

Year 10 C Pathway

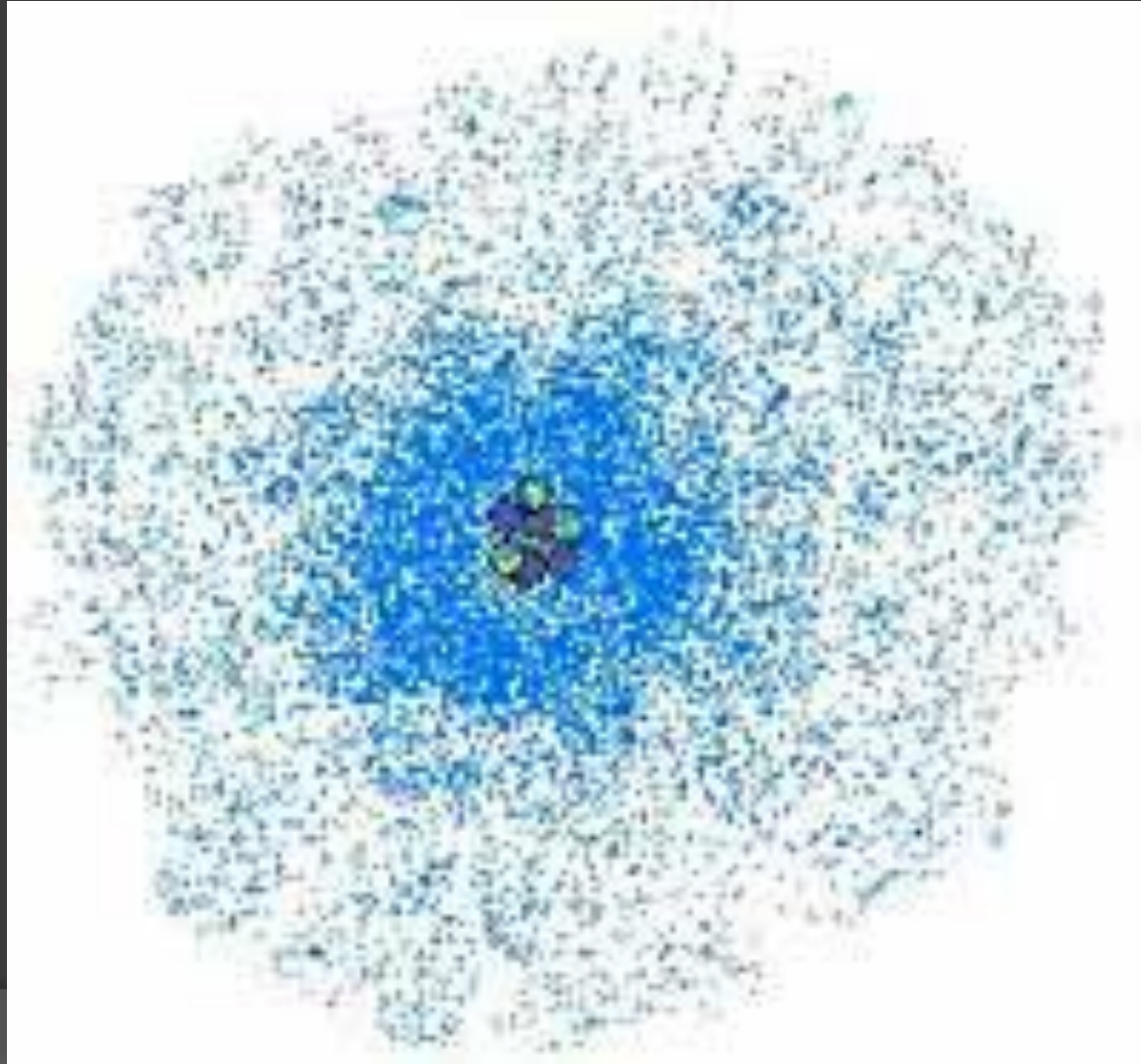
Mr. D. Patterson

# INTRODUCTORY CHEMISTRY

# Outcomes

- Identify the difference between an ion and an atom
- Determine the number of electrons in a neutral atom and its ion
- Use a diagram to show the number of electrons around a nucleus
- Remember the commonly used ions and their valency

