IDENTIFICATION OF A COMPOUND BY CHEMICAL PROPERTIES

لم نهتم بعدد ال drops (يعني الكمية) ←

qualitative analysis
تحليل نوعي
لا يعتمد على كمية ال Drops

Chemical properties

Chemical properties are characteristics that can be measured or observed only when the identity of the substance is changed (undergoes a chemical reaction or change).

form new substance. تحول المادة إلى مادة جديدة مختلفة كليا عن ما كانت عليه

- **Examples** of chemical reactions are color change, precipitate, odor, etc.

Here are some examples of chemical properties:

- **Reactivity (e.g.,** the ability of matter to react chemically with other substances or chemicals**).**
- **Toxicity.**
- **Flammability.**
- **Enthalpy Of Formation.**
- **Heat Of Combustion.**
- **Chemical Stability.**
- **Ability To Rust (rusting)**
- **pH**
- **Reactivity With Water**
- **Creating Gas Bubbles From Chemical Reaction,**
- **Explosion Of Dynamite**
- **Electromotive force (in volts)**
- **Coordination Number.**
- **Oxidation States.**

أمثلة على الخصائص الكيميائية

مشاهدات حدوث التفاعل الكيميائي

كيف نستدل على حدوث تفاعل ؟

Chemical changes (rxns) (evidences or signs):

1. A gas is evolved, with or without odor. انطلاق غاز

2. A precipitate appears (or disappears). The nature of the precipitate is important; it may be crystalline, it may have color, it may merely cloud the solution. ظهور راسب

3. Heat may be evolved or absorbed. The reaction vessel becomes warm if the reaction is exothermic or cools if the reaction is endothermic. تفاعل ماص او طارد للحرارة

4• A color change occurs. A substance added to the system may cause a color change. تغير اللون

5• A change in odor is detected. The odor of a substance may appear, disappear, or become more intense during the course of a chemical reaction. تغير في الرائحة (ظهور رائحة او اختفاءها)

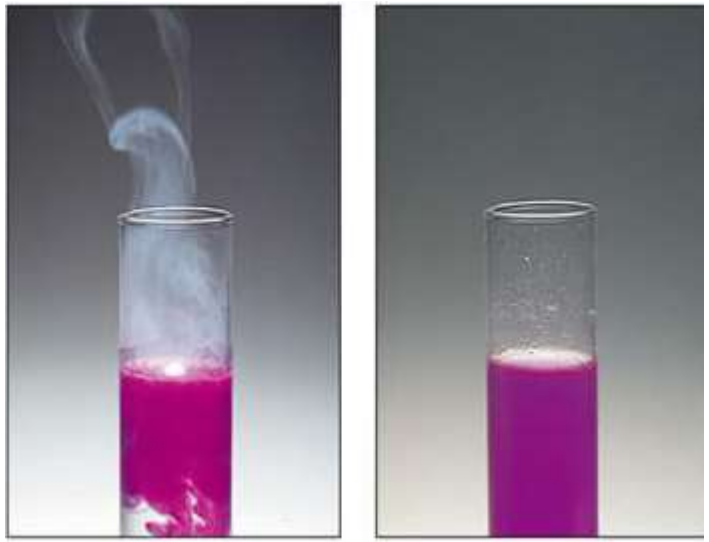
6. No reaction ,No sign at all, since the reactants and products are colorless and soluble in the solution لا يحدث تفاعل

gas is evolved, with or without odor

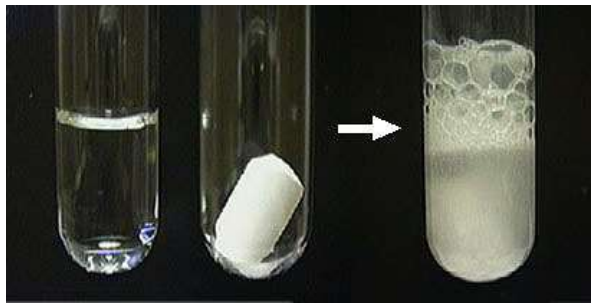
go (gas with odor)/ gno (gas without odor)

انطلاق غاز برائحة او بدون عن طريق تصاعد الغاز
مع مراعاة عدم شم الغاز لكن من اجل الاستدلال عليه عن طريق Fanning

