

TIPS FOR EXAM TECHNIQUE → CHEMISTRY

- Multiple choice → draw everything out/show working
→ cross out options that you know it isn't for sure
- Calculations → circle all numbers in the question.
Questions → always give answers to 3 s.f.
→ if question asks for a specific number of s.f. write it under the answer line
→ check your units with units under the answer line
- Always draw dot and cross diagrams for bond angles questions.
- Strategy for finding isomers:
 - ① Put the double bond at the end
 - ② Reduce the chain by one each time and branch until you can't anymore
 - ③ Move the double bond along once.
 - ④ Draw cis/trans or E/Z isomers.

Chemistry

ATOMIC STRUCTURE

- nucleus \rightarrow protons + neutrons
- electrons arranged in shells
- nucleus = very dense
- atom = mostly empty space.

Particle	Relative mass	Relative charge
P	1	1+
N	1	0
e ⁻	1/1836	1-

- Overall charge = 0
- No. of protons determines element
- **Atomic number** - no. of protons
- **Mass number** - no. of protons + neutrons

e.g. Xe atomic no. = 54
mass no. = 131

$$\therefore p = 54 \quad n = 77 \quad e^- = 54$$

- **Isotope** - atom of the same element which has the same no. of p + e⁻ but diff. no. of n.

• To show an isotope \rightarrow ³⁹19K \rightarrow element
atomic no. \rightarrow mass no.

- Different isotopes react in the same way \rightarrow neutrons don't affect reaction.

- Small differences in physical properties

IONS

- **Charged atom where protons \neq electrons**
- **Cations** - +ve, fewer electrons
- **Anions** - -ve, more electrons.

e.g. Na⁺ p = 11 n = 12 e⁻ = 10

HISTORY OF THE ATOM

1. Democritus

- Only divide matter a certain no. of times \rightarrow atom



2. Dalton

- Atoms = tiny particles which make up elements
- All same in one element + diff. to all others.



3. Thomson

- cathode rays - -ve charge, deflected by magnet + electric field + tiny mass (electrons)



4. Rutherford

- Fired alpha particles at gold foil \rightarrow most weren't deflected, some deflected by a large amount, some

- came straight back.
- He said that +ve charge + mass is concentrated in the nucleus, -ve electrons orbit nucleus, most is empty space.



4. Bohr & Moseley

- electrons only allowed to follow certain paths → otherwise spiral into nucleus.
- Link between x ray frequency + atomic number.



5. Rutherford

- Discovered the proton.



6. De Broglie + Schrödinger

- particles could have nature of a wave.
- electrons had wave like properties



7. Chadwick.

- New type of radiation → uncharged
- Later became known as neutrons.

RELATIVE MASS

- **Unified atomic mass unit, u** - mass of carbon-12 = 12u
- $\frac{1}{12}$ mass of carbon-12 = 1u.

• **Relative isotopic mass** - mass of an atom of an isotope compared with $\frac{1}{12}$ of the mass of an atom of carbon-12.

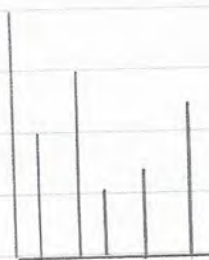
• **Relative atomic mass** - weighted mean mass of an atom of an element compared with $\frac{1}{12}$ of the mass of an atom of carbon-12.

• **Relative molecular mass** - weighted mean mass of a molecule compared with $\frac{1}{12}$ mass of carbon-12.

• **Relative formula mass** - weighted mean mass of a formula unit compared with $\frac{1}{12}$ of carbon-12.

CALCULATING A_r

- Mass spectrometer → determine mass of isotope/molecule.
- Shows relative abundances of isotopes → calculate A_r .
- Identify unknown compounds.



y axis → % abundance

x axis → mass/charge

↓
charge = 1 ∴ mass.

$$A_r = \frac{(\text{mass} \times \%) + (\text{mass} \times \%)}{100}$$