

GCSE Physics Complete Revision Summary

Particles and atomic

Topics Covered:

- a) Atomic Structure
- b) Periodic Table
- c) Structure and Bonding
- d) Quantitative Chemistry
- e) Chemical Changes
- f) Energy Changes

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→ History of Atoms.

→ Structure of Atoms: → Electronic Configuration

→ Ions and Isotopes.

History of Atoms

John Dalton

→ Discovered Atoms.

Early 1800

J.J Thomson

→ Discovered electrons.

→ Plum pudding model.

1800 end.

Rutherford

→ Discovered Nucleus.

→ Alpha Scattering Experiment.

1911

- Electronic shells

1914

Neil Bohr

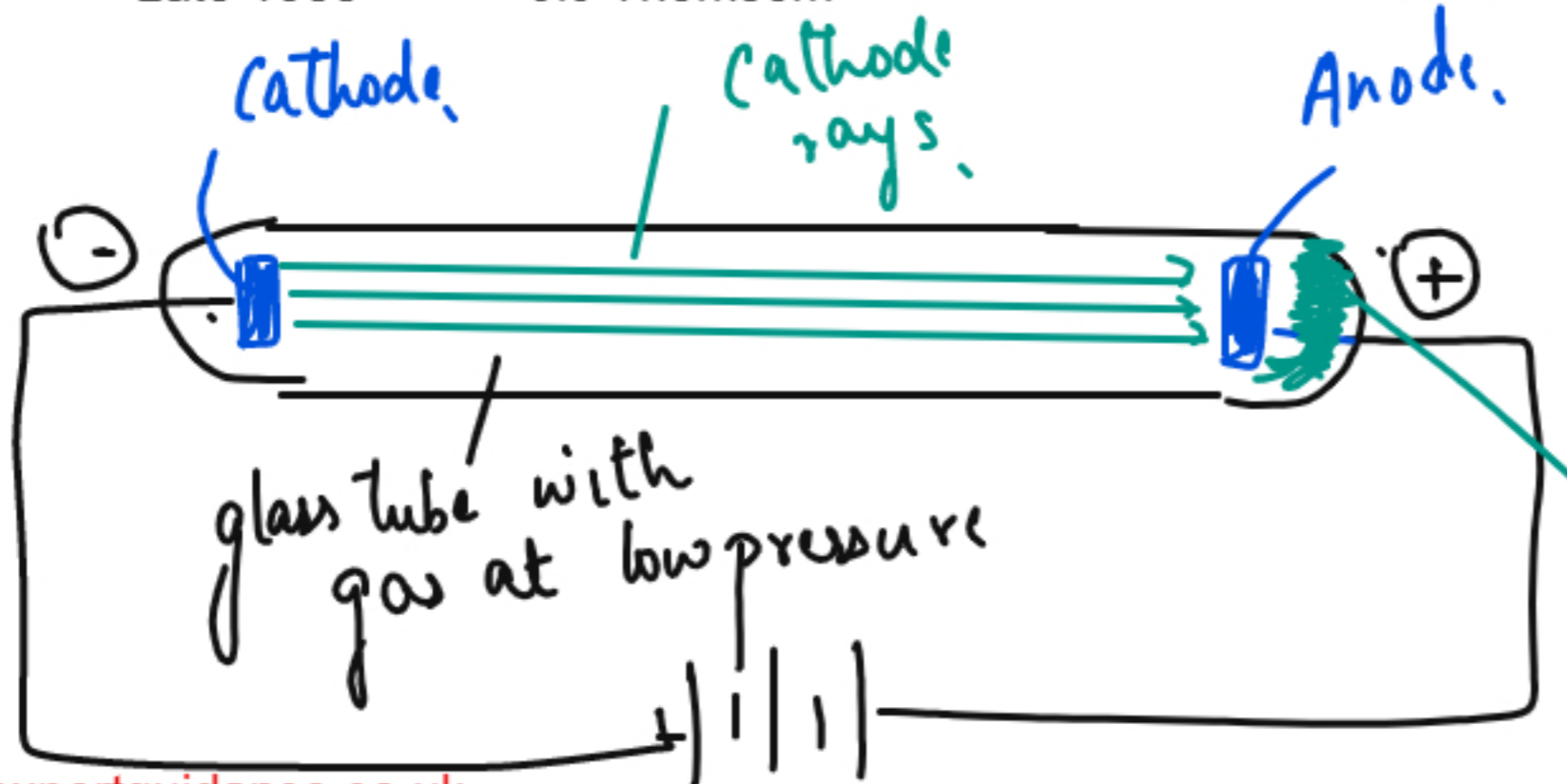
James Chadwick