غاز برائحة مثل $NH_{3\ (g)}$



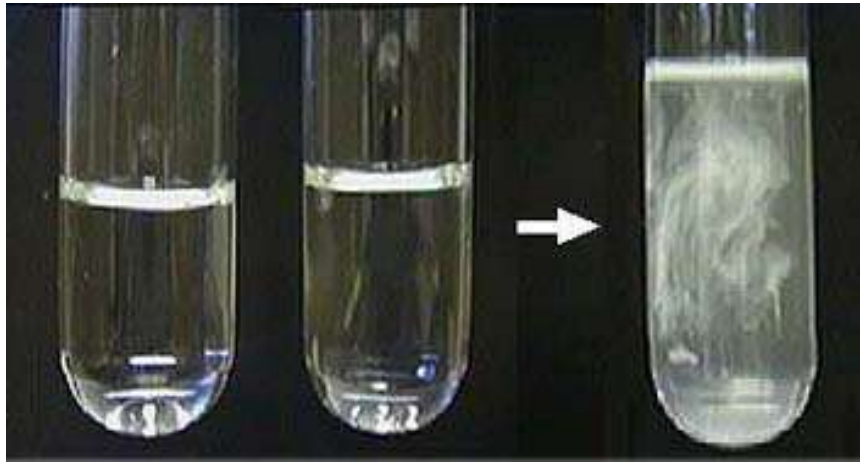
غاز بدون رائحة مثل CO_2



نستدل على الغاز => by "fizzing" sound

A precipitate appears

ppt



ظهور راسب باشكال مختلفة

1. crystalline
2. it may have color
3. it may merely cloud the solution
4. granules
5. milky
6. powder
7. cloudy

No reaction

nr

لم يحدث أى تفاعل

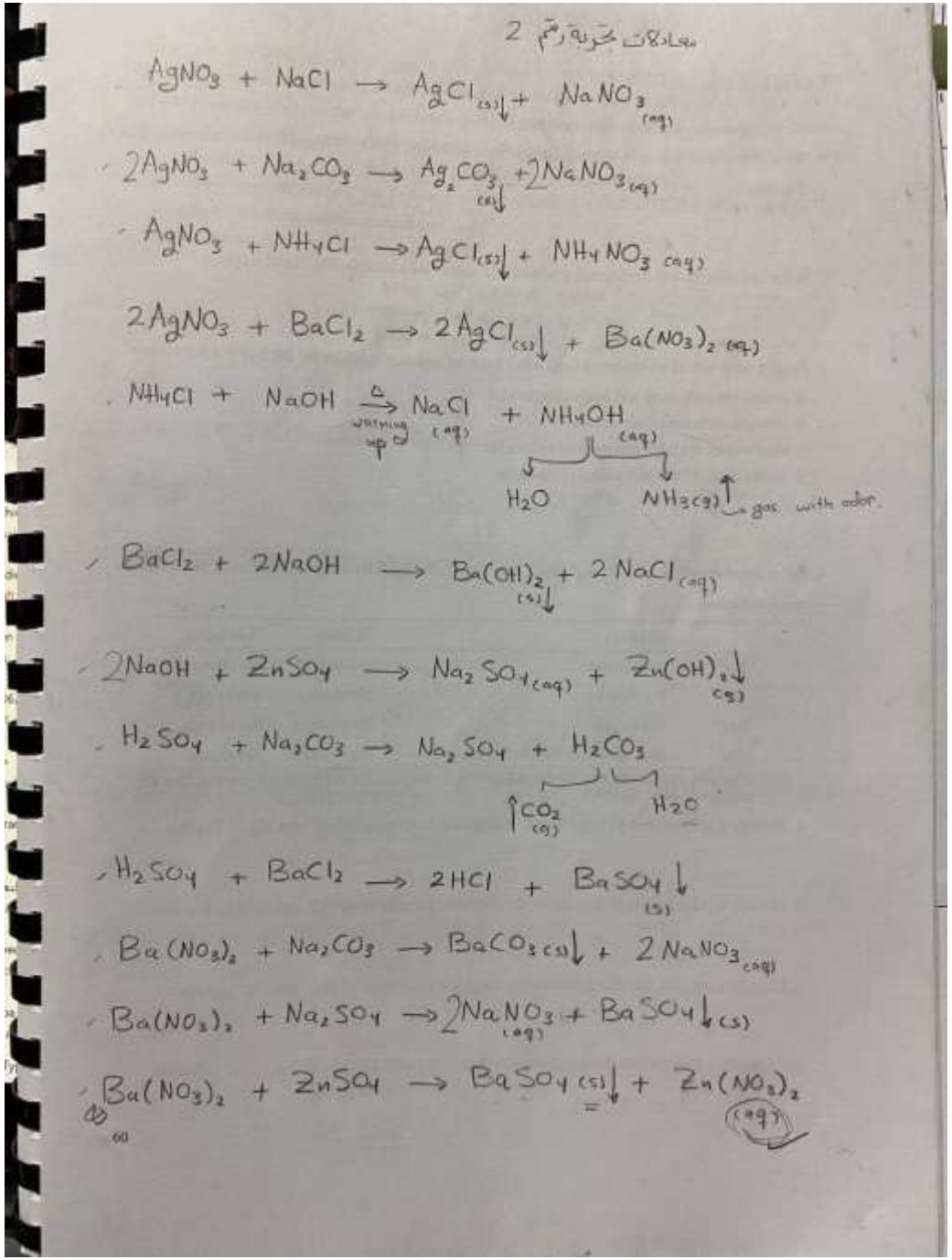
Table G.1 Summary of the Solubility of Salts

