

Second



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Excell

Birzeit University
Chemistry Department
Chemistry 141

Second Hour Exam
Time: 80 min.

1st Sem. 2012-2013

● Student Name: Rahab Rimawi ● Student No: 1120125
● Instructor Name: Hejazi abo Ali ● Section No: Pharma-F

Important note: There are (21) equally graded questions, please answer all of them.

E	D	C	B	A	O
			X		1
				X	2
	X				3
X					4
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X					6
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			X		16
		X			17
X					18
				X	19
			X		20
		X			21

⇒ A

GOOD LUCK

● Student Name: Rahaf Rimawi

● Student No: 120125

Please read each question carefully before you answer, and choose the best correct answer.

1. Which of the following compounds is a weak electrolyte?
- A) HCl B) NH₃ C) C₆H₁₂O₆ (glucose) D) N₂ E) KCl
2. Based on the solubility rules, which one of the following should be soluble in water?
- A) (NH₄)₃PO₄ B) Ca₃(PO₄)₂ C) AlPO₄ D) Ag₃PO₄ E) Mg₃(PO₄)₂
3. Which of the following will occur when a solution containing about 0.1 g of Pb(NO₃)₂(aq) is mixed with a solution containing 0.1 g of KI(aq) /100 mL?
- A) KNO₃ will precipitate; Pb²⁺ and I⁻ are spectator ions.
B) No precipitate will form.
C) Pb(NO₃)₂ will precipitate; K⁺ and I⁻ are spectator ions.
 D) PbI₂ will precipitate; K⁺ and NO₃⁻ are spectator ions.
E) Pb²⁺ and I⁻ are spectator ions, and PbI₂ will precipitate.
4. What mass of Li₃PO₄ is needed to prepare 500. mL of a solution having a lithium ion concentration of 0.175 M?
- A) 6.75 g B) 10.1 g C) 19.3 g D) 30.4 g E) 3.38 g
5. In the following chemical reaction the oxidizing agent is
- $$5\text{S} + 6\text{KNO}_3 + 2\text{CaCO}_3 \rightarrow 3\text{K}_2\text{SO}_4 + 2\text{CaSO}_4 + \text{CO}_2 + 3\text{N}_2$$
- A) S B) N₂ C) KNO₃ D) CaSO₄ E) CaCO₃
6. Which of these properties is/are characteristic(s) of gases?
- A) High compressibility
B) Relatively large distances between molecules.
C) Formation of homogeneous mixtures regardless of the nature of gases
D) A and B.
 E) A, B, and C.
7. If the pressure of a gas sample is quadrupled and the absolute temperature is doubled, by what factor does the volume of the sample change?
- A) 8 B) 2 C) 1/2 D) 1/4 E) 1/8
8. Two moles of chlorine gas at 20.0 °C are heated to 350 °C while the volume is kept constant. The density of the gas
- A) increases B) decreases C) remains the same
D) Not enough information is given to correctly answer the question.

9. How many molecules of N_2 gas can be present in a 5.0 L flask at $50^\circ C$ and 650 mmHg?
 A) 2.1×10^{-23} molecules B) 4.9×10^{22} molecules C) 3.1×10^{23} molecules
 D) 9.8×10^{22} molecules E) 0.081 molecules
10. The mole fraction of oxygen molecules in dry air is 0.2095. What volume of dry air at 1.00 atm and $25^\circ C$ is required for burning 1.00 L of octane (C_8H_{18} , density = 0.7025 g/mL) completely, yielding carbon dioxide and water?
 A) 718 L B) 367 L C) 8980 L D) 1880 L E) 150 L
11. Which one of these gases is "lighter-than-air"?
 A) Cl_2 B) SO_2 C) PH_3 D) Ne E) NO_2
12. A sample of mercury(II) oxide is placed in a 5.00 L evacuated container and heated until it decomposes entirely to mercury metal and oxygen gas. The container is then cooled to $25^\circ C$. One now finds that the gas pressure inside the container is 1.73 atm. What mass of mercury(II) oxide was originally placed into the container?
 A) 913 g B) 76.6 g C) 1.51 g D) 45.6 g E) 153 g
13. A beaker contains 115 g of ethanol at $18.2^\circ C$. If the ethanol absorbs 1125 J of heat without losing heat to the surroundings, what will be the final temperature of the ethanol? The specific heat of ethanol is $2.46 J/g \cdot ^\circ C$.
 A) $4.08^\circ C$ B) $14.1^\circ C$ C) $18.4^\circ C$ D) $22.2^\circ C$ E) $36.4^\circ C$
14. To which one of the following reactions occurring at $25^\circ C$ does the symbol $\Delta H_f^\circ [HNO_3(l)]$ refer?
 A) $H(g) + N(g) + O_3(g) \rightarrow HNO_3(l)$
 B) $(1/2)H_2(g) + (1/2)N_2(g) + (3/2)O_2(g) \rightarrow HNO_3(l)$
 C) $HNO_3(l) \rightarrow (1/2)H_2(g) + (1/2)N_2(g) + (3/2)O_2(g)$
 D) $HNO_3(l) \rightarrow H(g) + N(g) + 3O(g)$
 E) $H_2(g) + N_2(g) + O_3(g) \rightarrow HNO_3(l)$
15. When 0.560 g of $Na(s)$ reacts with excess $F_2(g)$ to form $NaF(s)$, 13.8 kJ of heat is evolved at standard-state conditions. What is the standard enthalpy of formation (ΔH_f°) of $NaF(s)$?
 A) 24.8 kJ/mol B) 570 kJ/mol C) -24.8 kJ/mol D) -7.8 kJ/mol E) -570 kJ/mol
16. Calculate the standard enthalpy of formation of liquid methanol, $CH_3OH(l)$, using the following information:
 $C(\text{graph}) + O_2 \rightarrow CO_2(g)$ $\Delta H^\circ = -393.5 \text{ kJ/mol}$
 $H_2(g) + (1/2)O_2 \rightarrow H_2O(l)$ $\Delta H^\circ = -285.8 \text{ kJ/mol}$
 $CH_3OH(l) + (3/2)O_2(g) \rightarrow CO_2(g) + 2H_2O(l)$ $\Delta H^\circ = -726.4 \text{ kJ/mol}$
 C + $\frac{2}{2}H_2 + \frac{1}{2}O_2$
 A) -1,691.5 kJ/mol B) -238.7 kJ/mol C) 1691.5 kJ/mol D) 47.1 kJ/mol E) -47.1 kJ/mol
17. A system which undergoes an adiabatic change and has work done on it by the surroundings has
 A) $w = \Delta E$ B) $w = -\Delta E$ C) $w > 0, \Delta E < 0$ D) $w < 0, \Delta E > 0$ E) $w > \Delta E$

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18. The 4p orbital has:
A) Two total nodes B) Zero angular nodes C) Two radial nodes
D) One angular node **E) C + D are correct**
19. Select the arrangement of electromagnetic radiation which starts with the lowest energy and increases to greatest energy.
A) radio, infrared, ultraviolet, gamma rays
B) radio, ultraviolet, infrared, gamma rays
C) gamma rays, infrared, radio, ultraviolet
D) gamma rays, ultraviolet, infrared, radio
E) infrared, ultraviolet, radio, gamma rays
20. An electron in the $n = 6$ level emits a photon with a wavelength of 410.2 nm. To what energy level does the electron move?
A) $n = 1$ **B) $n = 2$** C) $n = 3$ D) $n = 4$ E) $n = 5$
21. The orientation in space of an atomic orbital is associated with
A) the principal quantum number (n).
B) the angular momentum quantum number (l).
C) the magnetic quantum number (m_l).
D) the spin quantum number (m_s).
E) None of these choices is correct.

Avogadro's number = 6.022×10^{23}

$R = 0.0821 \text{ atmL/mol K}$

$R = 8.314 \text{ J/mol K}$

$h = 6.626 \times 10^{-34} \text{ J.s}$

Rydberg constant = $1.096776 \times 10^7 \text{ m}^{-1}$

g x uv v IR no . r

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Birzeit University---Chemistry Department

2nd Hr. Exam

Chem. 141

2nd Sem. 2013/2014

17/12/2013

Time: 65 Minutes

Instructors: Dr. Zaki Hassan (Sections 1 and 2)

Dr. Abdullatif Abuhijleh (Sections 3 and 4)

Dr. Mazen Hamed (Sections 5 and 6)

Student name

Student No.

