

18-

15- 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) 0,5
 b) 1
 c) 0,08
 d) 0,1
 e) 1,6
 Leave blank

$$2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}$$

$\begin{matrix} 2 & 1 \\ \times & \\ \nu_{\text{NaOH}} & \nu_{\text{H}_2\text{SO}_4} \end{matrix}$

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

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

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

19-

10- Which of the following statements about thermochemistry is false?

universe = system + surrounding

a) A closed system is a system that does not exchange matter with the environment, but energy.

b) The surrounding is the part of the universe that is outside the system.

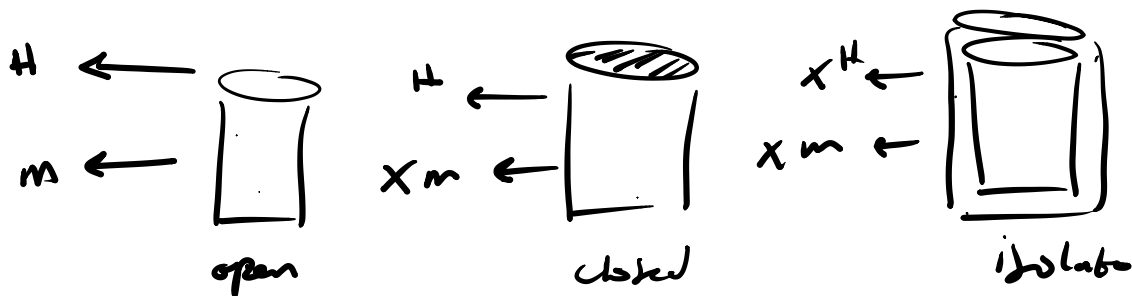
c) Internal energy is a state function.

d) The system is the studied part of the universe in terms of the thermodynamic process.

e) An open system is one that exchanges matter with the environment, but not energy.

Leave blank

$\Delta u = q + w$



20-

12- Since $\Delta H(\text{LiOH}(s)) = -487 \text{ kJ/mol}$, $\Delta H(\text{Li}_2\text{CO}_3(s)) = -1216.04 \text{ kJ/mol}$, $\Delta H(\text{CO}_2(g)) = -393.5 \text{ kJ/mol}$ and $\Delta H(\text{H}_2\text{O}(g)) = -286 \text{ kJ/mol}$, what is the enthalpy change in kJ for the reaction $2 \text{LiOH}(s) + \text{CO}_2(g) \rightarrow \text{Li}_2\text{CO}_3(s) + \text{H}_2\text{O}(g)$?

a) 85.34
 b) 80.34
 c) -80.34
 d) 89.34
 e) -89.34
 Leave blank

$$\Delta H_{rxn} = \sum \Delta H_p - \sum \Delta H_r$$



$$\begin{aligned} \Delta H_p &= \Delta H_{\text{Li}_2\text{CO}_3} + \Delta H_{\text{H}_2\text{O}} \\ &= -286 - 1216.04 = -1502.04 \text{ kJ} \end{aligned}$$

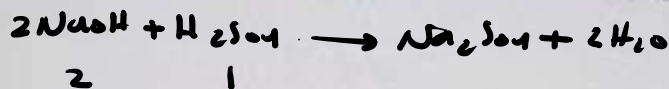
$$\begin{aligned} \Delta H_r &= \Delta H_{\text{CO}_2} + 2 \Delta H_{\text{LiOH}} \\ &= -393.5 - (487 \times 2) = -1367.5 \end{aligned}$$

21-

$$\Delta H_{rxn} = -1502.04 + 1367.5 = -134.5 \text{ kJ}$$

20- Titrate 100 ml of NaOH solution of unknown concentration with 0.1 M H₂SO₄ solution. Since 80 ml of H₂SO₄ is consumed during this process, how many molar (M) is the concentration of the NaOH solution?

