12) The reaction for the formation of ammonia releases a heat of 177.65 kJ/mol at constant pressure at a temperature of 25°C. If ΔCp = -3.85 cal/mol, the heat at T = 100°C and at the same pressure is:

a)42211,25cal/mole

b) 177361cal/mol

c) -42,788 Kcal/mol

d) 42,21 Kcal/mole

e) Other answer

13) At 25°C, one mole of an ideal gas undergoes an isothermal transformation from state 1 (P_1, T_1) to state 2 ($2P_1$, T_1). The values of the quantity of heat and the work are

a) W = 16.93J Q = -16.93J

b) W = 413J Q = -413J

c) W = 1716.13J Q = -1716.13J

d) W= -1716.13J Q = 1716.13J

e) Other answer

14) Consider the reaction $NH_3 + HBr \rightarrow NH_2Br + H_2$

We give : $\Delta H_{reaction}$ = - 46 cal/mol $\Delta H_{L(N-H)}$ = -22 cal/mol

$\Delta H_{L(H-Br)}$ = -12.5 cal/mol $\Delta H_{L(N-Br)}$ = -28 cal/mol

The binding energy $\Delta H_{L(H-H)}$ is equal to:

a) -46 Cal/mol

b) 12.5Cal/mol

c) -52.5 Cal/mol

d) 46 Cal/mol

e) Other answer

16) Consider the reaction: $N_2 + 3H_2 ==== 2NH_3$

The equilibrium constant $K_{p1} = 1.11x10^{-2}$ at température T_1= 1800K

The equilibrium constant $K_{p2} = 2.02x10^{-2}$ at température T_2= 2000K

The change in enthalpy of the réaction is equal to:

a) $\Delta H°_f$= 2.15cal

b) $\Delta H°_f$ =215kcal

c) $\Delta H°_f$ =21.2cal

d) $\Delta H°_f$ = 21.745 kcal

e) other answer

16) 200 ml of an ideal gas expands to 1 liter under a pressure of P = 5 atm. The work is:

a) W= -404.8j

b) W= - $40x10^5$j

c) W= 404.8j

d) W= 810j

e) Other answer

17) The standard Gibbs free energy of formation of ammoniac is: -16,5 k J/mol^{-1}. $N_{2(G)}$ + $3H_{2(G)}$ == $2NH_{3\ (G)}$ à 25°c the equilibrium constant of the reaction is:

a) K= 0.993

b) K =$1.27x10^{-3}$

c) K = $9.52x10^{-13}$

d) K =$1.05x10^{-12}$

e) Other answer

18) The standard change in Gibbs free energy is expressed in terms of the equilibrium constant by the relation:

a) $\Delta G° = RTlnK$

b) $K = e^{-\frac{\Delta G°}{RT}}$

c) $\Delta G° = - RTlnK$

d)$\Delta G° = \frac{RT}{LnK}$

e) $K = e^{-\frac{RT}{\Delta G°}}$

Data:

r_H: radius of hydrogen r_{An+} : radius of the hydrogen-like ion

$h=6.62.10^{-34}$ j/s $R_H=1.09.10^{7}$ m^{-1} $e=1.6.10^{-19}c$ $C=3x10^{8}$m/s

$1eV=1.6x10^{-19}j$ $1A° = 10^{-10}m$ $1nm = 10^{-9}m$

$R= 8,31jK^{-1}mol^{-1}$ $= 0.082Latm\ mol^{-1}\ K^{-1}$ = 2 cal K-1 mol^{-1}

1 atm = $1.012 \times 10^{+5}$Pa N=14g/mol 1cal = 4.18j

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**A**	**e**	**c**	**d**	**A**	**b , c**	**b**	**a**	**c, d**	**a , b**
QCM	11	12	13	14	15	16	17	18		
Answer	**D**	**a , d**	**c**	**c**	**d**	**a**	**b**	**b , c**		

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject1_____2018_____

1) Two isotopes of lithium, ^{6}Li and ^{7}Li, present in natural state, have abundances of 7.6% and 92.4%, respectively. The atomic mass, in u.m.a (atomic mass unit), of this natural pure substance is:

a) 6,076

b) 6,216

c) 6,664

d) 6,924

e) Other answer

2) A Nuclear Medicine department receives, 7 days after ordering, a vial containing a radionuclide whose activity at the time of ordering was 4 GBq. Two weeks after receipt, the activity measured in the vial has decreased to only 500 MBq.

a) The half-life of the radionuclide is 7 days.

b) The half-life of the radionuclide is 4,7 days.

c) The radioactive constant of the radionuclide is 0.15 day^{-1}.

d) The radioactive constant of the radionuclide is 0.10 day^{-1}.

e) The radioactive constant is the inverse of the half-life.

3) The minimum activity required to perform a good quality scintigraphy with this radionuclide is 100 MBq. Under these conditions, how much time is available, after receiving the vial, to perform the examination?

a) About 3 weeks.

b) About 4 weeks.

c) About 5 weeks.

d) About 6 weeks.

e) About 7 weeks.

4) An element X located in the 4th period and group VIIB of the periodic table has an electronic structure that ends with:

a) $3d^7$

b) $4s^2$

c) $3d^5$

d) $4d^5$

e) other answer

5) To go from n=2 to n=3, the Li^{2+} (Z=3) hydrogen-like ion must absorb a photon with a wavelength of

a) 73.4nm

b) 55.8nm

c) 23.5nm

d) 65.7nm

e) other answer

6) The energy of an electron as a function of the radius is given by the relation:

a) $Ke^2/2r$

b) $-Ke^2/2r$

c) Ke^2/r

d) $2Ke^2/r$

e) Ke^2/r^2

7) One of the lines of the Lyman series at a frequency of 3.17×10^{15} Hz corresponds to an electronic transition from:

a) $6 \rightarrow 2$

b) $6 \rightarrow 1$

c) $4 \rightarrow 2$

d) $4 \rightarrow 1$

e) $1 \rightarrow 6$

8) An electron in the hydrogen atom in its ground state absorbs an energy of 12.68 eV. The electron is on the level:

a) n = 3

b) n = 4

c) n = 5

d) n = 6

e) other answer

9) The wavelength of the third line of the Paschen series is:

a) 1280nm

b) 1291nm

c) 7740nm

d) 0.774A°

e) other answer

10) The initial activity of a Cesium sample is $9x10^{14}$ Bq, $\lambda = 7.32x10^{-10}$ s^{-1}. After 30 years, it reaches:

a) $4.5x10^{14}$ Bq

b) $5.6x10^{7}$ Bq

c) other answer

d) $8x10^{14}$ Bq

e) $9.2x10^{7}$ Bq

11) Are the following statement, correct?

a) Two atoms with the same number of neutrons are isotopes.

b) Quantum numbers characterize the nucleus of an atom.

c) Two electrons in the same orbital have the same 4 quantum numbers.

d) Two electrons having the same value of m have the same value of n.

e) The de Broglie relation is applicable in classical mechanics.

12) In an emission spectrum series of the hydrogen atom.

a) The wavelength increases from the first line to the limit line.

b) The frequency decreases from the limit line to the first line.

c) The wavenumber increases from the limit line to the first line.

d) The energy variation ΔE decreases from the first line to the limit line.

e) Other answer.

13) Iodine-131 (^{131}I) is radioactive with a half-life of T = 8 days. After 48 days, the number of nuclei that have undergone decay is:

a) $N_0/64$

b) $N_0/8$

c) $N_0/16$

d) $63N_0/64$

e) no answer

14) How many lines are there in the emission spectrum of the hydrogen atom for n<6?

a) 9 rays

b) 14rays

c) 10 rays

d) 12 rays

e) 8rays

15) The first postulate of Bohr is given by:

a) nvr =mh/π

b) 2πr =nh/mv

c) 2πn =mh/vr

d) mvr2π =nh

e) mv = nh/2πr

16) The penultimate electron of the electron configuration of an element X is characterized by the quantum numbers (3,2,0,+12). This element has:

a) $28e^-$

b) $25e^-$

c) $23e^-$

d) $20e^-$

e) $22e^-$

17) The potential energy of an electron located at a distance rrr from the nucleus is:

a) $E_p=mv^2/2$

b) $E_p=-Ke^2/r$

c) $E_p=-Ke^2/2r$

d) $E_p=Ke^2/r$

e) $E_p=-Ke^2/r^2$

18) An element X is missing 3 electrons to have the same structure as an element in the 4th period and 3rd column of the periodic table. It has:

a) $23e^-$

b) $25e^-$

c) $18e^-$

d) $20e^-$

e) no answer

19) An element X belongs to the same column as oxygen $_8O$ and the same period as bromine 35Br. This element has:

a) $16e^-$

b) $35e^-$

c) $8e^-$

d) $34e^-$

e) no answer

20) The quantum numbers of the penultimate electron in the electron configuration of a seventh transition metal are:

a) (3,2,-1,-1/2)

b) (3,2,-2,1/2)

c) (4,2,-2,-1/2)

d) (3,2,-2,-1/2)

e) no answer

C=3x10^{8}m/s 1GBq=10^{9}Bq 1MBq= 10^{6}Bq 1nm =10^{-9}m 1eV=1.6x10-^{19}j
R_H=1.09x10^{7}

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**D**	**a,d**	**c**	**c**	**a**	**b**	**b**	**b**	**e**	**a**
QCM	11	12	13	14	15	16	17	18	19	20
Answer	**D**	**b**	**a**	**c**	**b,d,e**	**c**	**b**	**c**	**d**	**a**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject2_____2018_____

1) The amount of heat received by one mole of an ideal gas when it is heated from 20°C to 100°C under constant volume is: Cp=33 J/mol.k.

a) Q=1975,2 J

b) Q= 2640 J

c) Q= 631.5cal

d) Q= 472.53cal

e) no answer

2) The reaction for the formation of ammonia releases 177.65 kJ/mol of heat at constant pressure at a temperature of 25°C. If ΔCp=−3.85cal/mol, what is the heat at T=100°C and the same pressure?