# An atom – revisited



# Sub atomic particles - revisited

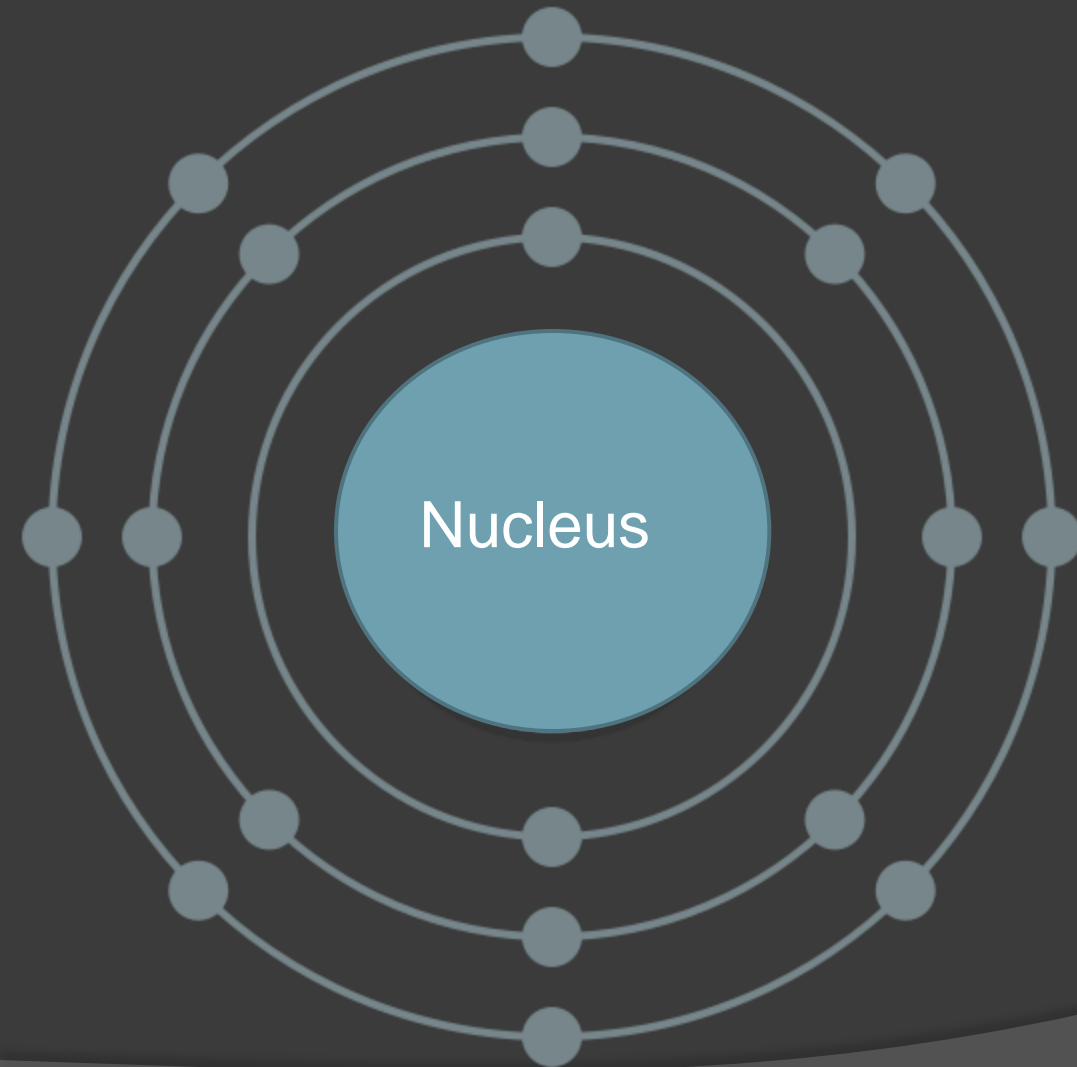
Particle	Mass (kg)	Relative Mass	Charge
<b>Proton</b>	$1.673 \times 10^{-27}$	1	+1
<b>Neutron</b>	$1.675 \times 10^{-27}$	1	0
<b>Electron</b>	$9.110 \times 10^{-31}$	1/2000	-1

# Number of electrons

- ⦿ A normal atom has a neutral (zero) charge
- ⦿ A neutral atom must have the same number of electrons (-1 charge) as protons (+1 charge)

