



Theatre of Science The Periodic Table Lesson 1: Atoms and Elements

Starter Questions!

Which of these would you call Ingredients?

Banana

Bread

Pancake

Cake

Egg

Sugar

Butter

Apple pie

Milk

Explain your answer!

Know stuff?! Which of these would you call elements?

Lead

Calcium

Water

Oxygen

Neon

Arsenic

Carbon dioxide

Fluoride

Which are metals?! That's hard! Have a guess.

To join in with the lesson bring:

Any or none of the following. (Just visual aids, we're not doing anything with them!) Cereal fortified with iron, a cast iron pan, a UK 1p or 2p piece, foil, a pencil.

If you split aluminium foil in **half**, then in **half** again, and **again** and **again** and **again** until you couldn't split it anymore...what would you be left with?

You might want to sketch or make notes here while I talk!

Try these! Work at YOUR speed! You can pause it if you need more time.

1. Sketch & label an atom using ONLY what's in the box!

neutron negative
proton neutral
electron positive

2. What's your atom called? _____

3. Lithium has three protons & four neutrons. Sketch Lithium.

4. What do you call Lithium if you take away:

An electron? _____

A proton? _____

5. What's an element? If you've got an idea, write it down!

Chemical symbols are always one or two letters. The first letter is always a capital, second always small. Find the incorrect chemical symbols and correct them.

i

fE

V

Si

Cal

The Periodic Table of Elements!

1 H																	2 He
3 Li	4 Be										5 B	6 C	7 N	8 O	9 F	10 Ne	
11 Na	12 Mg										13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba	* 71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	* 103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og
		* 57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb		
		* 89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No		

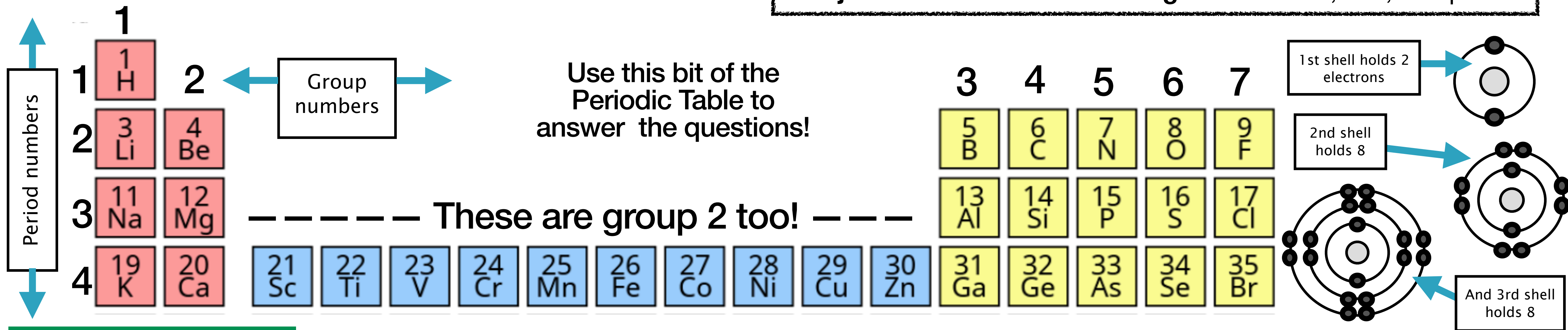


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Theatre of Science The Periodic Table 2: Electron Shells

To join in with the lesson bring: Warm water, salt, teaspoon



How many protons?
 Aluminium (Al) _____
 Iron (Fe) _____

How many electrons?
 Oxygen (O) _____
 Calcium (Ca) _____

How many electron shells in atoms of..?

Hydrogen (H) 1

Sodium (Na) _____

Carbon (C) _____

Calcium (Ca) _____

Sketch atoms of...

Lithium (Li) Sodium (Na) Fluorine (F) Chlorine (Cl)

Look at your answers & the periodic table. Can you spot any patterns?!

Fill in the gaps! When I say!!

Atoms are more stable if they have _____ outer shells.

Atoms that have lost or gained _____ are called

ions. Sodium _____ easily lose their outer _____

and become _____ charged ions. Chlorine atoms

only need to gain one electron to _____ their outer

_____ shells. When this happens, the chlorine atom is a

_____ charged ion. The chlorine and sodium ions have

_____ charges and are _____ to each

other, forming sodium chloride. Otherwise known as salt!

