

Spect. Deter. Of a Mixture

Introduction: تركي الصالح الخليوي

Faculty Member (BSc, MSc, DSc, Major in "Instrumental Analysis"-Expert & Advanced Major in: التحليل الآلي
FAAS, FAES, GC, GC-MS, HPLC, IEC, ICP-CES, ICP-MS, ICP-AES, FTIR & NMR



In this experiment you would determine the amount of chromium and manganese in a given mixture. These are present as dichromate and manganate ions respectively. In fact this determination mimics the determination of the amount of chromium and manganese in alloy steels wherein these are oxidized to dichromate and permanganate ions respectively. The spectra of these ions overlap to certain extent. In the next experiment you would learn about the determination of methylethyl ketone—an important industrial solvent.

What are:

Types of Substances?

Matter Phases?

Phase Changes?

Permanganate & Dichromate Structural Formula?

ξ and $\lambda_{\max}$ values calculations?

Types of Substances:

• Element

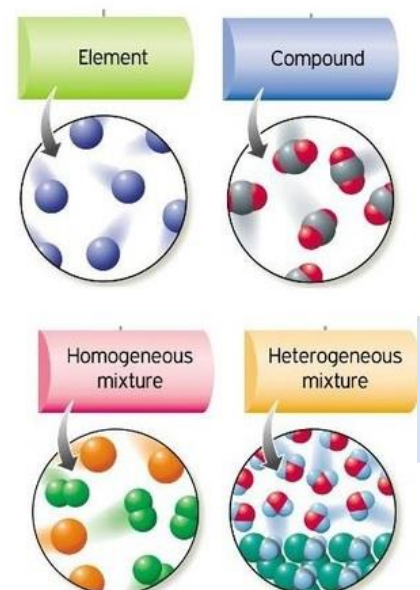
- Any substance that contains only one kind of atom
- Cannot be broken down

• Compound

- Consists of atoms of two or more different elements
- Can be broken down

• Mixture

- Consists of two or more different elements/compounds
- Can be separated



Element

- A pure substance that is listed in the periodic table and only has one type of atom in it.
- There are over 100 elements.
- Most are metals, a few are metalloids (also known as semi-metals), and the rest are non-metals.