a) 177361cal/mol

b) -177.93 kj//mol

c)42211,25cal/mole

d) -42.57 Kcal/mole

e) no answer

3) The amount of heat exchanged during an adiabatic process is given by the relation:

a) $Q= nC_v (T_f-T_i)$

b) $Q=nC_p (T_f-T_i)$

c) $Q= nRT_f \ lnV_f/V_i$

d) $Q= 0$

e) no answer

4) During an isothermal expansion, we have:

a)W=0

b) W<0

c) ΔU=0

d) ΔH =0

e)Q< 0

5) 6 liters of an ideal gas are compressed from a pressure of P=5 atm to 2 liters. The work done during the transformation in joules is:

a) W= -40

b) W= - 40x10^5

c) W= 2024j

d) W= 2.024kj

e) no answer

6) Consider the reaction $NH_3 + HCl \rightarrow NH_2Cl + H_2$

We give : $\Delta H_{reaction}$ = - 46 cal/mol $\Delta H_{L(N-H)}$ = -22 cal/mol

$\Delta H_{L(H-Cl)}$ = -12.5 cal/mol $\Delta H_{L(N-Cl)}$ = -28 cal/mol

The binding energy $\Delta H_{L(H-H)}$ is equal to :

a) -46 Cal/mol

b) 12.5Cal/mol

c) -52.5 Cal/mol

d) 46 Cal/mol

e) no answer

7) 200 ml of an ideal gas expands to 1 liter under a pressure of P=5atm. The work is

a) W= -404.8j

b) W= - 40x10^{5}j

c) W= - 4j

d) W= 810j

e) other answer

8) The amount of heat received by 10g of nitrogen (N_2) heated from 20°C to 100°C at constant volume is: we give: Cp=24.69 J/mol.K

a) Q=685.7 J

b) Q= 111.9cal

c) Q= 168.55cal

d) Q= 467.8j

e) other answer

9) 0.5 mole of an ideal gas at T=0∘C and 1 atm undergoes an isobaric transformation until the temperature reaches 100∘C. The initial volume is:

a) 20 L

b) 12,5 L

c) 11,20 L

d) 13L

e) other answer

10) The final volume is:

a) 15,3 L

b) 25 L

c) other answer

d) 26 L

e) 40 L

11) The work done is:

a) no answer

b) 540 J

c) 415 J

d) 315,5 J

e) -415 J

12) We mix 0.21g of N_2 and 0.87g of H_2 at atmospheric pressure and a temperature of 272K. The mole fraction of nitrogen is:

a) 0.435

b) $7.5x10^{-3}$

c) 0.98

d) 0.0169

e) Other answer

The partial pressure of hydrogen is:

a) 0.435

b) 0.983

c) $7.5x10^{-3}$

d) 0.0169

e) Other answer

13) The equilibrium constant Kp is related to the equilibrium constant Kc by the following expression:

a) $Kc = Kp(RT)^{\Delta n}$

b) $Kp = KcR(T)^{\Delta n}$

c) $Kp = \frac{Kc}{(RT)^{-\Delta n}}$

d) $Kp = Kc(RT)^{\Delta n}$

e) no answer

14) At 25°C, one mole of an ideal gas undergoes an isothermal transformation from state 1 (P1,T1) to state 2 (2P1,T1). The values of the amount of heat and the work are:

a) W = 16.93J Q = -16.93J

b) W = 413J Q = -413J

c) W = 1716.13J Q = -1716.13J

d) W= -1716.13J Q = 1716.13J

e) no answer

15) consider the reaction: $N_2 + 3H_2 ==== 2NH_3$

The equilibrium constant $K_{p1} = 1.11x10^{-2}$ at the temperature T_1= 1800K
The equilibrium constant $K_{p2} = 2.02x10^{-2}$ at the temperature T_2= 2000K
The change in enthalpy of the reaction is equal to:

a) $\Delta H°_f$= 2.15cal

b) $\Delta H°_f$ = 215kcal

c) $\Delta H°_f$ =21.2cal

d) $\Delta H°_f$ = 21.745 kcal

e) no answer

16) The change in entropy during an isothermal transformation is given by:
a) $\Delta S = nCv \Delta T$

b) $\Delta S = nCpln P_2/P_1$

c) $\Delta S = nRln T_2/T_1$

d) $\Delta S = nCpln V_2/V_1$

e) $\Delta S = - nRln T_1/T_2$

17) In an isothermal transformation, the amount of heat is expressed by:
a) $Q= - nRTln P_2/P_1$

b) $Q= - nRTln V_1/V_2$

c) $Q= nRTln V_1/V_2$

d) $Q= nRTln P_1/P_2$

e) no answer

18) Consider the following data. $S°_{N2}$ = 191,5 J K^{-1} mol^{-1} $S°_{H2}$ = 130,6 J K^{-1} mol^{-1}
$S°_{Cl2}$ = 223,0 J K^{-1} mol^{-1} $S°_{NH4Cl}$ = 94,6 J K^{-1} mol^{-1}
$\Delta H°_{f\ NH4Cl}$ = -314,4 J K^{-1} mol^{-1}
The change in the standard Gibbs free energy of formation of NH_4Cl at 25°C in J/mol.

a) $\Delta G°_f$=-28473

b) $\Delta G°_f$ =24000

c) $\Delta G°_f$ =-152

d) $\Delta G°_f$ = 111092.9

e) no answer

19) The standard Gibbs free energy of formation of ammonia at 25°C is -16.5 kJ/mol. $N_{2(G)} + 3H_{2(G)}$ == $2NH_{3\,(G)}$ à 25°C. The equilibrium constant of the reaction is:

a) K= 0.993

b) K =1.27x10^{-3}

c) K = 9.52x10^{-13}

d) K =1.05x10^{-12}

e) no answer

20) The partial pressure of a gas is given by:

a) $P_i = n \times P_T$

b) $P_i = X_i \times P_i$

c) $P_i = X_i \times P_T$

d) $P_i = n_i/n_T \times P_T$

e) no answer

we give : H =1g/mol N =14g/mol 1atm = 1.012x105 Pa 1cal = 4.18j

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**a,d**	**b,d**	**d**	**b,c,d**	**c,d**	**c**	**a**	**b,d**	**c**	**A**
QCM	11	12	13	14	15	16	17	18	19	20
Answer	**e**	**d,b**	**c,d**	**c**	**d**	**c,e**	**a,b,d**	**d**	**b**	**c,d**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject1_____2019_____

1) The energy of an electron in the Bohr atom is: $E = -13.6/n^2$ eV. How many possible spectral lines are there for $n \leq 7$ in the Balmer series of the hydrogen atom's emission spectrum?

a) 7

b) 3

c) 4

d) 5

e) other answer

2) In the Bohr atom model:

a) The total energy decreases with the number of shells (n).

b) The total energy decreases with the square of the radius.

c) The radius increases with the number of shells (n).

d) The energy is proportional to the square of the radius.

e) Other answer

3) The electron configuration of the 4th transition metal ends with:

a) $4s^1$

b) $4d^4$

c) $5d^4$

d) $4p^2$

e) $3d^4$

4) An element X from group IIB of the periodic table belonging to the 4th period has:

a) 35 e^-

b) 32 e^-

c) 20 e^-

d) 30 e^-

e) Other answer

5) The second-to-last electron in the electron configuration of an X^{2-} ion is characterized by the quantum numbers (3, 2, 0, +1/2). The element X^{3+} has:

a) 27e^-

b) 19e^-

c) 22e^-

d) 24e^-

e) 23e^-

6) An electron in the hydrogen atom in its ground state absorbs an energy of 12.68 eV in order to occupy the level:

a) n = 3

b) n = 4

c) n = 5

d) n = 6

e) Other answer

7) The radius of the 3rd shell of the hydrogenoide ion Li^{2+} (Z = 3) is

a) r_{Li2+} =1.59A°

b) r_{Li2+} =4.77A°

c) r_{Li2+} =0.176A°

d) r_{Li2+} =1.06A°

e) Other answer

8) The relationship between the energy of the hydrogen-like ion An+and the energy of the hydrogen atom is given by:

a) $E_{An+} = ZE_H$

b) $E_{An+} = E_H/Z^2$

c) $E_{An+} = Z^2E_H$

d) $E_H = E_{An+} / Z^2$

e) Other answer

9) of the lines in the Balmer series is characterized by a frequency of 1.635×10^{14} Hz. This line corresponds to an electronic transition from:

a) 6 → 2

b) 6 → 3

c) 5 → 2

d) 5 → 1

e) 1 → 4

10) The wavelength of the third line in the Paschen series is:"

a) 1280nm

b) 11.01×10^{-7}**m**

c) 7740nm

d) 0.774A°

e)11010A°

11) The energy of an electron in a shell n is equal to 0.8704×10^{-19} J. The electron is located in shell:

a) n = 3

b) n = 1

c) n = 5

d) n = 1

e) no answer

12) The third line of the Pfund series is characterized by the frequency:

a) $9x10^{15}$Hz

b) $13.6x10^{15}$ Hz

c) $3.5x10^{15}$ Hz

d) $7.9x10^{15}$ Hz

e) other answer

13) Which statements are true?

a) If l=1l = 1l=1, the electron is in a d-subshell

b) Two electrons in the same orbital have the same four quantum numbers.

c) Quantum number characterize the state of an atom. .

d) For an electron in a d-subshell, mmm can be equal to 3.

E) Other answer

14) The energy of a photon is given by the relationship:

a)$\Delta E = h.c.\lambda$

b)$\Delta E = h/c.\lambda$

c)$\Delta E = h.c/\lambda$

d)$\Delta E = h.\lambda/c$

e) other answer

15- An element X located in the 4th period and group IV_A of the periodic table has its electronic structure ending with:

a) $3d^1$

b) $4p^2$

c) $5p^4$

d) $4p^4$

e) Autre réponse

16) In a series of emission spectra of the hydrogen atom:

a) The wavelength increases from the first line to the limit line.

b) The frequency decreases from the limit line to the first line.

c) The wave number increases from the limit line to the first line.

d) The change in energy ΔE decreases from the first line to the limit line.

e) Other answer.

17) The potential energy of an electron located at a distance r from the nucleus is:

a) $E_p=mv^2/2$

b) $E_p=-Ke^2/r$

c) $E_p=-Ke^2/2r$

d) $E_p=Ke^2/r$

e) $E_p=-Ke^2/r^2$

18) The quantum numbers of the second-to-last electron in the electronic configuration of a seventh transition metal are:

a) (3,2,-1,-1/2)

b) (3,2,-2,1/2)

c) (4,2,-2,-1/2)

d) (3,2,-2,-1/2)

e) other answer

19) To go from n=2 to n=4, the hydrogenoid ion Li^{2+} must absorb a photon with a wavelength of:

a) 38.9nm

b) 55.8nm

c) 235nm

d) 657nm

e) 54.36nm

20) The electron configuration of the 4th alkali metal ends with:

a) $\mathbf{4s^1}$

b) $\mathbf{4s^2}$

c) $\mathbf{5s^1}$

d) $\mathbf{5s^2}$

e) $\mathbf{3s^1}$

$h=6.62x10^{-34}$; $1nm=10^{-9}m$; $1A°=10^{-10}m$; $1eV=1.6x10^{-19}j$; $R_H=1.09x10^{7}m^{-1}$; $c=3x10^{8}m/s$

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**D**	**a**	**e**	**d**	**b**	**b**	**a**	**c , d**	**c**	**b , e**
QCM	11	12	13	14	15	16	17	18	19	20
Answer	**C**	**d**	**e**	**c**	**b**	**b**	**b**	**d**	**e**	**c**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject2_____2019_____

1) The change in entropy during an isothermal transformation is given by:

a) $\Delta S = nCv\ \Delta T$

b) $\Delta S = nCpln P_2/P_1$

c) $\Delta S = nRlnT_2/T_1$

d) $\Delta S = nCpln V_2/V_1$

e) $\Delta S = - nRlnT_1/T_2$

2) In an isothermal transformation, the amount of heat is expressed by:

a) $Q= - nRTlnP_2/P_1$

b) $Q= - nRTlnV_1/V_2$

c) $Q= nRTlnV_1/V_2$

d) $Q= nRTlnP_1/P_2$

e) other answer

3) Given the following data:

$S°N_2=191.5\ J\ K^{-1}mol^{-1}$ $S°H_2=130.6\ J\ K^{-1}mol^{-1}$

$S°Cl_2=223.0\ J\ K^{-1}mol^{-1}$ $S°NH_4Cl=94.6\ J\ K^{-1}mol^{-1}$

$\Delta Hf°\ NH_4Cl=-314.4\ J\ K^{-1}mol^{-1}$

The change in standard Gibbs free energy of formation of NH_4Cl at 25°C in J/mol:

a) $\Delta G°_f$=-28473

b) $\Delta G°_f$ =24000

c) $\Delta G°_f$ =-152

d) $\Delta G°_f$ = 111092.9

e) no answer

4) The standard free energy of formation of ammonia at 25°C is -16.5 kJ/mol.
$N_{2(G)} + 3H_{2(G)}$ == $2NH_{3\ (G)}$ à 25°C the equilibrium constant for the reaction is:

a) K= 0.993

b) K =1.27x10^{-3}

c) K = 9.52x10^{-13}

d) K =1.05x10^{-12}

e) other answer

5) A covalent bond results from an overlap between:

a) s and s

b) py and pz

c) s and p

d) py and px

e) other answer

6) The reaction for the formation of ammonia releases 177.65 kJ/mol of heat at constant pressure at a temperature of 25°C. If ΔCp = -3.85 cal/mol, its heat at T = 100°C and at the same pressure is:

a)42211,25cal/mole

b) 177361cal/mol

c) -42,788 Kcal/mol

d) 42,21 Kcal/mole

e) other answer

7) - At 25°C, one mole of an ideal gas undergoes an isothermal transformation from state1 (P_1,T_1) to state 2($2P_1$,T_1). The values of the amount of heat and the work are:

a) W = 16.93J Q = -16.93J

b) W = 413J Q = -413J

c) W = 1716.13J Q = -1716.13J

d) W= -1716.13J Q = 1716.13J e)other answer

8) - let the reaction be $NH_3 + HBr \rightarrow NH_2Br + H_2$
On donne : $\Delta H_{reaction}$ = - 46 cal/mol $\Delta H_{L(N-H)}$ = -22 cal/mol
$\Delta H_{L(H-Br)}$ = -12.5 cal/mol $\Delta H_{L(N-Br)}$ = -28 cal/mol
Binding reaction $\Delta H_{L(H-H)}$ est égale à :

a) -46 Cal/mol

b) 12.5Cal/mol

c) -52.5 Cal/mol

d) 46 Cal/mol

e) other answer

9)- let the reaction be: $N_2 + 3H_2 ==== 2NH_3$
The equilibrium $K_{p1} = 1.11x10^{-2}$ at température T_1= 1800K
The equilibrium $K_{p2} = 2.02x10^{-2}$ at température T_2= 2000K
The change in enthalpy of the reaction is equal to:

a) $\Delta H°_f$= 2.15cal

b) $\Delta H°_f$ =215kcal

c) $\Delta H°_f$ =21.2cal

d) $\Delta H°_f$ = 21.745 kcal

e) other answer

10) 200 ml of an ideal gas expands to 1 liter under a pressure of P=5 atm. The work is:

a) W= -404.8j

b) W= - $40x10^5$j

c) W= 404.8j

d) W= 810j

e) other answer

11) The standard free energy of formation of ammonia at 25°C is -5 kJ/mol.

$N_{2(G)} + 3H_{2(G)}$ == $2NH_{3\,(G)}$ à 25°c the equilibrium constant of the reaction is:

a) K= 0.993

b) K =$1.27x10^{-3}$

c) K = $9.52x10^{-13}$

d) K =1.05x10^{-12}

e) other answer

12) In the periodic table, the ranking of electronegativity, the force of attraction, and the atomic radius for the elements: $_4$Be, $_6$C ,$_9$F, $_{20}$Ca

a) en$^-$(Ca) > en$^-$(C) > en$^-$(Be) > en$^-$(F)

b) en$^-$(Ca) < en$^-$(Be) < en$^-$(C) < en$^-$(F)

c) Fa(F) > Fa (Be) > Fa (C) > Fa (Ca)

d) ra(Ca) > ra (F) > ra (Be) > ra (C)

e) ra(Ca) > ra (Be) > ra (C) > ra (F)

13) he change in standard Gibbs free energy is expressed in terms of the equilibrium constant by the following relation:

a) ΔG° = RTlnK

b) K = e $-\frac{\Delta G^\circ}{RT}$

c) ΔG° = - RTlnK

d)ΔG° = $\frac{RT}{LnK}$

e) K = e $-\frac{RT}{\Delta G^\circ}$

14) The entropies are given as :

$S°_{N2}$ = 191,5 J K^{-1} mol^{-1} $S°_{H2}$ = 130,6 J K^{-1} mol^{-1} $S°_{Cl2}$ = 223,0 J K^{-1} mol^{-1}
$S°_{NH4Cl}$ = 94,6 J K^{-1} mol^{-1} The enthalpy of the reaction: $\Delta H°_{f\ NH4Cl}$ = -314,4 J K^{-1} mol^{-1}
The change in the standard Gibbs free energy of formation of NH_4Cl, à 25°C in j/mol

a) $\Delta G°_f$=-28473

b) $\Delta G°_f$ =24000

c) $\Delta G°_f$ =-152

d) $\Delta G°_f$ = 111092.9

e) no answer

$h=6.62.10^{-34}$ j/s **$R_H=1.09.10^{7}$ m^{-1}** **$e=1.6.10^{-19}c$** **$C=3x10^{8}$m/s**
$1eV=1.6x10^{-19}$j **$1A° = 10^{-10}$m** **$1nm = 10^{-9}$m**

$R= 8,31jK^{-1}mol^{-1}$ **$= 0.082Latm\ mol^{-1}\ K^{-1}$** **$= 2\ cal\ K^{-1}\ mol^{-1}$**
1 atm = $1.012 \times 10^{+5}$Pa **N=14g/mol** **1cal = 4.18j**

the solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**c , e**	**A,b,d**	**d**	**b**	**a , c**	**A , d**	**c**	**c**	**d**	**a**
QCM	11	12	13	14						
Answer	**b**	**B , e**	**B , c**	**d**						

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject3_____2019_____

1) The amount of heat received by 3.5g of chlorine (Cl2) when heated from 20°C to 100°C under atmospheric pressure is: we give Cv=24.69 J/mol.K

a) Q=129.36 cal

b) Q= 96.78cal

c) Q= 31.05cal

d) Q= 56.21cal

e) other answer

2) The amount of heat received by 3.5g of chlorine (Cl_2) when heated from 20°C to 100°C under atmospheric pressure is:
Given: temperature at 5°c if ΔCp= - 3,85 cal/mole, Its heat at T= 100°c and at the same pressure is:

a)5847.6cal/mole

b) -5847.6 cal/mol

c) -42,788 Kcal/mol

d) -6.425 Kcal/mole

e) other answer

3) The amount of heat exchanged during an isothermal transformation is given by the relation:

a) $Q= nRTlnP_2/P_1$

b) $Q= nRTlnP_1/P_2$

c) $Q= +nRT\ lnV_1/V_2$

d) Q= 0

e) other answer

4) At 25°C, one mole of an ideal gas undergoes an isothermal transformation from state 1 (P1, T1) to state 2 (2P1, T1). The values of the amount of heat and the work are:

a) W = 16.93J Q = -16.93J

b) W = 413J Q = -413J

c) W = 1716.13J Q = -1716.13J

d) W= -1716.13J Q = 1716.13J

e) other answer

5) We compress 25 mL of an ideal gas to 2 mL under a pressure P = 5 atm.
The work is:

a) W= 115j

b) W= 0.01163Kj

c) W= 116.38j

d) W= 810j

e) other answer

6) We consider an ideal gas undergoing successive transformations represented in a Clapeyron diagram, starting from the initial state A (PA = 3 atm, VA = 16 L, TA = 300 K).
A → B: Isobaric compression, VB = 8 L
B → C: Isochoric heating
C → A: Isothermal expansion back to the initial state A
Given: Cp = 11.66 $J \cdot K^{-1}$

The number of moles of the ideal gas:

a) n = 1.95mol

b) n = 0..0192mol

c) n =1.5mol

d) n = 2mol

e) n = 2.5mol

7) The pressure at point C

a) P= 4.5atm

b) P = 5atm

c) P = 3.5atm

d) P = 5.999atm

e) P = 6.5atm

8) The amount of heat from A to B:

a) Q= 432 cal

b) Q = 815.78 cal

c) Q = 3412.68j

d) Q = 12.5cal

e) Q= 500cal

9) In the simple cubic system, the value of the packing fraction is:

a) 0,5

b) 0,74

c) 0,679

d) 0,523

e) $\frac{\pi}{3}$

10)- In the body-centered cubic system, the number of atoms is:

a) 1 atome

b) 3 atomes

c)3 atomes

d) 4atomes

e) no answer

11)- In the face-centered cubic system, the volume occupied by the atoms is:

a) $\frac{N\pi a^3}{6}$

b) $\frac{N\pi a^3}{16}$

c) pas de réponse

d) $\frac{N\pi a^3\sqrt{3}}{24}$

e) $\frac{N\pi a^3\sqrt{2}}{24}$

12- A solution is obtained by dissolving 3.5g of H_2SO_4 in 350 mL of solution. Its normality is:

a) 0,102 N

b) 0,204N

c) 2N

d) 3N

e) no answer

13- The kinetic equation for a zero-order reaction (order 0)

a) $log\frac{[A]}{[A]_0} = -kt$

b) $[A]=-kt + [A]_0$

c) $\frac{[A]}{[A]0} = -kt$

d) $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$

e) $[A] - [A]_0=-kt$

14- The half-life (t½) for a first-order reaction (order 1)

a) $t_{½}=\frac{1}{k[A]0}$

b) $t_{½} = \frac{ln2}{k}$

c) $t_{½}=\frac{[A]0}{2k}$

d) $t_{½}=\frac{ln2}{k[A]0}$

e) no answer

15- The kinetic equation for a second-order reaction (order 2)

a) $log\frac{[A]}{[A]_0}=-kt$

b) $[A]=-kt+[A]_0$

c) $\frac{[A]}{[A]_0}=-kt$

d) $\frac{1}{[A]}=kt+\frac{1}{[A]0}$

e) ln [A]= -kt

Data: R= 8,31jK^{-1}mol^{-1} R = 0.082Latm mol^{-1} K^{-1} R = 2 cal K-1 mol^{-1}
1 atm = 1.012 x 10^{+5}Pa Cl=35.5g/mol 1cal = 4.18j

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**c**	**D**	**b**	**c**	**b**	**a**	**d**	**b**	**d**	**e**
QCM	11	12	13	14	15					
Answer	**e**	**B**	**B , e**	**b**	**d**					