Make notes on this diagram if it helps!

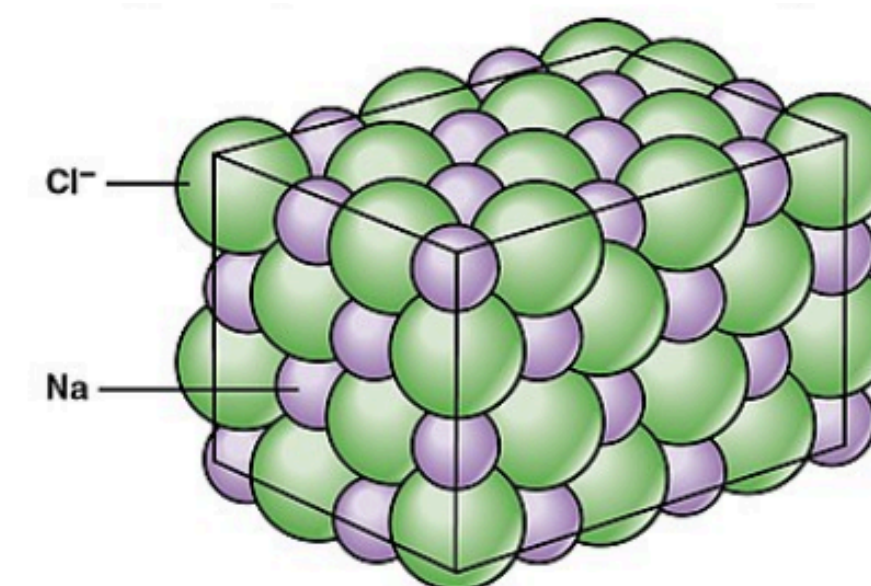
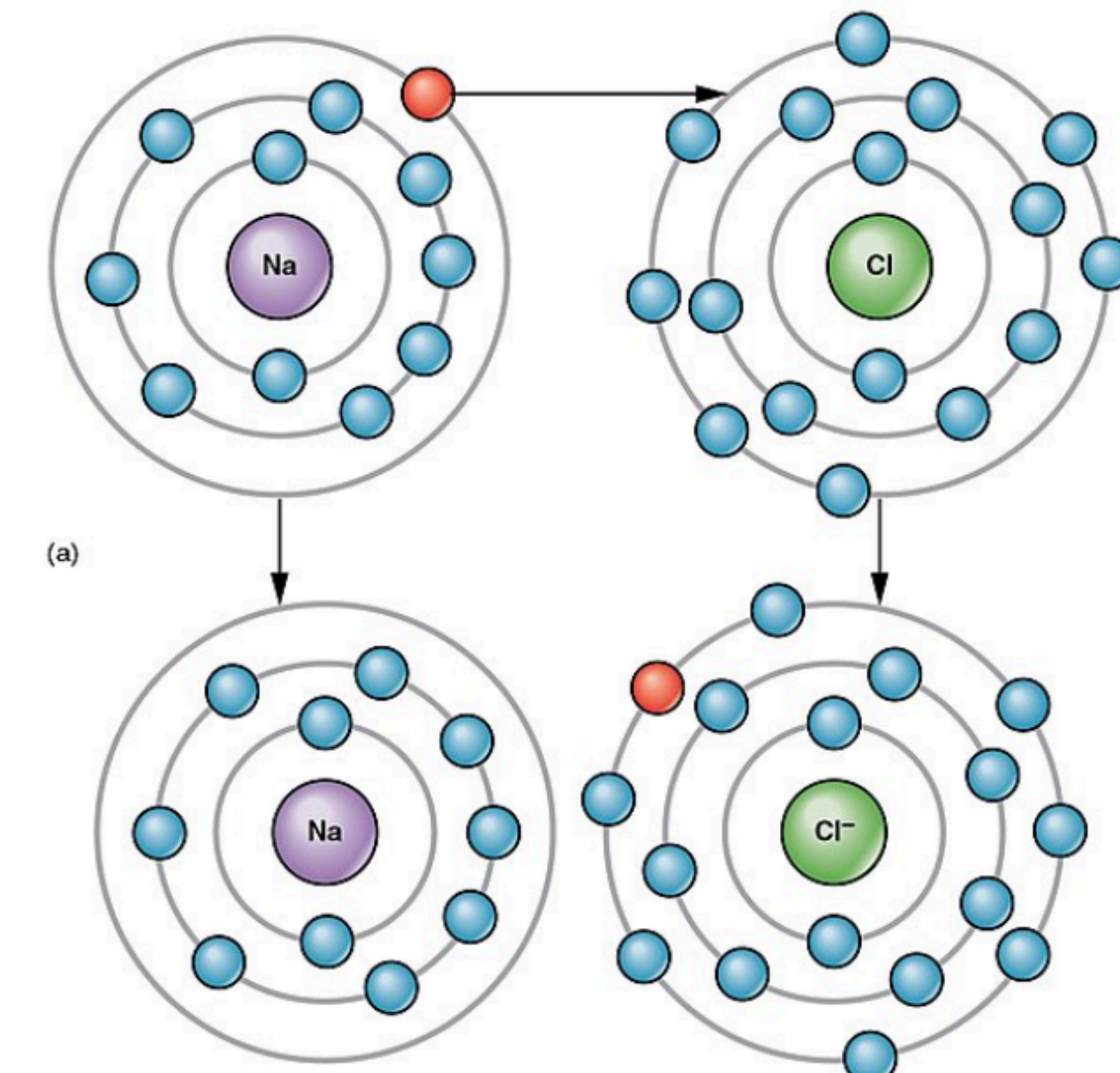
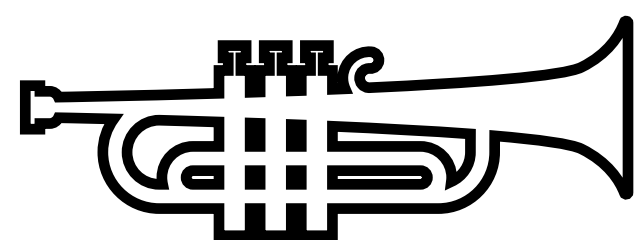


