



Guangdong Technion

Israel Institute of Technology

广东以色列理工学院

Report Lab # 2

Chemical reactions

Lab group: 3_

Date: 2025/1/4		Instructor:	
Grade:	Remarks:		

Name:	ID:
Junlin Liu	999026131
Kangfu Tang	999026248

a. Introduction to chemical reactions

While describing a chemical reaction make sure to note the state of all compounds or solvent (s, g, l)¹ before it starts, changes during the reaction and final state of all reactants and products.

1. Is it always possible to detect an ongoing chemical reaction? If yes, give an example. If not, explain why. 5 points

_____ No, an ongoing chemical reaction cannot always be detected. The changes in some chemical reactions are very subtle and have no visible phenomena. Such reactions need to be analyzed and measured through sensitive tests or specialized equipment. _____

2. In the simple chemical reactions, three tubes were used to observe different phenomena.

a. Describe the reaction phenomena in tube#1 (changes in color, states of matter, the temperature of the tube etc.) 5 points

_____ 1: The solid gradually dissolves, and a large number of bubbles are produced in the test tube. 2: The temperature of the test tube rises. _____

b. What is the composition and function of tube #2 in this experiment. 5 points

Composition: 5 mL of 0.1 M copper sulfate solution.

Function: Serves as the control group to rule out changes in the CuSO₄ solution itself, allowing comparison with test tube #3 to clarify the reaction between zinc powder and CuSO₄. _____

c. Did you obtain elemental copper in tube #3? If yes, describe the phenomena; if not, try _____

S = solid, l = liquid, g = gas, aq = aqueous

to explain the reason and suggest an evidence to determine whether reaction happened.

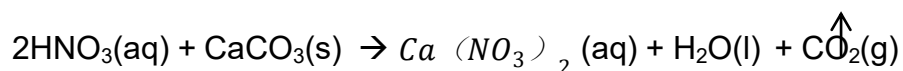
5 points

Yes, we obtained elemental copper

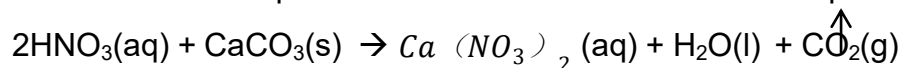
Observation: The blue solution gradually fades, the white solid powder dissolved and a red solid precipitates at the bottom of the solution.

m _____

3. Following is the equation for the reaction between nitric acid and calcium carbonate in water



- a. Balance the chemical equation. 5 points



- b. Calculate the amount of how many mL of 0.2854 M HCl solution are needed to react with 20 mL of 0.1213 M CaCO_3 solution. 10 points

Amount of CaCO_3 : $0.02 \text{ L} \times 0.1213 \text{ mol/L} = 0.002426 \text{ mol}$.

Amount of HCl needed: $0.002426 \text{ mol} \times 2 = 0.004852 \text{ mol}$.

Volume of HCl solution: $0.004852 \text{ mol} \div 0.2854 \text{ mol/L} \approx 0.0170 \text{ L} = 17 \text{ mL}$.

(b) Demonstration of a chemical reaction

1. Write the chemical equation for the reaction between potassium permanganate (KMnO_4) and oxalic acid (CHCOOH)₂ acid that was going on in one of the conical flasks. What are the observations that support the reaction you propose?

5 points

$2\text{KMnO}_4 (aq) + 5(\text{COOH})_2 (aq) + 3\text{H}_2\text{SO}_4 (aq) \rightarrow \text{K}_2\text{SO}_4 (aq) + 2\text{MnSO}_4 (aq) + 10\text{CO}_2(g) \uparrow + 8\text{H}_2\text{O}(l)$ The purple color turned orange, yellow and finally faded. Bubbles formed. _____

- Write the chemical reaction that takes place in the conical flask with the calcium hydroxide. What are the observations that support the reaction you propose?

