**8-**

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

$m = 4.8\ g$

$V = 5.6\ L$

$T = 27^\circ C + 273 = 546\ K$

$P = ?\ atm$

$M_{wt} = 32$

$R = 0.0821$

$PV = nRT$

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

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

$P = 1.2\ atm$

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

$V_1 = 12\ L$

$P_1 = 2\ atm$

$T_1 = ?\ ^\circ C$

$V_2 = 4\ L$

$P_2 = 8\ atm$

$T_2 = 127^\circ C + 273 = 400\ K$

Combined gas law

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

$$T_1 = \frac{P_1V_1T_2}{P_2V_2} = \frac{2 \times 12 \times 400}{8 \times 4} = 300\ K$$

$= 300 - 273$

$= 27^\circ C$

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

1 atm → 1.01325 bar
? → 1

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

11-

5- 2 Fe(k) + O2(g) → 2 FeO(k) ΔH= -544,0 kJ and 3 Fe (k) + 2O2(g) → 2 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) [illegible]
d) -30,4
e) -1662,4
Leave blank

Hess law

reverse ×2 ← $2Fe + O_2 \rightarrow 2FeO$ $\Delta H = 544.0$ kJ

$3Fe + 2O_2 \rightarrow Fe_3O_4$ $\Delta H = -1118.4$ kJ

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

$3Fe + 2O_2 \rightarrow Fe_3O_4$ $\Delta H = -1118.4$ kJ

$4FeO \rightarrow Fe + Fe_3O_4$ $\Delta H = +544 \times 2 + (-1118.4)$

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 the NaOH solution (M)?

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

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

$V = 200$ ml, $C = ?$ | $V = 40$ ml, $C = 0.1$ M

NaOH : $H_2SO_4$ = 2 : 1

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

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

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

$= \frac{2(0.1 \times 40)}{200}$

13-

$n = C \times V$

$C_{NaOH} = 0.04$ M

find enthalp in kj/mol

14-

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 = ? kj
V = 10 ml
ΔH = -1367 kj/mol
d = 0.789 g/ml
$M_r$ = 46 g/mol

ΔH = q/n
q = ΔH · n
n = m/$M_r$
m = d x V

m = d x V = 10 x 0.789 = 7.89 g
n = m/$M_r$ = 7.89/46 = 0.1715 mol
q = ΔH.n = -1367 x 0.1715 = -234.4 kj

15-

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

* $4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

$N_2 + 3H_2 \rightarrow 2NH_3$ ΔH1 → reverse x2
2x $N_2 + O_2 \rightarrow 2NO$ ΔH2
3x $2H_2 + O_2 \rightarrow 2H_2O$ ΔH3

$4NH_3 \rightarrow 2N_2 + 6H_2$ $-2\Delta H_1$
$2N_2 + 2O_2 \rightarrow 4NO$ $+2\Delta H_2$
$6H_2 + 3O_2 \rightarrow 6H_2O$ $+3\Delta H_3$

$4NH_3 + 5O_2 \rightarrow 4NO + 6H_2O$

$\Delta H_{rxn} = -2\Delta H_1 + 2\Delta H_2 + 3\Delta H_3$

16-

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

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

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