Given the data in the table below, calculate ΔH° (kJ) for the reaction:

$CH_{4(g)} + 2O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

Substance	ΔH°_f (kJ/mol)
$CH_{4(g)}$	-80
$CO_{2(g)}$	-393
$H_2O_{(l)}$	-286

- a. -900
- b. -890
- c. -895
- d. -885
- e. -880

Next page

[1]

$$(-393 + 2 * -286) - (2 * 0 + (-80))$$

$$= -885$$ [d]

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AL CHEMISTRY I /جميع الشعب

A sample of N_2 gas is mixed with a gas (A) of unknown molar mass. The partial pressure of each gas is known to be 200. torr at 25°C. The gases are allowed to effuse through a pinhole, and it is found that gas A escapes at 1.25 times the rate of N_2. The molar mass of gas A is:

- a. 24.0
- b. 11.2
- c. 17.9
- d. 56.4
- e. 32.1

[2] $N_2 + A$ at Constant T, P

The rate of effusion of A = 1.2 the rate of N_2

$$\frac{\text{rate of A}}{\text{rate of } N_2} = 1.2$$

$$\frac{\sqrt{28}}{\sqrt{M.W_A}} = 1.2 \rightarrow M.W_A = 17.9 \text{ g/mol}$$

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ERAL CHEMISTRY I / جميع الشعب

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Calculate the density of ozone at STP.

- a. 3.21 g/L
- b. 1.21 g/L
- c. 8.10 g/L
- d. 2.14 g/L
- e. 6.13 g/L

[3] $D = \frac{\text{mass}}{\text{volume}} = \frac{\text{mol} * \text{M.W}}{\text{volume}}$

at STP $= \frac{1 * 48}{22.4}$

$D = 2.14\ g/L$

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Question 5

Not yet answered

Marked out of 1.0

Flag question

Oxygen gas, generated by the reaction $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$, is collected over water at 27°C in a 3.82-L vessel at a total pressure of 760. torr. (The vapor pressure of H_2O at 27°C is 26.0 torr.) How many moles of $KClO_3$ were consumed in the reaction?

$R = 0.0821\ L\ atm\ mol^{-1}\ K^{-1}$

- a. 0.0999 moles
- b. 0.410 moles
- c. 0.281 moles
- d. 0.0776 moles
- e. 0.0594 moles

[4] $2KClO_3 \longrightarrow 2KCl + 3O_2$

$T = 27°C + 273 = 300K$

$V = 3.82\ L$

$P_T = 760\ mm\ Hg$

$P_{H_2O} = 26.0\ mm\ Hg$

$P_T = P_{H_2O} + P_{O_2} \rightarrow P_{O_2} = 760 - 26$

$= 734\ mm\ Hg$

$= 0.966\ atm$

$n_{O_2} = \frac{PV}{RT}$

$= \frac{0.966 * 3.82}{0.0821 * 300} = 0.150\ mol\ of\ O_2$

$0.150 * \frac{2}{3} = 0.100\ mol\ of\ KCl$ [a]

