(CHEM 101+ CHEM 103) **1438-1439 H / 2017-2018 G**

FIRST SEMESTER **FINAL EXAM-I**

Date: Sunday 13/04/1439 H	**الاسم :** .....
Time: 9:00 - 12:00 noon	**الرقم الجامعي :** .....
Time allowed: 180 minutes	**رقم الشعبة :** .....

Write your answer in the table below

Q1:	***Q8:***	***Q15:***	***Q22:***	***Q29:***	***Q36:***
Q2:	***Q9:***	***Q16:***	***Q23:***	***Q30:***	***Q37:***
Q3:	***Q10:***	***Q17:***	***Q24:***	***Q31:***	***Q38:***
Q4:	***Q11:***	***Q18:***	***Q25:***	***Q32:***	***Q39:***
Q5:	***Q12:***	***Q19:***	***Q26:***	***Q33:***	***Q40:***
Q6:	***Q13:***	***Q20:***	***Q27:***	***Q34:***	
Q7:	***Q14:***	***Q21:***	***Q28:***	***Q35:***	

IA												IIIA	IVA	VA	VIA	VIIA	VIIIA
1 H 1.008	2 IIA											13	14	15	16	17	2 He 4.003
3 Li 6.94	4 Be 9.01											5 B 10.811	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
11 Na 23.00	12 Mg 24.31	3 IIIB	4 IVB	5 VB	6 VIB	7 VIIB	8	9 VIIIB	10	11 IB	12 IIB	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.07	17 Cl 35.45	18 Ar 39.98
19 K 39.09	20 Ca 40.08	21 Sc 44.96	22 Ti 47.87	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.69	29 Cu 63.546	30 Zn 65.41	31 Ga 69.72	32 Ge 72.64	33 As 74.9216	34 Se 78.96	35 Br 79.90	36 Kr 83.80
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.23	41 Nb 92.91	42 Mo 95.94	43 Tc [98]	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.760	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	71 Lu 174.97	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.980	84 Po [209]	85 At [210]	86 Rn [222]
87 Fr [223]	88 Ra [226]	103 Lr [262]	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [269]	109 Mt [268]	110 Ds [271]	111 Rg [272]	112 Uub [285]	113 Uut [286]					

Constants:

1 atm = 760 torr = 760 mmHg = 101.325 kPa

N_A (*Avogadro's Number*) = 6.022×10^{23}

R = 0.0821 atm L mol^{-1} K^{-1} = 8.314 J mol^{-1} K^{-1}

1 atm.L = 101.325 J

Q1: Express 0.000840 in scientific notation?

A) 8.40×10^{-3} B) 8.40×10^{-4}

C) 8.4×10^{4} D) 8.40×10^{4}

Q2: Dissolving sugar into water is an example of:

A) chemical change. B) energy change.

C) physical change. D) chemical reaction.

Q3: An example of extensive property, is:

A) mass B) color

C) temperature D) density

Q4: The SI unit for speed of light, is:

A) km/s B) km/hr

C) m/hr D) m/s

Q5: The formula for "chromium(III) nitrite", is:

A) $Cr_3(NO_2)_2$ B) $Cr_2(NO_2)_3$

C) $Cr(NO_2)_3$ D) $CrNO_3$

Q6: The formula of ionic compound formed by magnesium and chlorine, is:

A) MgCl B) $MgCl_2$

C) Mg_2Cl D) $Mg(II)Cl_2$

Q7: Which pair of atoms are isotopes of the same element?

A) ${}^{14}_{6}X$ ${}^{14}_{7}X$ B) ${}^{19}_{10}X$ ${}^{19}_{9}X$

C) ${}^{20}_{10}X$ ${}^{21}_{11}X$ D) ${}^{14}_{6}X$ ${}^{12}_{6}X$

Q8: The formula of a salt is XCl_2. The X-ion in this salt has 36 electrons. The metal "X" is:

A) Sr B) K

C) Ba D) Zn

Q9: The oxidation state of iodine "I" in (IO_3^{-1}), is:

A) -1 B) +3

C) +5 D) -2

Q10: The number of hydrogen atoms in 5.0 g of hydrogen gas "H_2", is:

A) 1.51×10^{24} B) 3.00×10^{24}

C) 9.27×10^{24} D) 6.85×10^{24}

Q11: The mass percent of boron "B" in $Al(BF_4)_3$, is:

A) 10.15 % B) 9.39 %

C) 23.71 % D) 11.28%

Q12: A compound has an empirical formula "CH_2O". If the molar mass of this compound is 150.13 g/mol, then the correct molecular formula, is:

A) $C_5H_{10}O_5$ B) $C_6H_{12}O_6$

C) $C_4H_8O_4$ D) $C_3H_6O_3$

Q13: How many grams of "Na_2O_2" can be produced from the reaction of 10.0 g of "Na" with excess amount of "O_2" gas, if the percent yield of the reaction is 55% ? $2\ Na + O_2 \rightarrow Na_2O_2$