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Theatre of Science The Periodic Table 3: Metals!



To join in
bring:
Two metal
spoons!

Ten seconds to...

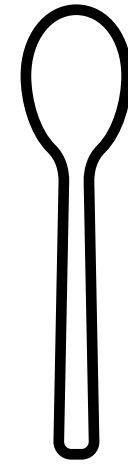
Name as many
metals as you can:

Say what metals are like (What are their *properties*? This can be what they look like, or how they behave. Eg, metals have to get REALLY hot before they turn into gases).

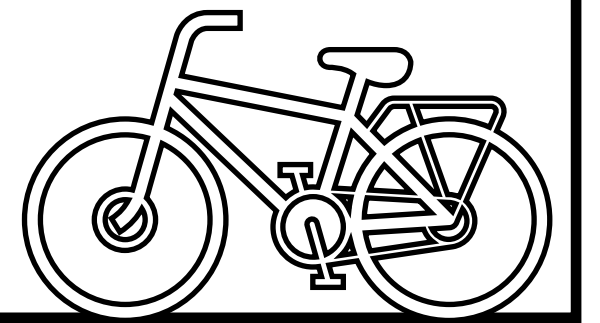
Looking at the metals of the periodic table, **rank them** from those you've heard about most (in books, films, conversation etc) to ones you've heard of least. Stop when you get to 12, or the ones you've never heard of!

- | | | |
|----|----|-----|
| 1. | 5. | 9. |
| 2. | 6. | 10. |
| 3. | 7. | 11. |
| 4. | 8. | 12. |

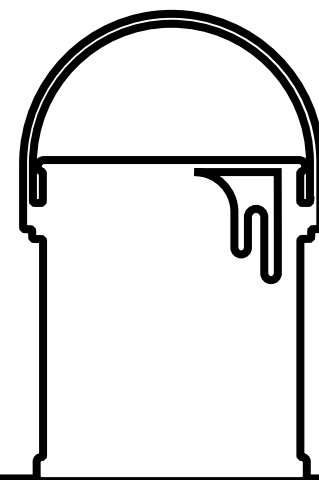
Can you think of why you might not have heard of them?!