Element	No. of protons	No. of electrons	Total charge
H	1	1	$1 \times (+1) + 1 \times (-1) = 0$
O	8	8	$8 \times (+1) + 8 \times (-1) = 0$
K	19	19	$19 \times (+1) + 19 \times (-1) = 0$

# Electron energy level diagrams

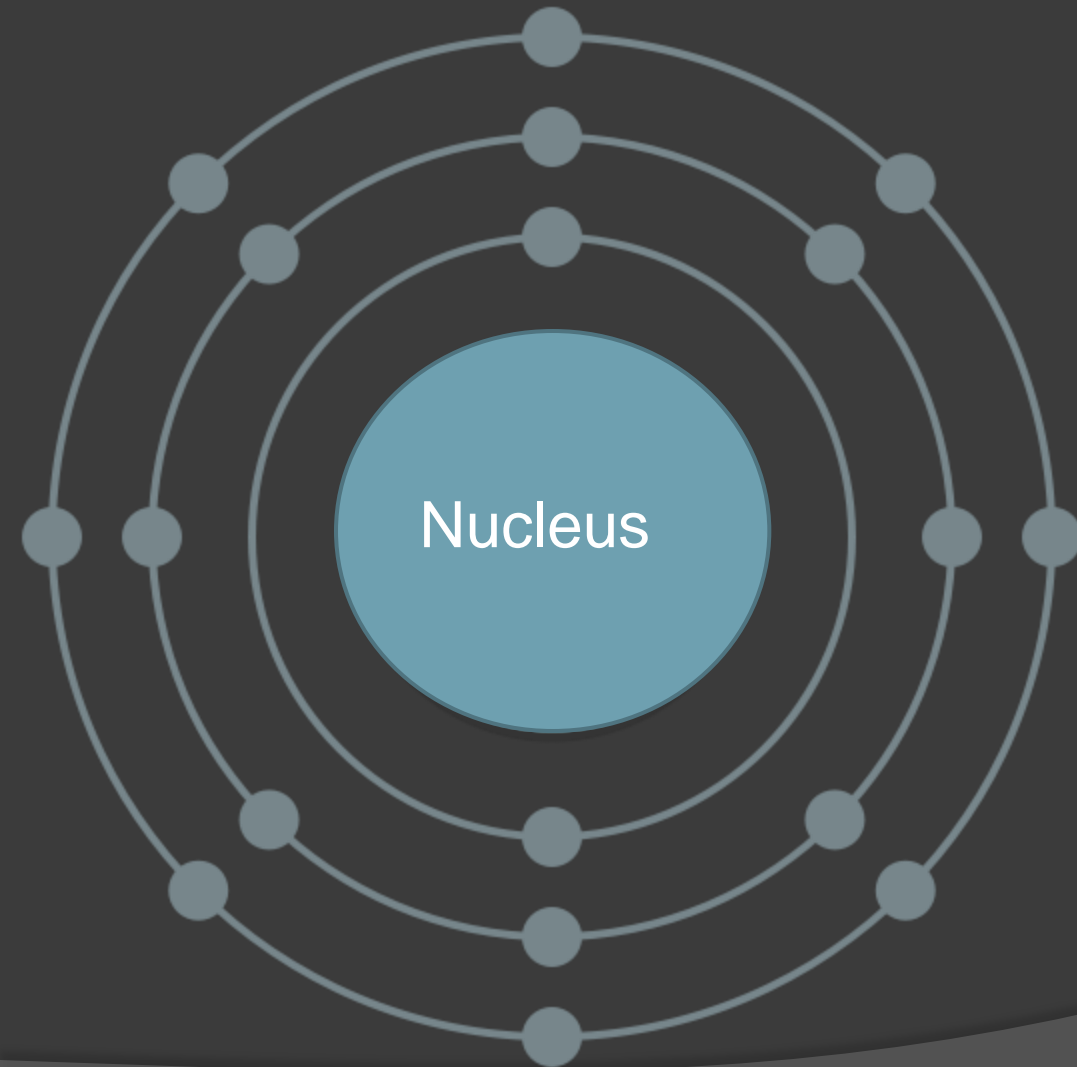


Where are the electrons?

