



Date: Sunday 20/08/1439 H : الاسم				
Time: 8:00 - 11:00 AM : 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 1 H 1.008	2 IIA Be 9.01											13 IIIA B 10.811	14 IVA C 12.01	15 VA N 14.01	16 VIA O 16.00	17 VIIA F 19.00	VIIIA 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 Sc 44.96	4 IVB Ti 47.87	5 VB V 50.94	6 VIB Cr 52.00	7 VIIB Mn 54.94	8 Fe 55.85	9 VIII B Co 58.93	10 Ni 58.69	11 IB Cu 63.546	12 IIB Zn 65.41	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 = 101.325 kPa

R = 0.0821 atm L mol⁻¹ K⁻¹ = 8.314 J mol⁻¹ K⁻¹

N_A (Avogadro's Number) = 6.022 × 10²³

1 atm.L = 101.325 J

Q1: The diameter of an atom is 1×10^{-7} mm. What is this diameter when expressed in nanometers "nm"?

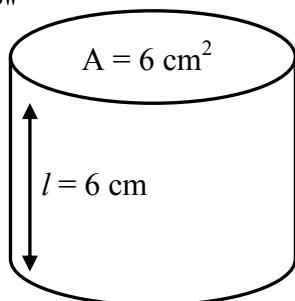
- A) 1×10^{-18} B) 1×10^{-1}
C) 1×10^{-15} D) 1×10^{-9}
-

Q2: Convert 20 mg into "kg"?

- A) 2×10^{-2} B) 2×10^{-6}
C) 2×10^{-4} D) 2×10^{-5}
-

Q3: What is the density in " g/cm^3 " of 52 g of a metal, as shown in:

- A) 0.14
B) 5.20
C) 1.44
D) 0.52



Q4: An object is moving at a speed of 750 m/s after 3.5 min, its rate of acceleration in " m/s^2 " is:

- A) 3.6 B) 214.3
C) 0.3 D) 16.5
-

Q5: Potassium is a _____ and chlorine is a _____.

- A) metal, metal B) metal, metalloid
C) nonmetal, metal D) metal, nonmetal
-

Q6: Which of the following is a monoatomic cation?

- A) CN^- B) NH^{+3}
C) Fe^{+3} D) Cl^-
-

Q7: The correct name of " $(\text{NH}_4)_3\text{PO}_4$ " is:

- A) tetrammonium phosphate
B) ammonium phosphate
C) nitrogen hydrogen phosphate
D) triammonium phosphate

Q8: What is the formula for phosphoric acid?

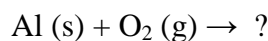
- A) H_3PO_4 B) H_2PO_4
C) H_2PO_3 D) H_3PO_3
-

Q9: The atomic mass of an element "X" is 221.4 amu. Find the mass of the third isotope using given information below:

isotope	% abundance	mass "amu"
1	75.00	220.9
2	10.00	220.0
3	15.00	????

- A) 221.0 B) 222.9
C) 223.9 D) 224.8
-

Q10: Predict the product in the following reaction:



- A) Al_3O B) Al_2O_3
C) AlO_2 D) AlO
-

Q11: The mass in "g" of Pt that contains 4.6×10^{22} "Pt" atoms, is:

- A) 12.3 B) 13.9
C) 14.9 D) 16.3
-

Q12: What is the mass of "KI" ($M_{\text{wt}} = 166 \text{ g/mol}$) is needed to produce 60.6 g of " K_2SO_4 " ($M_{\text{wt}} = 174.3 \text{ g/mol}$)? $8\text{KI} + 4\text{H}_2\text{SO}_4 \rightarrow 4\text{K}_2\text{SO}_4 + 8\text{HI}$

- A) 251.7 B) 138.8
C) 331.3 D) 115.5
-

Q13: What is the empirical formula that contains 49.4% K, 20.3% S and 30.3% O by mass?