Anion	Soluble Salts with These Cations	"Insoluble" Salts with These Cations
acetate, $CH_3CO_2^-$	most cations	none
arsenate, AsO_4^{3-}	NH_4^+, Group 1A (except Li^+)	most cations
arsenite, AsO_3^{3-}	NH_4^+, Group 1A (except Li^+)	most cations
borate, BO_3^{3-}	NH_4^+, Group 1A (except Li^+)	most cations
bromide, Br^-	most cations	Ag^+, Hg_2^{2+}, Pb^{2+}, Cu^+, Tl^+
carbonate, CO_3^{2-}	NH_4^+, Group 1A (except Li^+)	most cations
chlorate, ClO_3^-	most cations	none
chloride, Cl^-	most cations	Ag^+, Hg_2^{2+}, Pb^{2+}, Cu^+, Tl^+
chromate, CrO_4^{2-}	NH_4^+, Ca^{2+}, Cu^{2+}, Mg^{2+}, Group 1A	most cations
cyanide, CN^-	NH_4^+, Group 1A (except Li^+)	most cations
ferricyanide, $[Fe(CN)_6]^{3-}$	NH_4^+, Group 1A (except Li^+)	most cations
ferrocyanide, $[Fe(CN)_6]^{4-}$	NH_4^+, Group 1A (except Li^+)	most cations
fluoride, F^-	Ag^+, NH_4^+, Group 1A	most cations
fluorosilicate, SiF_6^{2-}	most cations	Ba^{2+}, Group 1A
hydroxide, OH^-	NH_4^+, Sr^{2+}, Ba^{2+}, Group 1A	most cations
iodide, I^-	most cations	Ag^+, Hg_2^{2+}, Pb^{2+}, Cu^+, Tl^+, Br^{3+}, Sn^{4+}
nitrate, NO_3^-	most cations	none
nitrite, NO_2^-	most cations	none
oxalate, $C_2O_4^{2-}$	NH_4^+, Group 1A (except Li^+)	most cations
oxide, O^{2-}	NH_4^+, Sr^{2+}, Ba^{2+}, Group 1A	most cations
perchlorate, ClO_4^-	most cations	none
permanganate, MnO_4^-	most cations	none
phosphate, PO_4^{3-}	NH_4^+, Group 1A (except Li^+)	most cations
silicate, SiO_3^{2-}	Group 1A	most cations
sulfate, SO_4^{2-}	most cations	Sr^{2+}, Ba^{2+}, Pb^{2+}, Hg^{2+}
sulfide, S^{2-}	NH_4^+, Groups 1A and 2A	most cations
sulfite, SO_3^{2-}	NH_4^+, Group 1A (except Li^+)	most cations
thiocyanate, SCN^-	most cations	Ag^+, Hg_2^{2+}, Pb^{2+}
thiosulfate, $S_2O_3^{2-}$	most cations	Ag^+, Pb^{2+}