A) 5.8 B) 9.3

C) 6.8 D) 16.9

Q14: The maximum mass in (***g***) of" $PH_3(g)$" that can be formed when 6.2 g of $P_4(g)$ react with 4.0 g of "$H_2(g)$", is: $P_4(g) + 6H_2(g) \rightarrow 4PH_3(g)$

A) 6.8 B) 4.3

C) 27.0 D) 45.0

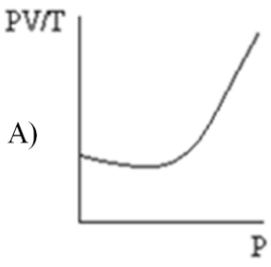
Q15: The volume of a nitrogen "N_2" sample is 6.0 L at 35°C and 740 torr. What volume in (***L***) will it occupy at STP?

A) 6.95 B) 4.28

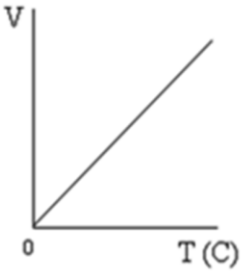
C) 5.18 D) 3.86

Q16: Which of the following graphs represents a correct relationship for an ideal gas?

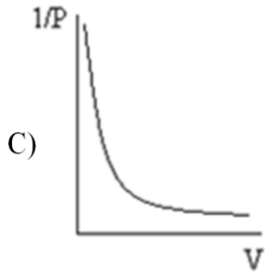
A)



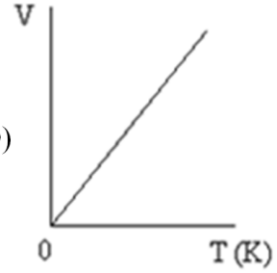
B)



C)



D)



Q17: What volume in (***L***) does 0.136 g of oxygen gas "O_2" occupy at 20°C and 748 torr?

A) 0.104 B) 0.004

C) 10.55 D) 0.412

Q18: If a 22.4 L of a gas sample at 0°C contains 0.3 moles of N_2, 0.2 moles of O_2 and 0.5 moles of CO_2, then the partial pressure in (***atm***) of N_2 is:

A) 1.0 B) 0.1

C) 0.5 D) 0.3

Q19: An exothermic reaction causes the surrounding to:

A) decrease in temperature
B) increase in temperature
C) decrease in pressure
D) no effect

Q20: According to the following reaction:

$$2Cr^{3+}(aq) + 3Ni(s) \rightarrow 2Cr(s) + 3Ni^{2+}(aq)$$

the value of ΔH in (***kJ***), is:

($\Delta H^{\circ}_f Cr^{3+} = -143kJ/mol$ & $\Delta H^{\circ}_f Ni^{2+} = -54kJ/mol$)

A) 89 B) -89

C) 124 D) -124

Q21: According to the following reaction:

$2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$ $\Delta H^{\circ}_{rxn} = -198$ kJ

When 320 g of "SO_2" is burned in air, then the amount of heat given off in (***kJ***), is:

A) 754 B) 207

C) 990 D) 495

Q22: Which of the following is endothermic process?

A) $Hg(g) \rightarrow Hg(l)$ B) $CO_2(g) \rightarrow CO_2(s)$

C) $I_2(s) \rightarrow I_2(g)$ D) $H_2O(l) \rightarrow H_2O(s)$

Q23: The"ΔH^{o}" of the following reaction is -36.4 kJ:

$$1/2\ H_2(g) + 1/2\ Br_2(l) \rightarrow HBr(g)$$

Calculate the "ΔE^{o}" in ***(kJ)*** at 25°C?

A) – 37.6 B) + 35.2

C) + 37.6 D) - 34.2

Q24: In which of the following reactions is work done by the system on the surroundings?

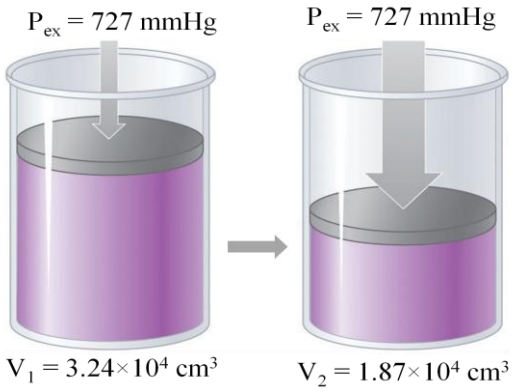
A) $3O_2(g) \rightarrow 2O_3(g)$

B) $2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$

C) $H_2(g) + F_2(g) \rightarrow 2HF(g)$

D) $S(g) \rightarrow S(l)$

Q25: In the figure shown below:



the value of the work "w" in ***(kJ)***, is:

A) + 7.312 B) + 3.127

C) + 1.328 D) – 3.128

Q26: The work done to compress a gas is 74 J. As a results , 26 J of heat is given off to the surroundings. The change in the internal energy "ΔE" in (J), is :

A) 48 B) 100

C) – 48 D) – 100

Q27: What is the specific heat of a substance if 1560 cal are required to raise the temperature of a 312 g sample by 15°C?