→ Discovered neutrons

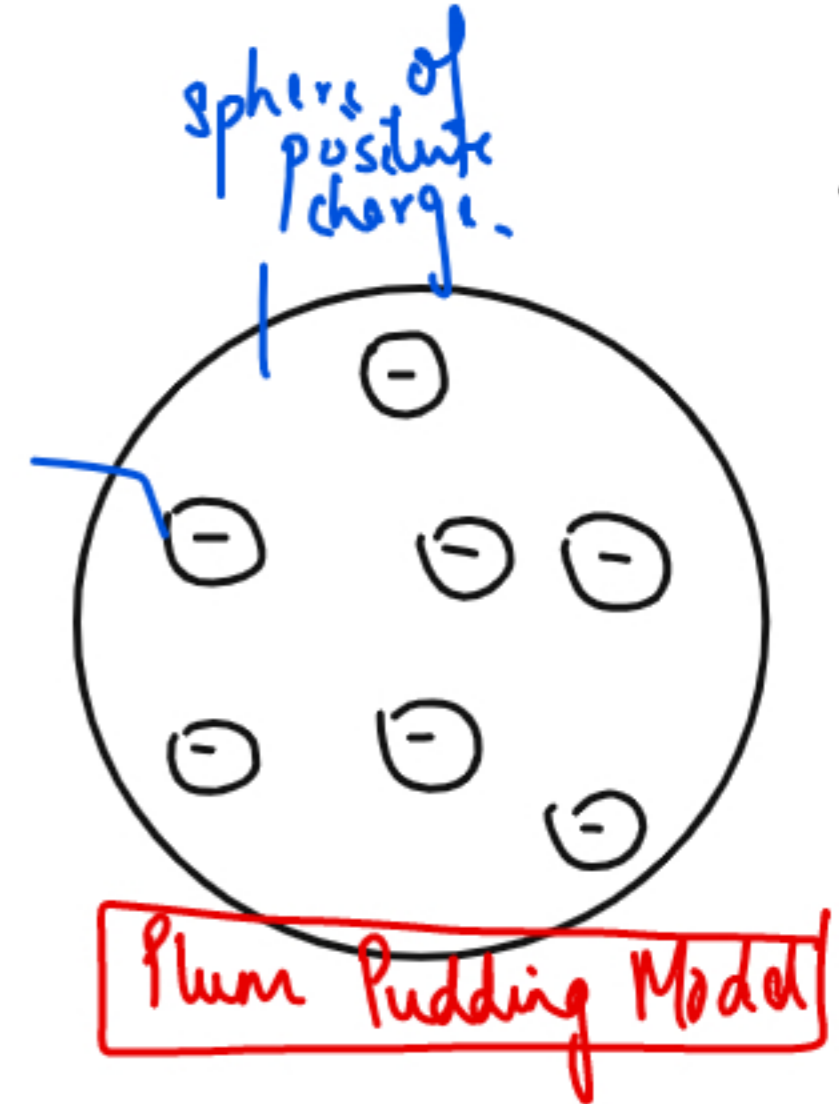
1932

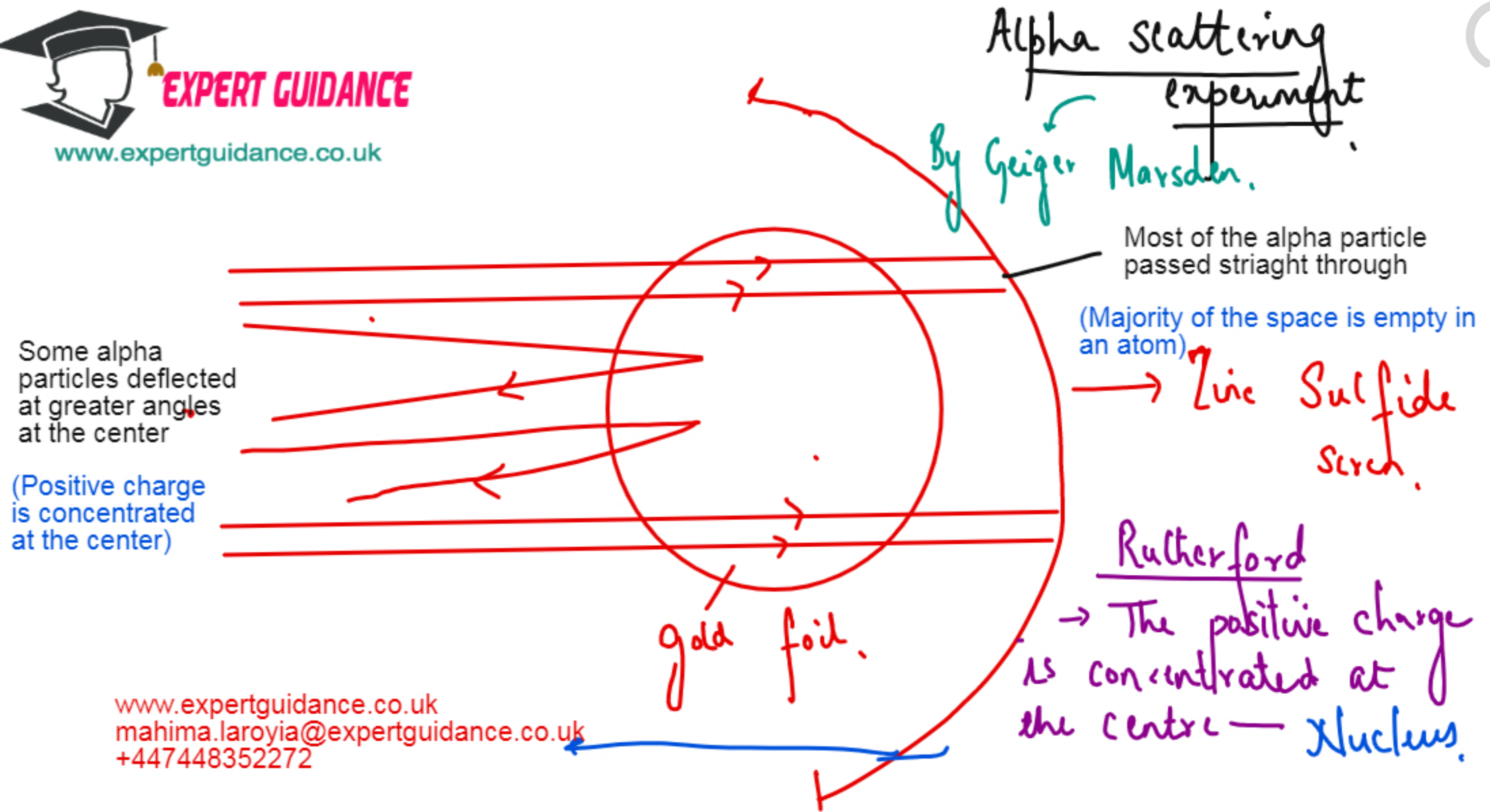
Early 1800: John Dalton : Everything that has mass or volume is made up of atoms which is indivisible.

Late 1800 J.J Thomson Discovered Atoms and Gave Plum Pudding model



Electrons embedded as raisins
green glow at the glass.