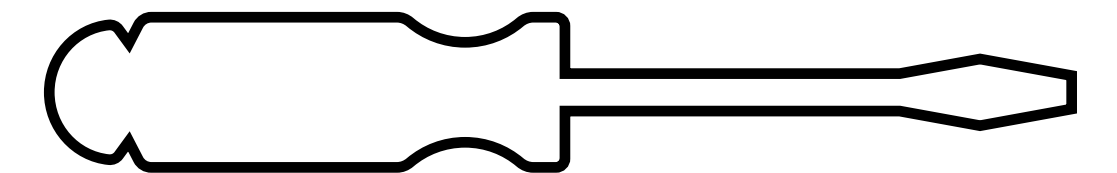
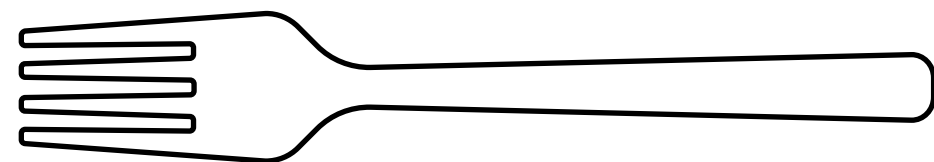
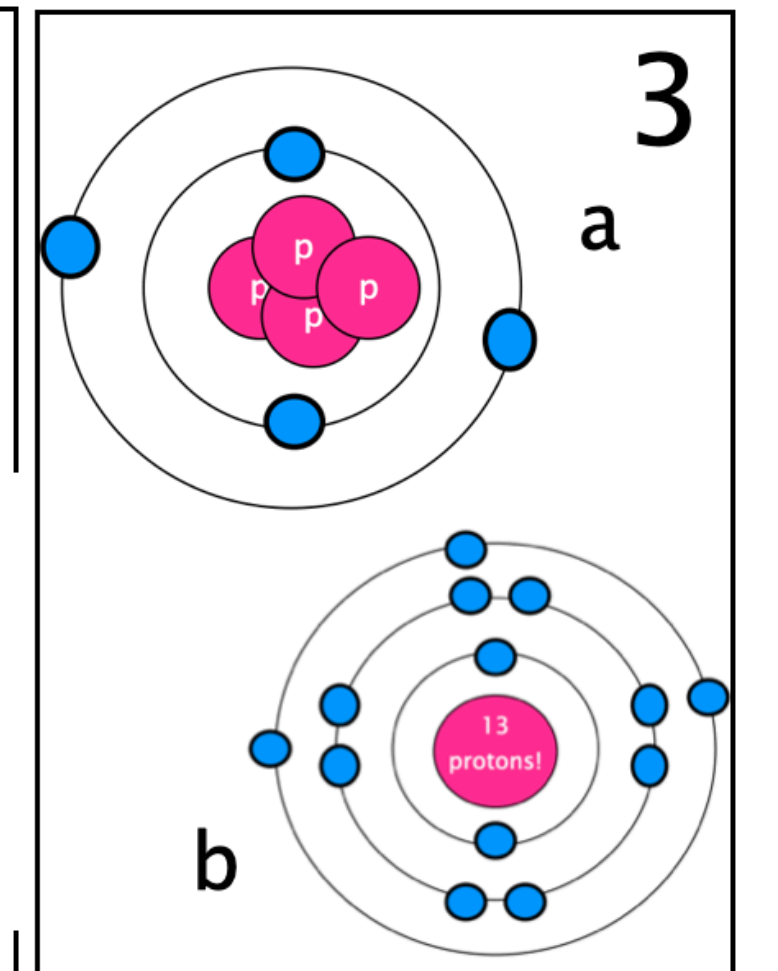
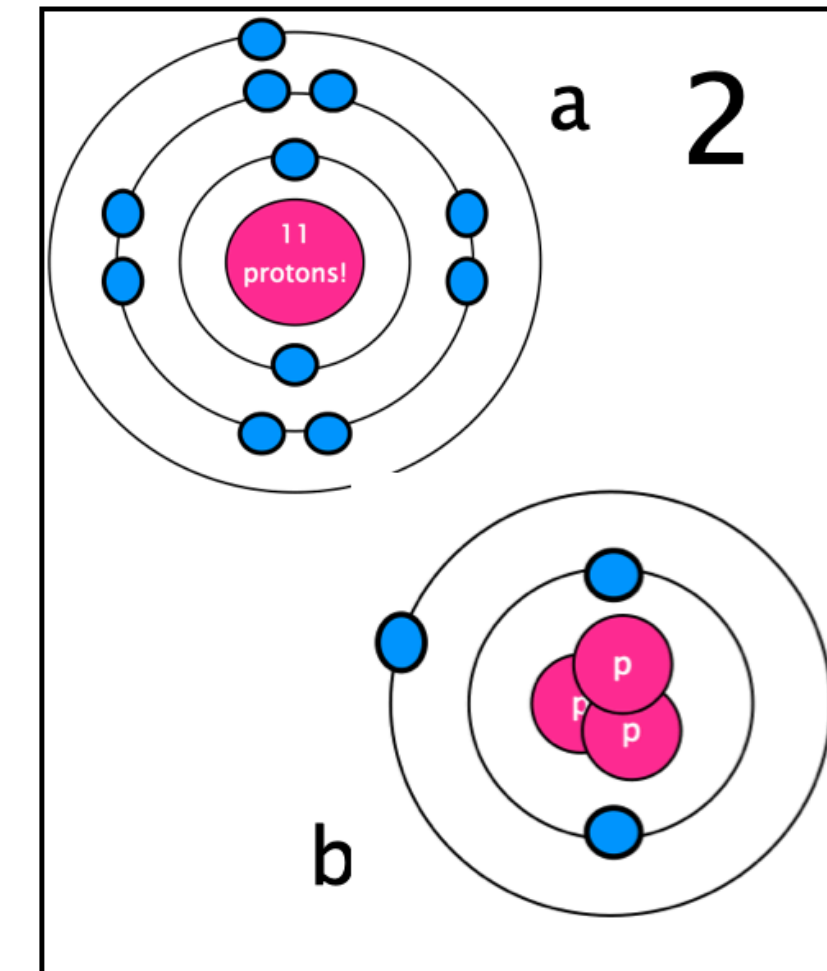
