

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

$m = 4.8 \text{ g}$
 $V = 5.6 \text{ L}$
 $T = 273^\circ\text{C} + 273 = 546 \text{ K}$
 $p = ? \text{ atm}$
 $M_{\text{wt}} = 32$
 $R = 0.0821$

$PV = nRT$
 $PV = \frac{m}{M_r} RT$
 $P = \frac{mRT}{VM_r} = \frac{4.8 \times 0.0821 \times 546}{5.6 \times 32}$
 $P = \underline{1.2 \text{ atm}}$

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

$V_1 = 12 \text{ L}$
 $P_1 = 2 \text{ atm}$
 $T_1 = ? \text{ }^\circ\text{C}$

$V_2 = 4 \text{ L}$
 $P_2 = 8 \text{ atm}$
 $T_2 = 127^\circ\text{C} + 273 = 400 \text{ K}$

Combined gas law

$\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$

$$T_1 = \frac{P_1 V_1 T_2}{P_2 V_2} = \frac{2 \times 12 \times 400}{8 \times 4} = 300 \text{ K}$$

$$= 300 - 273 = 27^\circ\text{C}$$

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

$$1 \text{ atm} \rightarrow 1.01325 \text{ bar}$$

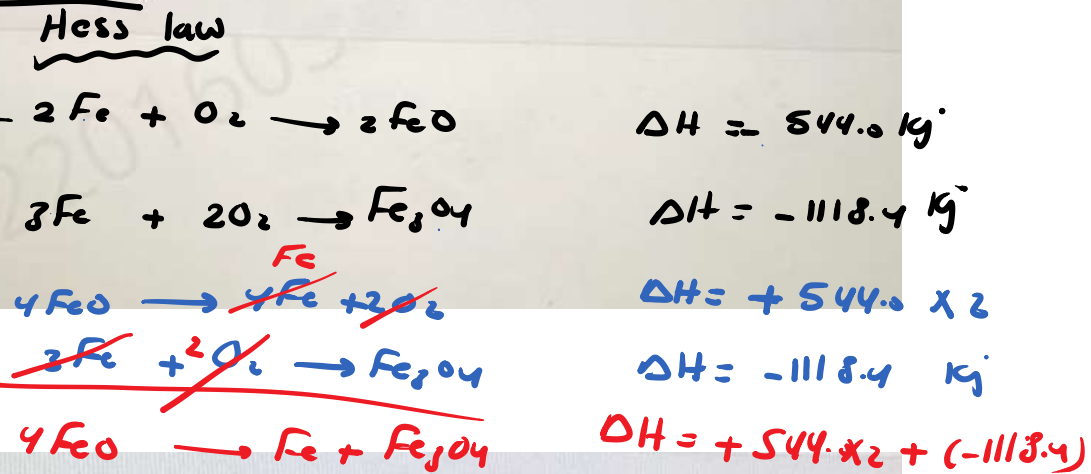
$$? \rightarrow 1$$

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

11-

5. $2 \text{ Fe}(k) + \text{O}_2(g) \rightarrow 2 \text{ FeO}(k) \Delta H = -544,0 \text{ kJ}$ and $3 \text{ Fe}(k) + 2 \text{ O}_2(g) \rightarrow \text{Fe}_3\text{O}_4(k) \Delta H = -1118,4 \text{ kJ}$. What is the enthalpy of the reaction $4 \text{ FeO}(k) \rightarrow \text{Fe}(k) + \text{Fe}_3\text{O}_4(k)$ in kJ?