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1914 :

Neil Bohr

Idea of Electronic Shells

Energy given by atoms when heated had only specific amount of energy



So Electrons are orbiting at the specific energy levels called the electronic Shells

1932 :

James Chadwick

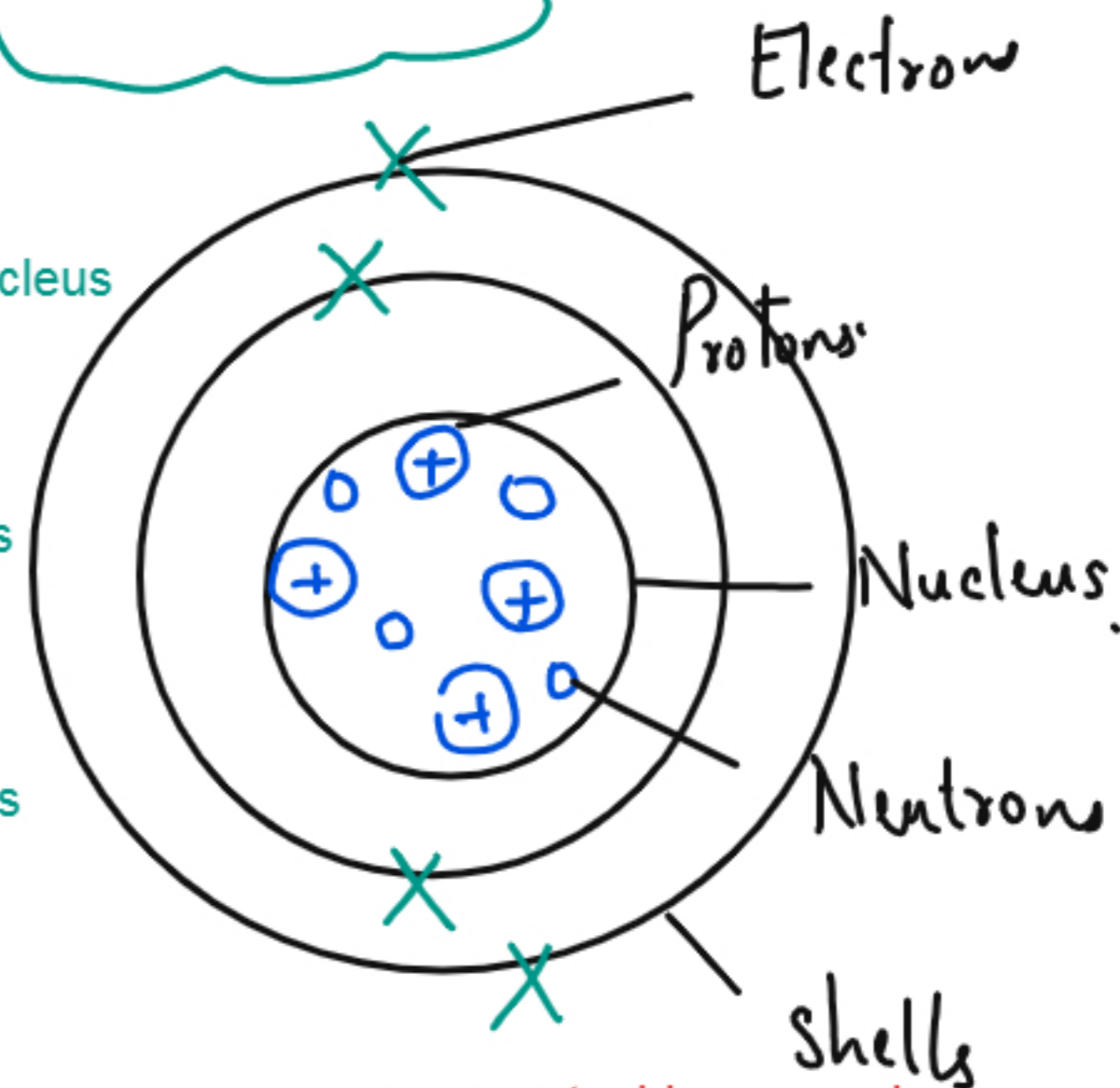
Discovered Neutrones

Due to difference in mass of protons and the nucleus.

