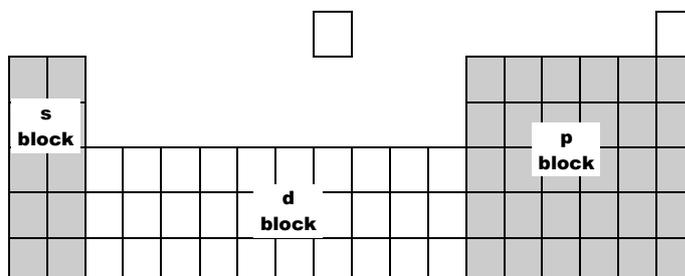




## Classification of elements in s, p and d blocks

- Elements are classified as s, p or d block, according to which orbitals the **highest energy electrons** are in.



- 1) In which block are the following elements classified?

Element	C	Mg	He	Rb	Mo	Te	Fe	Cr	P	H	Cl
Block	p	s	s	s	d	p	d	d	p	s	p

- 2) a) Give the electron configuration of silicon.  $1s^2 2s^2 2p^6 3s^2 3p^2$ .  
b) In which block is silicon classified? **p block**  
c) Why is silicon classified in this block? **Highest energy electron is in a p orbital**
- 3) a) Give the electron configuration of vanadium.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^3$   
b) In which block is vanadium classified? **d block**  
c) Why is vanadium classified in this block? **Highest energy electron is in a d orbital**

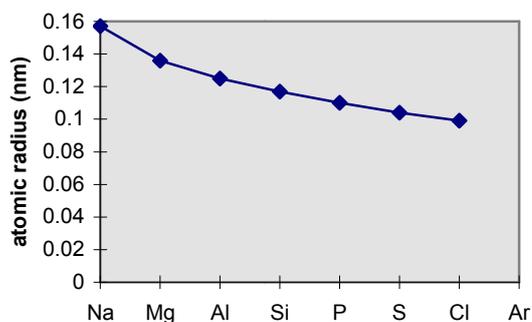
## Trends across Period 3

Periodicity = pattern in properties across a row which is repeated in each row

### a) Atomic radius

**Across the period**

- **more protons**
- **outer electrons in same shell**
- **stronger pull due to more protons pulling the electrons closer to the nucleus**



## **b) 1st ionisation energy**

Enthalpy change to remove one electron from each atom in a mole of gaseous atoms.

### **General increase**

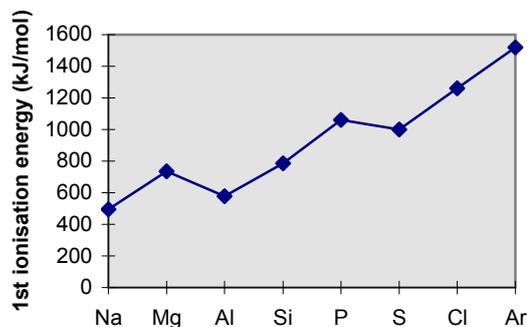
- more protons
- smaller atoms
- stronger attraction from nucleus to outer electron

### **Group 2→3 dip**

- Mg electron from s orbital, Al from p orbital
- p orbital higher energy than s orbital

### **Group 5→6 dip**

- S from orbital with 2 electrons, P from orbital with 1
- extra electron-electron repulsions for S

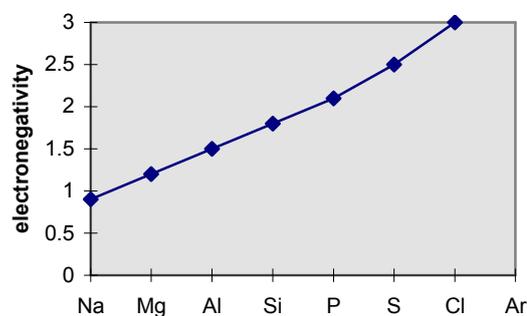


## **c) Electronegativity**

Power of an atom to attract the two electrons in a covalent bond.

### **Across the period**

- more protons
- smaller atoms
- stronger attraction from nucleus to 2 electrons in covalent bond



## **d) Melting and boiling point**

### **Na, Mg, Al**

- High as strong metallic bonding
- Al > Mg > Na as from Na to Al have smaller ions, higher charge on metal ions and more delocalised electrons

### **Si**

- Very high as giant covalent and need to break many strong covalent bonds to melt

### **P<sub>4</sub>, S<sub>8</sub>, Cl<sub>2</sub>**

- Low as simple molecular with weak van der Waals' forces
- S<sub>8</sub> > P<sub>4</sub> > Cl<sub>2</sub> as S<sub>8</sub> has most electrons so strongest van der Waals' forces

### **Ar**

- Monatomic so very low bpt as very weak van der Waals' forces between atoms