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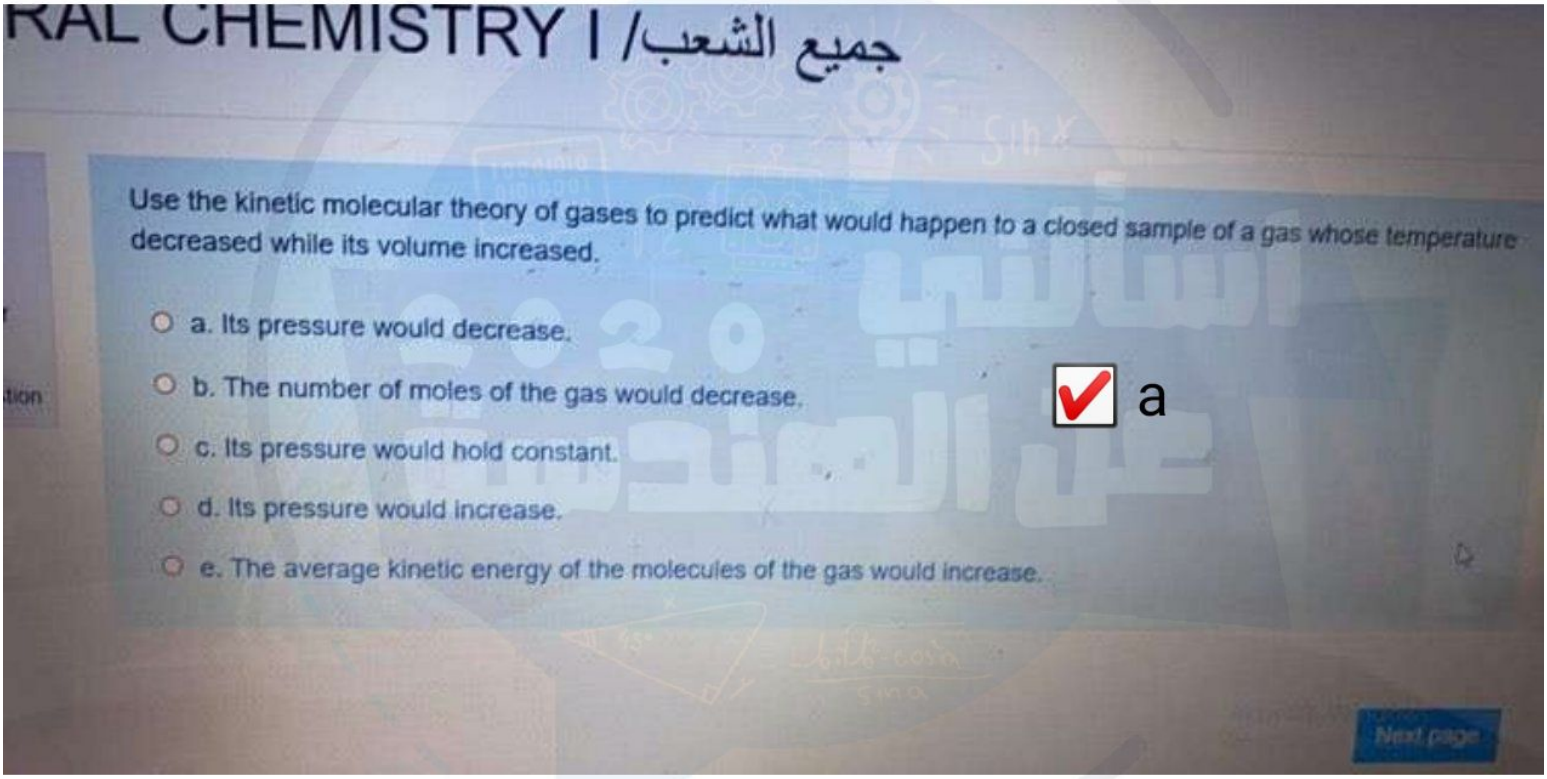