Student Section

(Gas constant, $R=0.0821 \text{ atm}\cdot\text{L}/\text{mol}\cdot\text{K}$; Planck's constant, $h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$ or $\text{kg}\cdot\text{m}^2/\text{s}$; Speed of Light, $c = 3.00 \times 10^8 \text{ m/s}$; Rydberg constant, $R = 1.096776 \times 10^7 \text{ m}^{-1}$; Bohr constant = $2.18 \times 10^{-18} \text{ J}$)

$n = 0.376 \rightarrow n = 2.745$, $P_1 V_1 = nRT =$

Circle the correct answer

1. A sample of carbon dioxide gas at 125°C and 248 torr occupies a volume of 275 L. What will the gas pressure be if the volume is increased to 321 L at 125°C?

- A) 212 torr B) 289 torr C) 356 torr D) 441 torr E) 359 torr

2. A sample of ideal gas at 65.5°C and 524 torr has a volume of 15.31 L. What is its volume when the temperature is (-15.8°C) and its pressure is 524 torr?

- A) 3.69 L
B) 11.6 L
C) 20.2 L
D) 63.5 L
E) It is not possible, since the volume would have to be negative.

3. A 250.0-mL sample of ammonia, $\text{NH}_3(\text{g})$, exerts a pressure of 833 torr at 42.4°C. What mass of ammonia is in the container?

- A) 0.0787 g B) 59.8 g C) 8.04 g D) 17.0 g E) 0.180 g

4. A flask with a volume of 3.16 L contains 9.33 grams of an unknown gas at 32.0°C and 1.00 atm. What is the molar mass of the gas?

- A) 7.76 g/mol B) 66.1 g/mol C) 74.0 g/mol D) 81.4 g/mol E) 144 g/mol

$n = 0.376$
 $n = \frac{PV}{RT}$
 $\frac{RT}{P} = 0.057$
 $n = \frac{m}{M}$
 $M = \frac{mRT}{PV}$

5. Which of the following gases effuses most rapidly?
- A) nitrogen $N_2 \rightarrow 28$
 B) oxygen $O_2 \rightarrow 32$
 C) hydrogen chloride $HCl \rightarrow 36.5$
 D) ammonia $NH_3 \rightarrow 17$
 E) carbon monoxide $CO \rightarrow 28$

6. Small quantities of hydrogen can be prepared by the addition of hydrochloric acid to zinc. A sample of 195 mL of hydrogen was collected over water at 25°C and 753 torr. What mass of hydrogen was collected? ($P_{\text{water}} = 24$ torr at 25°C) $2HCl + Zn \rightarrow ZnCl_2 + H_2$
- A) 0.00765 g **B) 0.0154 g** C) 0.0159 g D) 0.0164 g E) 0.159 g

7. A gas mixture with a total pressure of 300. torr, consists of equal masses of Ne (atomic weight 20) and Ar (atomic weight 40). What is the partial pressure of Ar, in torr?
- A) 100. torr B) 75 torr C) 150. torr D) 200. torr E) None of these choices is correct.
- Handwritten notes:
 $n_{Ar} = m$
 $n_{Ne} = m$
 $2n_{Ar} = 20n_{Ne}$
 $Ar = n_{Ne}$
 $V = \frac{n_{Ar}}{n_{tot}} P_{tot}$
 $X = \frac{m}{40} = \frac{1}{3}$
 $P_{Ar} = \frac{1}{3} \times 300 = 100$
 $n_{tot} = \frac{n_{Ar} + n_{Ne}}{40} = \frac{m}{40} + \frac{m}{20} = \frac{3m}{40}$

8. A 20.0 L container holds 15.3 mol of Cl_2 gas at 227°C. Calculate the pressure, assuming real gas behavior. The van der Waals constants for Cl_2 are $a = 6.49$ atm·L²/mol² and $b = 0.0562$ L/mol.

Real gas equation: $(P + \frac{n^2 a}{V^2})(V - nb) = nRT$

Handwritten calculation:
 $(P + \frac{(15.3)^2 (6.49)}{20^2})(20 - (15.3 \times 0.0562)) = 15.3 (0.0821) (500)$
 $(P + 3.8)(19.14) = 15.3 (0.0821) (500)$
 $P + 3.8 = \frac{619.5}{19.14} = 32.37$
 $P = 32.37 - 3.8 = 28.57$
 Closest answer is B) 29.0 atm.

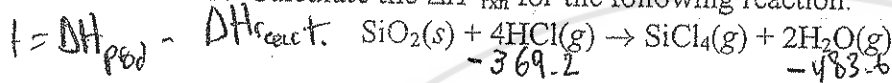
9. How much faster will hydrogen effuse than oxygen through the same hole at the same temperature?
- A) 0.25 B) 2.83 C) 0.50 D) 16 **E) 4**
- Handwritten notes:
 $\frac{\text{speed } H_2}{\text{speed } O_2} = 4$
 $\frac{v_{H_2}}{v_{O_2}} = \sqrt{\frac{M_{O_2}}{M_{H_2}}} = \sqrt{\frac{32}{2}} = 4$

10. A system delivers (gives) 225 J of heat to the surroundings while delivering 645 J of work. Calculate the change in the internal energy, ΔE , of the system.
- A) -420 J B) 420 J C) 870 J **D) -870 J** E) -225 J
- Handwritten note: $-225 J$

11. Ethylene glycol, used as a coolant in automotive engines, has a specific heat capacity of $2.42 \text{ J/(g}\cdot\text{K)}$. Calculate q (heat) when 3.65 kg of ethylene glycol is cooled from 132°C to 85°C .

- A) -1900 kJ (B) -420 kJ C) -99 kJ D) -0.42 kJ E) $-4.2 \times 10^{-6} \text{ kJ}$

12. Calculate the $\Delta H^\circ_{\text{rxn}}$ for the following reaction:



Given the following data: $\Delta H^\circ_f[\text{SiO}_2(\text{s})] = -910.9 \text{ kJ/mol}$; $\Delta H^\circ_f[\text{SiCl}_4(\text{g})] = -657.0 \text{ kJ/mol}$; $\Delta H^\circ_f[\text{HCl}(\text{g})] = -92.3 \text{ kJ/mol}$; $\Delta H^\circ_f[\text{H}_2\text{O}(\text{g})] = -241.8 \text{ kJ/mol}$

- A) -139.5 kJ B) -137.4 kJ C) -104.4 kJ D) 104.4 kJ (E) 139.5 kJ

13. An electron in the $n = 6$ level emits a photon with a wavelength of 410.2 nm . To what energy level does the electron move?

- (A) $n = 1$ B) $n = 5$ C) $n = 3$ D) $n = 4$ (E) $n = 2$

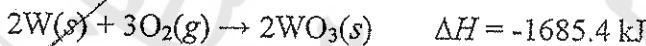
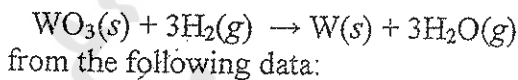
14. If the energy of a photon is $1.32 \times 10^{-18} \text{ J}$, what is its wavelength in nm?