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject1_____2020____

1) The total energy of an electron located at a distance r from the nucleus is:
a) $E_T=mv^2/2$

b) $E_T=-Ke^2/2r$

c) $E_T=-Ke^2/2r$

d) $E_T=Ke^2/r$

e) $E_T=-Ke^2/r^2$

2) The quantum numbers of the second-to-last electron in the electron configuration of a fourth halogen are:

a) (3,2,-1,-1/2)

b) (5,1,0,1/2)

c) (4,1,0,-1/2)

d) (5,1,0,-1/2)

e) no answer

3) To go from n=2 to n=4, the hydrogen-like ion Li^{2+} must absorb a photon of wavelength:
a) 38.9nm

b) 55.8nm

c) 235nm

d) 657nm

e) 54.36nm

4) An electron in the hydrogen atom in its ground state absorbs an energy of 12.68 eV to occupy the level:

a) n = 3

b) n = 4

c) n = 5

d) n = 6

e) no answer

5) The radius of the 3rd shell of the hydrogenoid ion Li^{2+} (Z=3) is:

a) r_{Li2+} =1.59A°

b) r_{Li2+} =4.77A°

c) r_{Li2+} =0.176A°

d) r_{Li2+} =1.06A°

e) no answer

6) The relationship between the energy of the hydrogenoid ion A^{n+} and the energy of the hydrogen atom is given by:

a) $E_{An+} = ZE_H$

b) $E_{An+} = E_H/Z^2$

c) $E_{An+} = Z^2E_H$

d) $E_H = E_{An+}/Z^2$

e) no answer

7) One of the lines in the Balmer series is characterized by a frequency of 1.635×10^{14} Hz. This line corresponds to an electronic transition from:

a) $6 \rightarrow 2$

b) $6 \rightarrow 3$

c) $5 \rightarrow 2$

d) $5 \rightarrow 1$

e) $1 \rightarrow 4$

8) The wavelength of the third line in the Paschen series

a) 1280nm

b) 11.01×10^{-7}m

c) 7740nm

d) 0.774A°

e) 11010A°

9) The reaction for the formation of ammonia releases 25.65 kJ/mole of heat at constant pressure at a temperature of 25°C. If $\Delta Cp = -3.85$ cal/mole, the heat at T=100°c and at the same pressure

a)5847.6cal/mole

b) -5847.6 cal/mol

c) -42,788 Kcal/mol

d) -6.425 Kcal/mole

e) no answer

10) The amount of heat exchanged during an isothermal process is given by the relation:

a) $Q = nRT\ln P_2/P_1$

b) $Q = nRT\ln P_1/P_2$

c) $Q = +nRT\ \ln V_1/V_2$

d) Q= 0

e) no answer

11) At 25°C, one mole of an ideal gas undergoes an isothermal transformation from state 1 (P1, T1) to state 2 (2P1, T1). What are the values of the quantity of heat and the work?

a) W = 16.93J Q = -16.93J

b) W = 413J Q = -413J

c) W = 1716.13J Q = -1716.13J

d) W= -1716.13J Q = 1716.13J

e) no answer

12) 25 ml of an ideal gas is compressed to 2 ml under a pressure P=5 atm. The work done is:

a) W= 115j

b) W= 0.01163Kj

c) W= 116.38j

d) W= 810j

e) no answer

13) Consider an ideal gas undergoing successive transformations represented in a Clapeyron diagram starting from the initial state A (P_A=3 atm, V_A =16 L, T_A = 300K).

- A → B: isobaric compression, V_B=8L
- B → C: isochoric heating
- C → A: isothermal expansion back to the initial state A

Given Cp=11.66 J/ K,

- The number of moles of the ideal gas is:

a) n = 1.95mol

b) n = 0..0192mol

c) n =1.5mol

d) n = 2mol

e) n = 2.5mol

14) The pressure at point C

a) P= 4.5atm

b) P = 5atm

c) P = 3.5atm

d) P = 5.999atm

e) P = 6.5atm

15) The amount of heat from A to B:

a) Q= 432 cal

b) Q = 815.78 cal

c) Q = 3412.68j

d) Q = 12.5cal

e) Q= 500cal

16) Check the correct answer:

a) The curve of the exchanged energy is continuous according to Planck.

b) Energy exchanges are quantized.

c) Energy exchanges are linear.

d) Energy can only be exchanged in integer multiples of the quantum.

e) It is Einstein who attributed to light both a corpuscular and wave-like aspect.

17) We consider the following electronic configurations:

Atom 1 : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$
Atom 2 : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^6\ 4s^2$
Atom 3 : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^4\ 4s^2$
Atom 4 : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^6\ 4d^{10}\ 5s^2\ 5p^6\ 5d^1\ 6s^2$
Atom 5 : $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^5$

a) All of these configurations exist.

b) Only configurations 1 and 5 exist.

c) Atoms 1, 2, and 5 belong to the same period.

d) Atom 5 has a lower electronegativity than atom 2.

e) Atom 5 is a halogen.

18) The rate equation for a zero-order reaction (order 0):

a) $\boldsymbol{log\ \frac{[A]}{[A]_0} = -kt}$

b) $[A]=-kt + [A]_0$

c) $\boldsymbol{\frac{[A]}{[A]0} = -kt}$

d) $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$

e) [A] - $[A]_0$=-kt

19) The rate constant for a first-order reaction (order 1) is given by:

a) $k=\frac{1}{t\,½[A]0}$

b) $K = \frac{ln2}{t\,½}$

c) $k =\frac{[A]0}{2t\,½}$

d) $k=\frac{ln2}{t\,½[A]0}$

e) Other answer

20) The rate equation for a first-order reaction (order 1):

a) $log\frac{[A]}{[A]_0} = +kt$

b) $[A]=-kt + [A]_0$

c) $\frac{[A]}{[A]_0} = -kt$

d) $\frac{1}{[A]} = kt + \frac{1}{[A]0}$

e) ln [A]= -kt + ln[A_0]

Data : R= 8,31jK^{-1}mol^{-1} R= 0.082Latm mol^{-1} K^{-1} R= 2 cal K-1 mol^{-1}
1 atm = 1.012 x 10^{+5}Pa Cl=35.5g/mol S=32 g/mol , O=16g/mol, 1cal = 4.18j

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**b**	**d**	**e**	**b**	**A**	**c**	**c**	**b**	**d**	**b**
QCM	11	12	13	14	15	16	17	18	19	20
Answer	**c**	**b**	**a**	**d**	**B**	**b,d,e**	**c,e**	**e**	**b**	**e**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject2_____2020_____

1) The amount of heat received by 2.5 g of nitrogen (N2) when heated from 20°C to 100°C at atmospheric pressure is: we give Cv=24.69 J/mol.K

a) Q=234.96 cal

b) Q= 177.71cal

c) Q= 168.55cal

d) Q= 56.21cal

e) other answer

2)The formation reaction of ammonia releases a heat of 177.65 kJ/mol at constant pressure at a temperature of 25°C. If ΔCp = -3.85 cal/mol, its heat at T = 100°C and at the same pressure is:

a)42211,25Kcal/mole

b) 177361cal/mol

c) -42,788 Kcal/mol

d) 42,21 Kcal/mole

e) other answer

3) At 25°C, one mole of an ideal gas undergoes an isothermal transformation from state 1 (P1, T1) to state 2 (2P1, T1). The value of the work is equal to:

a) W = 16.93J

b) W = 413J

c) W = 1716.13J

d) W= -1716.13J

e) other answer

4) Consider the reaction $NH_3 + HBr \rightarrow NH_2Br + H_2$

On donne : $\Delta H_{reaction}$ = - 46 cal/mol $\Delta H_{L(N-H)}$ = -22 cal/mol

$\Delta H_{L(H-Br)}$ = -12.5 cal/mol $\Delta H_{L(N-Br)}$ = -28 cal/mol

The bond energy $\Delta H_{L(H-H)}$ is equal to:

a) -46 Cal/mol

b) 12.5Cal/mol

c) -52.5 Cal/mol

d) 46 Cal/mol

e) other answer

5) 200 mL of an ideal gas expands to 1 liter under a pressure of P = 5 atm. The work is:

a) W= -404.8j

b) W= - $40x10^5$j

c) W= 404.8j

d) W= 810j

e) other answer

6) Given the following data

$S°_{N2}$ = 191,5 J K^{-1} mol^{-1} $S°_{H2}$ = 130,6 J K^{-1} mol^{-1} $S°_{Cl2}$ = 223,0 J K^{-1} mol^{-1}

$S°_{NH4Cl}$ = 94,6 J K^{-1} mol^{-1} $\Delta H°_{f\ NH4Cl}$ = -314,4 J K^{-1} mol^{-1}

The change in standard Gibbs free energy of formation of NH_4Cl at 25°C in J/mol is:

a) $\Delta G°_f$=-28473

b) $\Delta G°_f$ =24000

c) $\Delta G°_f$ =-152

d) $\Delta G°_f$ = 111092.9

e) other answer

7) The pH of a weak acid is given by the following relation:

a) pH =1/2 pKa+1/2log C.

b) pH =7+1/2 pKa-1/2log C.

c) pH = log [H_3O+]

d) pH = -1/2 logC +1/2 pKa

e) pH = -1/2 pKa-1/2log C.

8) Consider the molecule of HNO_3 (H = 1, O = 16, N = 7), the molecule contains:

a) 4 pure covalent bonds, 1 dative bond.

b) 2 pure covalent bonds, 2 dative bonds, and 2 ionic bonds.

c) 2 pure covalent bonds, 3 dative bonds.

d) 4 pure covalent bonds, 2 dative bonds.

e) no answer.

9) Consider a solution of formic acid HCOOH with a concentration of 10^{-2} mol/L, its pKa = 3.78. The pH value is:

a) 3.2

b) b) 7.90

c) c) 2.89

d) d) 2

e) e) no answer

10) The combustion of aspirin C9H8O4 is an exothermic reaction that releases an amount of heat equal to 65.19 Kcal/mol at 25°C under a pressure of 1 atm according to the following reaction:

$C_9H_8O_4 + 9O_2 \; ===9CO_2 + 4\,H_2O \qquad \Delta Hr=65,19Kcal/mol$

We give: $\Delta H_{f\ CO2} = -95,04$ Kcal/mol K $\qquad \Delta H_{f\ H2O} = -68,37$ Kcal/mol K

The specific heats in cal/mol·K are:

$Cp_{(C9H8O4)} = 12,5$; $Cp_{(Cs)} = 5,2 \qquad Cp_{(H2)} = 6,88$; $Cp_{(O2)} = 7,17.$

The enthalpy of formation of $C_9H_8O_4$ at 100°C in kcal/mol is:

a) $\Delta H°_f$=-1036.65

b) $\Delta H°_f$ =-1063.65

c) $\Delta H°_f$ = 0

d) $\Delta H°_f$ = -1069.36

e) no answer

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**D**	**D**	**c**	**c**	**a**	**d**	**d**	**a**	**c**	**d**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject1_____2021_____

1) Among the following statements, which one is correct?

a) A bond is purely covalent if its ionic character is 100%.

b) An ionic bond is a sharing of two electrons.

c) A covalent bond is a transfer of electrons between two atoms.

d) A covalent bond is a sharing of two electrons.

e) No answer

2) Check the correct answer:

a) The dipole moment is zero in an ionic bond.

b) The dipole moment is zero in a heteronuclear diatomic molecule.

c) The total dipole moment is zero in a water (H_2O) molecule.

d) A hydrogen bond forms between two identical atoms.

e) No answer.

3)- The kinetic equation for a zero-order reaction (order 0):

a) $log\frac{[A]}{[A]_0} = -kt$

b) $\frac{[A]}{[A]0} = -kt$

c) $\frac{1}{[A]} = kt + \frac{1}{[A]_0}$

d) $[A]_0 = kt + [A]$

e) No answer.