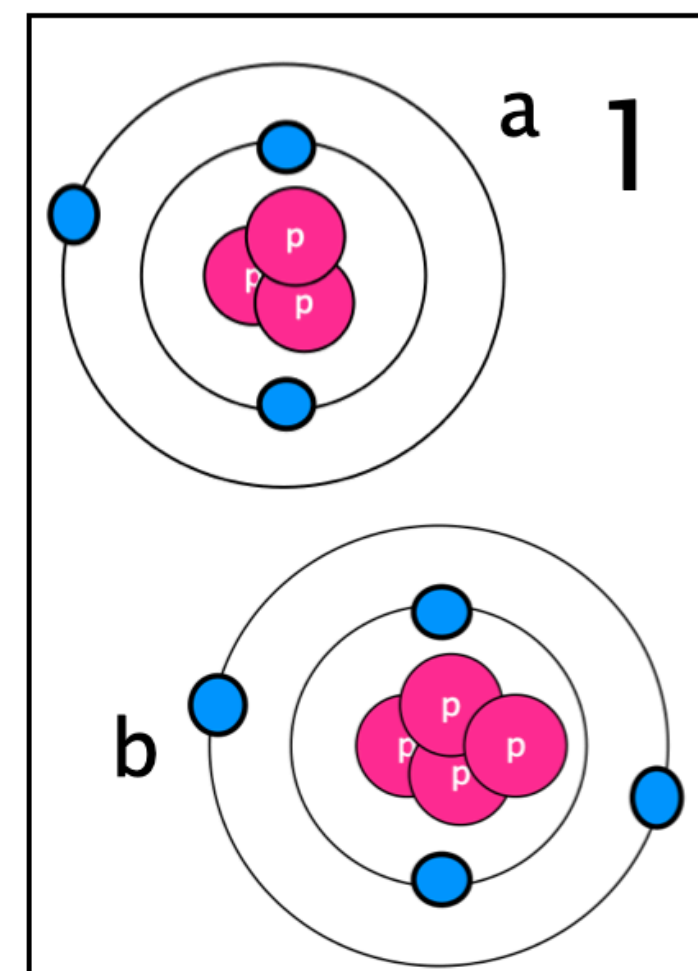
Why aren't bronze, brass, steel, in the periodic table?!
They're metals aren't they?!