- (A) $1.50 \times 10^{-7} \text{ nm}$ (D) $150. \text{ nm}$
 B) $1.99 \times 10^{24} \text{ nm}$ E) None of these choices is correct.
 C) $1.99 \times 10^{15} \text{ nm}$

15. Electromagnetic radiation of 500 nm wavelength lies in what region of the spectrum?

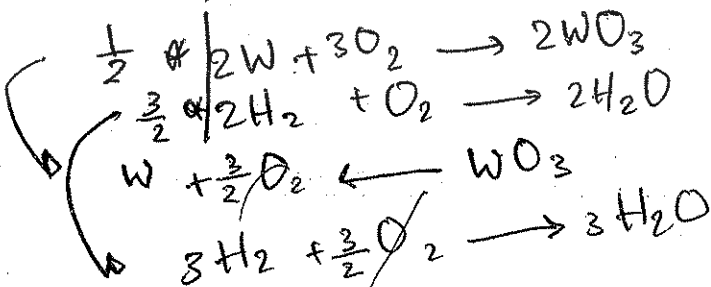
- A) infrared (B) visible C) ultraviolet D) X-ray E) γ -ray

16. Use Hess's Law to calculate the enthalpy change for the reaction



- (A) 125.9 kJ
 (B) 252.9 kJ
 (C) 364.9 kJ

- D) 1207.6 kJ
 E) None of these choices is correct.



$$\Delta H = -1685.4 \text{ kJ} \quad \times \frac{1}{2}$$

$$\rightarrow = +842.7$$

$$\Delta H = -477.84 \quad \times \frac{3}{2}$$

$$= -716.76$$

$$\Delta H = 842.7 - 716.76$$

17. The shape of an atomic orbital is associated with

- A) the principal quantum number (n).
- B) the angular momentum quantum number (l).
- C) the magnetic quantum number (m_l).
- D) the principal quantum number and magnetic quantum number.
- E) none of the above

18. Use the Rydberg equation to calculate the frequency of a photon absorbed when the hydrogen atom undergoes a transition from $n_1 = 2$ to $n_2 = 4$. ($R = 1.096776 \times 10^7 \text{ m}^{-1}$)

- A) $2.056 \times 10^6 \text{ s}^{-1}$
- B) $2.742 \times 10^6 \text{ s}^{-1}$
- C) $6.165 \times 10^{14} \text{ s}^{-1}$
- D) $8.226 \times 10^{14} \text{ s}^{-1}$
- E) $> 10^{15} \text{ s}^{-1}$

19. Which of the following is a correct set of quantum numbers for an electron in a $3p$ atomic orbital?

- A) $n = 3, l = 1, m_l = -1$
 - B) $n = 3, l = 0, m_l = +1$
 - C) $n = 3, l = 2, m_l = 3$
 - D) $n = 3, l = 3, m_l = +1$
 - E) $n = 3, l = 1, m_l = -2$
- $n=3 \rightarrow L=1$

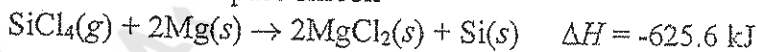
20. Use the Bohr equation to calculate the energy needed to ionize a hydrogen atom from its ground state.

- A) $2.18 \times 10^{-18} \text{ J}$
- B) $4.59 \times 10^{17} \text{ J}$
- C) $4.36 \times 10^{-18} \text{ J}$
- D) Zero J
- E) $1.09 \times 10^{-18} \text{ J}$

$$E = \frac{-2.18 \times 10^{-18}}{n^2}$$

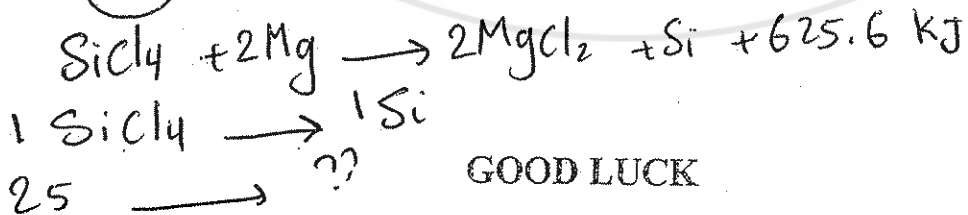
$$= \frac{-2.18 \times 10^{-18}}{(1)^2}$$

21. Sand is converted to pure silicon



What is the enthalpy change when 25.0 mol of silicon tetrachloride (SiCl_4) is converted to elemental silicon ($\text{Si}(s)$) ?

- A) -25.0 kJ
- B) -7820 kJ
- C) $-1.56 \times 10^4 \text{ kJ}$
- D) $-3.13 \times 10^4 \text{ kJ}$
- E) None of these choices is correct.



$$\Delta H = \frac{-9}{\text{\# of moles of Si}}$$

Birzeit University---Chemistry Department

2st Hr. Exam

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Instructors: Dr. Zaki Hassan (Sections 1 and 2)
Dr. Abdullatif Abuhijleh (Sections 3 and 4)
Dr. Mazen Hamed (Sections 5 and 6)

Student name Lina Hirbawi

Student No. 1131197

Student Section 1

(Gas constant, $R=0.0821 \text{ atm}\cdot\text{L}/\text{mol}\cdot\text{K}$; Planck's constant, $h = 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$ or $\text{kg}\cdot\text{m}^2/\text{s}$; Speed of Light, $c= 3.00 \times 10^8 \text{ m/s}$; Rydberg constant, $R = 1.096776 \times 10^7 \text{ m}^{-1}$; Bohr constant = $2.18 \times 10^{-18} \text{ J}$)

Circle the correct answer

1. A sample of carbon dioxide gas at 125°C and 248 torr occupies a volume of 275 L. What will the gas pressure be if the volume is increased to 321 L at 125°C?
- A) 212 torr B) 289 torr C) 356 torr D) 441 torr E) 359 torr
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18
20

5. Which of the following gases effuses most rapidly?
 23 A) nitrogen N_2
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 A) 100. torr D) 200. torr
 B) 75 torr E) None of these choices is correct.
 C) 150. torr

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Real gas equation : $(P + n^2a/V^2)(V - nb) = nRT$

- A) 31.4 atm D) 14.5 atm
 B) 29.0 atm E) 29.0 torr
 C) 46.9
9. How much faster will hydrogen effuse than oxygen through the same hole at the same temperature?
 A) 0.25 D) 16
 B) 2.83 E) 4
 C) 0.50

10. A system delivers (gives) 225 J of heat to the surroundings while delivering 645 J of work. Calculate the change in the internal energy, ΔE , of the system.

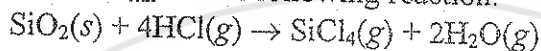
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11. Ethylene glycol, used as a coolant in automotive engines, has a specific heat capacity of $2.42 \text{ J/(g}\cdot\text{K)}$. Calculate q (heat) when 3.65 kg of ethylene glycol is cooled from 132°C to 85°C .

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- (A) -139.5 kJ B) -137.4 kJ C) -104.4 kJ D) 104.4 kJ (E) 139.5 kJ

13. An electron in the $n = 6$ level emits a photon with a wavelength of 410.2 nm . To what energy level does the electron move?

- A) $n = 1$ B) $n = 5$ C) $n = 3$ D) $n = 4$ (E) $n = 2$

14. If the energy of a photon is $1.32 \times 10^{-18} \text{ J}$, what is its wavelength in nm?

- A) $1.50 \times 10^{-7} \text{ nm}$
 B) $1.99 \times 10^{24} \text{ nm}$
 C) $1.99 \times 10^{15} \text{ nm}$

~~150. nm~~ correct
 None of these choices is correct.