4) - The half-life (t1/2) for a first-order reaction (order 1):

a) $t_{½}=\frac{1}{k[A]0}$

b) $t_{½}=\frac{ln2}{k}$

c) $t_{½}=\frac{[A]0}{2k}$

d) $t_{½}=\frac{ln2}{k[A]0}$

e) No answer

5) The kinetic equation for a second-order reaction (order 2):

a) $log\frac{[A]}{[A]_0}=-kt$

b) $\frac{[A]}{[A]_0}=-kt$

c) $\frac{1}{[A]0}=-kt+\frac{1}{[A]}$

d)ln [A]= -kt

e) [A]=-kt + $[A]_0$

6). Select the correct statement:

a) In a zero-order reaction, the half-life is inversely proportional to the initial concentration.

b) In a first-order reaction, the half-life is inversely proportional to the initial concentration.

c) In a first-order reaction, the half-life depends on the initial concentration.

d) In a second-order reaction, the half-life is inversely proportional to the initial concentration.

e) In a second-order reaction, the half-life is proportional to the initial concentration.

7) Select the correct statement:

a) The unit of the rate constant k is the same for all reaction orders.

b) k does not depend on temperature.

c) In a zero-order reaction: k= v. The unit of k is moles per liter per second.

d) In a first-order reaction, the unit of k is moles per second.

e) No answer.

8) Among these statements, which one is the most correct?

a) A difference in electronegativity causes electron displacement through the π bond.

b) The plot of [A]=f(t) is a straight line for a zero-order reaction.

c) The plot of ln[A]=f(t) is a straight line for a zero-order reaction.

d) The plot of 1/[A]=f(t) is a straight line for a first-order reaction (1).

e) The half-life is independent of the rate constant.

9) The pH of a weak acid is given by the following relation:

a) pH = -1/2log [H_3O+]

b) pH =1/2 pKa-1/2log C.

c) pH =1/2 pKa+1/2log C.

d) pH =7+1/2 pKa-1/2log C.

e) pH = -1/2 pKa-1/2log C.

10) The Arrhenius relation is given by the equation:

a) K = RTlnEa

b) $A = K\, e^{\frac{Ea}{RT}}$

c) $K = A\, e^{\frac{Ea}{RT}}$

d) $Ea = \frac{RT}{LnK}$

e) $K = e^{-\frac{RT}{Ea\Delta G^{\circ}}}$

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**d**	**e**	**d**	**b**	**c**	**d**	**c**	**b**	**b**	**b**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject1_____2022_____

1) Given the following reaction: $NO_{2g} + 2H_{2g} == 2H_2O_l + 1/2N_{2g}$ at T=37°c
If the amount of heat released at constant pressure is 14 Kcal/mol, the amount of heat exchanged at constant volume is:

a)12450 cal/mol

b)15550 cal/mol

c)-12450 cal/mol

d)-11423.9cal/mol

e) no answer

2) Given the following data:: $S°_{(N2)} = 191,5\ J\ K^{-1}\ mol^{-1}$ $S°_{(H2)} = 130,6\ J\ K^{-1}\ mol^{-1}$ $S°_{(Cl2)} = 223,0\ J\ K^{-1}\ mol^{-1}$ $S°_{(NH4Cl)} = 94,6\ J\ K^{-1}\ mol^{-1}$ $\Delta H°_{f\ (NH4Cl)} = -314000\ J\ K^{-1}\ mol^{-1}$
The standard free energy change of formation of NH_4Cl at 25°C in J/mol is:

a) $\Delta G°_f$=-373.84

b) $\Delta G°_f$ =-202592.7

c) $\Delta G°_f$ =425407.3

d) $\Delta G°_f$ = 111092.9

e) no answer

3) The combustion of aspirin $C_9H_8O_4$ is an exothermic reaction that releases a heat quantity of 65.19 Kcal/mol at 25°C under 1 atm pressure, according to the following reaction: $C_9H_8O_4 + 9O_2 === 9CO_2 + 4\ H_2O$ ΔHr=65,19Kcal/mol
We give: $\Delta H_{f\ CO2}$ = -95, 04 Kcal/mol K $\Delta H_{f\ H2O}$ = -68, 37 Kcal/mol K
Specific heats in cal/mol K are: $Cp_{(C9H8O4)}$ = 12,5 ; $Cp_{(Cs)}$ = 5,2 $Cp_{(H2)}$ = 6,88 ; $Cp_{(O2)}$ = 7,17. The enthalpy of formation of $C_9H_8O_4$ à 100°C in kcal/mol is :

a) $\Delta H°_f$=-1036.65

b) $\Delta H°_f$ =-1063.65

c) $\Delta H°_f$ = 0

d) $\Delta H°_f = -1057.936$

e) no answer

4) The expression for the amount of heat exchanged at constant volume is given by the relation:

a)Qv=n(Cv + R) ΔT

b)Qv=-nCv ΔT

c) Qv=-n(R-Cp) ΔT

d) Qv=n(Cv – Cp) ΔT

e) other answer

5) In an isothermal compression of an ideal gas, we have:

a) ΔT= cste

b) ΔU=Cste

c) Q< 0

d) U=0

e) other answer

6) The enthalpy of the following reaction: **$Mg^{2+} + 2Cl^-$ === $MgCl_2$** is said:

a) Enthalpy of formation

b) Enthalpy of ionization

c) Enthalpy of bond dissociation

d) Enthalpy of affinity

e) Other answer

7) Given the reaction at 298 K:

CO (g)+ 3H2(g) → CH4(g) + H2O (g)

We are given the standard enthalpies of the following reactions:

CO (g) + 1/2O_2(g)	→	CO_2 (g)	ΔH° (1) = -283 kJ
H2 (g) + 1/2O_2 (g)	→	H_2O (g)	ΔH° (2) = -241, 8 kJ
CH4 (g) + 2O_2 (g)	→	CO_2 (g) + 2H2O (g)	ΔH°(3) = -803, 2 kJ

The value of the change in internal energy ΔUr at 298 K for the same reaction is:

a) $\Delta H°_f$=-136.65

b) $\Delta H°_f$ =-283

c) ΔH=-201.28

d) $\Delta H°_f$ = 157.936

e) other answer

8) 5 moles of an ideal gas at T=0°C and p=1atm undergo an isobaric transformation until the temperature reaches 100° C. The work done is:

a) W=-136.65j

b) ΔW_f =-1063.65j

c) W =986.8j

d) W = 358.65j

e) other answer

9) The amount of heat exchanged during an adiabatic transformation is given by the relation:

a) $Q= nC_v (T_f - T_i)$

b) $Q=nC_p (T_f - T_i)$

c) $Q= nRlnT_f/T_i$

d) Q= 0

e) other answer

10). Given the following combustion reactions under standard conditions:

C_2H_4 (g) + $3O_2$ (g) → 2 CO_2 (g) + $2H_2O$ (g) ΔH (1) = -332 kcal

H_2 (g) + ½ O_2 (g) → H_2O (l) ΔH (2) = -68.3 kcal

C_2H_6 (g) + 7/2 O_2 (g) → 2 CO_2 (g) + $3H_2O$ (g) ΔH (3) = -372,8 kcal

The standard heat $\Delta Hr°$ at 298 K for the following reaction is:

C_2H_4 (g) + H_2 (g) → C_2H_6 (g)

a) $\Delta H°_f$=-27.5

b) $\Delta H°_f$ =773.1

c) $\Delta H°_f$ = 0

d) $\Delta H°_f$ = -773.1

e) other answer

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**c**	**b**	**D**	**c**	**c**	**e**	**c**	**d**	**d**	**a**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject2_____2022_____

1) Check the correct answer:
a) A closed system exchanges matter only but not energy.

b) An isolated system exchanges energy with the external environment.

c) The exchange of heat and energy characterizes an open system.

d) The exchange of heat and matter characterizes a closed system.

e) The exchange of heat and matter characterizes an open system.

2) Check the correct answer:
a) Work W is a function of temperature.

b) Internal energy is zero in an isochoric process.

c) The amount of heat exchanged during an adiabatic process is zero.

d) The heat exchanged at constant pressure is equal to the change in internal energy.

e) Internal energy is zero in an isobaric process.

3) Among the following reactions, which one is a formation reaction:
a) $C(s) + 4H(g) = CH_4(g)$

b) $3/2O_2(g) + 2Fe(g) = Fe_2O_3(s)$

c) $N_2(g) + O_3(g) = N_2O_3(g)$

d) $1/2O_2(g) + CO(g) = CO_2(g)$

e) $1/2N_2(g) + 3/2H_2(g) = NH3(g)$

4) The heat of combustion $\Delta H°r$ at 298 K and 1 atm of solid oxalic acid $H_2C_2O_4$, using the standard molar enthalpies of formation $\Delta H°f(H_2C_2O_4(s)) = -1822.2$ kJ/mol.
$\Delta H°f(CO_{2(g)}) = -393$kj/mol $\Delta H°f(H_2O_{(liq)}) = -285.2$ kj/mol
a) -752.2kj

b)752.2kj

c)376.1kj

d)751kj

e) 1504.4kj

5) - A system releases Q = 2 kJ while doing work W = 500 J on the outside. The change in internal energy of the system is equal to:

a) ΔU=1500j

b) ΔU=1.5kj

c) ΔU=2500j

d) ΔU=-1500j

e) ΔU=-2500j

6)- The change in entropy ΔS during an isochoric process is given by:

a) ΔS = nCv ΔT

b)ΔS = $nCpln P_2/P_1$

c) ΔS = $nCvln T_2/T_1$

d) ΔS = $nCpln V_2/V_1$

e) no answer

7)- Cp: It is the molar heat capacity at constant pressure, and it expresses:

a) The amount of heat required to raise the temperature by one degree for n molecules

b) The amount of heat required to raise the temperature by 0 Kelvin for 1 gram of substance

c) The amount of heat required to raise the temperature by 10 Kelvin for 1 gram of substance

d) The amount of heat required to raise the temperature by one degree for one mole of substance

e) None of the above

8) Thiosulfuric acid H2S2O3 has a structure in which a single sulfur atom represents the central atom. The molecule contains:

a) Two single σ bonds and three dative bonds.

b) One dative bond and four single σ bonds.

c) Four σ bonds and two dative bonds.

d) Four single σ bonds and no dative bonds.

e) None of the above

9)- The carbon dioxide molecule is linear with the structure O=C=O. If the oxygen atom is more electronegative than the carbon and the dipole moment of the C=O bond is equal to 1.25 D, the total dipole moment is:

a) 2.5D

b) 1.25D

c) -1.25D

d) 0D

e) no answer

10)- Check the correct answer:

a) The dipole moment is zero in an ionic bond.

b) The dipole moment is zero in a heteronuclear diatomic molecule.

c) The total dipole moment is zero in a H2O molecule.

d) The dative bond forms between two electronegative atoms.

e) no answer

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**e**	**c**	**e**	**d**	**E**	**d**	**d**	**c**	**d**	**e**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject3_____2022_____

