectronic	نظير الالكتروني
according	وفقا	reaction	تفاعل
analyzed	تم تحليله	Found	وجد
around	حول	lowest	الأقل
associated	المصاحب	maximum	اقصى
beam	شعاع	mixture	خليط
bonds	روابط	Tripled	ثلاث اضعاف
characteristic	صفه	Present	موجود
charge	شحنه	molecules	جزيئات
collected	جُمع	unknown	مجهول
compound	مركب	distance	مسافه
compressibility	قابليه للضغط	molar mass	الكتله الموليه
considering	بالنظر الى	Observed	تلاحظ
constant	ثابت	Occupy	يحتل
Contain	يحتوي	Orbital	مدار
density	كثافه	partial pressure	ضغط جزئي
determine	اوجد	evolved	نتج
diamagnetic	ثنائي المغناطيسيه	possible	ممكن
difference	الفرق	initial	ابتدائي
electron configuration	توزيع الكتروني	process	عمليه
electron microscope	ميكروسكوب الكتروني	accelerated	يتسارع
electron transitions	انتقاله الكترونيه	quantum number	اعداد كم
emission	انبعاث	outermost	خارجي
emit	يبعث	radiation	إشعاع
energy	طاقه	radius	نصف قطر
equation	معادله	paramagentic	احادي المغناطيسيه
exists	موجود	Relatively	نسبيا
expressed	عبر عنه	required	مطلوب
fixed	ثابت	quadrupled	اربعه اضعاف
flask	وعاء	respectively	على التوالي
formal charge	شحنه اسميه	smallest	اصغر
formation	تكوين	relationship	علاقه
Frequency	تردد	doubled	ضعفين
gaseous	غازي	transition element	عنصر انتقالي
greatest	اكبر	Type	نوع
ground-state atom	ذره في الحاله الارضيه	volume	حجم
heated	سخن	valence electrons	الكترونات التكافؤ
Highest	اعلى	wavelength	طول موجي
nonbonding	غير رابط	local radio station	محطة اذاعه محليه
series	سلسله	occurs	تحدث
Shape	شكل	sets	مجموعات
species	صنف	*pair*	زوج
unpaired	مفرد	represent	يمثل
velocities	سرعه	traveling	المتنقل