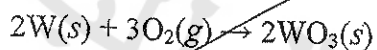
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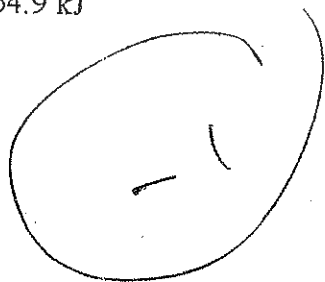


$\leftarrow \frac{\times 2}{2}$

$\frac{\times 3}{2}$

~~842.7~~
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 - D) the principal quantum number and magnetic quantum number.
 - E) none of the above.
18. Use the Rydberg equation to calculate the frequency of a photon absorbed when the hydrogen atom undergoes a transition from $n_1 = 2$ to $n_2 = 4$. ($R = 1.096776 \times 10^7 \text{ m}^{-1}$)
- A) $2.056 \times 10^6 \text{ s}^{-1}$
 - B) $2.742 \times 10^7 \text{ s}^{-1}$
 - C) $6.165 \times 10^{14} \text{ s}^{-1}$
 - D) $8.226 \times 10^{14} \text{ s}^{-1}$
 - E) $> 10^{15} \text{ s}^{-1}$
19. Which of the following is a correct set of quantum numbers for an electron in a $3P$ atomic orbital?
- A) $n = 3, l = 1, m_l = -1$
 - B) $n = 3, l = 0, m_l = +1$
 - C) $n = 3, l = 2, m_l = 3$
 - D) $n = 3, l = 3, m_l = +1$
 - E) $n = 3, l = 1, m_l = -2$
20. Use the Bohr equation to calculate the energy needed to ionize a hydrogen atom from its ground state.
- A) $2.18 \times 10^{-18} \text{ J}$
 - B) $4.59 \times 10^{17} \text{ J}$
 - C) $4.36 \times 10^{-18} \text{ J}$
 - D) Zero J
 - E) $1.09 \times 10^{-18} \text{ J}$
21. Sand is converted to pure silicon
- $$\text{SiCl}_4(g) + 2\text{Mg}(s) \rightarrow 2\text{MgCl}_2(s) + \text{Si}(s) \quad \Delta H = -625.6 \text{ kJ}$$
- What is the enthalpy change when 25.0 mol of silicon tetrachloride (SiCl_4) is converted to elemental silicon ($\text{Si}(s)$) ?
- A) -25.0 kJ
 - B) -7820 kJ
 - C) $-1.56 \times 10^4 \text{ kJ}$
 - D) $-3.13 \times 10^4 \text{ kJ}$
 - E) None of these choices is correct.

GOOD LUCK

MAIN-GROUP ELEMENTS

Periodic Table of the Elements

MAIN-GROUP ELEMENTS

- Metals (main-group)
- Metals (transition)
- Metals (inner transition)
- Metalloids
- Nonmetals

1A (1)		TRANSITION ELEMENTS										MAIN-GROUP ELEMENTS							2 8A (18)															
1 H 1.008 (2)	2A (2)	3B (3)	4B (4)	5B (5)	6B (6)	7B (7)	8B (8)	9B (9)	10B (10)	11B (11)	12B (12)	13 3A (13)	14 4A (14)	15 5A (15)	16 6A (16)	17 7A (17)	18 8A (18)																	
Li 6.941	Be 9.012	Na 22.99	Mg 24.31	Al 26.98	Si 28.09	P 30.97	S 32.07	Cl 35.45	Ar 39.95	K 39.10	Ca 40.08	Sc 44.96	Ti 47.88	V 50.94	Cr 52.00	Mn 54.94	Fe 55.85	Co 58.93	Ni 58.69	Cu 63.55	Zn 65.41	Ga 69.72	Ge 72.61	As 74.92	Se 78.96	Br 79.90	Kr 83.80							
Rb 85.47	Sr 87.62	Y 88.91	Zr 91.22	Nb 92.91	Mo 95.94	Tc (98)	Ru 101.1	Rh 102.9	Pd 106.4	Ag 107.9	Cd 112.4	In 114.8	Sn 118.7	Sb 121.8	Te 127.6	I 126.9	Xe 131.3	Ba 137.3	La 138.9	Hf 178.5	Ta 180.9	W 183.9	Re 186.2	Os 190.2	Ir 192.2	Pt 195.1	Au 197.0	Hg 200.6	Tl 204.4	Pb 207.2	Bi 209.0	Po (209)	At (210)	Rn (222)
Fr (223)	Ra (226)	Ac (227)	Th (232)	Pa (231)	U (238)	Np (237)	Pu (244)	Am (243)	Cm (247)	Bk (247)	Cf (251)	Es (252)	Fm (257)	Md (258)	No (259)	Lr (260)																		

INNER TRANSITION ELEMENTS

6 Lanthanides	59 Ce 140.1	58 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
7 Actinides	89 Th 232.0	90 Pa (231)	91 U 238.0	92 Np (237)	93 Pu 242	94 Am (243)	95 Cm (247)	96 Bk (247)	97 Cf (251)	98 Es (252)	99 Fm (257)	100 Md (258)	101 No (259)	102 Lr (260)

As of late 2007, elements 112 through 116 have not been named.

(13)
20

Birzeit University---Chemistry Department

2nd Hr. Exam

Chem. 141

1st. Sem.2014/2015

30/11/2014

Time: 80 Minutes

Instructors: Dr.Adil Alhidmeh(section 1)

Mr.Adi Qamhieh(section 2)

Dr. Zaki Hassan (Section 3)

Dr.Abdullatif Abuhijleh (Sections 4)

Student name Shorouq Odeh

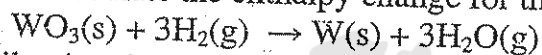
Student No. 110564

Student Section -----

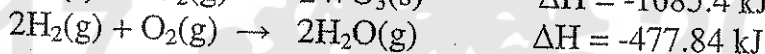
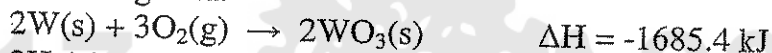
Constants : (gas constant $R= 0.0821 \text{ atm.L/mol.K}$, Plank's constant $(h)= 6.626 \times 10^{-34} \text{ J}\cdot\text{s}$, speed of light $=3.00 \times 10^8 \text{ m/s}$)

Circle the correct answer

1. Use Hess's Law to calculate the enthalpy change for the reaction:



from the following data:



A) 1207.6 kJ

D) 364.9 kJ

B) 125.9 kJ

E) None of these choices is correct

C) 252.9 kJ

2

2. Complete this sentence: Atoms emit visible and ultraviolet light -----

A. as electrons jump from higher energy levels to lower levels.

B. as they are heated and the solid melts to form a liquid.

C. as the electrons move about the atom within an orbit.

D. as electrons jump from lower energy levels to higher levels.

E. as the atoms condense from a gas to a liquid.

3. Which of the following is a correct set of quantum numbers for an electron in a 3p atomic orbital?

A) $n = 3, l = 3, m_l = 3$

C) $n = 3, l = 1, m_l = -1$

E) $n = 4, l = 3, m_l = 0$

B) $n = 3, l = 0, m_l = +1$

D) $n = 3, l = 2, m_l = +2$

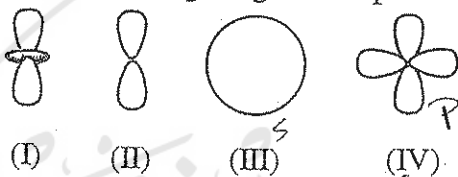
4. Methane, $\text{CH}_4(\text{g})$, reacts with steam ($\text{H}_2\text{O}(\text{g})$) to give synthesis gas, a mixture of carbon monoxide and hydrogen:



What mass of hydrogen is formed if 275 L of methane (measured at STP, zero°C and 1 atm) is converted to synthesis-gas?

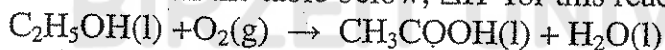
- A) 49.4 g
 B) 73.6 g
 C) 12.3 g
 D) 24.7 g
 E) 37.1 g

5. Which of the following diagrams represent d-orbitals?



- A) (I) only
 B) (II) only
 C) (III) only
 D) (IV) only
 E) (I) and (IV)

6. Given the data in the table below, ΔH^0 for this reaction is _____ kJ.



Substance	ΔH_f^0 (kJ/mol)
$\text{C}_2\text{H}_5\text{OH}(\text{l})$	-277.7
$\text{CH}_3\text{COOH}(\text{l})$	-484.5
$\text{H}_2\text{O}(\text{l})$	-285.8

- A) -476.4 kJ
 B) -79.0 kJ
 C) -492.6 kJ
 D) -1048.0 kJ
 E) The value of ΔH^0 can't be determined from this data

7. Use the Rydberg equation to calculate the frequency of a photon absorbed when the hydrogen atom undergoes a transition from $n_1 = 2$ to $n_2 = 4$. ($R = 1.096776 \times 10^7 \text{ m}^{-1}$)

- A) $6.165 \times 10^{14} \text{ s}^{-1}$
 B) $> 10^{15} \text{ s}^{-1}$
 C) $8.226 \times 10^{14} \text{ s}^{-1}$
 D) $2.742 \times 10^6 \text{ s}^{-1}$
 E) $2.056 \times 10^6 \text{ s}^{-1}$

8. A sample container of carbon monoxide occupies a volume of 435 mL at a pressure of 785 torr and a temperature of 298 K. What would its temperature be if the volume were changed to 265 mL at a pressure of 785 torr?