1) Among the following molecules, which one has a non-zero dipole moment:

a) CO_2

b) **b)** C_2H_2

c) **c) HC≡N**

d) **d)** Cl_2

e) **e) no answer**

2) A solution of NH_3 has a pH = 10.8 and its pKa = 9.2. Its concentration is:

a) $6.3x10^{-4}$

b) 10^{-3}

c) $2.51x10^{-2}$

d) **d)** $2.51x10^{-2}$

e) **e) pas de réponse**

3) We mix 60 mL of a strong acid with concentration $C_1 = 10^{-1}$ mol/L with 180 mL of another strong acid with concentration $C_2 = 2x10^{-2}$ mol/L. The pH of the mixture is:

a) 4.27

b) 0.92

c) 0.30

d) 3.5

e) no answer

4) In a mixture of two weak bases:

a) $pH = 14 + \frac{1}{2} \log (Ka_1C_1 + Ka_2C_2)$

b) $pOH = -\frac{1}{2} log(Kb_1C_1 + Kb_2C_2)$

c) $pOH = -\frac{1}{2}(pKb_1C_1 + pKb_2C_2)$

d) $pH = 7 + \frac{1}{2}pKa_1C_1 - \frac{1}{2}pKa_2C_2$

e) no answer

5) Among the following propositions, indicate the one that is correct:

a) The higher the pKa, the weaker the base of the conjugate pair AH/A^- is.

b) The pH is proportional to the concentration of H_3O^+ ions.

c) For two bases B_1 and B_2, if $pKa_1 > pKa_2$, then B_1 is stronger than B_2.

d) The rate constant k in first-order reactions is proportional to $t_{1/2}$.

e) None of the above

6) The half-life time of a second-order reaction is equal to:

a) $t_{½} = \frac{1}{2ka[A]0}$

b) $t_{½} = \frac{1}{ak[A]0}$

c) $t_{½} = \frac{[A]0}{2ak}$

d) $t_{½} = \frac{ln2}{ka[A]0}$

e) no answer

7) A weak acid with a concentration $C = 10^{-2}$ mol/L and a pH = 3.6, its Kb constant is:

a) $6.3x10^{-6}$

b) $6.3.x10^{-10}$

c) $1.58x10^{-9}$

d) $3x10^{-4}$

e) no answer

8) The rate constant of a zero-order reaction is given by the relation:

a) $k = \frac{1}{2t\,½a[A]0}$

b) $k = \frac{1}{at\,½[A]0}$

c) $k = \frac{[A]0}{2at\,½}$

d) $k = \frac{ln2}{t\,½a[A]0}$

e) no answer

9) Given the following reaction: $2N_2O_5 \rightarrow 4NO_2 + O_2$
Its rate constant k = 7.5 x 10^{-3} L·mol^{-1}·s^{-1} and the initial concentration $C_0 = 10^{-2}$ mol/L. The half-life time is equal to:

a) $0.066x10^5$

b) $0.13.x10^5$

c) $7.5x10^9$

d) $3x10^{-4}$

e) no answer

10) Given a mixture of a strong acid A_1H and a weak acid A_2H:

a) $pH = log\frac{c1+\sqrt{c1^2+4ka2c2}}{2a}$

b) $pOH = -log\frac{c1-\sqrt{c1^2-4ka2c2}}{2a}$

c) $pOH = 14 + log\frac{c1+\sqrt{c1^2+4ka2c2}}{2a}$

d) $pH = -log\frac{c1-\sqrt{c1^2+4ka2c2}}{2a}$

f) no answer

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**c**	**D**	**b**	**c**	**c**	**b**	**c**	**c**	**a**	**c**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject4_____2022_____

1) Choose the correct statement:

a) During a transformation, an open system does not exchange matter with its environment.

b) The change in internal energy of a reaction corresponds to the heat of the reaction at constant volume.

c) The standard entropy of a simple pure substance is zero.

d) The specific heat capacity of water is the amount of heat needed to change the temperature of 1 liter of water.

e) No answer

2) Choose the correct statement:

a) Work corresponds to an energy transfer between the system and the surroundings.

b) During an isobaric reaction, the change in enthalpy is equal to the heat of the reaction.

c) The enthalpy of formation of a compound is the change in enthalpy of the reaction leading to its formation from the atoms.

d) Work corresponds to an energy transfer between the system and the external environment.

e) No answer

3) Given the reaction: $H—C\equiv C—H + 2H_2 \longrightarrow H_3C—CH_3$
Calculate the change in enthalpy of the reaction. The following is provided:

	C≡C	C—C	H—H	C—H
Bending energy (Kj/mol)	-810	-347	-436	-414

a) 5127kj

b) 3210kj

c) 1131.5kj

d) -321k j

e) No answer.

4) What will be, in joules, the amount of heat received by one mole of an ideal gas undergoing an isothermal process at 100°C when its pressure is halved?
a) -517 j

b) 517 j

c) 2148.5 j

d)21.2 j

e) No answer.

5) For an isochoric process involving 4 g of oxygen (M(O) = 16 g/mol), changing from 100°C to 250°C, what is the amount of heat received (in joules)?
Given Cp = 15.5 J/K
a) 135 j

b) 290.62 j

c) 581.25 j

d) 260.8 j

e) No answer.

6) For an ideal gas, during an isochoric cooling:
a) W> 0

b) W = 0

c) ΔU = 0

d) W < 0

e) No answer.

7) Check the correct answer:

a) The internal energy is zero in an isobaric transformation.

b) The work WWW is zero in an isobaric transformation.

c) The amount of heat exchanged during an adiabatic transformation is zero.

d) The heat exchanged at constant pressure is equal to the change in internal energy.

e) No answer.

8) In the case of an ideal gas during an adiabatic expansion:

a) ΔU = 0

b) W > 0

c) Q = 0

d) ΔH = 0

e) pas de réponse

9) A system gives off 2850 J of heat to the outside and receives a work W=500 J. The change in internal energy of the system is equal to:

a) ΔU=3350j

b) ΔU=2350kj

c) ΔU=-3350j

d) ΔU=-2350j

e) No answer.

10) Which of the following statements is correct?

a) The simple bond results from lateral overlap.

b) The ionic bond is the sharing of two electrons.

c) The ionic bond has a non-zero dipole moment.

d) The internal energy is zero in an isochoric transformation.

e) No answer.

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**b**	**b**	**d**	**c**	**a**	**b**	**c**	**c**	**d**	**c**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject5_____2022_____

1)- The acetylene molecule is a hydrocarbon with the structure H-C≡C-H, and the dipole moment of the C-H bond is equal to 1.25D. The total dipole moment is:
a)2.5D

b)0D

c)1.25D

d)-1.25D

e) no answer

2)- At 25°C, one mole of a perfect gas undergoes an isothermal transformation from state 1 (P1, T1) to state 2 (2P1, T1). The value of the work is:
a) W = 16.93J

b) W = 413J

c) W= -1716.13J d)

d) W = 1716.13J

e) no answer

3)- Consider a solution of formic acid HCOOH with a concentration of 10^{-2} mol/L. Its pKa is 3.78, and the value of its pH is:
a) 2.89

b) 7.90

c) 3.2

d)2

e) no answer

4)- Check the correct answer:
a) The dipole moment is always zero in an ionic bond.

b) The dipole moment is zero in a homonuclear diatomic molecule.

c) The total dipole moment is zero in the H2O molecule.

d) A dative bond is formed between two electronegative atoms.

e) No answer

5) Check the correct answer:

a) The work W of an isobaric compression is positive.

b) The internal energy is zero in an isochoric transformation.

c) The quantity of heat exchanged during an isothermal transformation is zero.

d) The heat exchanged at constant pressure is equal to the change in internal energy.

e) The internal energy is zero in an isobaric transformation.

6). Select the correct statement**:**

a) For a zero-order reaction, the half-life time is inversely proportional to the initial concentration.

b) For a first-order reaction, the half-life time is inversely proportional to the initial concentration.

c) For a first-order reaction, the half-life time is directly proportional to the initial concentration.

d) For a second-order reaction, the half-life time is inversely proportional to the initial concentration.

e) No answer.

7)- The change in entropy ΔS during an isochoric transformation is given by:

a) $\Delta S = nCv\ \Delta T$

b)$\Delta S = nCp\ln P_2/P_1$

c) $\Delta S = nCv\ln T_2/T_1$

d) $\Delta S = nCp\ln V_2/V_1$

e) No answer.

8) - The half-life time (t½) for a second-order reaction is given by the following relation:

a) $k=\frac{1}{t\,½a[A]0}$

b) $k=\frac{ln2}{at\,½}$

c) $k=\frac{[A]0}{2at\,½}$

d) $k=\frac{ln2}{t\,½a[A]0}$

e) No answer.

9)- Cp: It is the molar heat capacity at constant pressure, it expresses:

a) The amount of heat required to raise the temperature by one degree for n moles of substance.

b) The amount of heat required to raise the temperature by 0 Kelvin for one mole of substance.

c) The amount of heat required to raise the temperature by 1°C for one mole of substance.

d) The amount of heat required to raise the temperature by one degree for...

e) No answer.

10). Select the correct statement:

a) In a zero-order reaction, the half-life time is inversely proportional to the initial concentration.

b) In a first-order reaction, the half-life time is inversely proportional to the initial concentration.

c) In a first-order reaction, the half-life time depends on the initial concentration.

d) In a second-order reaction, the half-life time is inversely proportional to the initial concentration.

e) In a second-order reaction, the half-life time is directly proportional to the concentration.

11) Among the following molecules, which one has a non-zero dipole moment?

a) CO_2

b) C_2H_2

c) HC≡N

d) Cl_2

e) no answer

12) A solution of NH_3 has a pH = 10.8 and pKa = 9.2. Its concentration is:

a) $6.3x10^{-4}$
b) b) 10^{-3}
c) 10^{-3}
d) d)$2.51x10^{-2}$
e) e) no answer

13) When mixing 60 mL of a strong acid with concentration $C_1 = 10^{-1}$ mol/L with 180 mL of another strong acid with concentration $C_2 = 2x10^{-2}$ mol/L, the pH of the mixture is:

a) 4.27

b) 0.92

c) 0.30

d) 3.5

e) no answer

14) In a mixture of two weak bases:

a) $pH= 14+ \frac{1}{2} \log (Ka_1C_1 + Ka_2C_2)$

b) $pOH=- \frac{1}{2} log(Kb_1C_1 + Kb_2 C_2)$

c) pOH =- $\frac{1}{2}$ **(pKb$_1$C$_1$ +** $\frac{1}{2}$**pKb$_2$C$_2$)**

d) pH= 7+$\frac{1}{2}$**pKa$_1$C$_1$ -** $\frac{1}{2}$**pKa$_2$C$_2$**

e) no answer

15) Among the following statements, indicate the correct one:

a) The higher the pKa, the weaker the base in the AH/A- couple.

b) pH is proportional to the concentration of H3O+ ions.

c) For two bases B1 and B2, if pKa1 > pKa2, then B1 is stronger than B2.

d) The higher the pKa of an acid, the more its dissociation is significant.

e) No answer

16) A weak acid with concentration C = 10^{-2} mol/L and pH = 3.6, its basicity constant is equal to:

a) 6.3x10^{-6}

b) 6.3.x10^{-10}

c) 1.58x10^{-9}

d)3x10^{-4}

e) pas de réponse

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**b**	**d**	**a**	**b**	**a**	**d**	**e**	**a**	**c**	**d**
QCM	11	12	13	14	15					
Answer	**c**	**d**	**a**	**b**	**c**					

versity Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject6_____2022_____

1) The pH of a mixture of two weak acids A_1H and A_2H is given by the following relation:

a) $pH = 7 + \frac{1}{2}pKa_1C_1 + \frac{1}{2}pKa_2C_2$

b) $pH = \frac{1}{2}pKa_1C_1 - \frac{1}{2}pKa_2\ C_2$

c) $pH = \frac{1}{2}pKa_1C_1 + \frac{1}{2}pKa_2C_2$

d) $pH = 7 + \frac{1}{2}pKa_1C_1 - \frac{1}{2}pKa_2C_2$

e) No answer

2) Consider a weak acid with a concentration of 10^{-3} mol/L and pH = 3.7. Its degree of dissociation (α) is:

a) 10%

b) 20%

c) 5.01 %

d) 35%

e) No answer

3) Among the following propositions, indicate the correct one:

a) The higher the pKa, the weaker the base of the AH/A- couple.

