EX2 CHEM101(DTM) FORM K 22 Oct rm100 HELD (11:30 Class)

Name KEY **(Print last name in CAPS)**

SECTION 552 - 561 **(same as your lab section)**

1.	**Fill in your name, ID, the department=CHEM, Course no. = 101, and Section= your lab section. Blacken the corresponding letters and numbers.**
2.	Read each question carefully before answering.
3.	Mark the choice that best answers the question or completes the statement.
4.	Use the scantron provided. Use a no. 2 pencil and clearly mark your choice. If you change an answer, completely erase your previous mark.
5.	Answer each question. There is no penalty for guessing. However, multiple answers are graded as incorrect, and blank answers are graded as incorrect.
6.	On the scantron, fill in your last name, first name and initial. Blacken the corresponding letters.
7.	Use the test for scratch paper.
8.	Mark your answers on the test so you can check them with the key.
9.	***Turning in a blank scantron results in a grade of zero. ***
10.	You may be asked to turn in both the scantron and the exam, have your PHOTO ID and your calculator ready to be checked when you do so.
11.	Work at a steady pace and you will have ample time to finish.
12.	The keys will be posted on my class web page as soon as possible. You may check your grade at the class web site. Your password is the middle 5 numbers of your student ID followed by the first letter of your last name in CAPS. Be patient and give the webmaster time to enter all of this information.

There are 30 questions for 150 points. Good Luck!

K

EX2 CHEM101(DTM) Key FORM K 22 Oct rm100 HELD (11:30 Class)

Possibly Useful Information

$M = \frac{\text{mol solute}}{\text{L soln}}$ $M_1V_1 = M_2V_2$ $\text{density} = \frac{\text{mass}}{\text{volume}}$ $\lambda\nu = c$

$\frac{w}{w}\% = \frac{\text{mass}}{\text{total mass}} \times 100$ $E = mc^2$ $E = h\nu$ $\lambda = h/mv$ $1\ \text{Å} = 1 \times 10^{-10}\text{m}$

A periodic table is also provided on the last page of this exam.

Q.1 Classify the reaction by giving all the reaction types that apply.

I. redox ✔
II. combination
III. decomposition
IV. single displacement ✔
V. double displacement

I and IV

$Zn\ (s) + 2HC\ell\ aq) \rightarrow ZnC\ell_2\ (aq) + H_2\ (g)$

a. only II
b. only V
c. only I
d. only III
(e.) I and IV

Q.2 Determine the oxidation number of the underlined element in $Na\underline{Mn}O_4$.

(a.) +7
b. +6
c. +3
d. +1
e. +5

$+1 + 7 - 8 = 0$

Q.3 Which one of the following is not isoelectronic with neon?

a. O^{2-}
(b.) $C\ell^-$ ← 18e⁻
c. $A\ell^{3+}$
d. Mg^{2+}
e. Na^+

Q.4	The general shape of the region in space occupied by electrons is described by which quantum number?
a.	m_ℓ
(b.)	ℓ ←
c.	n
d.	m_s
e.	ψ

Q.5	The amount of energy absorbed in a process in which an electron is added to a gaseous atom is defined as …
a.	standard reduction potential
b.	first ionization energy
c.	shielding effect
(d.)	electron affinity
e.	electronegativity

Q.6	Which statement regarding the "gold foil" experiment is false?
a.	It was performed by Rutherford and his research group in the early 20th century.
b.	It suggested that atoms are mostly empty space.
c.	Most of the alpha particles passed through the foil undeflected.
(d.)	The alpha particles were repelled by the electrons.
e.	It suggested the nuclear model of the atom.

