

## Experiment 3

Identification of a Compound: Chemical Properties

Chemists do experiments for different reasons; some of them may be detection, identification, and separation of chemicals from natural samples or from reaction mixtures, and study of the physical and chemical properties of these substances. We will see some of this work through out this laboratory course.

In this experiment:

- You will perform some chemical reactions, write down your observations, explanations and comments.
- You will be given an UNKNOWN substance, which you have already investigated.
- Your duty, depending on the investigations that you have already made

in the lab, will be to find what your unknown substance would be  
 in order to know whether you have  
 a chemical reaction or not there are some  
 signals

يعني ممكن نلاحظ انك بعض الملاحظات  
 انك اذا لاحظت انك بعض الملاحظات يعني  
 انه صار تفاعل كيميائي

in the lab, will be to find what your unknown substance would be

Possible Observations:

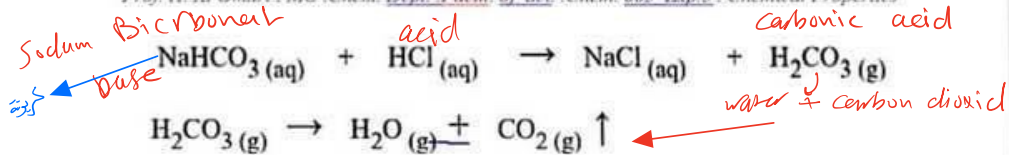
You may notice any of the following or any combination of them.

Never try to smell the reaction mixture directly. There is away to do that in the lab.

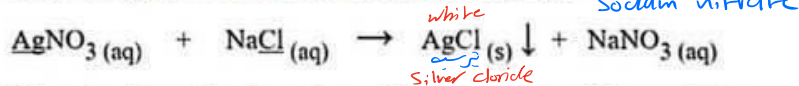
تصاحف ناز

1. ♦ Evolution of a gas, a gaseous substance is one of the products, the reaction between sodium bicarbonate and hydrochloric acid produces water and carbon dioxide gas.

اذا ظلمنا اننا نرى بعضه وطلع عندي  
 غاز صفر ابيض يعني انه صار تفاعل كيميائي



**Precipitate formation:** formation of an insoluble substance. The reaction between silver nitrate and sodium chloride is an example.



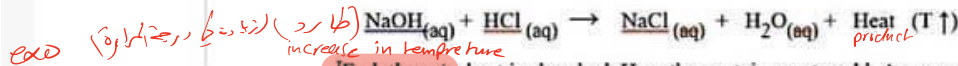
It is important to notice the **color** and the **appearance of the precipitate**, it may be **crystalline** or **cloudy**.

(aq) Aqueous → dissolve in water  
 يعني ايدو في المحلول

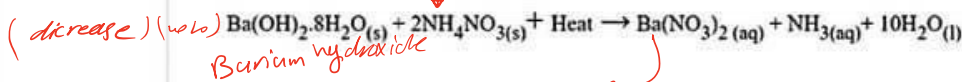
ان

**Heat changes:** Chemical reactions may be exothermic or endothermic.

**Exothermic:** heat is produced. Here, the container gets warmer. The reaction between sodium hydroxide and hydrochloric acid is exothermic where the temperature of the reaction mixture increases upon the reaction.



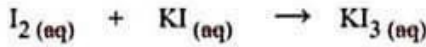
**Endothermic:** heat is absorbed. Here the container gets cold. An example of an endothermic reaction is the reaction between barium hydroxide and ammonium nitrate.



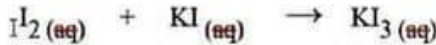
المحو (المكو) يمتص  
 الحمض، لنتو  
 الحمض، لنتو  
 درجة الحرارة تنقص

appearance in color  
 or disappearance  
 of the color  
 or changes  
 on color  
 الذي يدل على حدوث تفاعل  
 كيميائي معين

• **Color change.** *يظهر تبايناً في اللون*  
 Oxidation-Reduction reaction of potassium permanganate (KMnO<sub>4</sub>) with potassium sulfite (K<sub>2</sub>SO<sub>3</sub>) undergoes many color changes as the permanganate (MnO<sub>4</sub><sup>-</sup>, violet color) is converted into manganate (MnO<sub>4</sub><sup>2-</sup>, green color) then into hypomanganate (MnO<sub>4</sub><sup>3-</sup>, blue) and finally into manganese +4 oxidation state with yellow color. The oxidation state of manganese has changed from +7 to +6 then +5 respectively. Another example is the reaction of iodine (I<sub>2</sub>) with potassium iodide (KI).