b) For two acids A_1H and A_2H, if $pKa_1 > pKa_2$, then A_2H is stronger than A_1H.

c) The value of pH provides information on the strength of acids and bases.

d) The higher the pKa of an acid, the greater its dissociation.

e) No answer

4) The acidity constant of a weak base with a concentration of $C = 10^{-2}$ mol/L and pH = 10.8 is equal to:

a) 2. 1x10^{-5}

b) 3.98.x10^{-7}

c) 2.51x10^{-10}

d)3x10^{-4}

e) No answer

5) The pH of a mixture of a strong acid A_1H and a weak acid A_2H is given by the following expression:

a) pH= $log\frac{c1+\sqrt{c1^2+4ka2c2}}{2a}$

b) pH= $-log\frac{c1-\sqrt{c1^2-4ka2c2}}{2a}$

c) pH= $-log\frac{c1+\sqrt{c1^2+4ka2c2}}{2a}$

***d*) pH=** $-log\frac{c1-\sqrt{c1^2+4ka2c2}}{2a}$

e) No answer

6) - The half-life time (t ½) for a first-order reaction (order 2):

a) $t_{½}=\frac{1}{ka[A]0}$

b) $t_{½}=\frac{ln2}{ak}$

c) $t_{½}=\frac{[A]0}{2ak}$

d) $t_{½}=\frac{ln2}{ka[A]0}$

e) No answer

7). Select the correct statement:

a) In a zero-order reaction, the half-life time is inversely proportional to the initial concentration.

b) In a first-order reaction, the half-life time is inversely proportional to the

initial concentration.

c) In a first-order reaction, the half-life time is directly proportional to the initial concentration.

d) In a second-order reaction, the half-life time is inversely proportional to the initial concentration.

e) No answer

8) Among these statements concerning reactions of the type A → B, with a global order of 1, which ones are correct?

a) The plot of [A] = f(t) is a straight line.

b) The plot of ln[A] = f(t) is a straight line.

c) The plot of 1/[A] = f(t) is a straight line.

d) The half-life time is independent of the rate constant k.

e) No answer

8) The reaction $NH_3 \rightleftharpoons 1/2\ N_2 + 3/2\ H_2$ is first-order.
Its half-life $t_{1/2}$ = 1110 min and its concentration is C = 2.4 mol/L. Among these statements concerning this reaction, which ones are correct?

a) The order cannot be deduced from the unit of the rate constant k.

b) Its rate constant k = 3.75×10^{-4} min^{-1}.

c) Its rate constant is inversely proportional to the initial concentration.

d) Its rate constant k = 1.04×10^{-5} s^{-1}.

e) No statement is correct.

10) Consider a reaction where a reactant disappears, and its half-life is independent of the concentration.

a) The reaction has no order.

b) The reaction follows zero-order kinetics.

c) The reaction follows first-order kinetics.

d) The reaction follows second-order kinetics.

e) No answer

The solution:

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**c**	**b**	**b**	**c**	**c**	**a**	**d**	**B**	**d**	**C**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Selected MCQs** **General Chemistry**

_____ subject1_____2023_____

1) Select the correct statement:

a) The hydrogen atom is capable of absorbing energy exclusively in the form of light radiation.

b) All electrons with the same quantum number *l* have the same energy.

c) Hydrogen belongs to the group of metals.

d) Metals tend to give positive ions.

e) Elements belonging to the group of non-metals tend to give negative ions.

2) Select the correct statement:

a) The metallic character decreases from left to right in the periodic table.

b) To define an atom, we generally determine its atomic radius.

c) The atom is primarily composed of "vacuum."

d) The atom is 10 times larger than a nucleon.

e) The nucleus is 10 times smaller than the atom.

3) Select the correct statement:

a) More energy is required to ionize an atom when it is in the ground state than when it is in the excited state.

b) If K is 13.6, the energy at the M orbit level is (-1.5 eV).

c) An atom is said to be excited when the electron is at infinity.

d) A hydrogen atom in the ground state has an energy of 13.6 eV.

e) The farther from the nucleus, the higher the energy of the shells.

4) We consider the atom according to Bohr's model, where the electron is in the L shell. It loses an energy of 10.2 eV. (The constant K is 13.6 eV)

a) The atom was ionized.

b) The atom returns to its ground state.

c) A spectrum of emission is observed, unlike the absorption spectrum.

d) The initial energy level had a value of (-3.4 eV).

e) The emitted line from this electronic transition belongs to the Lyman series.

5) We consider the element 6C:

a) The electronic structure of this atom is: $1s^2\ 2s^2\ 2p^2$.

b) According to Hund's rule, two electrons of the same atom cannot have all four of their quantum numbers identical.

c) In a quantum box, we can only have 2 electrons with antiparallel spin, or one electron alone, or no electron.

d) In the 3rd shell of the carbon atom, there can be a maximum of 18 electrons.

e) The carbon atom belongs to the p block in the periodic table.

6) Consider the following elements: 4Be, 11Na, 6C, 9F, 17Cl, 12Mg, 10Ne:

a) They all belong to the same period.

b) 4Be and 12Mg belong to the same chemical family.

c) 9F and 10Ne are halogens, and 17Cl is a noble gas.

d) The most electronegative element is 17Cl.

e) The one with the highest second ionization energy is 10Ne.

7) Select the correct statement:

a) The atom consists of two types of particles: nucleons and protons, both belonging to the neutron family.

b) The atomic number Z, characteristic of the element, represents the mass number.

c) An element is the set of atoms and ions that have the same atomic number.

d) Oxygen and carbon dioxide are both compound substances.

e) Isotopes have identical chemical and physical properties.

8) Select the correct statement:

a) The energy of the electron is quantized: it can only take certain values between 0 and +∞.

b) Energy changes of the electron occur randomly.

c) In the absence of external excitation, the electron is always in the lowest energy level.

d) The excited state is unstable, and the electron quickly returns to a lower energy level by emitting radiation.

e) The energy of the electron in the atom is defined by 2.

9) What is the electron configuration of 14Si?

a. [10Ne] $3s^2$ $3p^2$

b. [10Ne] $3s^2$ $3p^3$

c. [10Ne] $3s^2$

d. $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^2$

e. $1s^2$ $2s^2$ $2p^6$ $3s^2$ $3p^3$

10) Regarding period number 2:

a. It contains all the alkali metals.

b. It contains all the elements belonging to group 2.

c. It is characterized by a number of electronic shells equal to two.

d. It contains 6C.

e. It contains 13Al.

11) Consider the element 15P:

a. It has an empty quantum box.

b. It has a quantum box defined by n = 1, l = 2, m = -2.

c. It belongs to the same group as nitrogen (7N) and the same period as iron (26Fe).

d. The ion P^{2+} has 1 unpaired electron.

e. The ion P^{+} has the same number of unpaired electrons as 32Ge.

12) : Consider the following elements: 26Fe, 27Co, 28Ni:

a. They belong to the same group of transition elements.

b. They belong to the same period.

c. They all have a pair of electrons in the N shell.

d. Only two of them are transition elements.

e. They all have unpaired electrons.

13) Select the correct statement:

a. The number of protons in the nucleus is equal to the number of electrons orbiting the nucleus.

b. Protons, neutrons, and electrons are called nucleons.

c. The number of protons is equal to the number of neutrons.

d. The number of nucleons determines the mass number A.

e. The number of protons determines the charge number.

14) Consider the element 11Na:

a. Its first ionization energy is higher than its second ionization energy.

b. Na^{+} has a smaller radius than Na.

c. For alkali metals, the second ionization energy is higher than the first ionization energy.

d. The second ionization energy of Na is higher than the second ionization energy of Li.

e. Its first ionization energy is lower than that of 19K.

15) The electron of a hydrogen atom moves from the M shell to the L shell:

a) The energy released is directly proportional to the wavelength of the emitted radiation.

b) The energy released is 4.91 eV.

c) The energy released is 3.40 eV.

d) The observed light line belongs to the Balmer series.

e) When the electron is on the L shell, the hydrogen atom is in an excited state.

16- : Consider the following elements: 54Xe, 17Cl, 53I:

a) Two of them are noble gases.

b) Two of them are halogens.

c) They all belong to the same group.

d) Only two of them belong to the same period.

e) Only two of them belong to the same group.

17) Regarding sp^2 hybridization:

a. The hybrid orbitals are formed from 3 pure orbitals.

b. The orbitals will all have a strict angle of 109°28' between them.

c. They will all have the same energy.

d. This hybridization results in a linear geometry.

e. The C in the CO_2 molecule is sp^2 hybridized.

18 Indicate the compounds in which the carbon atom is sp^2 hybridized:

a. CH_4

b. C_2H_2

c. HCO_3

d. CO_2

e. C_2H_4

19 Consider the nucleus $^{235}_{92}U$:

a) This nucleus has 92 neutrons.

b) This nucleus consists of 235 nucleons, including 92 protons and 143 neutrons.

c) This nucleus has 143 electrons.

d) The element Uranium consists of all atoms with the atomic number 235.

e) The nucleus $^{238}_{92}U$ has the same physical properties as the nucleus $^{235}_{92}U$.

20 Select the correct answer:

a) n is the principal quantum number, it ranges from 1 to infinity.

b) l is the secondary quantum number, and $0 \leq l \leq n$.

c) If n = 3, there are 3 possible values of l.

d) If n = 1, there will be one s subshell and one p subshell.

e) A quantum box is defined by the 4 quantum numbers.

The solution

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**d,e**	**a,c**	**a,b,e**	**b,c,d,e**	**a,c,e**	**b**	**c,d,e**	**c,d,e**	**a,d**	**C,d**
QCM	11	12	13	14	15	16	17	18	19	20
Answer	**d,e**	**a,b,c,e**	**a,d,e**	**b,c**	**d,e**	**b,d,e**	**a,c**	**E**	**B**	**a,c**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject1_____2024_____

1) Consider the atom of Aluminum **(13Al)**:

a) It contains 9 subshells.

b) It has 5 orbitals.

c) It contains 5 electrons with a spin quantum number of +1/2.

d) It contains 8 electrons with a magnetic quantum number m=0.

e) It contains 5 electrons with a spin quantum number of -1/2.