Q.7	Which two subatomic particles have approximately the same mass?
(a.)	protons and neutrons
b.	protons and electrons
c.	electrons and nuclei
d.	neutrons and electrons
e.	protons and alpha particles

Q.8	Write net ionic equation for the complete neutralization of HBr by $Ca(OH)_2$. Use H^+ rather than H_3O^+. Using the smallest integer coefficients, what is the sum of the balancing coefficients? Do not forget coefficients of one.
a.	6
(b.)	3
c.	4
d.	5
e.	7

$$2HBr_{aq} + Ca(OH)_{2\,aq} \rightarrow CaBr_{2\,aq} + 2\,H_2O(l)$$

$$2H^+ + 2OH^- \rightarrow 2\,H_2O(l)$$

$$H^+ + OH^- \rightarrow H_2O(l)$$

$$1 + 1 + 1 = 3$$

Q.9	An electron of mass 9.11×10^{-28} g is traveling at 2.50×10^{6} m/s. Calculate its de Broglie wavelength(in Å).
a.	2.90×10^{-3} Å
b.	0.029 Å
c.	0.14 Å
(d.)	2.91 Å
e.	345 Å

$\lambda = \frac{h}{mv} = \frac{6.626 \times 10^{-34}\ kg\ m^2 s^{-2} \cdot s}{9.11 \times 10^{-28}\ g * \frac{10^{-3}\ kg}{g} * 2.50 \times 10^{6}\ m \cdot s^{-1}}$

$\lambda = 2.909 \times 10^{-10}\ m = 2.91\ Å$

Q.10	Which element has the smallest radius?
a.	I
b.	At
c.	Cℓ
(d.)	F
e.	Br

all Gp VII A

Q.11	Which of the following represents the net ionic equation for all strong acid/strong base reactions that produce a soluble salt and water?
a.	$H_2O\ (\ell) + OH^-\ (aq) \rightarrow O_2\ (g) + 3/2\ H_2\ (g)$
b.	$2\ H^+\ (aq) + O^{2-}\ (aq) \rightarrow 2\ H_2O\ (\ell)$
c.	$2\ H^+\ (aq) + H_2O\ (\ell) \rightarrow 4\ OH^-\ (aq)$
d.	$2\ H^+\ (aq) + 2\ e^- \rightarrow H_2\ (g)$
(e.)	$H^+\ (aq) + OH^-\ (aq) \rightarrow H_2O\ (\ell)$

Q.12	Which of the following contains no ionic compounds?
(a.)	CH_2O, H_2S, NH_3
b.	$PC\ell_5$, LiBr, $Zn(OH)_2$
c.	KOH, $CC\ell_4$, SF_4
d.	NaH, CaF_2, $NaNH_2$
e.	HCN, NO_2, $Ca(NO_3)_2$

Q.13	Which element has the largest atomic radius?
(a.)	Rb
b.	Na
c.	I
d.	Li
e.	F

Q.14	Which of the following has the lowest first ionization energy?
a.	F
b.	B
(c.)	Sr ← metal
d.	S
e.	O

Q.15	Diamagnetism is characteristic of systems containing...
a.	one or more unpaired electrons
(b.)	no unpaired electrons
c.	only p electrons unpaired
d.	only d electrons unpaired
e.	only s electrons as valence electrons

Q.16	Which statement is false?
a.	The 4s orbitals are lower in energy than the 3d orbitals.
b.	The third energy level has d orbitals.
c.	The 5d and 4f orbitals are very close in energy.
d.	A set of p orbitals in a given energy level are equal in energy.
(e.)	An f set of orbitals is filled with 10 electrons. X

Q.17	If an element has the following electron configuration, what is the symbol for the element? $1s^2 2s^2 2p^6 3s^2 3p^5$
a.	P
(b.)	Cℓ
c.	Aℓ
d.	Si
e.	S

Q.18	A tanning booth uses ultraviolet light at a wavelength of 1000.Å. What is the frequency of this light?
a.	$3.3 \times 10^{16} s^{-1}$
b.	$2.48 \times 10^{13} s^{-1}$
(c.)	$3.0 \times 10^{15} s^{-1}$
d.	$6.63 \times 10^{16} s^{-1}$
e.	$1.5 \times 10^{26} s^{-1}$

$\nu = \frac{c}{\lambda} = \frac{3.00 \times 10^{8}\ m \cdot s^{-1}}{1000 \times 10^{-10}\ m}$

$\nu = 3.00 \times 10^{15}\ s^{-1}$

Q.19 Classify the reaction by giving all of these reaction type(s) that apply.