STRUCTURE OF ATOMS

ATOM IS NEUTRAL

	Relative Charge	Relative Mass	Position in the atom
Electron	-1	$\frac{1}{2000}$	around the nucleus in shells
Proton	+1	1	In the nucleus
Neutron	0	1	In the nucleus





Mass Number

→ Number of Protons + Neutrons.

Atom is neutral so it has equal number of proton and neutrons

Atomic Number

- Number of Protons
- Number of Electrons

Electron: — Z

Proton — Z

Neutron — A - Z

ELECTRONIC CONFIGURATIONS

Shell No	I	II	III	IV
Max No of Electron	2	8	8	18

For example

Sodium = No of electron = 2, 8, 1

Magnesium = $^{12}_{11}$ = 2, 8, 2

Electronic Configuration of first elements

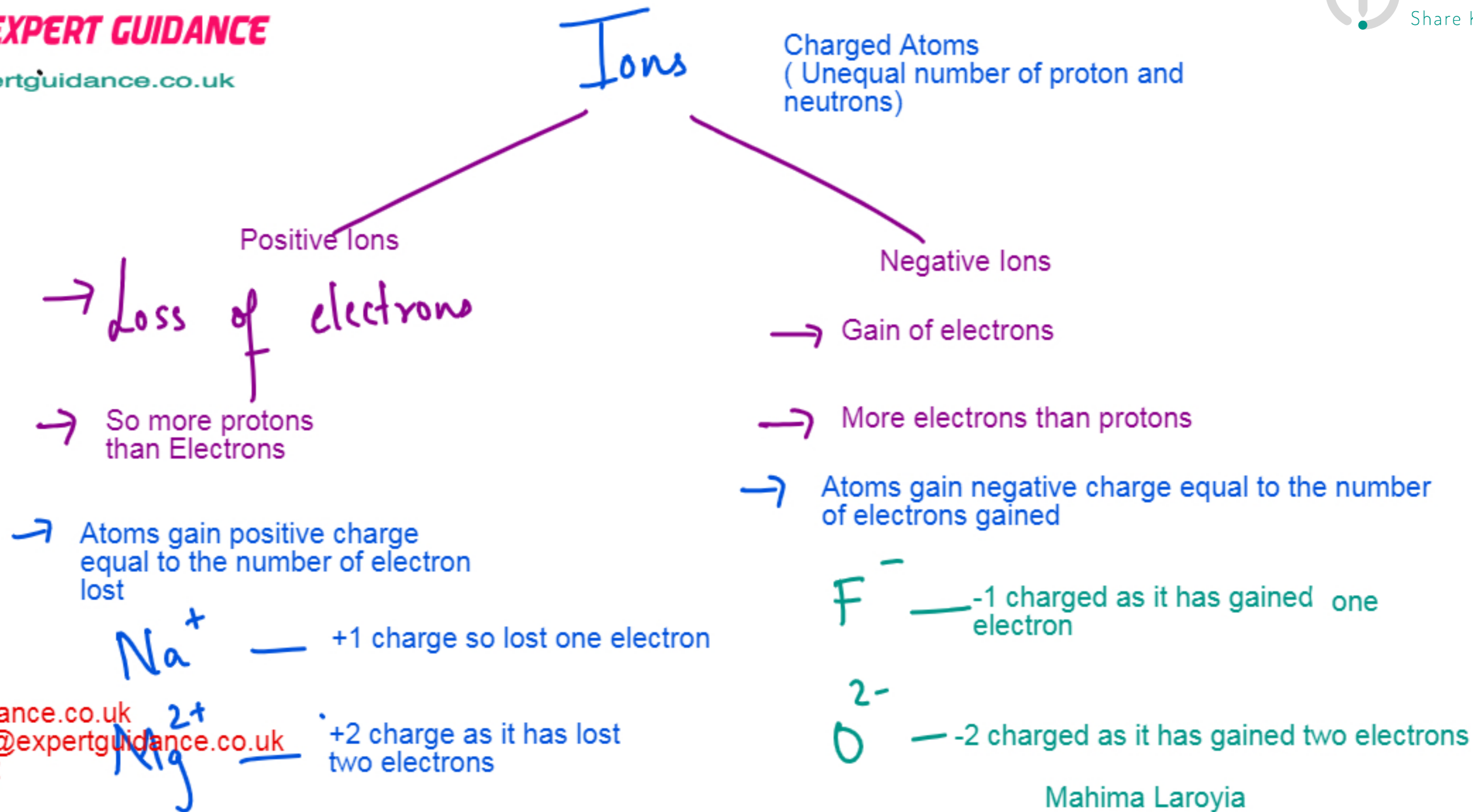
a) All Elements React to gain full outer shell