2) The number of lines in the Paschen series in the emission spectrum of hydrogen for $n \leq 10$ is:

a) 3lines

b) 7 lines

c) 15 lines

d)10 lines

e) no answer

3) Consider the atom of copper (29Cu), the quantum quadruplet of its last electron in the outermost shell is:

a) 4,0,0,-1/2

b) 3,2,-2,+1/2

c) 4,0,0,+1/2

d) 3,2,-2,-1/2

e) no answer

4) Cesium (55Cs) is located in the periodic table in

a) 6th period, 2nd column

b) 4th period, 2nd column

c) 5th period, 1st column

d) 6th period, 1st column

e) No answer

5) The energy of the third line of the Paschen series in the emission spectrum is:

a) $4.18x10^{-19}j$

b) $3.24x10^{-19}j$

c) $1.804x10^{-19}j$

d) $5.49x10^{-19}j$

e)$69.54x10^{-19}j$

6) The magnetic quantum number mmm for an electron in the 4d subshell:

a) is necessarily greater than 2

b) can have the value -1

c) cannot have the value 0

d) can take 10 different values

e) No answer

7) In the periodic classification table:

a) The attraction force increases from top to bottom.

b) Electronegativity increases from right to left.

c) The atomic radius decreases from left to right.

d) Ionization energy increases from right to left.

e) no answer

8) Une des raie de la série de Brackett à une fréquence de $7.357x10^{13}$ Hz cette raie correspond à une transition électronique de :

a) **6 → 4**

b) **5 → 3**

c) **4 → 6**

d) **5→ 4**

e) **7 → 4**

9) For Chlorine (17Cl), its 14th electron is characterized by the following quantum numbers:

a) **(3,0,0,+1/2)**

b) **(3,1,0, +1/2)**

c) **(3,1,-1,+1/2)**

d) **(3,1,1,-1/2)**

e) **(2,1,-1,-1/2)**

10) The kinetic energy of an electron as a function of its radius is given by the relation:

a) **$Ke^2/2r$**

b) **$-Ke^2/2r$**

c)- **Ke^2/r**

d) **$2Ke^2/r$**

e) **Ke^2/r^2**

11) quelles est la proposition correcte ?

a) In isobaric expansion,Vi >Vf et W< 0

b) In adiabatic expansion Vi >Vf et Q= 0

c) In isochoric cooling, Tf >Ti et P i < Tf

d) In isothermal compressionQ = 0 et $\Delta U = 0$

e) In isochoric heating, Tf >Ti et Pi < Pf

12) The lattice energy is the energy required to:

a) form a bond from gaseous atoms

b) form a solid from gaseous atoms

c) form a solid atom from gaseous ions

d) form a solid from gaseous ions

e) form a solid crystal from pure simple substances

13) 0.8 kg of nitrogen (N_2), assumed to be perfect, is compressed isothermally from 0°C and P_1=1.5 atm to P_2=10 atm. The value of the work is:

a)W= 1.213kj

b)W=122.967kj

c)W = 29.595kj

d)W = --18496.77j

e) no answer

The volume at the initial and final states is:

a)V_i = 43212L **a) V_f = 6481.8L**

b)V_i = 88.43m^3 **b) V_f = 39.97L**

c) V_i =426.4L **c) V_f= 63.95**

d) V_i = 10400L **d) V_f= 1560L**

e) no answer

14) The relationship between the quantity of heat exchanged at constant pressure and the quantity of heat exchanged at constant volume is:

a) $Q_v = Q_p - \Delta(nRT)$

b) $Q_v = Q_p + \Delta nRT$

c) $Q_v = Q_p + nR\Delta T$

d) $Q_v - Q_p = - \Delta nRT$

e) No answer

15) The initial state of one mole of a perfect gas is characterized by P0=2 atm, V0=14 L. The gas undergoes an isobaric expansion that doubles its volume with a temperature decrease of ΔT = 150K, si Cp =7 cal/mol

- the work done is :

a)W = - 28x10^{3}J

b) W = -2833.6J

c) W = -28J

d)W=28x10^{3}J

e) no answer

- The change in enthalpy is:

a) ΔH =1050cal

b) ΔH = - 1050cal

c) ΔH = 28cal

d) ΔH= - 28x10^{3}cal

e) no answer

16) consider the reaction :**$C_2H_4 + H_2 \rightarrow C_2H_6$**

We give : $\Delta H_{reaction}$= -66 cal/mol $\Delta H_{L(C-H)}$ = -289.2 cal/mol $\Delta H_{L(H-H)}$ = -12.5 cal/mol $\Delta H_{L(C-C)}$ = -238 cal/mol

The bending energy $\Delta H_{L(C=C)}$ in Cal/mol est égale à :

a) -400

b) -125

c) -737.9

d)416

e) -152.5

17) The amount of heat received by 1 mole of gas when its temperature is raised from 25°C to 100°C at constant volume is: Cp=33 J/mol.K

a)Q=2475 J

b) Q= 2640 J

c) Q= 720720 J

d) Q= 1851.75j

e) no answer

18) 2.5 moles of an ideal gas at T = 0°C and P = 1 atm undergo an isobaric transformation to a temperature of 200°C. The work done is:

a)-408.2j

b)4155j

c)-4149.2j

d)315.3j

e) no answer

19) In an isothermal transformation, the amount of heat is expressed by:

a)$Q= - nRT \ln P_1/P_2$

b) $Q= nRT \ln P_1/P_2$

c) $Q = nRT \ln V_1/V_2$

d) $Q = - nRT \ln V_2/V_1$

e) no answer

20) In an adiabatic transformation:

a) $Q=\Delta U$

b) $TV^{\gamma} = cst$

c) $TV^{\gamma-1} = cst$

d) $PV^{\gamma-1} = cst$

e) Q= cste

Rh $1.09x10^7$ C= $3x10^8$m/s 1cal=4.18j 1atm=$1.012x10^5$ Pa N=14g/mol

---

The solution

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**c**	**b**	**c**	**d**	**c**	**b**	**c**	**d**	**B**	**A**
QCM	11	12	13	14	15	16	17	18	19	20
Answer	**e**	**d**	**b,c,c**	**d**	**b,a**	**c**	**d**	**c**	**b**	**C**

University Djilali Liabes of Sidi Bel Abbes
Faculty of Medicine
Chemistry Module **Midterm Exam n°1** **General Chemistry**

_____ subject2_____2024_____

1) Let the strong acid HCl with a concentration of C = 10^{-9} mol/L. Its pH is equal to:
a) 7.0

b) 5.0

c) 4.0

d) 9.0

e) no answer.

2) 1 kg of carbon dioxide (CO_2), assumed to be ideal, is compressed reversibly and isothermally at 25°C from P_1 = 2 atm to P_2 = 12 atm. The value of the work is:
a) W=3.483 kJ
b) W=24.896 kJ

c) W=101.158 kJ

d) W=−2.726 kJ

e) No answer

3) A solution of CH3COOH has a pH = 3.2 and its pKa = 4.7. What is its concentration in mol/L?
a) 0.06

b) 1.8 x 10^{-2}

c) 0.02

d) 0.025

e) 5.64.

4) Barium $_{56}$Ba is located in the periodic table in:
a) the 5th period, 1st column

b) the 6th period, 2nd column

c) the 4th period, 2nd column

d) the 6th period, 1st column

e) No answer.

5) Among the following statements, indicate the one that is correct:

a) The higher the pKa, the stronger the acid of the AH/A^- pair.

b) The pH is inversely proportional to the concentration of OH^- ions.

c) For two acids HA_1 and HA_2, if pKa1 < pKa2, then HA_1 is stronger than HA_2.

d) The acid dissociation constant Ka is proportional to the pH.

e) A Lewis base is a chemical entity that accepts electron pairs.

6) For the Fluorine atom ($_9F$), its 7th electron is characterized by the following quantum numbers:

a) (2,1,0,-1/2)

b) (2,1,0,+1/2)

c) (2,1,1,+1/2)

d) (2,1,2,-1/2)

e) (2,0,0,-1/2).

7) The rate constant (K) of a first-order reaction is:

a) $K=\ln 2/t_{1/2}$

b) $K=1/t_{1/2}[A]_0$

c) $K=[A]_0/2t_{1/2}$

d) $K=\ln 2/[A]_0 t_{1/2}$

e) No answer

8) For the atom of 17Cl (chlorine), how many electrons with a spin quantum number of +1/2 are there in the chlorine atom?

a) 7

b) 9

c) 10

d) 8

e) 12

9) In the periodic table:

a) The attraction force decreases from left to right.

b) Electronegativity decreases from bottom to top.

c) The atomic radius increases from top to bottom.

d) Ionization energy decreases from bottom to top.

e) No answer.

10) HCl has a dipole moment of 1.1 D. What is the value of the partial charges carried by the two atoms? Given: 1 D = 3.33 x 10^{-30} C·m and dH-Cl = 1.27 x 10^{-10} m.

a) 0,73 x 10^{-19} C

b) 1,2 x 10^{-19} C

c) 0,243 x 10^{-19} C

d) 0,29 x 10^{-19} C

e) No answer

11) The number of lines for the Balmer series in the emission spectrum of H for $n \leq 6$ is:

a) 3 raies

b) 5 raies

c) 10 raies

d) 6 raies

e) No answer

12) The initial state of one mole of an ideal gas is characterized by P_0 = 1.5 atm, V_0 = 10 L. The gas undergoes an isobaric expansion that triples its volume with a temperature decrease of ΔT = 100 K. If Cp = 8 cal·mol^{-1}·K^{-1},The work done is:

a)W=−2026.5J

b)W=−3039.75J

c)W=5039.75J

d)W=−1.013×10^5J

e) No answer

13) The pH of a solution with 0.05 mol/L of acetic acid, knowing that its acid dissociation constant is 1.8×10^{-5}, is on the order of:

a) 2.72

b) 3.02

c) 2.34

d) 3.48

e) No answer

14) The energy of the second line of the Balmer series in the emission spectrum is:

a) $3.03\text{x}10^{-19}$ J

b) $2.55\text{x}10^{-19}$ J

c) $4.09\text{x}10^{-19}$ J

d) $1.89\text{x}10^{-19}$ J

e) $5.10\text{x}10^{-19}$ J.

15) Indicate the correct statement:

a) An sp3 hybridized carbon has two π bonds.

b) A molecule with an sp2 hybridized carbon has a linear geometry.

c) The σ bond results from axial overlap.

d) A molecule with an sp hybridized carbon has a tetrahedral geometry.

e) A molecule with an sp3 hybridized carbon has a planar geometry.

16) The reaction A → Products is first-order. Its $t_{1/2}$ = 500 minutes, with an initial concentration $[A]_0$ = 1.0 mol/L. Which of these statements is correct?

a) One cannot deduce the order from the unit of the rate constant k.

b) Its rate constant k is proportional to the initial concentration.

c) Its rate constant is proportional to the half-life time $t_{1/2}$.

d) Its rate constant $k = 1.39 \times 10^{-3}$ min^{-1}.

e) No statement is correct.

17) What is the correct definition of sublimation energy?

a) The energy required to transform a solid into gaseous ions.

b) The energy required to transform a solid into gaseous atoms.

c) The energy required to transform gaseous atoms into a solid.

d) The energy required to transform gaseous ions into a solid.

e) The energy required to transform a solid into liquid molecules.

18) Among the following molecules, which one has a zero molecular dipole moment?

a) H_2O

b) $CHCl_3$

c) NH_3

d) COS

e) no answer

La solution

QCM	1	2	3	4	5	6	7	8	9	10
Answer	**a**	**c**	**c**	**b**	**c**	**c**	**a**	**D**	**c**	**d**
QCM	11	12	13	14	15	16	17	18	19	20
Answer	**e**	**b**	**b**	**c**	**C**	**d**	**b**	**e**		