1. Electrons will fill from the inner most shell first

This is called the 2, 8, 8 model

# Electron energy level diagrams

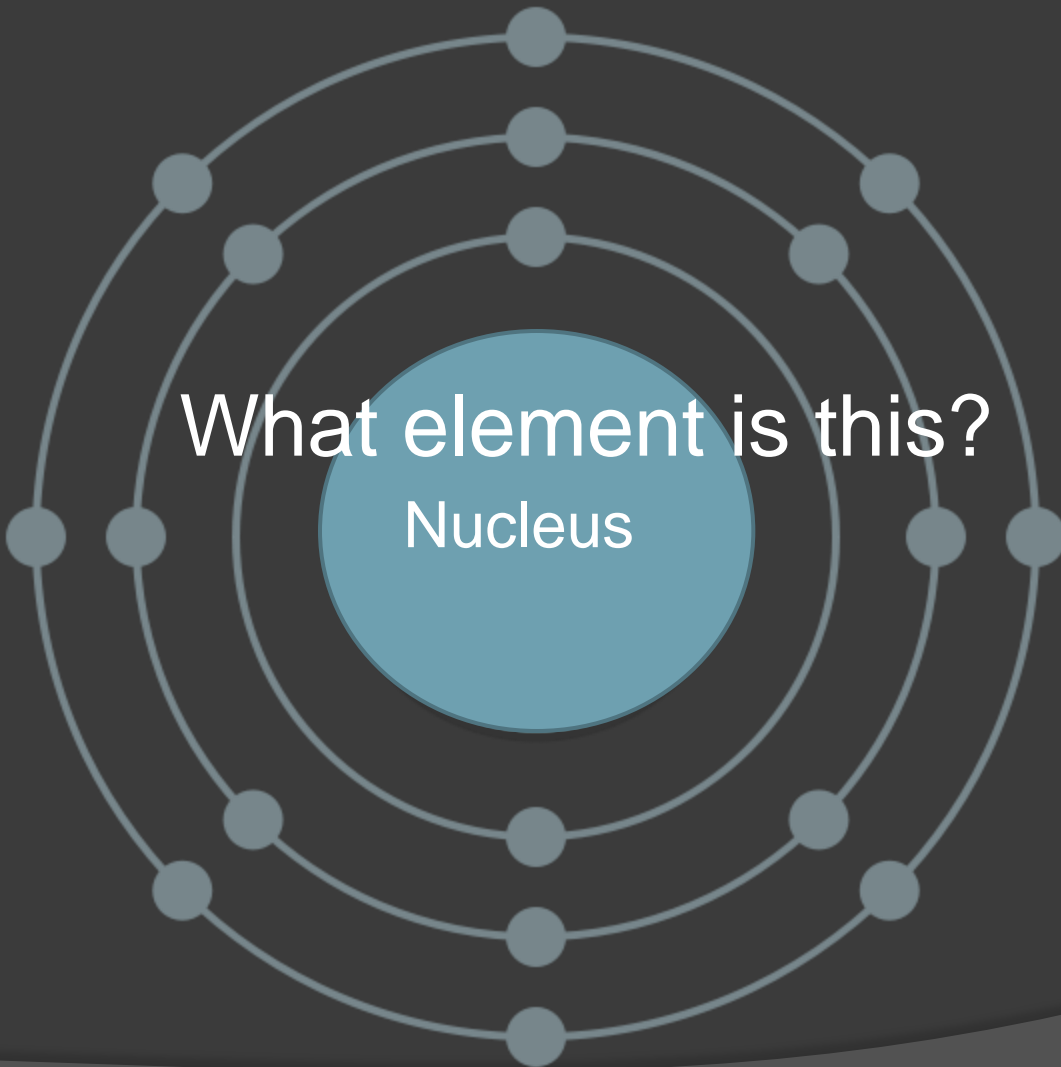


Where are the electrons?

2. The first shell can hold 2 electrons

This is called the 2, 8, 8 model

# Electron energy level diagrams



Where are the electrons?