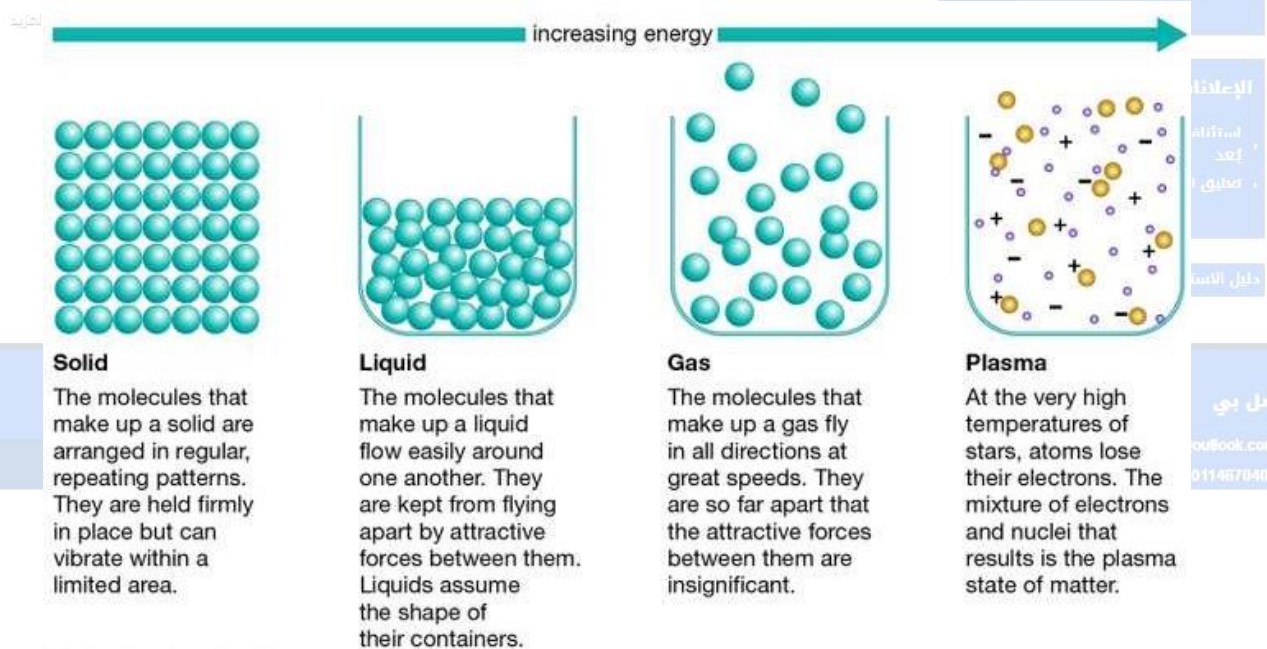
Compound

- A pure substance made from more than one type of element chemically bonded together.
- Elements bond in fixed ratios and so can be represented by a chemical formula. For example, sodium chloride has the same number of sodium ions and chloride ions, so its formula is NaCl, whereas water is always made from twice the number of hydrogen atoms as oxygen atoms, so it is H₂O.

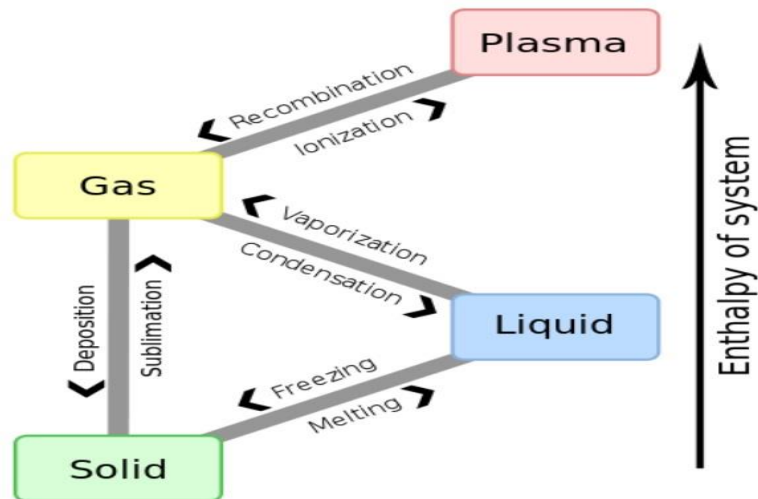
Mixture

- An impure substance made from different elements or compounds mixed together that are not chemically joined.
- Mixtures can usually be separated by physical techniques such as filtering and distillation.
- Air is a mixture that contains the elements nitrogen, oxygen and argon, and also the compound carbon dioxide.