Cations	Soluble Salts with These Anions	"Insoluble" Salts with These Anions
ammonium, NH_4^+	most anions	no common anions
Group 1A	most anions	no common anions

(10)

محلول	ذائب مع	غیر ذائب مع
NH_4^+	ذائب ہوتا ہے۔	
Na^+	ذائب ہے	
K^+	ذائب ہے	
NO_3^-	ذائب ہے	
Li^+	ذائب ہے	
SO_4^{-2}	ذائب ہے۔	PO_4^{3-} مع [illegible]
CO_3^{-2}	$K^+ / Na^+ / Li^+ / NH_4^+$	Pb^{2+} / Ba^{+2} مع
PO_4^{3-}	$Na / K / NH_4^+$	باقی بعناصر
CH_3C	ذائب	باقی بعناصر
CrO_4^{-2}	$Ba^{+2}/Ca^{+2} / Mg^{+2} / K^+ / Na^+ / Li^+ / NH_4^+$	باقی بعناصر۔
OH^-	$Ba^{+2} / Ca^{+2} / K^+ / Na^+ / Li^+ / NH_4^+$	باقی بعناصر
Cl^- Br^- I^-	ذائب	Ag
F^-		$Mg^{+2} / Ca^{+2} / Pb^{+2}$



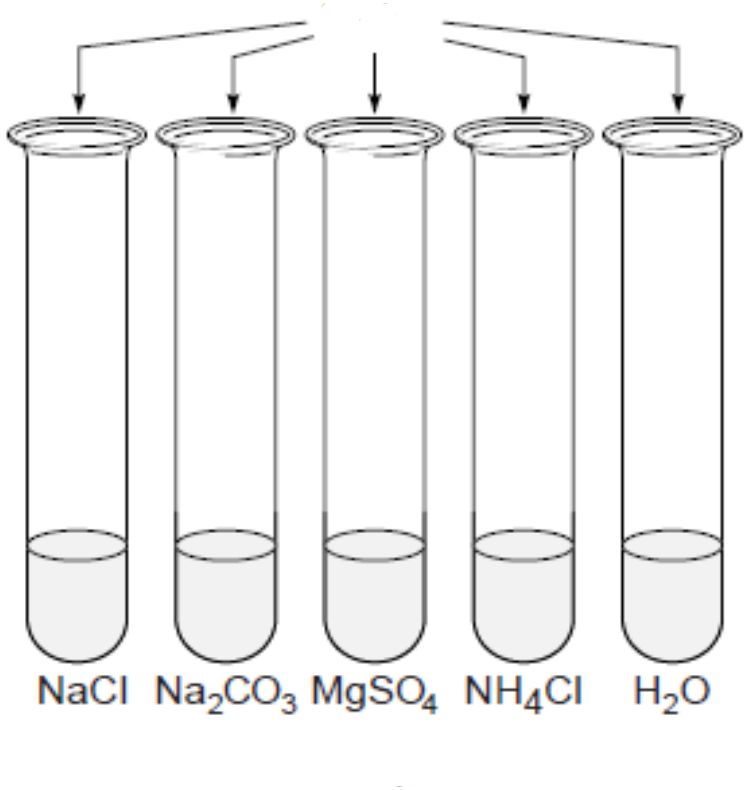
جميع المعادلات مهمه

طريقة كتابة المعادلات مهمه جدا وأي مادة سينتج عنها راسب او
اي تغير كيميائي

Rinse the test tubes with **tap water** and twice with **deionized water.**

-No water droplets should adhere to the inner surface of the test tube after cleaning.

- In qualitative analysis, clean glassware are needed to prevent contamination of the testing reagents



الجانب العملي

Test reagent	NaCl	Na_2CO_3	Na_2SO_4	NH_4Cl	$BaCl_2$	$ZnSO_4$	unknown
$AgNO_3$	P. AgCl	P. Ag_2CO_3					
NaOH	NR	NR		go. NH_3		P. $Zn(OH)_2$	
H_2SO_4	NR	g. CO_2					
$Ba(NO_3)_2$	NR	P. $BaCO_3$		NR		P. $BaSO_4$	

Test tubes