3. The second and third shell can hold 8 electrons

This is called the 2, 8, 8 model



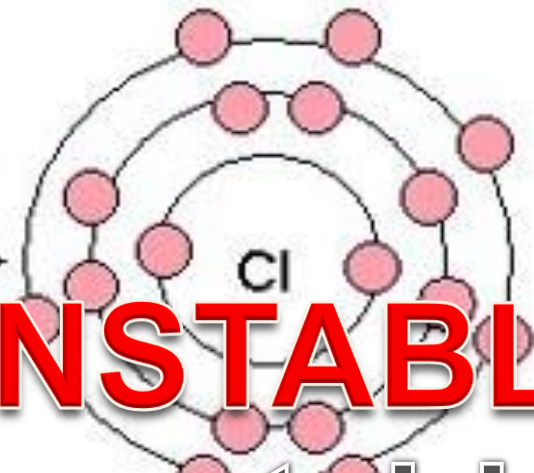
# Ions

- An ion is an atom that does NOT have a neutral charge.
- Ions form when one atom passes an electron(s) to another





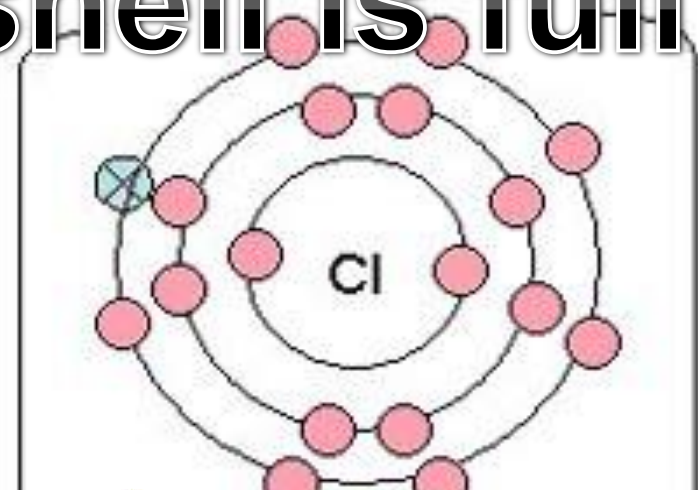
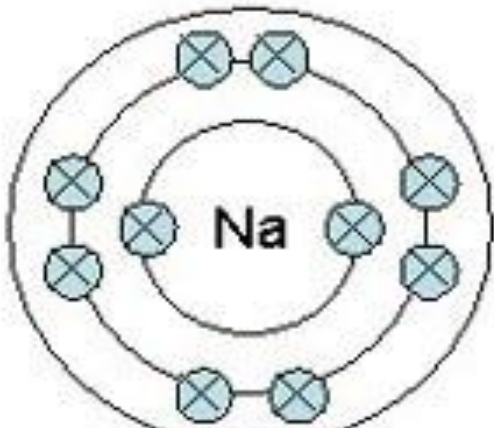
One electron is completely transferred



**UNSTABLE**

**UNSTABLE**

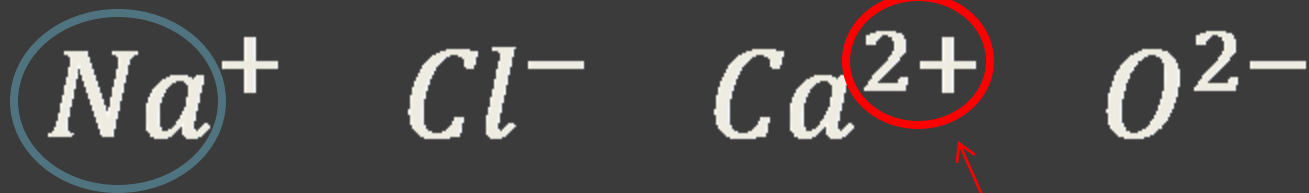
Every atom is more stable when its outer shell is full



**STABLE**

**STABLE**

# Ionic notation



↑  
Element symbol

↑  
valency (charge)