10 points

_____ $\text{Ca}(\text{OH})_2(aq) + \text{CO}_2(g) \rightarrow \text{CaCO}_3(s) \downarrow + \text{H}_2\text{O}(l)$ The calcium hydroxide solution turned vague _____

- Indicate why it is important that the end of the glass tube is dipped in the solution of calcium hydroxide.

5 points

It ensured that the CO_2 came into contact with the calcium hydroxide, and prevented the gas from escaping into the air without reacting. It also visualized the form of gas.

- What is the ratio between the reactants in the reaction? Explain.

10 points

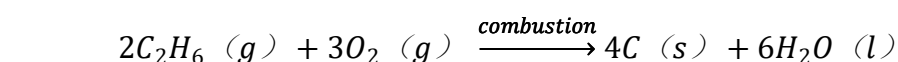
Ration between KMnO_4 and $(\text{COOH})_2$ is 2:5. Potassium permanganate ions are reduced from +7 oxidation state to +2, where 5 electrons are transferred. Oxalic acid is oxidized from +3 to +4, losing 1 electrons per carbon atom. To balance the transfer, the ration should be 2:5.

Ration between $\text{Ca}(\text{OH})_2$ and CO_2 is 1:1. Each mole of calcium hydroxide reacts with one mole of CO_2 .

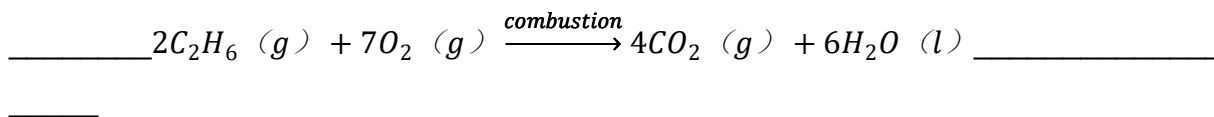
(C) The Bunsen burner

- Write the chemical equation for the reaction that takes place in the partial burning process of ethane (C_2H_6).

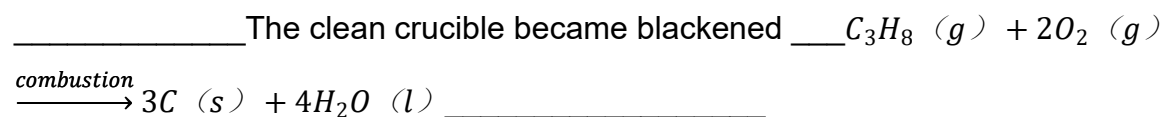
7 points



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2. Write the chemical equation for the reaction that takes place in the complete burning process of ethane (C_2H_6). 7 points



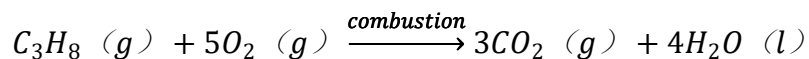
3. Describe what has happened when a clean crucible was held over the yellow flame. Suggest a relevant chemical equation: 3 points



4. Describe what has happened when a dry, clean beaker was held upside down over the blue flame for a second. Suggest a relevant chemical equation:

3 points

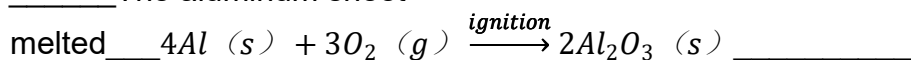
_____ water droplets formed on the inner surface of the beaker



(d) Metals in the fire:

1. Describe what did you see and suggest a chemical equation for the burning of the aluminum (Al) sheet: 5 points

_____The aluminum sheet



1. Write an observation and a possible chemical equation equation for the burning of iron (Fe) sheet: 5 points

_____The iron sparked and formed black solid $3Fe (s) + 2O_2 (g) \xrightarrow{\text{ignition}} Fe_3O_4 (s)$ _____

2. Write an observation and a possible chemical equation for the burning of magnesium (Mg) turning: 5 points

_____It emitted a dazzling wight light and formed some white solid