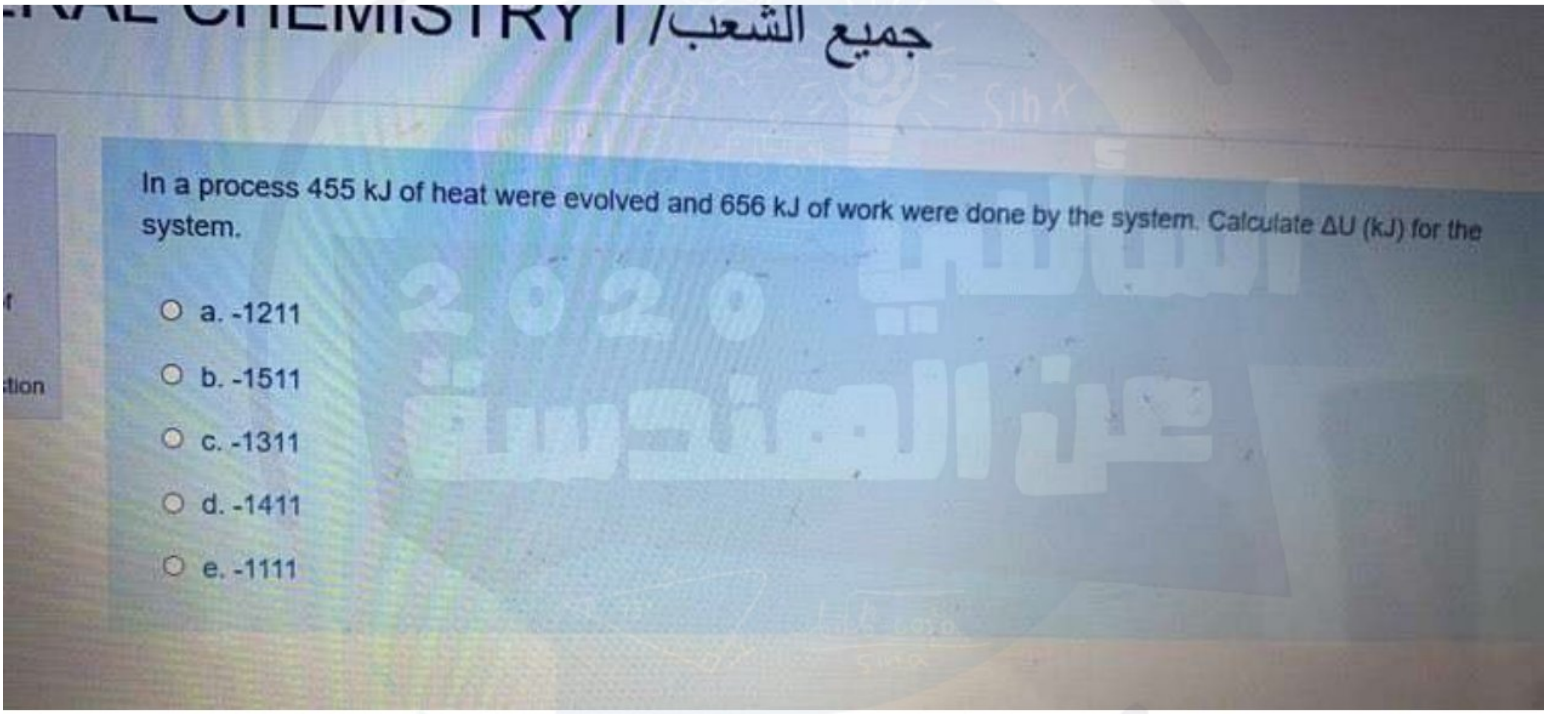

$$W = -656 - 455$$

$$= -1111 \text{ kJ}$$

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A 4.50 g sample of sugar $C_5H_{10}O_5$ (molar mass= 150.0 g/mol) was burned in excess oxygen in a bomb calorimeter according to:

$$C_5H_{10}O_{5(s)} + 5O_{2(g)} \rightarrow 5CO_2(g) + 5H_2O(l)$$

If the heat capacity of the calorimeter and its contents was 30.0 kJ/°C, and the temperature rose from 25.0 °C to 26.5 °C , calculate ΔH in kJ/mol for the combustion reaction.

- a. -1800
- b. -1500
- c. -2250
- d. -3000
- e. -4500

[7] $C = 30\ kJ/^\circ C$

$T_1 = 25.0$, $T_2 = 26.5$, $\Delta T = 1.5^\circ C$

$q_{rxn} = -q_{cal}$

$q_{rxn} = -C\Delta t = -30\ kJ/^\circ C \cdot 1.5^\circ C$

$[q_{rxn} = -45\ kJ]$, $mol\ C_5H_{10}O_5 = \frac{4.50}{150.0}$

$[= 0.0300\ mol]$

$\Delta H = \frac{-45\ kJ}{0.0300\ mol} = -1500\ kJ/mol$ [B]

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Gaseous C_2H_4 reacts with O_2 according to the following equation:

$$C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(g)$$

What volume of oxygen at STP is needed to react with 1.83 mol of C_2H_4?

- a. 319 L
- b. 664 L
- c. 432 L
- d. 123 L
- e. 501 L

Next page

[8] $C_2H_4 + 3O_2 \longrightarrow 2CO_2 + 2H_2O$

$1.83 \text{ mol of } C_2H_4 \cdot \frac{3 \text{ mol } O_2}{1 \text{ mol } C_2H_4} = 5.49 \text{ mol } O_2$

[at STP]

$22.4 \text{ V} \longrightarrow 1 \text{ mol}$

$?? \longrightarrow 5.49 \text{ mol}$

$\therefore V \text{ of } O_2 = 123 \text{ L}$ [d]

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How much heat (in kJ) is produced when 7.50 g of $C_2H_6(g)$ (Molar mass = 30.0 g/mol) are oxidized according to:

$2C_2H_{6(g)} + 7O_{2(g)} \rightarrow 4CO_{2(g)} + 6H_2O_{(l)}$ $\Delta H^\circ = -3120$ kJ

- a. 1560
- b. 390
- c. 3120
- d. 4680
- e. 780

[9] $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$, $\Delta H^\circ = -3120\ kJ$

$$\frac{7.50\ g}{30.0\ g/mol} \times \frac{-3120\ kJ}{2\ mol} = 780.\ kJ$$

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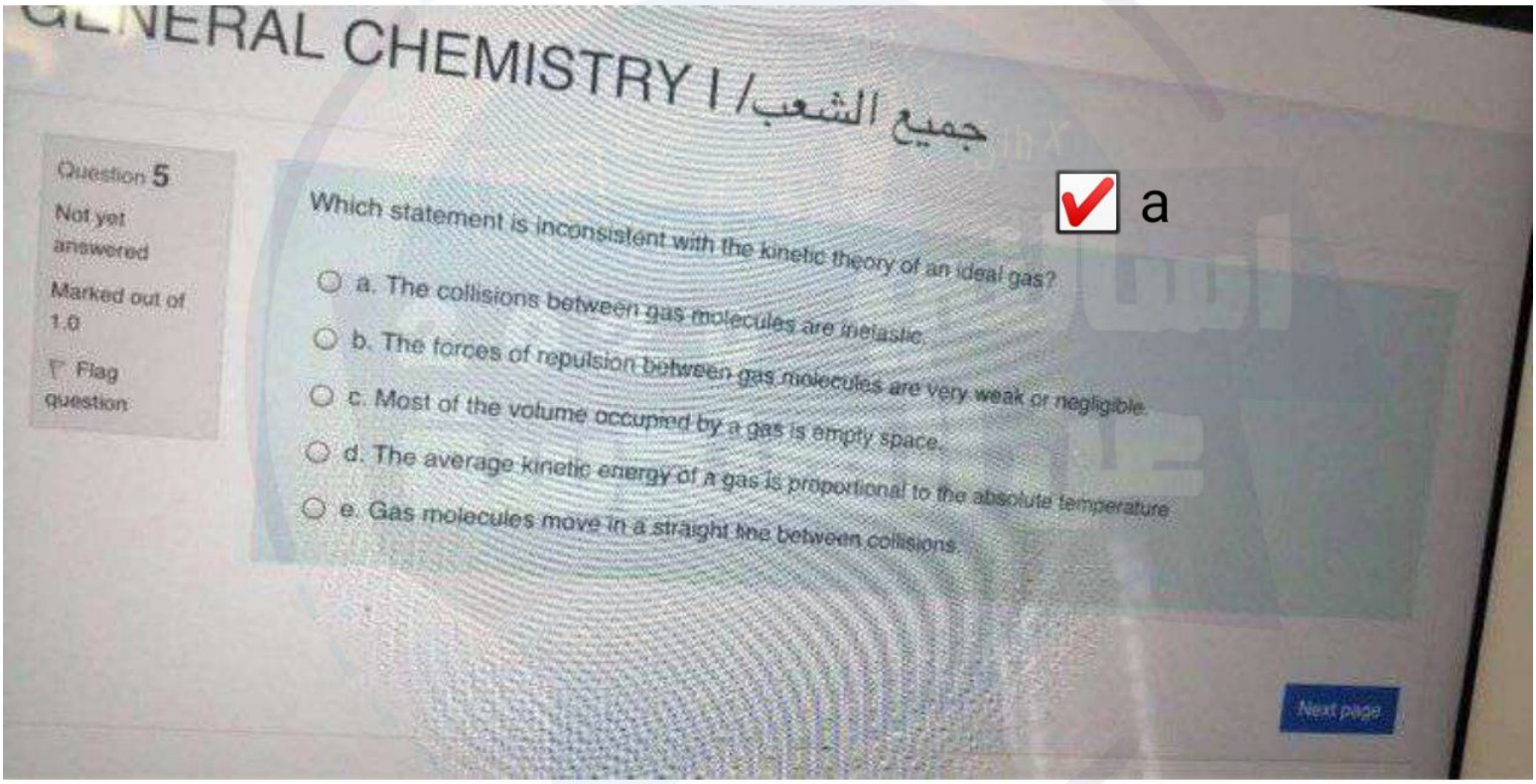

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GENERAL CHEMISTRY I /جميع الشعب

Question **15**

Not yet answered

Marked out of 1.0

Flag question

Given the data in the table below, calculate ΔH^{o} (kJ) for the reaction:

$CH_3OH_{(l)} + 3/2\ O_{2(g)} \rightarrow CO_{2(g)} + 2H_2O_{(l)}$

Substance	ΔH^{o}_{f} (kJ/mol)
$CH_3OH_{(l)}$	-269
$CO_{2(g)}$	-393
$H_2O_{(l)}$	-286

- a. -716
- b. -696
- c. -726
- d. -706
- e. -686

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[13] (-393 + 2 * -286) - (-269)

= -696 [B]

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Question 18

Not yet answered

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Flag question

How many values are there for the magnetic quantum number when the value of the angular momentum quantum number is 3?

- a. 14
- b. 1
- c. 12
- d. 7
- e. 15

Next page

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[14] $L = 3$

Values of $m_l = 2L + 1$

$= 7$ (d)

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GENERAL CHEMISTRY I /جميع الشعب

Question **13**

Not yet answered

Marked out of 1.0

Flag question

How much heat (in kJ) is produced when 204.6 g of $H_2S(g)$ (Molar mass = 34.1 g/mol) are oxidized according to:

$2H_2S_{(g)} + 3O_{2(g)} \rightarrow 2SO_{2(g)} + 2H_2O_{(g)}$ $\Delta H^\circ = -1036$ kJ

- a. 3108
- b. 2590
- c. 2070
- d. 3630
- e. 1550

Next page

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[15] $2H_2S + 3O_2 \rightarrow 2SO_2 + 2H_2O$, $\Delta H^\circ = -1036\ kJ$

$$\frac{204.6\ g}{34.1\ g/mol} \times \frac{-1036\ kJ}{2\ mol} = -3108\ kJ$$ [a]

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GENERAL CHEMISTRY I /جميع الشعب

Question 1

Not yet answered

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Flag question

Gaseous C_2H_4 reacts with O_2 according to the following equation:

$$C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(g)$$

What volume of oxygen at STP is needed to react with 1.80 mol of C_2H_4?

- a. 61.5 L
- b. 288 L
- c. 432 L
- d. 121 L
- e. 356 L

Next page

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[16] $1.80 \text{ mol } C_2H_4 \times \frac{3 \text{ mol } O_2}{1 \text{ mol } C_2H_4} = 5.40 \text{ mol } O_2$

22.4 V → 1 mol

?? → 5.40 mol [V = 121 L]

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GENERAL CHEMISTRY I /جميع الشعب

Question 2

Not yet answered

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Flag question

A 3.00 g sample of sugar $C_5H_{10}O_5$ (molar mass= 150.0 g/mol) was burned in excess oxygen in a bomb calorimeter according to:

$C_5H_{10}O_{5(s)} + 5O_{2(g)} \rightarrow 5CO_2(g) + 5H_2O(l)$

If the heat capacity of the calorimeter and its contents was 20.0 kJ/°C, and the temperature rose from 25.0 °C to 26.5 °C , calculate ΔH in kJ/mol for the combustion reaction.

- a. -1500
- b. -1000
- c. -2000
- d. -1200
- e. -3000

Next page

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[17] $q_{rxn} = -q_{cal}$

$= -(Cat)$

$= -20.0\ kJ/°C \times 1.5\ °C$

$q_{rxn} = -30.0\ kJ$

$mol\ C_5H_{10}O_5 = \frac{3.00\ g}{150.0\ g/mol} = 0.02\ mol$

$\Delta H = \frac{-30.0\ kJ}{0.02\ mol} = -1500\ kJ/mol$

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GENERAL CHEMISTRY I /جميع الشعب

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Question 6

Not yet answered

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Flag question

A 500-cm^3 sample of 1.0 M NaOH(aq) is added to 500 cm^3 of 1.0 M HCl(aq) in a Styrofoam cup, and the solution is quickly stirred. The rise in temperature (ΔT_1) is measured. The experiment is repeated using 100 cm^3 of each solution, and the rise in temperature (ΔT_2) is measured. What conclusion can you draw about ΔT_1 and ΔT_2? $HCl(aq) + NaOH(aq) \rightarrow H_2O(l) + NaCl(aq)$; $\Delta H^\circ = -55.8$ kJ

- a. ΔT_2 is five times as large as ΔT_1.
- b. ΔT_1 is five times as large as ΔT_2.
- c. ΔT_1 is less than ΔT_2.
- d. ΔT_2 is equal to ΔT_1.
- e. ΔT_2 is greater than ΔT_1.

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[18] $\frac{V_1}{T_1} = \frac{V_2}{T_2}$ → $500\Delta T_1 = 0$

↳ $100\Delta T_2 = 0$

→ $[\Delta T_2 = 5\Delta T_1]$ [a]

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Question 3

Not yet answered

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Flag question

Calculate the density of krypton at STP.

- a. 6.13 g/L
- b. 7.61 g/L
- c. 8.10 g/L
- d. 1.54 g/L
- e. 3.74 g/L

Next page

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at STP : $D = \frac{\text{mass}}{\text{volume}} = \frac{n * M.w}{\text{volume}}$

$= \frac{1 * 83.798}{22.4}$

$= 3.74$ g/L Ej

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Question 4

Not yet answered

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Flag question

Given the following thermochemical equations:

$\frac{1}{2} N_{2(g)} + \frac{1}{2} O_{2(g)} \rightarrow NO_{(g)}$ $\Delta H = 90$ kJ

$N_{2(g)} + 2O_{2(g)} \rightarrow 2NO_{2(g)}$ $\Delta H = 76$ kJ

Calculate ΔH (in kJ) for the reaction

$NO_{(g)} + \frac{1}{2} O_{2(g)} \rightarrow NO_{2(g)}$

- a. -52
- b. -57
- c. -62
- d. -47
- e. -42

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[20]

$$NO + 1/2 O_2 \rightarrow NO_2$$

$(1/2 N_2 + 1/2 O_2 \rightarrow NO \quad \Delta H = 90\,KJ) \times -1$

$(N_2 + 2O_2 \rightarrow 2NO_2 \quad \Delta H = 76\,KJ) \times 1/2$

$NO \rightarrow 1/2 N_2 + 1/2 O_2 \quad \Delta H = -90\,KJ$

$1/2 N_2 + O_2 \rightarrow NO_2 \quad \Delta H = 38\,KJ$

$NO + 1/2 O_2 \rightarrow NO_2 \quad \Delta H = -52\,KJ$

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GENERAL CHEMISTRY I /جميع الشعب

Question 12

Not yet answered

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Flag question

Oxygen gas, generated by the reaction $2KClO_3(s) \rightarrow 2KCl(s) + 3O_2(g)$, is collected over water at 27°C in a 3.10-L vessel at a total pressure of 760. torr. (The vapor pressure of H_2O at 27°C is 26.0 torr.) How many moles of $KClO_3$ were consumed in the reaction?

$R = 0.0821\ L\ atm\ mol^{-1}\ K^{-1}$

- a. 0.0123 moles
- b. 0.0986 moles
- c. 0.354 moles
- d. 0.0464 moles
- e. 0.0810 moles

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[21] $P_T = P_{H_2O} + P_{O_2}$ $\quad T = 27 + 273 = 300K$

$P_{O_2} = P_T - P_{H_2O} \rightarrow 760 - 26 = 734$ mmHg

$[= 0.966$ atm$]$

$n_{O_2} = \frac{PV}{RT} = \frac{0.966 \cdot 3.10L}{0.0821 \cdot 300}$

$= 0.122$ mol

$0.122 \times \frac{2}{3} = 0.0813$ mol [e]

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GENERAL CHEMISTRY I /جميع الشعب

Time left 0:22:34

Question 15

Not yet answered

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Flag question

flexible vessel is filled to a certain pressure with 28.00 L of gas. Under conditions of constant temperature and moles of gas, how does the pressure of the gas change when the volume of the gas is tripled?