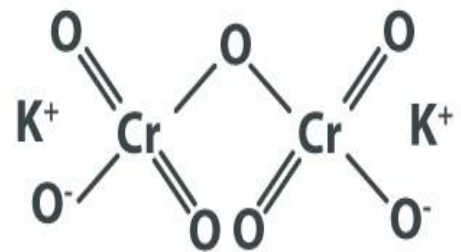
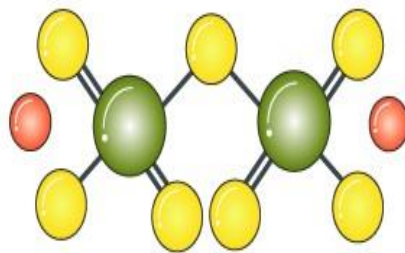
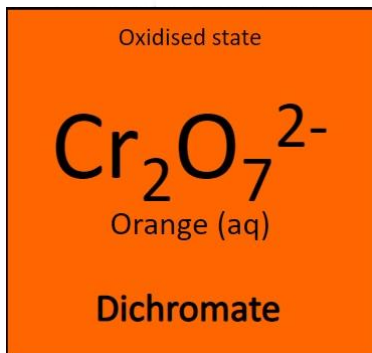
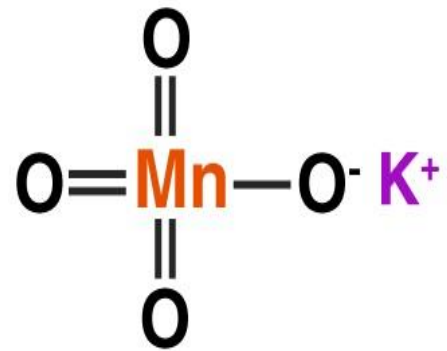
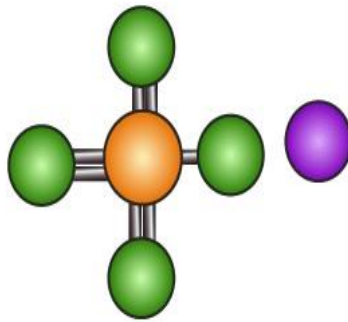
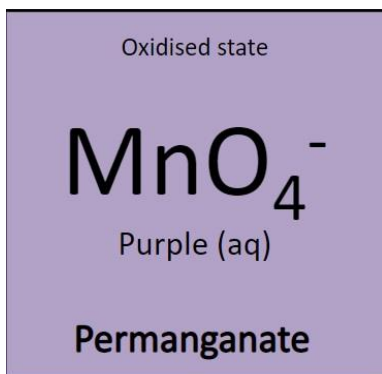
Matter Phases:



Phase Changes:



Permanganate & Dichromate Structural Formula:



ξ and $\lambda_{\max}$ Values calculations:

$$A_{\lambda_1} = C_1(\epsilon_1)_{\lambda_1} + C_2(\epsilon_2)_{\lambda_1}$$

$$A_{\lambda_2} = C_1(\epsilon_1)_{\lambda_2} + C_2(\epsilon_2)_{\lambda_2}$$

اتصل بي

Turksu@outlook.com

0114870404

$$A_{440} = \epsilon_{Cr,440} [Cr_2O_7^{2-}] + \epsilon_{Mn,440} [MnO_4^-]$$

$$A_{545} = \epsilon_{Cr,545} [Cr_2O_7^{2-}] + \epsilon_{Mn,545} [MnO_4^-]$$

$$[Cr_2O_7^{2-}] = \frac{A_{440}(\epsilon_{MnO_4^-})_{545} - A_{545}(\epsilon_{MnO_4^-})_{440}}{(\epsilon_{Cr_2O_7^{2-}})_{440}(\epsilon_{MnO_4^-})_{545} - (\epsilon_{MnO_4^-})_{440}(\epsilon_{Cr_2O_7^{2-}})_{545}}$$

$$[MnO_4^-] = \frac{A_{545} - (\epsilon_{Cr_2O_7^{2-}})_{545} [Cr_2O_7^{2-}]}{(\epsilon_{MnO_4^-})_{545}}$$

Experimental:

- 1- Prepare 50ml Of [0.005M] ($KMnO_4$) in water and including 1ml of [2M] H_2SO_4
- 2- Prepare 50ml Of [0.02M] ($K_2Cr_2O_7$) in water and including 1ml of [2M] H_2SO_4
- 3- Prepare Blank.
- 4- Take 10ml of the given Unknown in 50ml V.F and fill with water.

	$K_2Cr_2O_7$			$KMnO_4$			Blank	Unknown
NO								
ml	1	2	3	1	2	3	NIL	NIL

- 5- Move to the next Laboratory and find the concentration of $[Cr^{6+}]$ & $[Mn^{7+}]$ in the Unknown Sample.

Results:

No	$K_2Cr_2O_7$			$KMnO_4$		
	C	λ_{440}	λ_{545}	C	λ_{545}	λ_{440}
1	C_1	A_1	-	C_1	A_1	-
2	C_2	A_2	-	C_2	A_2	-
3	C_3	A_3	A	C_3	A_3	A
Unknown	?	$A_{Unknown}$		?	$A_{Unknown}$	

Calibration Graphs:

