

Chemistry Concept Sheet for 2nd Sec Second Term 2022

Periodic Table of the Elements

The periodic table is organized into groups (I to 18) and periods (1 to 7). It includes the Lanthanide Series (elements 57-71) and the Actinide Series (elements 89-103). Each element cell contains its atomic number, symbol, name, and atomic weight.

Examples of particles	Shape of the solid part	Arrangement of the electron pairs	Electron pairs		
			Free	Bonded	Resultant
$F-Be-F$ BeF_2 	Linear Ax_2 	Linear	0	2	2
 BF_3	Plane triangle Ax_3 	Planner Triangle	1	2	3
 SO_2	Angular Ax_2E Free electrons pair 				
 CH_4	Tetrahedron Ax_4 	Tetrahedral	0	4	
 NH_3	three - base pyramid Ax_3E 				
 H_2O	angular Ax_2E_2 				

Concepts of chapters three and four :

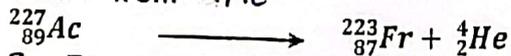
A bond <u>usually</u> formed between metals and nonmetals, when the difference in electronegativity is more than 1.7 .	Ionic bond
bond <u>usually</u> formed between two nonmetal atoms have the same electronegativity .	Pure covalent bond
bond formed between two nonmetal atoms the electronegativity between them less than 1.7.	Polar covalent bond
With the exception of hydrogen , lithium and beryllium the atoms of all elements tend to reach the octet structure .	octet theory
The covalent bond formed due to overlap of an atomic orbital of one atom containing a single electron with another atomic orbital in another atom containing a single electron . _	<u>Valence bond theory</u>
It is the overlap between two different orbitals or more of close energy in the same atom to form a number of equivalent orbitals called hybridized orbitals .	<u>Hybridization</u>
This theory considered the molecule as one unit in which all the atomic orbital of the combined atoms are mixed (overlapped) forming molecular orbital ,	<u>Molecular orbital theory</u>
It is formed as a result of the overlap of two atomic orbital head to head (on one line) (collinear overlap) so it is strong bond	Sigma bond
It is formed as a result of the overlap of two parallel atomic orbitals side by side (collateral overlap) ,so it is weak bond .	Pi (π) bond
A bond formed between two atoms one of them having an orbital with a lone pair of electron (donor atom) and the other atom having a vacant orbital (acceptor atom) .	<u>Coordinate bond</u>
Bond formed between hydrogen atom binds by polar bond {	Hydrogen bond

<p>like N-H , O-H , H-F } WITH high electronegative bonded atom like (N,O,F) .</p>							
<p>is produced from the electron cloud be of valence electrons which decreases the repulsive forces between the positive metal ions in the crystal lattice.</p>	<p>The metallic bond</p>						
<p>are known as A-groups. Inthese main groups there is a great regularity and graduation in their properties, theproperty which is not found in the transition elements of B-groups.</p>	<p>Regular groups</p>						
<p>The platinum wire is dipped in a concentrated hydrochloric acid to clean it. Then dip the platinum in the unknown salt and expose it to the non- illuminant Bunzen flame. The flame will acquire the specific colour of cation.</p>	<p>The dry test</p>						
<p>The phenomenon of having a large volume of the atom and small ionization energyThese elements when exposed to light, lose electrons from the outer surface of the metals; this is known as.</p>	<p>The photo electric phenomenon</p>						
<p>“This is the presence of the element in more than one form , of different physical properties, but of similar chemical ones”. Solid nonmetals, are characterized by allotropy .</p> <table border="1" data-bbox="316 1375 1002 1599"> <tr> <td>Phosphorus</td> <td>White (waxy), Red, Violet</td> </tr> <tr> <td>Arsenic</td> <td>Black, grey, yellow (waxy yellow</td> </tr> <tr> <td>Antimony</td> <td>Yellow, Black</td> </tr> </table>	Phosphorus	White (waxy), Red, Violet	Arsenic	Black, grey, yellow (waxy yellow	Antimony	Yellow, Black	<p>Allotropy</p>
Phosphorus	White (waxy), Red, Violet						
Arsenic	Black, grey, yellow (waxy yellow						
Antimony	Yellow, Black						
<p>Ammonia gas can be prepared in industry from nitrogen and hydrogen, in the presence of a catalyst: Iron, molybdenum , and under 200 atmospheric pressure and 500°C .</p> $\text{N}_2 + 3\text{H}_2 \xrightarrow{\text{Fe/Mo } 500 \text{ C/ } 200\text{At}} 2\text{NH}_3$	<p>Haber Bosch method</p>						