- A) K_2SO_4 B) $\text{K}_3(\text{SO}_3)_2$
C) K_2SO_3 D) $\text{K}_3(\text{SO}_4)_2$

Q14: The density in "g/L" of chlorine gas "Cl₂" at 25°C and 0.592 atm is:

- A) 1.7 B) 2.0
C) 4.9 D) 0.7
-

Q15: The pressure of a gas is 750 torr when its volume is 400 mL. Calculate the pressure in "atm" if the gas is allowed to expand to 600 mL at constant temperature:

- A) 500 B) 1125
C) 1.48 D) 0.66
-

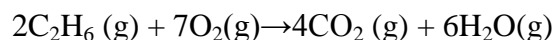
Q16: A gas sample occupies 200 mL at STP. What is the final temperature in "K" if the volume is doubled at constant pressure?

- A) 149 B) 546
C) 1192 D) 397
-

Q17: In a gas mixture of He, Ne, and Ar with a total pressure of 8.40 atm. If the partial pressures of He is 1.50 and Ne is 2.00 atm, the mole fraction of Ar is:

- A) 0.179 B) 0.238
C) 0.583 D) 0.357
-

Q18: When 8 L of "C₂H₆" react with enough amount of "O₂", the volume in "L" of "H₂O (g)" at constant temperature and pressure, is:



- A) 3 B) 1.5
C) 48 D) 24.0
-

Q19: The amount of heat in "J" required to raise the temperature of 350.0 g of copper from 25°C to 85°C is: (the specific heat of copper is 0.385 J/g °C).

- A) 8085 B) 7676
C) 6806 D) 6485
-

Q20: In endothermic reactions:

- A) The products energy is less than reactants energy
B) The products energy is more than reactants energy.
C) The products energy is equal to reactants energy.
D) Heat released from the system.
-

Q21: 850 g of a metal has a specific heat of 0.46 J/g °C. The heat capacity of this metal in "J/°C" is:

- A) 391 B) 0.391
C) 1848 D) 0.541
-

Q22: The change in internal energy ΔE of a system is always a negative value if the system:

- A) Absorbs heat and does work.
B) Gives off heat and does work.
C) Gives off heat and has work done on it.
D) Absorbs heat and has work done on it.
-

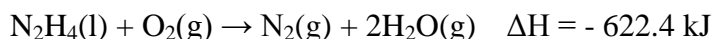
Q23: Which of the following reaction has ΔH ≠ ΔE?

- A) HCl (aq) + NaOH (aq) → NaCl (s) + H₂O (l)
B) C(s) + O₂ (g) → CO₂ (g)
C) H₂ (g) + I₂ (g) → 2HI (g)
D) N₂ (g) + 3H₂ (g) → 2NH₃ (g)
-

Q24: 0.1 mole of "CH₄" was burned and the energy given out raised the temperature of 200 g of water from 18 °C to 28 °C. The enthalpy of combustion of "CH₄" in "**kJ/mol**" is: (s for water = 4.18 J/g.°C)

- A) - 8.36 B) - 8360
C) - 83.6 D) - 836
-

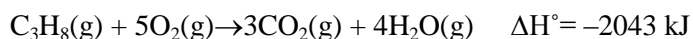
Q25: Hydrazine is completely burned in oxygen at 25 °C according to:



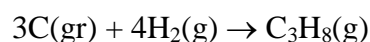
Calculate the change in the internal energy ΔE° in "**kJ**" for this combustion process?

- A) - 627.4 B) - 597.9
C) - 646.8 D) - 619.9
-

Q26: Given the following thermochemical equations:

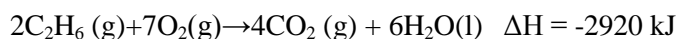


Find $\Delta H^\circ_{\text{rxn}}$ (in kJ) for:



- A) - 132 B) - 107
C) - 99 D) - 118
-

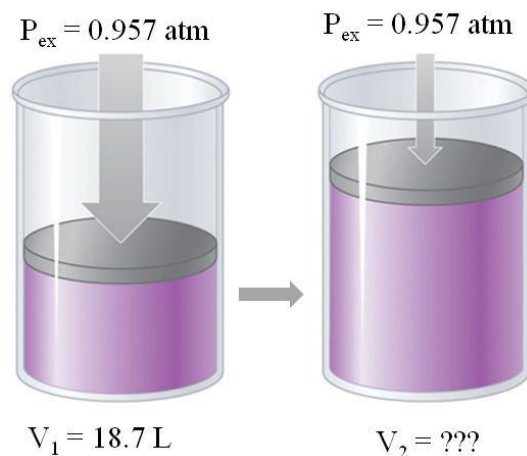
Q27: Given the reaction



If ΔH_f° of CO₂(g) is -393.7 kJ mol⁻¹ and ΔH_f° of H₂O(l) is -285.6 kJ mol⁻¹, what is ΔH_f° of C₂H₆(g) in "**kJ mol⁻¹**"?

- A) + 184.2 B) - 184.2
C) + 780.7 D) - 780.7
-

Q28: In the figure shown below:



If the work done by the system is 1327 J , what is the final volume in "**L**"?

- A) 32.4 B) 37.8
C) 26.6 D) 22.4
-

Q29: If the change in the internal energy (ΔE) is 48 J when a sample of gas is compressed. As a results, 26 J of heat is given off to the surroundings. The value of the work "w" in "**J**", is:

- A) + 22 B) - 22
C) - 74 D) + 74
-

Q30: How many grams of NaOH ($M_{\text{wt}} = 40\text{g/mol}$) are there in 500.0 mL of a 0.175 M NaOH solution?

- A) 3.5 B) 14
C) 114 D) 31
-

Q31: The molality "**m**" of urea ($M_{\text{wt}} = 60 \text{ g/mol}$) in a solution prepared by dissolving 16 g of urea in 39 g of water is:

- A) 96 B) 5.9
C) 6.8 D) 0.7

Q32: If the concentration of "NaCl" is 13.0% by mass with density of 1.10 g/mL, what is the molarity "*M*" of this solution?

- A) 2.98 B) 2.44
C) 2.75 D) 2.15
-

Q33: What is the molality "*m*" of a 2.5 M ethanol (C₂H₅OH) solution whose density is 0.90 g/mL?

- A) 2.77 B) 3.51
C) 2.92 D) 3.18
-

Q34: The vapor pressure of pure water at 25 °C is 23.8 torr. What is the vapor pressure in "*torr*" of water above a solution prepared by dissolving 18.0 g of glucose (a nonelectrolyte, M_{wt} = 180.0 g/mol) in 95.0 g of water?

- A) 25.1 B) 23.4
C) 0.44 D) 0.51
-

Q35: What is the boiling point of a solution in "*°C*" made by dissolving 66 g of a compound (a nonelectrolyte, M_{wt} = 331 g/mol) in 500 g of water? (For water: K_b = 0.512 °C/m).

- A) 100.2 B) 100.05
C) 100.5 D) 100.8
-

Q36: The freezing point of an aqueous solution is -2.79°C. Determine the boiling point of this solution. (For water: K_f = 1.86 °C/m, K_b = 0.512 °C/m).

- A) 101.26 B) 100.51
C) 100.78 D) 102.79

Q37: A 33.7 g sample of a nonelectrolyte was dissolved in 750. g of water. The solution's freezing point was -2.86 °C. What is the molar mass of the compound? (K_f of water = 1.86 °C/m)

- A) 68.8 B) 122
C) 38.8 D) 29.2
-

Q38: At 1 atm, the solubility of a gas in water is 0.75 mol/L. If the partial pressure becomes 7.5 atm, what is the solubility of this gas in "*mol/L*" ?

- A) 10.0 B) 6.22
C) 5.63 D) 7.13
-

Q39: Calculate the osmotic pressure in "*torr*" at 25°C of a 1.1 x 10⁻⁵ mol/L protein solution ?

- A) 0.20 B) 0.10
C) 2.00 D) 0.02
-

Q40: If 1x10⁻³ g of a substance (a nonelectrolyte) dissolved in 10 mL of solution generates an osmotic pressure of 9.87x10⁻³ atm at 300K, what is the molar mass in "*g/mol*" of the substance?

- A) 2.5x10⁴ B) 2.5x10⁵
C) 2.5x10² D) 2.5x10³
-