- 1) Na Meshé Al forageant metallic lattice with metallic bonds. From Na to Al, the number of delocalised electrons available for metallic bonding increases, thereby increasing the strength of metallic bond.
- 2) Si has the highest melting point as large amount of energy is needed to break the strong, extensive covalent bonds between Si atoms in the giant molecular structure.
- 3) P, S and CI form simple molecular structures with weak Van der Waals' forces of attraction between the molecules. Thus, they have very low melting points..



## Reactions of the elements with chlorine Notesale.co.th chlorine preview from Notesale.co.th chlorine



## Oxidation number uk

Elements	Oxides of the elected entry		Chlorides of the elements	
	re Frie Ma fr	O <b>nit</b> ation OP Number	Formula	Oxidation Number
Na	Na <sub>2</sub> O	+1	NaCl	+1
Mg	MgO	+2	MgCl <sub>2</sub>	+2
AI	Al <sub>2</sub> O <sub>3</sub>	+3	$Al_2Cl_6$ (AICl <sub>3</sub> )	+3
Si	SiO <sub>2</sub>	+4	SiCl <sub>4</sub>	+4
Р	P <sub>4</sub> O <sub>6</sub> P <sub>4</sub> O <sub>10</sub>	+3 +5	PCI <sub>3</sub> PCI <sub>5</sub>	+3 +5
S	SO <sub>2</sub> SO <sub>3</sub>	+4 +6	-	

## Acid-Base Nature of Not and Mg with oxygen - metapatent loses page electrons to oxygen atom to form metal ions

- - & basic oxide ions ( $O^{2-}$ ). Hence, oxides of Na and Mg are ionic and basic.
- 4) Small electronegativity difference of Si, P and S with oxygen
  - non-metal atom tends to share electrons with oxygen atom to form covalent bond. Hence, oxides of Si, P and S are covalent and acidic.
- 5) Large electronegativity difference of AI with oxygen
  - makes  $AI_2O_3$  an ionic compound. However, it has significant covalent character as electron cloud of O<sup>2-</sup> ions is distorted towards Al<sup>3+</sup> due to its high charge density. Hence,  $AI_2O_3$  is ionic with partial covalent character and amphoteric (has both acidic and basic properties).

## Structure, bonding and molting points Notesale 1) Chlorides of the and Material giant ionic lattice structures

- large amount of energy is needed to overcome the strong electrostatic forces of attraction between the metal ions and Cl<sup>-</sup> ions and thus they have high melting points.

2) Chlorides of AI, Si and P form simple molecular structures

- small amount of energy is needed to overcome the weak Van der Waals' forces of attraction between the molecules and thus they have low melting points.

3) Gaseous AlCl<sub>3</sub> is a covalent chloride

- electron cloud of  $CI^{-}$  ions is distorted towards  $AI^{3+}$  due to its high charge density. Hence, covalent character dominates in AICI<sub>3</sub> gaseous molecules.

Consecutive elements **X**, **Y**, **Z** are in period 3 of the Periodic

Table. Element Y has the highest first ionization energy and the Iowest melting point. What could be the identities of X, Y and Z? A. Sodium, magnesium, aluminium

- B. Magnesium, aluminium, silicon
- C. Aluminium, silicon, phosphorus
- D. Silicon, phosphorus, sulphur
- [AS Nov 2005 Paper | Q14]

Which pairs of compounds contain one that is giant ionic and one 1.  $Al_2O_3$  and  $Al_2O_4$  from Notesale.co.uk 2.  $SiO_2$  and  $SiCl_4$  Page 47 of 51 3. P  $\cap$ 

- 3.  $P_4O_{10}$  and  $PCI_3$
- [AS June 2004 Paper | Q34]