- A) 489 K
 B) 538 K
 C) 182 K
 D) 298 K
 E) 387 K

9. What is the pressure in a 7.50 Liter flask if 0.15 mol of carbon dioxide is added to 0.33 mol of oxygen? The temperature of the mixture is 48.0°C.
- A) 3.96 atm
 B) 4.80 atm
 C) 0.252 atm
 D) 0.592 atm
 E) 1.69 atm
10. If helium diffuses through a porous barrier at a rate of 4.0 moles per minute, at what rate (in moles per minute) would oxygen gas diffuse?
- A) 8.0
 B) 1.41
 C) 0.20
 D) 0.50
 E) 2.0
11. When the electron in a hydrogen atom moves from $n = 6$ to $n = 2$, light with a wavelength of _____ is emitted.
- A) 93.8nm
 B) 487nm
 C) 411nm
 D) 434nm
 E) 657nm
12. Calcium hydroxide, which reacts with carbon dioxide to form calcium carbonate, was used by the ancient Romans as mortar in stone structures. The reaction for this process is
- $$\text{Ca(OH)}_2(\text{s}) + \text{CO}_2(\text{g}) \rightarrow \text{CaCO}_3(\text{s}) + \text{H}_2\text{O}(\text{l}) \quad \Delta H = -69.1 \text{ kJ}$$
- What is the enthalpy change if 3.8 mol of calcium carbonate is formed?
- A) -260 kJ and exothermic
 B) -73 kJ and exothermic
 C) +260 kJ and endothermic
 D) -69 kJ and exothermic
 E) -18 kJ and endothermic
13. Calculate q (heat) when 28.6 g of water is cooled from 78.3°C to 22.0 °C
- A) 1.61×10^3 kJ
 B) -9.37 kJ
 C) -1.61 kJ
 D) 0.385 kJ
 E) -6.74 kJ
14. A system absorbs 21.6 kJ of heat while performing 6.9 kJ of work on the surroundings. If the initial internal energy, E , is 61.2 kJ, what is the final value of E ?
- A) 82.8 kJ
 B) 32.7 kJ
 C) 46.5 kJ
 D) 89.7 kJ
 E) 75.9 kJ
15. A sample of methane gas, $\text{CH}_4(\text{g})$, occupies a volume of 60.3 L at a pressure of 469 torr and a temperature of 29.3°C. What would be its temperature at a pressure of 243 torr and the same volume (60.3 L)?
- A) 310.6°C
 B) 15.5°C
 C) 57.7°C
 D) 15.2°C
 E) -116.5°C



BIRZEIT UNIVERSITY

CHEMISTRY DEPARTMENT

CHEMISTRY 141

79
78

SECOND HOUR EXAM

Tuesday, Dec. 1st, 2015

First Semester 2015/2016

Time; 90 min

Student Name: Saja Omar Mesteh.

Student No. 1151174.

Circle your **discussion** lecture

Dr. Hani Awad (Sec.1) (R 11:00-11:50)

Miss. Salam Maloul (Sec.2) (T 13:00 - 13:50)

Dr. Adel Hidmi (Sec.3) (S 13:00 - 13:50)

Dr. Ismail Badran (Sec.4) (R 09:00 - 09:50)

Dr. Mohammad Qneibi (Sec.5) (S 8:00-8:50)

GOOD LUCK

Student Name: Saja Omar Mesleh.

Fill the correct answer by putting a cross in the box

T/F Questions	True	False
1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
2	<input checked="" type="checkbox"/>	<input type="checkbox"/>
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>
8	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10	<input type="checkbox"/>	<input checked="" type="checkbox"/>

4

MC Question	A	B	C	D	E
1	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
6	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
9	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
14	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

15

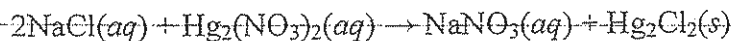
GOOD LUCK

A. Part One - True/False Questions

1. F Water is a polar molecule that can dissolve many covalent as well as ionic compounds.
2. T In an acid-base (neutralization) reaction the indicator will change color at the end point.
3. T At constant pressure, the density of the gas is directly proportional to its molecular mass and inversely proportional to its temperature.
4. F In an oxidation-reduction (redox) reaction, the oxidizing agent undergoes loss of electrons.
5. F Ammonia (NH_3) effuses faster than helium gas (He).
6. F The average kinetic energy of gas molecules is proportional to the absolute temperature.
7. T If a system does work (w) on the surrounding, then work would be negative.
8. T The standard heat (enthalpy) of formation of nitrogen gas, $\text{N}_2(\text{g})$, is zero.
9. F Bohr's model of the atom worked beautifully for all atoms in the periodic table.
10. F Heisenberg's uncertainty principle allows us to locate both the position and the speed of subatomic particles, like electrons.

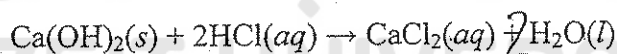
B. Multiple Choice Questions

1. Select the net ionic equation for the reaction between sodium chloride and mercury(I) nitrate.



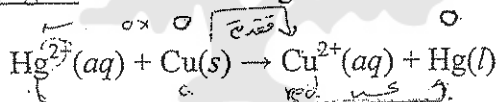
- A) $\text{Na}^+(aq) + \text{NO}_3^-(aq) \rightarrow \text{NaNO}_3(aq)$
B) $\text{Hg}_2^{2+}(aq) + 2\text{Cl}^-(aq) \rightarrow \text{Hg}_2\text{Cl}_2(s)$
C) $\text{NaCl}(aq) \rightarrow \text{Na}^+(aq) + \text{Cl}^-(aq)$
D) $\text{Hg}_2(\text{NO}_3)_2(aq) \rightarrow \text{Hg}_2^{2+}(aq) + 2\text{NO}_3^-(aq)$
E) $\text{Hg}_2^{2+}(aq) \rightarrow \text{Hg}_2(s)$

2. A 0.00100 mol sample of $\text{Ca}(\text{OH})_2$ requires 25.00 mL of aqueous HCl for neutralization according to the reaction below. What is the concentration of the HCl?



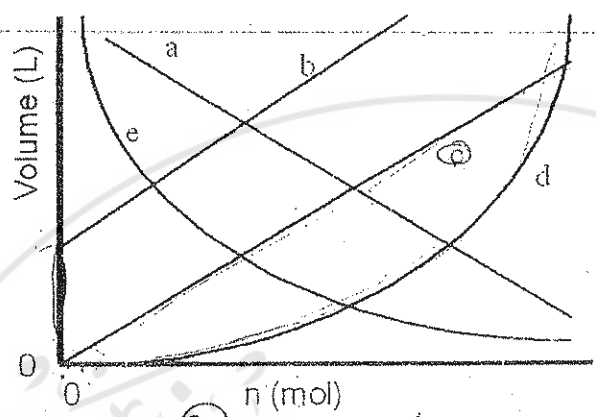
- A) 0.0200 M
B) 0.0400 M
C) 0.0800 M
D) $4.00 \times 10^{-5} M$
E) None of these choices is correct.

3. Identify the oxidizing agent in the following redox reaction.



- A) $\text{Hg}^{2+}(aq)$ B) $\text{Cu}(s)$ C) $\text{Cu}^{2+}(aq)$ D) $\text{Hg}(l)$ E) $\text{Hg}^{2+}(aq)$ and $\text{Cu}^{2+}(aq)$

4. Which of the lines on the figure below is the best representation of the relationship between the volume and the number of moles of a gas, measured at constant temperature and pressure?



- A) a B) b C) c D) d E) e

5. A sample of propane has a volume of 35.3 L at 315 K and 922 torr. What is its volume at STP?

- A) 25.2 L B) 30.6 L C) 33.6 L D) 37.1 L E) 49.2 L

6. A gas mixture, with a total pressure of 300. torr, consists of equal masses of Ne (atomic weight 20.) and Ar (atomic weight 40.). What is the partial pressure of Ar, in torr?