a) 3.2
 b) 0.16
 c) 1
 d) 0.5
 e) 0.1
 Leave blank



$$n_{\text{NaOH}} \quad n_{\text{H}_2\text{SO}_4}$$

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

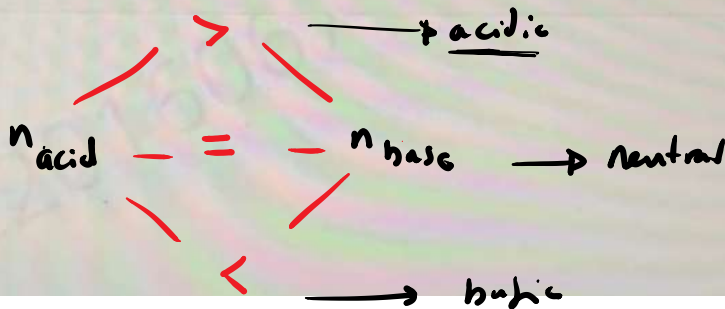
$$C_{\text{NaOH}} \times 100 = 2 (0.1 \times 80)$$

$$C_{\text{NaOH}} = \frac{0.16}{1} \text{ M}$$

22-

14- Which of the following is the final state of the medium after adding 200 ml 0.15 M HCl to 100 ml 0.1 M Fe(OH)₃ sample?

a) Basic
 b) None of them
 c) Acidic
 d) Neutral
 e) -
 Leave blank



$\begin{aligned} &\text{HCl} \\ V &= 200 \text{ ml} = 0.2 \text{ L} \\ C &= 0.15 \text{ M} \\ \hline n &= 0.2 \times 0.15 = 0.03 \end{aligned}$	$\begin{aligned} &\text{Fe(OH)}_3 \\ V &= 100 \text{ ml} = 0.1 \text{ L} \\ C &= 0.1 \text{ M} \\ \hline n &= 0.1 \times 0.1 = 0.01 \end{aligned}$	\gg	$0.03 > 0.01 \rightarrow \text{acidic}$
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23-

1 - 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: 16 g/mol)

$m = 4.8 \text{ g}$
 $V = 5.6 \text{ L}$
 $T = 273^\circ\text{C} + 273 = 546 \text{ K}$
 $P = ?$
 $M_r = 16$
 $R = 0.0821$

$PV = \frac{m}{M_r} RT$
 $P = \frac{m RT}{V M_r}$
 $= \frac{4.8 \times 0.0821 \times 546}{5.6 \times 16}$
 $= 2.4 \text{ atm}$

a) 2
 b) 1
 c) 1.5
 d) 0.5
 e) 1.2
 Leave blank

24-

1. Which of the following is wrong about the neutralization reaction of Cu(OH)₂ and HNO₃

$\text{Cu(OH)}_2 + 2\text{HNO}_3 \rightarrow \text{Cu(NO}_3)_2 + 2\text{H}_2\text{O}$

a) The reaction is an acid-base reaction.
 b) 2 moles of water are released when balanced with the smallest integers
 c) 2 moles of acid is required for 1 mole of base to react.
 d) The salt formed is CuNO₃ ✓
 e) The base in the reaction is HNO₃.
 Leave blank

25-

3. If 128 g of NH₄NO₂ decomposes according to the following reaction at 819°C and 1 atm, what is the total volume of the products formed? (NH₄NO₂: 64 g/mol) $\text{NH}_4\text{NO}_2(\text{s}) \rightarrow \text{N}_2(\text{g}) + 2\text{H}_2\text{O}(\text{g})$

$n_{\text{NH}_4\text{NO}_2} = \frac{m}{M_r} = \frac{128}{64} = 2$
 $n_{\text{N}_2} = 2$
 $n_{\text{H}_2\text{O}} = 2 \times 2 = 4$ } $n_{\text{total}} = 6$
 $T = 819^\circ\text{C} + 273 = 1092 \text{ K}$

a) 421,56
 b) 672,21
 c) 253,45
 d) 537,26
 e) 342,32
 Leave blank

$PV = n_{\text{total}} RT$
 $V = \frac{n_{\text{total}} RT}{P} = \frac{6 \times 0.0821 \times 1092}{1} = 537.9 \text{ L}$