A) 0.033 cal/g°C B) 0.33 cal/g°C

C) 1.33cal/g°C D) 0.99 cal/g°C

***Q28*:** What is the final temperature in (^{o}C) when 150 g of water at 90 ^{o}C is added to 100 g of water at 30 ^{o}C?

A) 72 B) 54

C) 42 D) 66

Q29: Using the following equations:

$H_2(g) \rightarrow 2H(g)$ $\Delta H° = 436.4$ kJ/mol

$Br_2(g) \rightarrow 2Br(g)$ $\Delta H° = 192.5$ kJ/mol

$H_2(g) + Br_2(g) \rightarrow 2HBr(g)$ $\Delta H° = -72.4$ kJ/mol

The enthalpy change in (***kJ***) of the following reaction is: $H(g) + Br(g) \rightarrow HBr(g)$

A) – 350.65 B) – 530.56

C) + 530.56 D) + 350.65

Q30: Under which conditions of temperature and pressure is a gas most soluble in water?

A) High temperature and low pressure
B) High temperature and high pressure
C) Low temperature and low pressure
D) Low temperature and high pressure

Q31: A solution is prepared by dissolving 50 g NaCl in 450 g of water. What is the molarity (***M***) of the solution? (*solution density = 1 g/mL*)

A) 0.85 B) 1.71

C) 1.20 D) 0.26

Q32: The mass percent of an aqueous solution of "C_2H_5OH" is 56%. The mole fraction of "C_2H_5OH" is:

A) 0.44 B) 0.67

C) 0.33 D) 0.56

Q33: If the concentration of an aqueous solution of "$C_6H_{12}O_6$" is 8.6% by mass, the molality (***m***) of the this solution, is:

A) 0.52 B) 0.44

C) 0.34 D) 0.26

Q34: What is the freezing point in (***^oC***) of an aqueous solution made by dissolving 60 g of "CH_4N_2O" (non-electrolyte) in 1000g of water? (*k_f of water=1.86 $^oC/m$*)

A) - 6.21 B) -8.95

C) – 1.86 D) -12.30

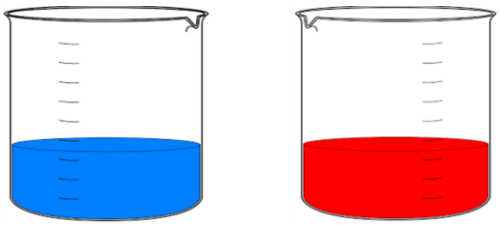
Q35: The boiling point in (***^oC***) of an aqueous solution of a non electrolyte solute that has a freezing point of -13.6 ^oC, is:

(*k_f of water = 1.86 $^oC/m$ and k_b of water = 0.52 $^oC/m$*)

A) 108.5 B) 103.8

C) 101.4 D) 105.3

Q36: In the figure illustrated below:



200 g Sucrose "$C_{12}H_{22}O_{11}$" + 750 g water

200 g Urea "CH_4N_2O" + 750 g water

Which of the following statements is true?

A) The sucrose solution has the highest boiling point.
B) The urea solution has the highest vapor pressure.
C) The two solutions have the same boiling point.
D) The urea solution has the lowest freezing point.

Q37: The vapor pressure of pure water (P^o) at 26 °C is 25.21 torr. What is the vapor pressure in (***torr***) of a solution that contains 16.0 g of glucose ($C_6H_{12}O_6$) dissolved in 80 g of water?

A) 24.7 B) 0.49

C) 16.8 D) 14.1

Q38: The solubility of methane gas in ethanol at 25 ^oC and 1atm is 0.512 mol/L. If the molarity of the gas becomes 6.25 mol/L, what is the partial pressure in (***atm***) at the same temperature?

A) 3.2 B) 7.6

C) 12.2 D) 9.8

Q39: A 250 mL solution containing 21.4 g of a nonelectrolyte substance in toluene had an osmotic pressure of 0.055 atm at 27 ^oC. The molar mass in ***(g/mol)*** of this substance is:

A) 1.5×10^4 B) 3.8×10^4

C) 1.8×10^3 D) 3.2×10^3

Q40: A solution containing 150 g of a nonelectrolyte substance in 1.0 kg water has boiling boiling point of 101.26 °C. The molar mass in ***(g/mol)*** of the substance is: (*k_b of water = 0.52 $^oC/m$*)

A) 126 B) 48

C) 86 D) 62