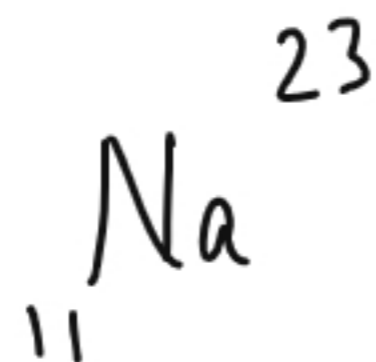
b) The number of electron in the outermost shell is the group number of the elements

c) Elements in the same group have same number of electron in their outer most shell

Aluminium	13	2, 8, 3
Silicon	14	2, 8, 4
Phosphorus	15	2, 8, 5
Sulphur	16	2, 8, 6
Chlorine	17	2, 8, 7
Argon	18	2, 8, 8
Potassium	19	2, 8, 8, 1
Sulphur	20	2, 8, 8, 2

Element	Atomic Number	Configuration
Hydrogen	1	1
Helium	2	2
Lithium	3	2, 1
Beryllium	4	2, 2
Boron	5	2, 3
Carbon	6	2, 4
Nitrogen	7	2, 5
Oxygen	8	2, 6
Fluorine	9	2, 7
Neon	10	2, 8
Sodium	11	2, 8, 1
Magnesium	12	2, 8, 2





Proton

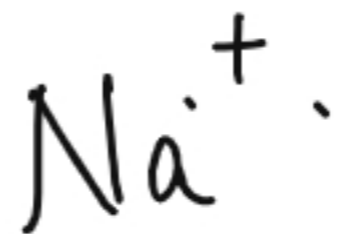
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Neutron