- A) 75 torr
 B) 100. Torr
 C) 150. torr
 D) 200. torr
 E) None of these choices is correct.

7. Magnesium metal (0.100 mol) and a volume of aqueous hydrochloric acid that contains 0.500 mol of HCl are combined and react to completion. How many liters of hydrogen gas, measured at STP, are produced?



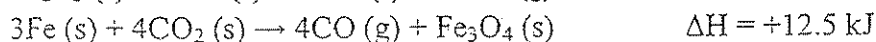
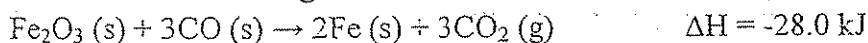
- A) 2.24 L of H₂
B) 4.48 L of H₂
C) 5.60 L of H₂
D) 11.2 L of H₂
E) 22.4 L of H₂
8. The ΔE of a system that releases 12.4 J of heat and does 4.2 J of work on the surroundings is _____ J.

- A) 16.6
B) 12.4
C) 4.2
D) -16.6
E) -8.2

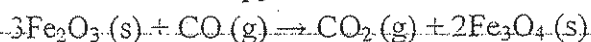
9. The specific heat of liquid bromine is 0.226 J/g-K. How much heat (J) is required to raise the temperature of 10.0 mL of bromine from 25.00°C to 27.30°C? The density of liquid bromine: 3.12 g/mL.

- A) 5.20
B) 16.2
C) 300
D) 32.4
E) 10.4

10. Given the following reactions -



What is the enthalpy of the reaction of Fe_2O_3 with CO in kJ?



- A) -59.0
- B) 40.5
- C) -15.5
- D) -109
- E) +109

$$q = -q$$
$$cm\Delta T = cm\Delta T$$
$$4.184(50) = c(75.0)$$
$$c = 0.278$$

11. A piece of copper metal is initially at 100.0°C . It is dropped into a coffee cup calorimeter containing 50.0 g of water at a temperature of 20.0°C . After stirring, the final temperature of both copper and water is 25.0°C . Assuming no heat losses, and that the specific heat (capacity) of water is $4.18 \text{ J}/(\text{g}\cdot\text{K})$, what is the heat capacity of the copper in J/K ?

- A) 2.79 J/K
- B) 3.33 J/K
- C) 13.9 J/K
- D) 209 J/K
- E) None of these choices is correct.

12. The wavelength of a photon that has an energy of $5.25 \times 10^{-19} \text{ J}$ is _____ m.

- A) 3.79×10^{-7}
- B) 2.64×10^6
- C) 2.38×10^{23}
- D) 4.21×10^{-24}
- E) 3.79×10^7

13. Calculate the energy (J) change associated with an electron transition from $n = 2$ to $n = 5$ in a Bohr hydrogen atom (Hint, use the formula provided at the end of the exam)

- A) 6.5×10^{-19}
- B) 5.5×10^{-19}
- C) 8.7×10^{-20}
- D) 4.6×10^{-19}
- E) 5.8×10^{-33}

Bonus Questions

14. Which of the following is a correct set of quantum numbers for an electron in a 5f orbital?

$n = 5$
 $l = 3$

- (A) $n = 5, l = 3, m_l = +1$ D) $n = 4, l = 2, m_l = +1$
B) $n = 5, l = 2, m_l = +3$ E) $n = 5, l = 4, m_l = 3$
C) $n = 4, l = 3, m_l = 0$

15. From your study of atomic orbitals, circle the INCORRECT statement

- (A) A (2s) orbital can hold a maximum of two electrons
(B) The quantum number (l) is called the angular momentum quantum number.
(C) The magnetic quantum number (m_l) cannot have negative values.
(D) The radial probability distribution (sum of all ψ^2) for any atomic orbital is zero at the nucleus ($r = 0$)
(E) 3s and 3p orbitals in the hydrogen atom are degenerate (have the same energy)