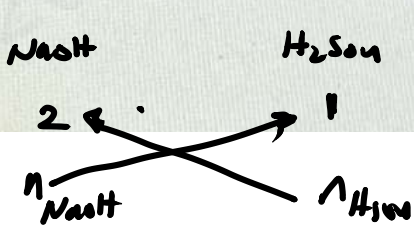
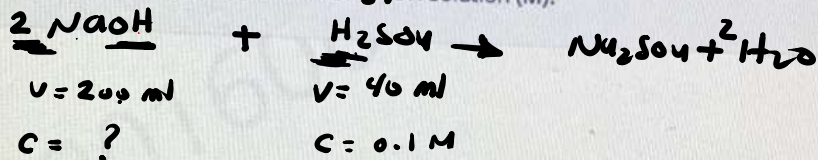
- a) 574,4
- b) 1662,4
- c) 778,4
- d) -30,4
- e) -1662,4
- Leave blank



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



$$n_{\text{NaOH}} = 2 n_{\text{H}_2\text{SO}_4}$$

$$C_{\text{NaOH}} \times V_{\text{NaOH}} = 2 (C_{\text{H}_2\text{SO}_4} \times V_{\text{H}_2\text{SO}_4})$$

$$C_{\text{NaOH}} = \frac{2 (C_{\text{H}_2\text{SO}_4} \times V_{\text{H}_2\text{SO}_4})}{V_{\text{NaOH}}}$$

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

13-

$$n = c \times V$$

$$C_{\text{NaOH}} = 0.04 \text{ M}$$

find enthalp in kJ/mol

9

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

ΔH

$q = ? \text{ kJ}$

$V = 10 \text{ ml}$

$\Delta H = -1367 \text{ kJ/mol}$

$d = 0.789 \text{ g/ml}$

$M_r = 46 \text{ g/mol}$

$d \times V$

$\frac{m}{M_r}$

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

$q = \Delta H \cdot n$

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

$m = d \times V = 10 \times 0.789 = 7.89 \text{ g}$

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

$q = \Delta H \cdot n = -1367 \times 0.1715 = -234.4 \text{ kJ}$

14-

7- Calculate the enthalpy value of the reaction $4 \text{ NH}_3(\text{g}) + 5 \text{ O}_2(\text{g}) \rightarrow 4 \text{ NO}(\text{g}) + 6 \text{ H}_2\text{O}(\text{l})$ in terms of the enthalpy values of the reactions given below. $\text{N}_2(\text{g}) + 3 \text{ H}_2(\text{g}) \rightarrow 2 \text{ NH}_3 \Delta H_1$ $\text{N}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{ NO} \Delta H_2$ $2 \text{ H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2 \text{ H}_2\text{O} \Delta H_3$

a) $2 \Delta H_1 - \Delta H_2 - 2 \Delta H_3$
 b) $2 \Delta H_1 - 2 \Delta H_2 - 3 \Delta H_3$
 c) $3 \Delta H_1 - 2 \Delta H_2 - 2 \Delta H_3$
 d) $\Delta H_1 + 3 \Delta H_2 - 2 \Delta H_3$
 e) $-2 \Delta H_1 + 2 \Delta H_2 + 3 \Delta H_3$
 Leave blank

* $4 \text{ NH}_3 + 5 \text{ O}_2 \rightarrow 4 \text{ NO} + 6 \text{ H}_2\text{O}$

$\text{N}_2 + 3 \text{ H}_2 \rightarrow 2 \text{ NH}_3$ ΔH_1 → reverse x 2

$2 \times \text{N}_2 + \text{O}_2 \rightarrow 2 \text{ NO}$ ΔH_2

$3 \times 2 \text{ H}_2 + \text{O}_2 \rightarrow 2 \text{ H}_2\text{O}$ ΔH_3



15-

7- Which of the following sets of quantum numbers n, l, m_l, m_s 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

$4 \text{ NH}_3 + 5 \text{ O}_2 \rightarrow 4 \text{ NO} + 6 \text{ H}_2\text{O}$

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

16-

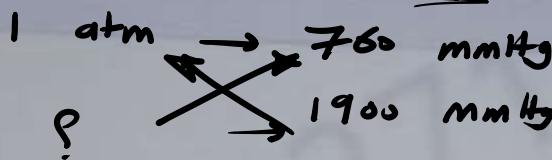
9 - Which of the following sets of quantum numbers, n , l , m_l , m_s , represents the 3d orbital?

- 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



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