Houston Community College System HCCS

Fall Semester 2018

General Chemistry I (CHEM 1311)

Exam II Time: 1 Hour

Student Name: _____ Student ID #_____

Instructor: Dr. Emad Akeer 100 Points

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.
4 Points Each

1) Which of the following is insoluble in water at 25 °C? 1) _____
A) $Mg_3(PO_4)_2$
B) Na_2S
C) $Ba(C_2H_3O_2)_2$
D) $(NH_4)_2CO_3$
E) $Ca(OH)_2$

2) The net ionic equation for the reaction between aqueous nitric acid and aqueous sodium hydroxide is _____. 2) _____
A) $HNO_3\ (aq) + NaOH\ (aq) \rightarrow NaNO_3\ (aq) + H_2O\ (l)$
B) $H^+\ (aq) + Na^+\ (aq) + OH^-\ (aq) \rightarrow H_2O\ (l) + Na^+\ (aq)$
C) $H^+\ (aq) + HNO_3\ (aq) + 2OH^-\ (aq) \rightarrow 2H_2O\ (l) + NO_3^-\ (aq)$
D) $HNO_3\ (aq) + OH^-\ (aq) \rightarrow NO_3^-\ (aq) + H_2O\ (l)$
E) $H^+\ (aq) + OH^-\ (aq) \rightarrow H_2O\ (l)$

3) Which of these metals will be oxidized by the ions of cobalt? 3) _____
A) silver B) iron C) copper D) nickel E) tin

4) Based on the activity series, which one of the reactions below will occur? 4) _____
A) $Zn\ (s) + MnI_2\ (aq) \rightarrow ZnI_2\ (aq) + Mn\ (s)$
B) $3Hg\ (l) + 2Cr(NO_3)_3\ (aq) \rightarrow 3Hg(NO_3)_2 + 2Cr\ (s)$
C) $SnCl_2\ (aq) + Cu\ (s) \rightarrow Sn\ (s) + CuCl_2\ (aq)$
D) $3FeBr_2\ (aq) + 2Au\ (s) \rightarrow 3Fe\ (s) + 2AuBr_3\ (aq)$
E) $2AgNO_3\ (aq) + Pb\ (s) \rightarrow 2Ag\ (s) + Pb(NO_3)_2\ (aq)$

5) Oxidation cannot occur without _____. 5) _____
A) air B) oxygen C) water D) acid E) reduction

6) Oxidation is the _____ and reduction is the _____. 6) _____

A) loss of oxygen, gain of electrons
B) gain of electrons, loss of electrons
C) gain of oxygen, loss of mass
D) gain of oxygen, loss of electrons
E) loss of electrons, gain of electrons

7) When a system _____, ΔE is <u>always</u> negative. 7) _____

A) gives off heat and has work done on it
B) absorbs heat and does work
C) absorbs heat and has work done on it
D) gives off heat and does work
E) None of the above is <u>always</u> negative.

8) Which one of the following is an endothermic process? 8) _____

A) boiling soup
B) water freezing
C) ice melting
D) Hydrochloric acid and barium hydroxide are mixed at 25 °C: the temperature increases.
E) Both A and C

9) A _____ ΔH corresponds to an _____ process. 9) _____

A) negative, endothermic
B) zero, endothermic
C) positive, endothermic
D) positive, exothermic
E) zero, exothermic

10) Of the following, _____ radiation has the shortest wavelength. 10) _____

A) radio
B) infrared
C) X–ray
D) ultraviolet
E) microwave

11) Of the following transitions in the Bohr hydrogen atom, the _____ transition results in the emission of the lowest–energy photon. 11) _____

A) $n = 6 \rightarrow n = 3$
B) $n = 3 \rightarrow n = 6$
C) $n = 1 \rightarrow n = 4$
D) $n = 1 \rightarrow n = 6$
E) $n = 6 \rightarrow n = 1$

12) Which one of the following is an <u>incorrect</u> subshell notation? 12) _____

A) 3s B) 3d C) 4f D) 2p E) 2d

13) Which of the following is not a valid set of four quantum numbers? (n, l, m_l, m_s) 13) _____

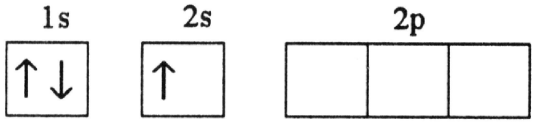
A) 2, 1, 0, –1/2
B) 1, 0, 0, +1/2
C) 2, 0, 0, +1/2
D) 3, 1, –1, –1/2
E) 1, 1, 0, +1/2

14) The ground-state electron configuration of _____ is $[Ar]4s^1 3d^5$. 14) _____

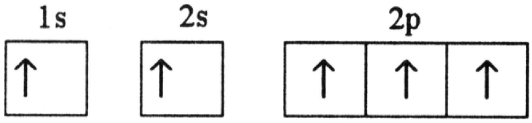
A) Cr B) V C) Fe D) K E) Mn

15) Which electron configuration represents a violation of Hund's rule for an atom in its ground state? 15) _____

A)



B)



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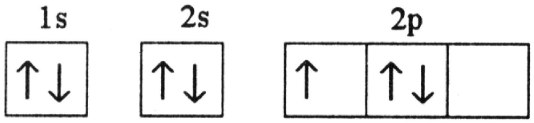

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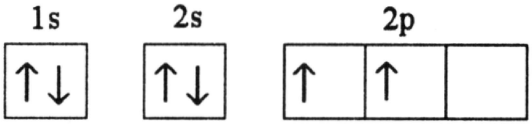
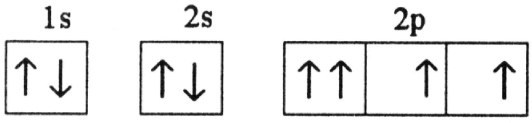


E)



You must show your calculations and units clearly for credit or partial credit.

16) Determine the oxidation number of sulfur in: 15 Points 16) _____

(a) H_2S, **(b)** Na_2SO_3, **(c)** SO_4^{2-}.

17) Predict the identity of the precipitate that forms when aqueous solutions of $BaCl_2$ and K_2SO_4 are mixed. 17) _____

Write the balanced chemical equation for the reaction.

10 points

18) The enthalpy of reaction for the combustion of C to CO_2 is −393.5 kJ/mol C, and the enthalpy for the combustion of CO to CO_2 is −283.0 kJ/mol CO: 18) _____

(**1**) $C(s) + O_2(g) \rightarrow CO_2(g)$ $\Delta H = -393.5$ kJ

(**2**) $CO(g) + 1/2\ O_2(g) \rightarrow CO_2(g)$ $\Delta H = -283.0$ kJ

Using these data, calculate the enthalpy for the combustion of C to CO:

(**3**) $C(s) + 1/2O_2(g) \rightarrow CO(g)$ $\Delta H = ?$

15 points

Answer Key
Testname: CHEM1411 EXAM II

1) A
2) E
3) B
4) E
5) E
6) E
7) D
8) E
9) C
10) C
11) A
12) E
13) E
14) A
15) C
16)
17)
18)