(End of lesson: why hadn't you heard of them?)



In each case, say which atom you think will lose an electron most easily. (Which electron needs the least energy to pop off?)

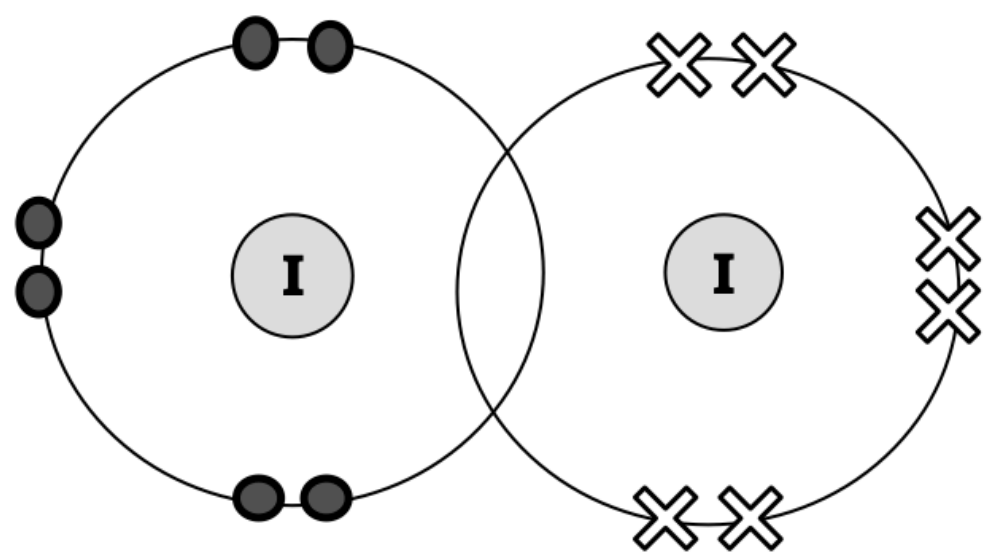




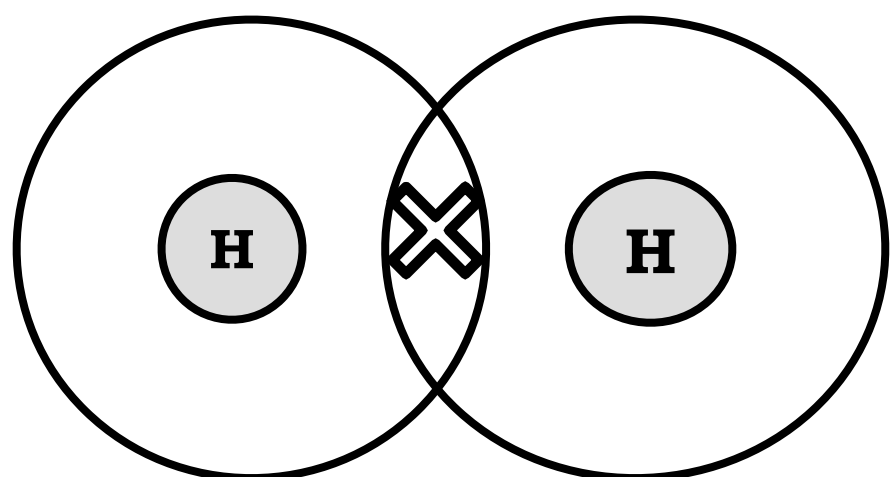
Theatre of Science The Periodic Table 4: Non-metals

To join in bring: A 5p plastic bag / thin plastic packaging, access to a tap!