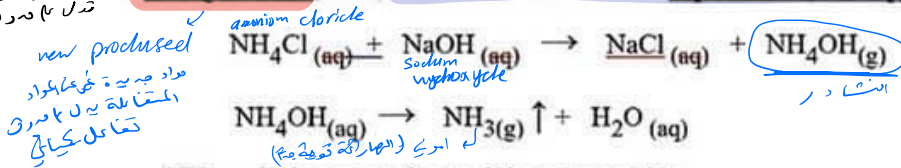
Activate Window  
 Go to Settings to activate



I<sub>2</sub> (aq) is brownish and KI<sub>3</sub> (aq) is colorless. So, this reaction shows a disappearance of the yellowish color of iodine.

اذا كان رائحة معينة  
 تدل على حدوث تفاعل كيميائي

• **Change in odor.** here, a substance with an odor is produced (or disappeared).



NH<sub>3</sub> (g) is the ammonia gas, it has strong odor.

Activate Window  
 Go to Settings to activate

الامثلة والتفاعلات  
 كيميائية فقط

اذا به في انا كند اذا تكد رائحة ادا ما يبرغم  
 التحي به بشكل مباشر بشع زك  
 المصوره التي تحت

اذا ما كان للتحليل كيميائي  
الاولى لتركيب كيميائية  
منها التي تحتوي على اذلة  
و يمكن افلا بعض الكوار و ما يظن  
تفاعل كيميائي



بعضه عن فحوصات و كوار اذلة من و كوار  
يعني ما يظن كيميائية لانه فحوصات

#### Experimental:

بلي الصا اذا ما صار اي دقة منها التي كيميائية ما تغير اللون  
و ولا احيى تيدي (هوت اذا) صار تفاعل ربيعه

#### I. Investigation of the chemical properties of the following reagents:

- Sodium chloride  $\text{NaCl}_{(aq)}$
- Sodium carbonate  $\text{Na}_2\text{CO}_3_{(aq)}$
- Sodium sulfate  $\text{Na}_2\text{SO}_4_{(aq)}$
- Barium chloride  $\text{BaCl}_2_{(aq)}$
- Zinc sulfate  $\text{ZnSO}_4_{(aq)}$
- Ammonium chloride  $\text{NH}_4\text{Cl}_{(aq)}$

The investigation will be done by use of the following test reagents according to the procedure 1, 2, 3 and 4 in your manual. You are required to record your observation and write the possible chemical reaction in each case.

The Test Reagents are:

1. Silver nitrate test reagent,  $\text{AgNO}_3_{(aq)}$
2. Sodium hydroxide test reagent,  $\text{NaOH}_{(aq)}$
3. Sulfuric acid test reagent,  $\text{H}_2\text{SO}_4_{(aq)}$
4. Barium nitrate test reagent,  $\text{Ba}(\text{NO}_3)_2_{(aq)}$

- 3. Sulfuric acid test reagent,  $H_2SO_4(aq)$
- 4. Barium nitrate test reagent,  $Ba(NO_3)_2(aq)$

Activate Windows  
Go to Settings to activate Windows.

11/11/2020 11:58 AM

II. Identification of an unknown: This is done according to step 5 in your manual.

		AgNO <sub>3</sub>	1 NaOH	H <sub>2</sub> SO <sub>4</sub>	Ba(NO <sub>3</sub> ) <sub>2</sub>
1.	<u>NaCl</u>	par لا شيء	X	X	X
2.	Na <sub>2</sub> CO <sub>3</sub>	X			
3.	Na <sub>2</sub> SO <sub>4</sub>				
4.	<u>BaCl<sub>2</sub></u>				
5.	<u>ZnSO<sub>4</sub></u>				
6.	NH <sub>4</sub> Cl				

7.	H <sub>2</sub> O				
	Unknown				

The End