BIRZEIT UNIVERSITY

2017



2016

مجلس الطلبة

GOOD LUCK

The Periodic Table of the Elements

1	H Hydrogen 1.00794	2	He Helium 4.003
3	Li Lithium 6.941	4	Be Beryllium 9.012182
5	B Boron 10.811	6	C Carbon 12.0107
7	N Nitrogen 14.00674	8	O Oxygen 15.9994
9	F Fluorine 18.9984032	10	Ne Neon 20.1797
11	Na Sodium 22.989770	12	Mg Magnesium 24.3050
13	Al Aluminum 26.981538	14	Si Silicon 28.0855
15	P Phosphorus 30.973761	16	S Sulfur 32.066
17	Cl Chlorine 35.4537	18	Ar Argon 39.948
19	K Potassium 39.0983	20	Ca Calcium 40.078
21	Sc Scandium 44.955910	22	Ti Titanium 47.867
23	V Vanadium 50.9415	24	Cr Chromium 51.9961
25	Mn Manganese 54.938049	26	Fe Iron 55.845
27	Co Cobalt 58.933200	28	Ni Nickel 58.6934
29	Cu Copper 63.546	30	Zn Zinc 65.39
31	Ga Gallium 69.723	32	Ge Germanium 72.61
33	As Arsenic 74.92160	34	Se Selenium 78.96
35	Br Bromine 79.904	36	Kr Krypton 83.80
37	Rb Rubidium 85.4678	38	Sr Strontium 87.62
39	Y Yttrium 88.90585	40	Zr Zirconium 91.224
41	Nb Niobium 92.90638	42	Mo Molybdenum 95.94
43	Tc Technetium (98)	44	Ru Ruthenium 101.07
45	Rh Rhodium 102.90550	46	Pd Palladium 106.42
47	Ag Silver 107.8682	48	Cd Cadmium 112.411
49	In Indium 114.818	50	Sn Tin 118.710
51	Sb Antimony 121.760	52	Te Tellurium 127.60
53	I Iodine 126.90447	54	Xe Xenon 131.29
55	Cs Cesium 132.90545	56	Ba Barium 137.327
57	La Lanthanum 138.9055	58	Ce Cerium 140.116
72	Hf Hafnium 178.49	73	Ta Tantalum 180.94790
74	W Tungsten 183.84	75	Re Rhenium 186.207
76	Os Osmium 190.23	77	Ir Iridium 192.217
78	Pt Platinum 195.078	79	Au Gold 196.96655
80	Hg Mercury 200.59	81	Tl Thallium 204.3833
82	Pb Lead 207.2	83	Bi Bismuth 208.98038
84	Po Polonium (209)	85	At Astatine (210)
86	Rn Radon (222)	87	Fr Francium (223)
88	Ra Radium (226)	89	Ac Actinium (227)
104	Rf Rutherfordium (261)	105	Db Dubnium (262)
106	Sg Seaborgium (266)	107	Bh Bohrium (267)
108	Hs Hassium (268)	109	Mt Meitnerium (269)
110	Ds Darmstadtium (271)	111	Rg Roentgenium (272)
112	Cn Copernicium (285)	113	Nh Nihonium (286)
114	Fl Flerovium (289)	115	Mc Moscovium (290)
116	Lv Livermorium (293)	117	Ts Tennessine (294)
118	Og Oganesson (294)	119	Uu Ununennium (295)
120	Ubn Unbinilium (296)	121	Uub Unbihassium (297)
122	Ubu Unbibium (299)	123	Ubc Unbibismium (301)
124	Ubd Unbiberyllium (303)	125	Ube Unbihexium (305)
126	Ubf Unbihafnium (307)	127	Ubg Unbihgmonium (309)
128	Ubh Unbihassium (311)	129	Ubi Unbihassium (313)
130	Ubl Unbihassium (315)	131	Ubm Unbihassium (317)
132	Ubn Unbihassium (319)	133	Ubo Unbihassium (321)
134	Ubn Unbihassium (323)	135	Ubu Unbihassium (325)
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148	Ubn Unbihassium (351)	149	Ubn Unbihassium (353)
150	Ubn Unbihassium (355)	151	Ubn Unbihassium (357)
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154	Ubn Unbihassium (363)	155	Ubn Unbihassium (365)
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160	Ubn Unbihassium (375)	161	Ubn Unbihassium (377)
162	Ubn Unbihassium (379)	163	Ubn Unbihassium (381)
164	Ubn Unbihassium (383)	165	Ubn Unbihassium (385)
166	Ubn Unbihassium (387)	167	Ubn Unbihassium (389)
168	Ubn Unbihassium (391)	169	Ubn Unbihassium (393)
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174	Ubn Unbihassium (403)	175	Ubn Unbihassium (405)
176	Ubn Unbihassium (407)	177	Ubn Unbihassium (409)
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180	Ubn Unbihassium (415)	181	Ubn Unbihassium (417)
182	Ubn Unbihassium (419)	183	Ubn Unbihassium (421)
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222	Ubn Unbihassium (499)	223	Ubn Unbihassium (501)
224	Ubn Unbihassium (503)	225	Ubn Unbihassium (505)
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234	Ubn Unbihassium (523)	235	Ubn Unbihassium (525)
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238	Ubn Unbihassium (531)	239	Ubn Unbihassium (533)
240	Ubn Unbihassium (535)	241	Ubn Unbihassium (537)
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260	Ubn Unbihassium (575)	261	Ubn Unbihassium (577)
262	Ubn Unbihassium (579)	263	Ubn Unbihassium (581)
264	Ubn Unbihassium (583)	265	Ubn Unbihassium (585)
266	Ubn Unbihassium (587)	267	Ubn Unbihassium (589)
268	Ubn Unbihassium (591)	269	Ubn Unbihassium (593)
270	Ubn Unbihassium (595)	271	Ubn Unbihassium (597)
272	Ubn Unbihassium (599)	273	Ubn Unbihassium (601)
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276	Ubn Unbihassium (607)	277	Ubn Unbihassium (609)
278	Ubn Unbihassium (611)	279	Ubn Unbihassium (613)
280	Ubn Unbihassium (615)	281	Ubn Unbihassium (617)
282	Ubn Unbihassium (619)	283	Ubn Unbihassium (621)
284	Ubn Unbihassium (623)	285	Ubn Unbihassium (625)
286	Ubn Unbihassium (627)	287	Ubn Unbihassium (629)
288	Ubn Unbihassium (631)	289	Ubn Unbihassium (633)
290	Ubn Unbihassium (635)	291	Ubn Unbihassium (637)
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330	Ubn Unbihassium (715)	331	Ubn Unbihassium (717)
332	Ubn Unbihassium (719)	333	Ubn Unbihassium (721)
334	Ubn Unbihassium (723)	335	Ubn Unbihassium (725)
336	Ubn Unbihassium (727)	337	Ubn Unbihassium (729)
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340	Ubn Unbihassium (735)	341	Ubn Unbihassium (737)
342	Ubn Unbihassium (739)	343	Ubn Unbihassium (741)
344	Ubn Unbihassium (743)	345	Ubn Unbihassium (745)
346	Ubn Unbihassium (747)	347	Ubn Unbihassium (749)
348	Ubn Unbihassium (751)	349	Ubn Unbihassium (753)
350	Ubn Unbihassium (755)	351	Ubn Unbihassium (757)
352	Ubn Unbihassium (759)	353	Ubn Unbihassium (761)
354	Ubn Unbihassium (763)	355	Ubn Unbihassium (765)
356	Ubn Unbihassium (767)	357	Ubn Unbihassium (769)
358	Ubn Unbihassium (771)	359	Ubn Unbihassium (773)
360	Ubn Unbihassium (775)	361	Ubn Unbihassium (777)
362	Ubn Unbihassium (779)	363	Ubn Unbihassium (781)
364	Ubn Unbihassium (783)	365	Ubn Unbihassium (785)
366	Ubn Unbihassium (787)	367	Ubn Unbihassium (789)
368	Ubn Unbihassium (791)	369	Ubn Unbihassium (793)
370	Ubn Unbihassium (795)	371	Ubn Unbihassium (797)
372	Ubn Unbihassium (799)	373	Ubn Unbihassium (801)
374	Ubn Unbihassium (803)	375	Ubn Unbihassium (805)
376	Ubn Unbihassium (807)	377	Ubn Unbihassium (809)
378	Ubn Unbihassium (811)	379	Ubn Unbihassium (813)
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394	Ubn Unbihassium (843)	395	Ubn Unbihassium (845)
396	Ubn Unbihassium (847)	397	Ubn Unbihassium (849)
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400	Ubn Unbihassium (855)	401	Ubn Unbihassium (857)
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406	Ubn Unbihassium (867)	407	Ubn Unbihassium (869)
408	Ubn Unbihassium (871)	409	Ubn Unbihassium (873)
410	Ubn Unbihassium (875)	411	Ubn Unbihassium (877)
412	Ubn Unbihassium (879)	413	Ubn Unbihassium (881)
414	Ubn Unbihassium (883)	415	Ubn Unbihassium (885)
416	Ubn Unbihassium (887)	417	Ubn Unbihassium (889)
418	Ubn Unbihassium		

Physical Constants and Important Equations

$$1 \text{ cal} = 4.1868 \text{ J}$$

$$1 \text{ atm} = 760 \text{ mmHg}$$

$$1 \text{ atm} = 101325 \text{ pa}$$

$$h = 6.626 \times 10^{-34} \text{ m}^2 \text{ kg/s,}$$

$$c = 299792458 \text{ m/s}$$

$$R = 0.08314 \text{ L bar K}^{-1} \text{ mol}^{-1} = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$$

$$N_a = 6.022 \times 10^{23} \text{ mol}^{-1}$$

$$PV = nRT$$

$$c = \lambda\nu$$

$$E = nh\nu$$

$$E = \frac{h}{m\lambda}$$

$$E = -2.18 \times 10^{-18} \text{ J} \left(\frac{1}{n_2^2} - \frac{1}{n_1^2} \right)$$



+
BirZeit University
Chemistry Department
Chemistry 143 + 141

Second Hour Exam
 80 min.

2nd Sem. 2015/2016
 17/5/2016

● Student Name: ~~XXXXXXXXXXXXXXXXXXXX~~ ● Student No: ~~XXXXXXXXXX~~

Discussion Instructor Name: Jack Mustapha Discussion Section: Tuesday

Q#	A	B	C	D	E	Q#	A	B	C	D	E
1			✓			14		✓			
2		✓				15			✓		
3		✓				16			✓		
4			✓	XXXX		17		✓			
5					✓	18	XXXX	✓			
6	✓					19				XXXX	✓
7				✓		20				✓	
8		✓				21	✓				
9		✓				22		✓			
10		✓				23			✓		
11			✓			24				✓	
12			✓			25				✓	
13					✓	26				✓	

GOOD LUCK

1. 1.05 g sample of benzoic acid ($C_7H_6O_2$) was burned in a calorimeter having a heat capacity of 1.80 kJ/°C. The temperature of the calorimeter rose 15.4°C. Calculate ΔH per mole of benzoic acid for this reaction.
- A) 3220 kJ/mol
 B) 26.4 kJ/mol
 C) -26.4 kJ/mol
 D) -3220 kJ/mol
- Handwritten notes: $m = \frac{1.05 \times 1.80}{15.4} = 1.80$
 $\Delta H = 15.4 \times 1.80 = 27.72$
 $1.80 = 1.05 \times \Delta H \times 1.80$
2. In an exothermic process the system
 A) releases energy and ΔH is positive
 B) releases energy and ΔH is negative
 C) absorbs energy and ΔH is positive
 D) absorbs energy and ΔH is negative

3. Which of the following statements is INCORRECT
- A) Enthalpy change $\Delta H = H_{final} - H_{initial}$
 B) Enthalpy change is heat of reaction at constant volume.
 C) Enthalpy is a state function.
 D) Enthalpy change is heat of reaction at constant pressure.
- Handwritten note: 1.05g

4. Under what condition(s) is the enthalpy change of a process equal to the amount of heat transferred into or out of the system?
- (i) temperature is constant
 (ii) pressure is constant
 (iii) volume is constant
- A) i and ii
 B) iii only
 C) ii and iii
 D) ii only
 E) i only
- Handwritten note: $P = P \Delta V$