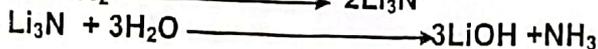
has a high nitrogen content (46 %).It is the most suitable fertilizer for hot areas , since the high temperature increases its dissociation to ammonia and carbon dioxide .	Urea
It is anhydrous liquefied ammonia because it has the highest nitrogen content over all fertilizers (82 %).It is supplied to the soil in a depth of nearly 12 cm .	The future fertilizer
An alloy formed of (Cu - Sn - P) to make propellers for ships .	Phosphorus bronze alloy
It is ammonium sulphate fertilizer which is prepared by reacting ammonia with sulphuric acid it increases acidity of soil. Thus it is important to neutralize the soil by basic substance.	Ammonium sulphate
$2\text{NH}_3 + \text{H}_2\text{SO}_4 \longrightarrow (\text{NH}_4)_2\text{SO}_4$	
Ammonium phosphate is an important fertilizer because it provides the soil with two essential elements which are nitrogen and phosphorus.	Nitrogenous phosphorous fertilizer
$3\text{NH}_3 + \text{H}_3\text{PO}_4 \longrightarrow (\text{NH}_4)_3\text{PO}_4$	
Ammonium nitrate has a high nitrogen content (35 %). It is highly soluble in water. Excess amount of ammonium nitrate causes acidic effect on soil.	Ammonium nitrate fertilizer
$\text{NH}_3 + \text{HNO}_3 \longrightarrow \text{NH}_4\text{NO}_3$	
Passivity of the metal is due to the oxidizing property of the acid; a layer of the metal oxide is formed, this layer is non porous so it protects the metal from further reaction	Passivity

Equations :

1 - Fr from Ac



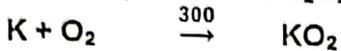
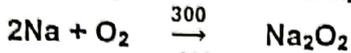
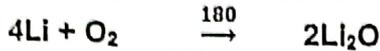
2 - Reaction of lithium with nitrogen then dissolve the product in water



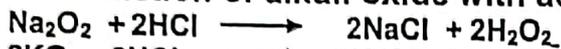
3 – Dissolving of sodium in water .



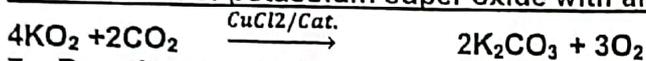
4 – Reaction of alkali metals with oxygen



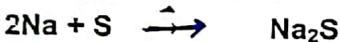
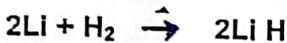
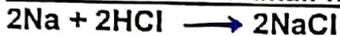
5 – Reaction of alkali oxide with acid



6 – Reaction of potassium super oxide with air in marines .



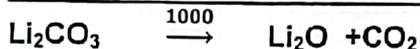
7 – Reactions of alkali metals with acids , hydrogen , and halogens .



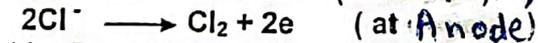
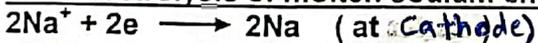
8 – Effect of heat on sodium nitrate .



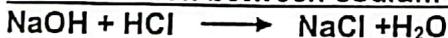
9 – Effect of heat on lithium carbonate .



10 – Electrolysis of molten sodium chloride



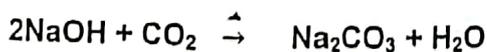
11 – Reaction between sodium hydroxide and acid .



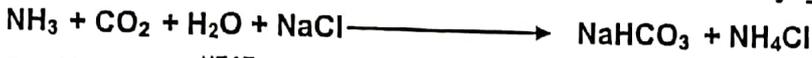
12 – Detection on CuII and Al cations .