- a. The pressure decreases by a factor of four.
- b. The pressure decreases by a factor of three.
- c. The pressure remains the same.
- d. The pressure decreases by a factor of two.
- e. The pressure increases by a factor of two.

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[24] $P_1V_1 = P_2V_2$

$P_1 V = P_2 3V$

$[P_1 = 3P_2] \longrightarrow P_2 = \frac{P_1}{3}$ [B]

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GENERAL CHEMISTRY I /جميع الشعب

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Question 7

Not yet answered

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Flag question

Calculate the change in enthalpy when 52.0 g of solid chromium at 25°C and 1 atm pressure is oxidized. ($\Delta H°f$ for $Cr_2O_3(s)$ is –1135 kJ/mol). $4Cr(s) + 3O_2(g) \rightarrow 2Cr_2O_3(s)$

- a. +568 kJ
- b. –1135 kJ
- c. –568 kJ
- d. +1135 kJ
- e. –284 kJ

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[21] $\frac{52.0}{52} * \frac{-1135}{4} = -284 \text{ kJ}$

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GENERAL CHEMISTRY I /جميع الشعب

Question 8

Not yet answered

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Flag question

Which of the following is included as a postulate in the kinetic molecular theory of an ideal gas?

- a. All molecules move randomly in zigzag directions
- b. In an average collision between molecules, both molecules have the same kinetic energy.
- c. Collisions between molecules are all elastic.
- d. All the molecules have the same velocity.
- e. The distance between gas molecules is small compared with the size of the molecule

☑ b

Next page

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GENERAL CHEMISTRY I /جميع الشعب

Question 7

Not yet answered

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Flag question

A sample of N_2 gas is mixed with a gas (A) of unknown molar mass. The partial pressure of each gas is known to be 200. torr at 25°C. The gases are allowed to effuse through a pinhole, and it is found that gas A escapes at 2.3 times the rate of N_2. The molar mass of gas A is:

- a. 41.3
- b. 7.99
- c. 16.4
- d. 5.29
- e. 23.9

Next page

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24 rate of effusion of A = 2.3 the rate of N_2

$$\frac{\text{rate of A}}{\text{rate of } N_2} = 2.3$$

$$\frac{\sqrt{28}}{\sqrt{M.w_A}} = 2.3 \rightarrow M.w_A = 5.89 \text{ g/mol}$$

[d]

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GENERAL CHEMISTRY I /جميع الشعب

Question 5

Not yet answered

Marked out of 1.0

Flag question

In a process 455 kJ of heat were evolved and 856 kJ of work were done on the system. Calculate ΔU (kJ) for the system.

- a. 601
- b. 501
- c. 401
- d. 301
- e. 201

Next page

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[25] $q = -455\ kJ$

$w = 856\ kJ$

$\Delta U = 856 - 455 = 401\ kJ$

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Time left 0:28:54

Which of the following sets of quantum numbers (n, l, ml, ms) refers to a 3d orbital?

- a. 2 0 0 −1/2
- b. 3 2 1 −1/2
- c. 4 2 −2 +1/2
- d. 5 4 1 −1/2
- e. 4 3 1 −1/2

Next page

3d orbital

$n = 3$

$l = 2 \rightarrow$ [b]

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ENERAL CHEMISTRY I /

Question 4

Not yet answered

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Flag question

The number of orbitals in a p subshell is

a. 2

b. 3

c. 1

d. 7

e. 5

Clear my choice

The number of orbitals in a p subshel

$3(-1 - +1)$

$= (-1, 0, +1) \rightarrow [3]$

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Question 16

Not yet answered

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Flag question

How many p orbitals are in the n = 3 shell?

- a. 5
- b. 1
- c. 3
- d. 0
- e. 6

p orbitals → 3 → [ ]

(-1, 0, +1)

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