12

Electron

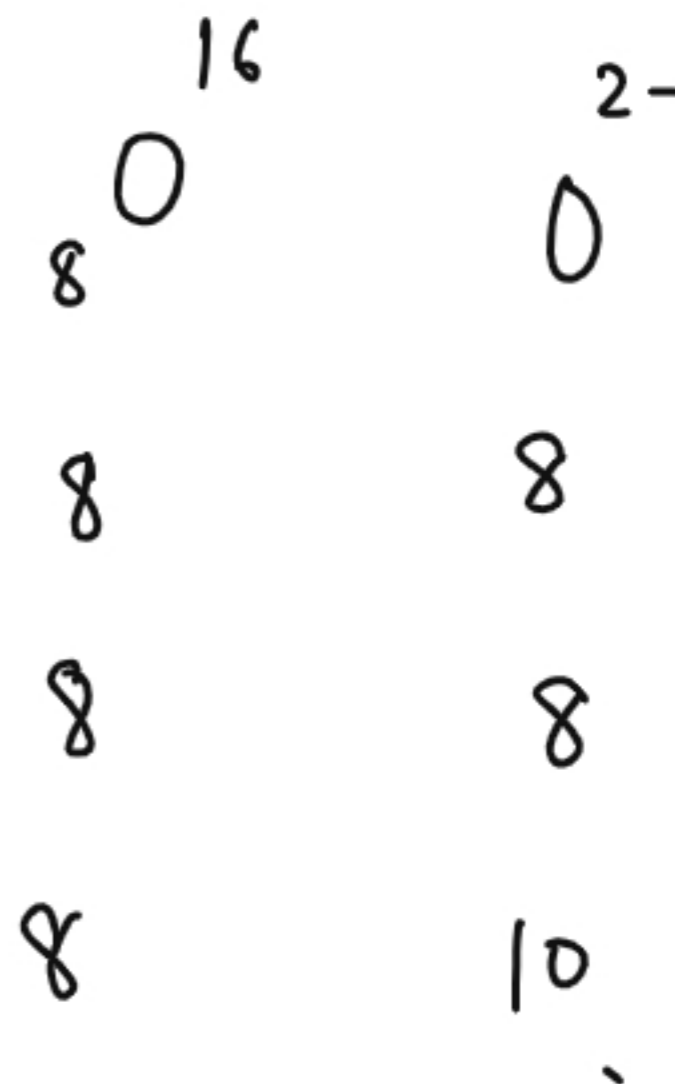
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11

12

10



	${}_{11}^{23}\text{Na}$	${}_{13}^{27}\text{Al}^{3+}$	${}_{8}^{16}\text{O}^{2-}$
Atomic Number	11	13	8
Mass Number	23	27	16
Electron Number	11	10	10
Proton Number	11	13	8
Neutron Number	12	14	8
Charge	0	+3	-2
Electronic Configuration	2, 8, 1	2, 8	2

Isotopes

- a) Members of the same elements
- b) Have same atomic number but different mass number
- c) Same number of electron and protons but different neutrons
- d) Since electron numbers are the same they show similar chemical properties
- e) They have different physical properties and radioactive properties.

	12	13
	C	C
Atomic Number	6	6
Mass Number	12	13
Electron	6	6
Proton	6	6
Neutron	6	7

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Atoms — the smallest particle which consists of electron, protons and neutrons

Electronic Configuration

Proton — Positively charged sub-atomic particles which relative charge of +1, relative mass of 1 found in the nucleus of the atom

Neutron — Neutral sub-atomic particles with relative charge of 0, relative mass of 1 found in the nucleus of the atom

Electron — Negatively charged sub-atomic particles with relative charge of -1, relative mass of 1/2000 found revolving around the nucleus in shells

Nucleus — The center of the atom which is positively charged and contains neutrons and protons.

Atomic Number — The number of protons in an atom

Mass Number — The number of proton and neutrons in an atom.

Ions — The charged atom with unequal number of protons and neutrons

Isotopes —

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TEST YOURSELF !!!!

Positively charged subatomic particle

Negatively charge subatomic particle

Electrons was discovered by

Neutrons was discovered by

Model given by J.J Thomson

Q1 How to work out the neutron number of an atom ?

Q2 What do elements in the same group have in common ?

Q3 Why isotopes have similar chemical properties

Q4 Draw Structure of Calcium Atom

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Positively charged subatomic particle — Protons

Negatively charge subatomic particle — Electrons

Electrons was discovered by — J.J Thomson

Neutrons was discovered by — James Chadwick

Model given by J.J Thomson — Plum Pudding Model

Q4 Draw Structure of Calcium Atom



Electron = 20 (2, 8, 8, 2)
Proton = 20
Neutron = 20

Q1 How to work out the neutron number of an atom ?

Mass number - Atomic Number ${}_Z^AX$ $A - Z$

Q2 What do elements in the same group have in common ?

They have same number of electrons in the outermost shell. For example, sodium potassium both group 1 has one electron in their outermost shells

Q3 Why isotopes have similar chemical properties

Since they have equal number of electrons they show similar chemical properties



NEXT STEP !!!!!

→ Check the specification

→ Try Exam Questions on this topic

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