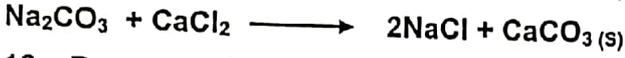
13 – Preparation of sodium carbonate in laboratory .



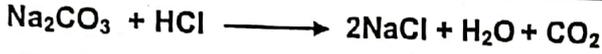
14 – Solvay method to prepare was ining soda industry .



15 – Using of sodium carbonates to remove hardness of water .



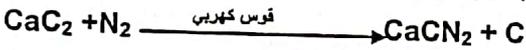
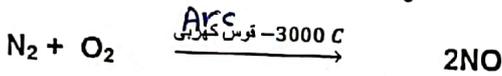
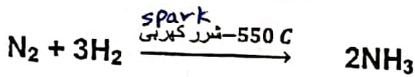
16 – Reaction of sodium carbonates with acids .



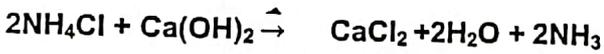
17 – Preparation of Nitrogen gas in laboratory .



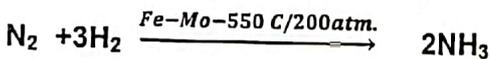
18 – Nitrogen reactions .



19 – Preparation of ammonia in laboratory .



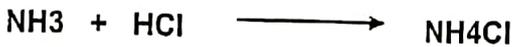
20 – Preparation of ammonia in industry .



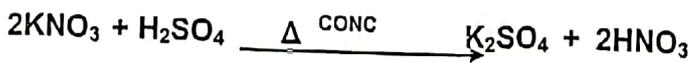
21 - Methods to obtain ammonium salts .



22 – Detection of ammonia gas .



23 – Preperation of Nitric acid in laboratory .



24 - Effect of heat on conc. nitric acid .



25 - Adding iron tuning to dilute nitric acid .



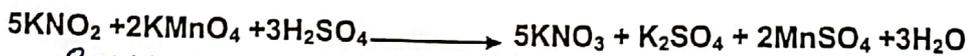
26 - Adding copper tuning to conc. nitric acid .



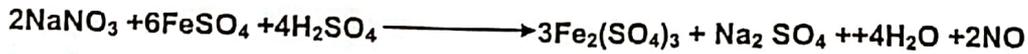
27- Adding copper tuning to conc. sulphuric acid .



28 -



29 - ^{Brown} ring equations .



30- Dissolve ammonia in water .



Economic importance

Compound	Economic importance
Potassium super oxide KO_2	Used in replacing carbon dioxide by oxygen in closed atmospheres such as submarines or airplanes (which fly at very high altitudes). Exhale gases which contain a large ratio of carbon dioxide are passed through filters containing potassium super oxide and the catalyst
Sodium hydroxide	Sodium hydroxide is used in many important industries such as: Soap, synthetic silk and paper. Detection of basic radicals: $(\text{Fe}^{3+}, \text{Fe}^{2+}, \text{Al}^{3+}, \text{Cu}^{2+})$
Washing soda	The hydrated sodium carbonate is known as washing soda $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$. Its uses: Manufacture of glass - Paper industry. - Textile industry .Water softening
Calcium Cyanamid CaCN_2	source of ammonia in the agricultural soil while land is being irrigated .

Bismoth	To make alloy with lead and cadmium ,used in electric fuse due its low melting point .
Nitrogen	Ammonia gas industry. Nitrogenous fertilizer industry.- Preperation of nitric acid
Phosphorus	To make matches, Phosphorus fertilizers industry. To make alloys like phosphorus bronze alloy (Cu - Sn - P) to make pushingfans for ships . To make fire works.
Phosphorus bronze alloy	An alloys formed of (Cu - Sn - P) to make pushingfans for ships .
Antemoni	- To make lead antemonal alloy used in car batteries . - Used in making semiconductors .
Potassium nitrate	An explosion takes place when potassium nitrate decomposes by heat. So, it is used inthe manufacture of bombs
Quick lime	Dry agent in ammonia preperation

مع تمنياتنا بالتوفيق *****

منسق الكيمياء / محمد البطيني