# Example problem

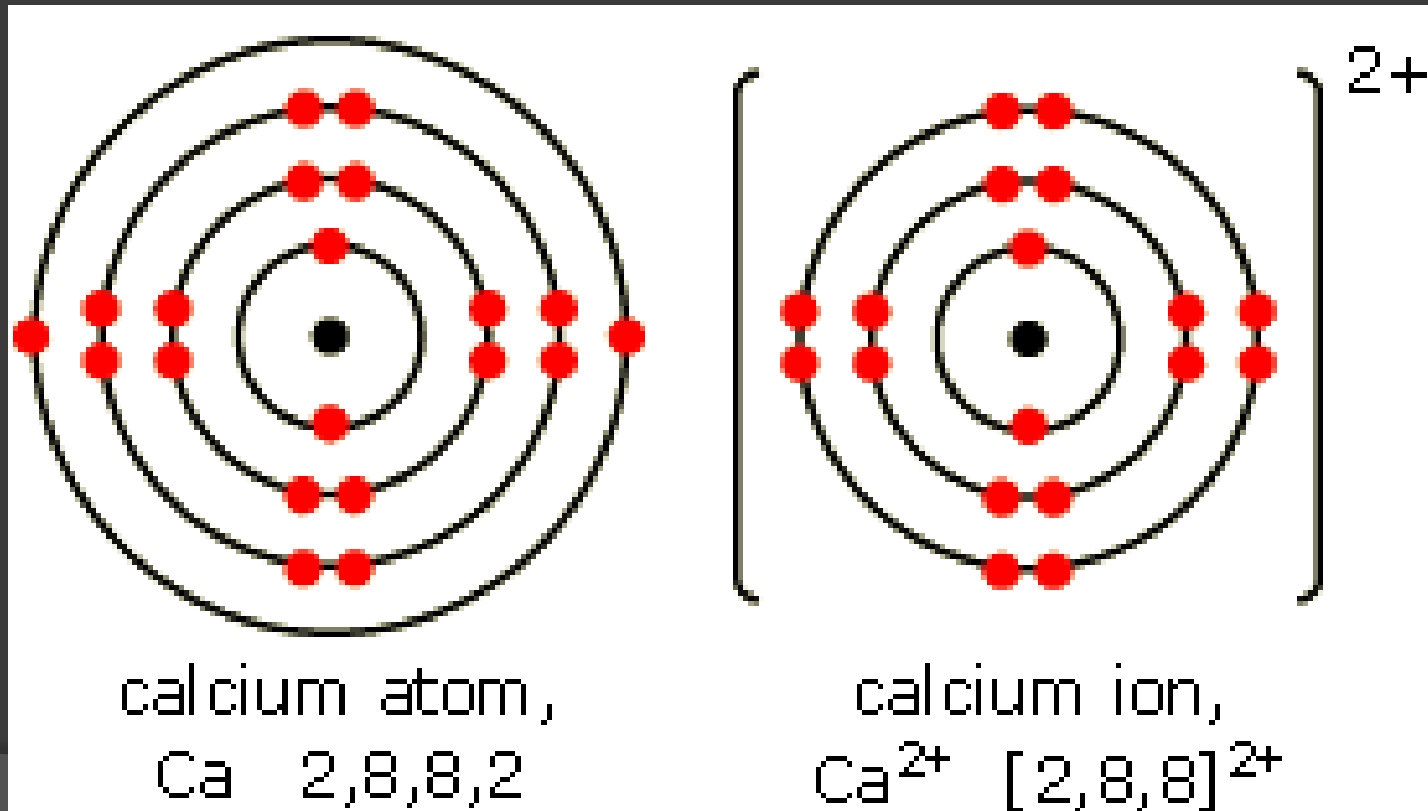
- ⦿ How many protons does an atom of calcium (Ca) have?
  - ⦿ How many electrons does it have?
  - ⦿ What is its overall valency (charge)?
- 
- ⦿ How many protons does an ion of calcium ( $Ca^{2+}$ ) have?
  - ⦿ How many electrons does it have?
  - ⦿ What is its overall valency (charge)?

# Example problem

- ⦿ How many protons does an atom of calcium (Ca) have? 20
- ⦿ How many electrons does it have? 20
- ⦿ What is its overall valency (charge)? 0
  
- ⦿ How many protons does an ion of calcium ( $Ca^{2+}$ ) have? 20
- ⦿ How many electrons does it have? 18
- ⦿ What is its overall valency (charge)? 2+

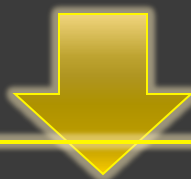
# Example problem cont..

- Draw an energy level diagram for a calcium atom and a calcium ion



# Outcomes

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- Remember the commonly used ions and their valency



**Study page 15... must know all!**  
**Checkpoint 2.1, 2.2, 2.3, Set 2 (Q 1, 2)**