8-

$w = -P_{ext} \Delta V \times 101$

$=$

5- There is 4.8 g of O2 gas in a 5.6 L container at 273°C. How many atm is the pressure applied to the vessel? (O: g/mol)

a) 1,2
b) 1,5
c) 1
d) 0,5
e) 2
Leave blank

$m = 4.8\ g$

$V = 5.6\ L$

$T = 273^\circ C + 273 = 546\ K$

$P = ?\ atm$

$M_r = 32\ g/mol$

$R = 0.0821$

$PV = nRT$

$PV = \frac{m}{M_r} RT$

$P = \frac{mRT}{VM_r}$

$= \frac{4.8 \times 0.0821 \times 546}{5.6 \times 32}$

$= 1.2\ atm.$

9-

5- The pressure of the gas in a 12 L container with an ideal frictionless piston is 2 atmospheres. When the piston is pushed down until the vessel volume is 4 liters, it is observed that the pressure of the gas is 8 atmospheres and the temperature is 127 °C. What is the initial temperature of the gas in °C? (Assume that the gas behaves ideally.)

a) 200
b) 105
c) 52
d) 27
e) 300
Leave blank

$V_1 = 12\ L$ $\quad V_2 = 4\ L$

$P_1 = 2\ atm$ $\quad P_2 = 8\ atm$

$T_1 = ?\ ^\circ C$ $\quad T_2 = 127^\circ C + 273 = 400$

Combined gas law

$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

$T_1 = \frac{P_1V_1T_2}{P_2V_2} = \frac{12 \times 2 \times 400}{8 \times 4}$

$= 300\ K - 273$

$= 27^\circ C$

10-

4- 1 bar pressure corresponds to how many atm pressure?

a) 7,3
b) 0,987
c) 1,01325
d) 2,5
e) 0,125
Leave blank

0.987
0.9869

1 atm = 1.01325 bar

? 1.

$\frac{1}{1.01325} = 0.9869$

11-

5- 2 Fe(k) + O2(g) → 2 FeO(k) ΔH= -544,0 kJ and 3 Fe (k) + 2O2(g) → Fe3O4(k) ΔH= -1118,4 kJ. What is the enthalpy of the reaction 4 FeO(k) → Fe(k) + Fe3O4(k) in kJ?

a) 574,4
b) 1662,4
c) 2206,4
d) -30,4
e) -1662,4
Leave blank

$4FeO \longrightarrow Fe + Fe_3O_4 \quad \Delta H = ?$

reverse

×2 $2Fe + O_2 \longrightarrow 2FeO \quad \Delta H = -544.0\ kj$

$3Fe + 2O_2 \longrightarrow Fe_3O_4 \quad \Delta H = -1118.4\ kj$

Fe

$4FeO \longrightarrow 4Fe + 2O_2 \quad \Delta H = +544.0 \times 2$

$3Fe + 2O_2 \longrightarrow Fe_3O_4 \quad \Delta H = -1118.4$

$4FeO \longrightarrow Fe + Fe_3O_4$

$\Delta H = +544.0 \times 2 - 1118.4 = -30.4\ kj$

12-

1 - 200 ml of NaOH solution of unknown concentration is titrated with 0.1 M H2SO4 solution. Since 40 ml H2SO4 is consumed during this process, what is the concentration of NaOH solution (M)?

a) 0,1
b) 1
c) 0,08
d) 1,6
e) 0,5
Leave blank

$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$

2 : 1

$n_{NaOH} = 2\, n_{H_2SO_4}$

$n_{H_2SO_4} = C \times V = 0.1 \times \frac{40}{1000} = 0.004$

$n_{NaOH} = 2 \times 0.004 = 0.008$

$C = \frac{n}{V} = \frac{0.008}{0.2}$

$C_{NaOH} \times V_{NaOH} = 2\,(C_{H_2SO_4} \times V_{H_2SO_4})$

$C_{NaOH} \times 200 = 2\,(0.1 \times 40)$

$C_{NaOH} = 0.04$

13-

6 - How many kJ is the heat released when 10 ml of ethanol is burned? (The molar entha -1367 kJ/mol; its density is 0.789 g/ml; its molar mass is 46 g/mol)

a) -856
b) -1367
c) -296
d) -234
e) -1079
Leave blank

$q = ?$

$V = 10$ ml

$\Delta H = -1367$

$d = 0.789$ g/ml

$M_r = 46$ g/mol

$\Delta H = \frac{q}{n}$

$q = n \times \Delta H$

$m = d \times V = 10 \times 0.789 = 7.89$

$n = \frac{m}{M_r} = \frac{7.89}{46} = 0.1715$

$q = n \times \Delta H$

$= 0.1715 \times -1367 = -234.4$ kj

14-

7 - Calculate the enthalpy value of the reaction 4 NH3(g) +5 O2(g) → 4 NO (g) + 6 H2O (l) in terms of the enthalpy values the reactions given below. N2 (g) + 3 H2 (g) → 2 NH3 ΔH1 N2 (g) + O2 (g) → 2 NO ΔH2 2H2 (g) + O2 (g) → 2 H2O ΔH3

a) 2 ΔH1 - ΔH2 -2 ΔH3
b) 2 ΔH1 -2 ΔH2 - 3 ΔH3
c) 3 ΔH1 -2 ΔH2 -2 ΔH3
d) ΔH1 +3 ΔH2 -2 ΔH3
e) -2 ΔH1 +2 ΔH2 + 3 ΔH3
Leave blank

2x ~ $N_2 + 3H_2 \rightarrow 2NH_3$ ΔH_1

2x $N_2 + O_2 \rightarrow 2NO$ ΔH_2

3x $2H_2 + O_2 \rightarrow 2H_2O$ ΔH_3

$2NH_3 \rightarrow N_2 + 3H_2$ $-2\Delta H_1$

$2NO_2 + 2O_2 \rightarrow 4NO$ $2\Delta H_2$

$6H_2 + 3O_2 \rightarrow 6H_2O$ $3\Delta H_3$

$2NH_3 + \frac{5}{2}O_2 \rightarrow 4NO + 6H_2O$

15-

$-2\Delta H_1 + 2\Delta H_2 + 3\Delta H_3$

7- Which of the following sets of quantum numbers, n, l, ml, ms, represents the 2p orbital?

a) (2, 1, 0, 1/2)
b) (3, 1, 1, 1/2)
c) (3, 2, 1, 0)
d) (1, 1, 1, 1/2)
e) (3, 2, 0, -1/2)
Leave blank

16-

9- Which of the following sets of quantum numbers, n, l, ml, ms, represents the 3d orbital?

a) (1, 1, 1, 1/2)
b) (2, -1, 0, 1/2)
c) (3, 2, 0, -1/2)
d) (3, 2, 1, 0)
e) (3, 1, 1, 1/2)
Leave blank

17-

14 - 1900 mmHg pressure corresponds to how many atm pressure?

a) 1.25
b) 70.3
c) 2.5
d) 0.125
e) 703000
Leave blank

1 atm → 760 mmHg
? 1900 mmHg

$\frac{1900}{760} = 2.5$ atm