I. redox ✔
II. combination
III. decomposition ✔
IV. single displacement
V. double displacement

$2\ Ag_2O\ (s) \rightarrow 4\ Ag\ (s) + O_2\ (g)$

a. I only
b. I and IV
c. III only
d. I, IV, and V
(e.) I and III

I and III

Q.20 Which of the following is a strong acid?
a. H_2SO_3
b. HNO_2
c. HF
d. $HC\ell O$
(e.) $HC\ell O_3$

Q.21 Arrange the following in order of **decreasing** atomic radii.

Pb, P, Cℓ, F, Si

a. Pb > Si > P > F > Cℓ
b. Pb > Cℓ > F > Si > P
(c.) Pb > Si > P > Cℓ > F
d. Cℓ > F > Pb > Si > P
e. Pb > Cℓ > P > Si > F

Q.22 Classify the reaction by giving all of these reaction type(s) that apply.

I. redox
II. combination
III. decomposition
IV. single displacement
V. double displacement ✔

$$Ba(OH)_2\,(aq) + Na_2CO_3\,(aq) \rightarrow BaCO_3\,(s) + 2\,NaOH\,(aq)$$

a. only I
b. only IV
c. only II
(d.) only V
e. II and III

Q.23 Which element has the following electron configuration?

1s	2s	2p	3s	3p
↑↓	↑↓	↑↓ ↑↓ ↑↓	↑↓	↑ ↑ ↑

(a.) P
b. Na
c. Mg
d. Cℓ
e. Br

Q.24 What is the acidic anhydride of H_2CO_3?

a. H_2
b. CO
(c.) CO_2
d. CO_3^-
e. H_2O

Q.25 In the following reaction CO is ...

$$Fe_2O_3\,(s) + 3\,CO\,(g) \rightarrow 2\,Fe\,(s) + 3\,CO_2(g)$$

a. the oxidizing agent and is oxidized.
b. the reducing agent and is reduced.
(c.) the reducing agent and is oxidized.
d. the oxidizing agent and is reduced.
e. neither an oxidizing agent nor a reducing agent.

Q.26	Which of these elements has the greatest attraction for electrons in a covalent bond?
a.	As
b.	Ge
c.	Se
d.	Kr
(e.)	Br

EN → increase for rep. element
Ge < As < Se < Br

Q.27	Which of the following reactions is not a decomposition reaction?
(a.)	H_2 (g) + $C\ell_2$ (g) → 2 $HC\ell$ (g)
b.	2 H_2O_2 (aq) → 2 H_2O (ℓ) + O_2 (g)
c.	$Mg(OH)_2$ (s) → MgO (s) + H_2O (g)
d.	2 HgO (s) → 2 Hg (ℓ) + O_2 (g)
e.	NH_4NO_3 (s) → N_2O (g) + 2 H_2O (g)

Q.28	An element with outermost electron configuration ns^2np^3 would be in Group...
a.	IIIA
b.	IIA
(c.)	VA
d.	VIIA
e.	VIIIA

Q.29	Which one of the following elements is paramagnetic in the ground state?
a.	Mg
b.	Hg
c.	He
d.	Kr
(e.)	Se

Q.30	The total number of electrons in s orbitals in a germanium atom (Z=32) is...
(a.)	8
b.	6
c.	15
d.	20
e.	18

1S
2S
3S
4S
} 8

End of Test

Key K Exam 2

Magnuson 22 Oct 2003

30 questions each 5 points for a total of 150 points

Q1	E
Q2	A
Q3	B
Q4	B
Q5	D
Q6	D
Q7	A
Q8	B
Q9	D
Q10	D
Q11	E
Q12	A
Q13	A
Q14	C
Q15	B
Q16	E
Q17	B
Q18	C
Q19	E
Q20	E
Q21	C
Q22	D
Q23	A
Q24	C
Q25	C
Q26	E
Q27	A
Q28	C
Q29	E
Q30	A