5. For which one of the following equations is ΔH_{rxn}° equal to ΔH_f° for the product?
- A) $CH_4(g) + 2Cl_2(g) \rightarrow CH_2Cl_2(l) + 2HCl(g)$
 B) $C(\text{diamond}) + O_2(g) \rightarrow CO_2(g)$
 C) $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$
 D) $Xe(g) + 2F_2(g) \rightarrow XeF_4(g)$
 E) $N_2(g) + O_3(g) \rightarrow N_2O_3(g)$
- Handwritten note: $255 = \frac{m}{44} \times 2944$

6. Based upon the following thermochemical equation, calculate the grams of $C_3H_8(g)$ that must be burnt to provide 255 kJ of thermal energy
- $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$ $\Delta H = -2044 \text{ kJ}$
- A) 5.50g
 B) 4.95g
 C) 9.11g
 D) 3.78g
- Handwritten notes: $m = \frac{255}{2044} \times 44$
 $m = 5.50$

7. Given the reaction, $AB + 3A \rightarrow 4C + 7D$, and some standard enthalpies of formation:
- A: 15.7 kJ/mole
 B: -86.4 kJ/mole
 C: -52.7 kJ/mole
 D: -71.6 kJ/mole
- What is the standard enthalpy of reaction, in kJ for the reaction shown?
- A) -908.4 kJ
 B) -515.6 kJ
 C) -53.6 kJ
 D) -413.5 kJ
 E) -853.6 kJ
- Handwritten notes: $m = 255$
 $m = 255$

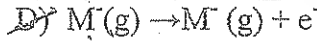
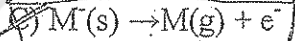
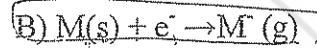
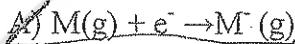
8. Use the reactions below to find the enthalpy of reaction (in kJ) for the formation of tungsten carbide, $WC_{(s)}$, from the elements. $W_{(s)} + C_{(graphite)} \rightarrow WC_{(s)}$

~~$2WO_3 \rightarrow 2W + 3O_2$~~

$2W_{(s)} + 3O_{2(g)} \rightarrow 2WO_{3(s)}$	$\Delta H = -1680.6 \text{ kJ}$
$C_{(graphite)} + O_{2(g)} \rightarrow CO_{2(g)}$	$\Delta H = -393.5 \text{ kJ}$
$2WC_{(s)} + 5O_{2(g)} \rightarrow 2WO_{3(s)} + 2CO_{2(g)}$	$\Delta H = -2391 \text{ kJ}$

- A) -380.0 B) -38.0 C) -3.80 D) +380 E) +380.0

9. The energy change in which of the following processes constitutes the electron affinity of the species symbolized M?



10. The shape of the orbital depends upon the quantum number

- A) m_l B) l C) n D) m_s

11. The following has the largest atomic radius:

- A) Ag B) Cl C) Rb D) Mn

12. Which of the following elements has the largest second ionization energy (IE_2)?

- A) Na B) F C) Li D) O E) B

13. Which one of the following statements about orbital energies is INCORRECT?

A) The energy of a given orbital increases as the nuclear charge Z increases.

B) The splitting of sublevels in many-electron atoms is explained in terms of the penetration effect.

C) In the hydrogen atom, the energy of an orbital depends only on the value of the quantum number n .

D) Inner electrons shield outer electrons more effectively than do electrons in the same orbital.

E) In many-electron atoms the energy of an orbital depends on both n and l .

14. Identify the element of Period 2 which has the following successive ionization energies, in kJ/mol.

$IE_1, 1314$

$IE_2, 3389$

$IE_3, 5298$

$IE_4, 7471$

$IE_5, 10992$

$IE_6, 13329$

$IE_7, 71345$

$IE_8, 84087$

A) Ne

D) B

B) O

C) Li

E) None of these choices is correct.

15. A reason why fluorine, F, has a smaller size than oxygen, O, is that:
- ~~A) O has smaller number of neutrons~~
~~B) O has larger number of neutrons~~
 C) F has larger effective nuclear charge
~~D) F has smaller effective nuclear charge~~
 E) Both have same number of electrons but F has larger number of protons
16. There are several possible arrangements of electrons when you try to place 7 electrons in a 3d subshell. To determine the correct distribution for the ground state we are guided by
- ~~A) the uncertainty principle~~ ~~B) the Aufbau principle~~
 C) the wave particle duality principle ~~D) Hund's Rule~~
~~E) the Pauli Principle~~
17. The number of unpaired electrons in the O^{2-} ion is:
- A) 0 B) 1 C) 2 D) 3 E) 4
18. Which of the following arrangements from lowest to highest in first ionization energies is correct?
- A) He < Ne < N < Be < Li B) Li < Be < N < Ne < He
 C) He < Li < Be < N < Ne D) Be < Li < N < He < Ne
nonmetal - non metal
19. Covalent bonds formed by the sharing of electrons are most likely to be formed between
- ~~A) an atom with a low electronegativity and an atom with a high ionization energy~~
~~B) an atom with a low electronegativity and an atom with a high ionization energy~~
~~C) an atom with a high electron affinity and an atom with a low ionization energy~~
 D) two atoms with low electron affinities and low ionization energies
~~E) two atoms with high electron affinities and high ionization energies~~
20. A "shell" consists of all orbitals having
- A) the same values of n and l .
 B) the same value of n .
 C) the same values of all four quantum numbers.
 D) the same values of n , l , and m_l
21. Which of the following equations describes the lattice energy of a substance?
- A) $M^+(g) + X^-(s) \rightarrow MX(g) + \text{energy}$ B) $MX(s) + \text{energy} \rightarrow M^+(g) + X^-(g)$
 C) $M(s) + \text{energy} \rightarrow M^+(g) + e^-$ D) $X^-(g) + \text{energy} \rightarrow X(g) + e^-$

22. The chloride of which of the following metals should have the greatest lattice energy?

A) cesium

B) lithium

C) potassium D) sodium

E) rubidium

23. Which of the following has the bonds correctly arranged in order of increasing polarity?

A) Mg-F < Be-F < N-F < O-F

B) N-F < Be-F < Mg-F < O-F

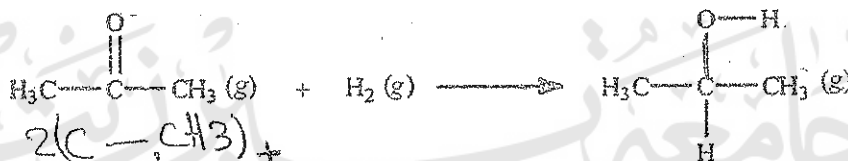
C) O-F < N-F < Be-F < Mg-F

D) Be-F < Mg-F < N-F < O-F

E) O-F < Be-F < Mg-F < N-F

24. Acetone can be easily converted to isopropyl alcohol by addition of hydrogen to the carbon-oxygen double bond. Calculate the enthalpy of reaction using the bond energies given.

(C=O)
2(C-C)
6(C-H)



2(C-C)
6(C-H)
(C-O)
(O-H)

Bond: (C=O)

Bond energy (kJ/mol):

C=O	H-H	C-H	O-H	C-C	C-O
745	436	414	464	347	351

$$745 + 2(347) + 6(414) + 436 - [694 + 2484 + 351 + 465]$$

4359

A) +48 kJ

B) -48 kJ

D) +366 kJ

E) -366 kJ

3994

C) -484 kJ

25. Based on electronegativity trends in the periodic table, predict which of the following compounds will have the greatest % ionic character in its bonds.

A) H₂O

B) LiI

C) $\frac{\text{CaO}}{\text{CaO}}$

D) $\frac{\text{RbF}}{\text{RbF}}$

E) HCl

H → Cl

26. Arrange the following bonds in order of increasing bond strength.

A) C-Br < C-I < C-Cl < C-F

D) C-F < C-Cl < C-Br < C-I

B) C-I < C-Br < C-Cl < C-F

E) None of these orders is correct.

C) C-I < C-Br < C-F < C-Cl