1. Iodine has seven electrons in its outer shell. Complete this dot and cross diagram for an iodine molecule



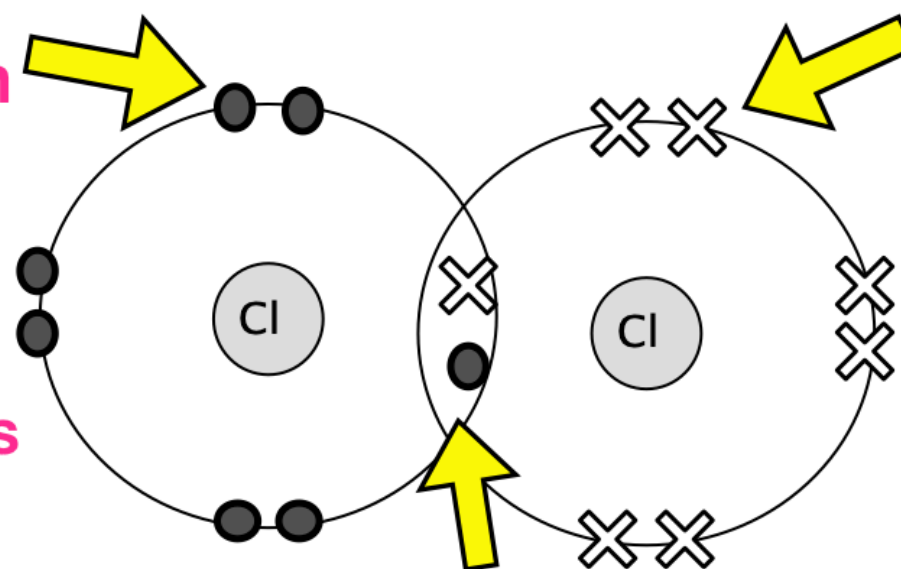
2. Hydrogen has one electron in its outer shell. It needs two to be full. Complete this dot and cross diagram of a hydrogen molecule..



Dot and cross diagram for a chlorine molecule

Show the electrons on one atom as dots

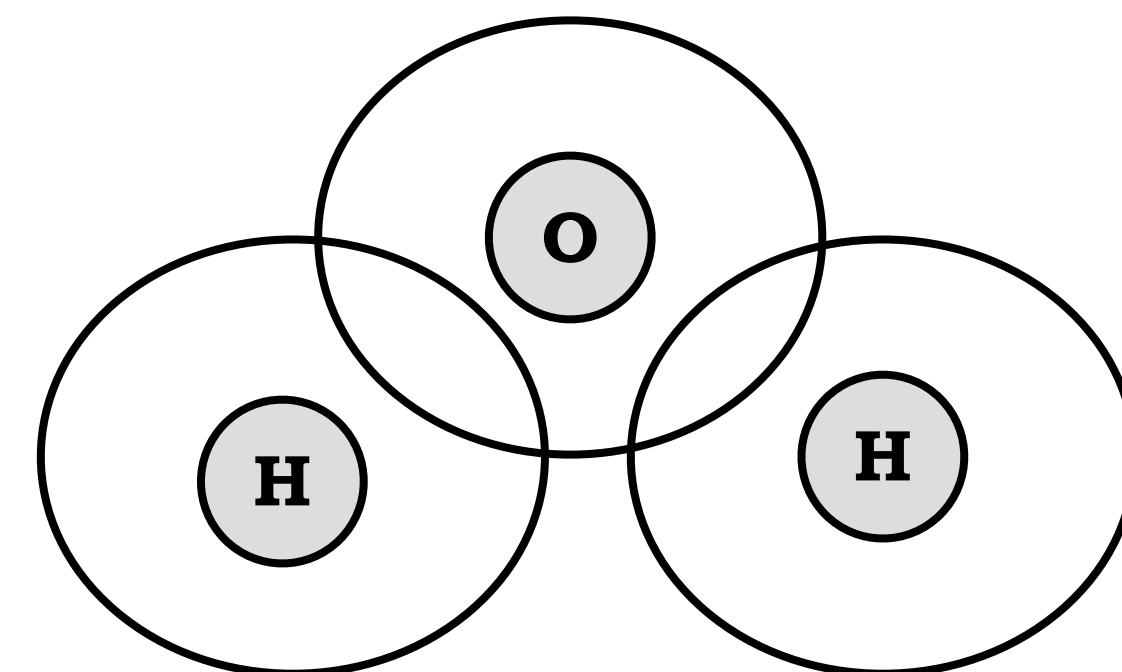
Only draw the electrons in the outer shell.



And on the other atom as crosses

Draw the shells overlapping and the shared electrons in the middle.

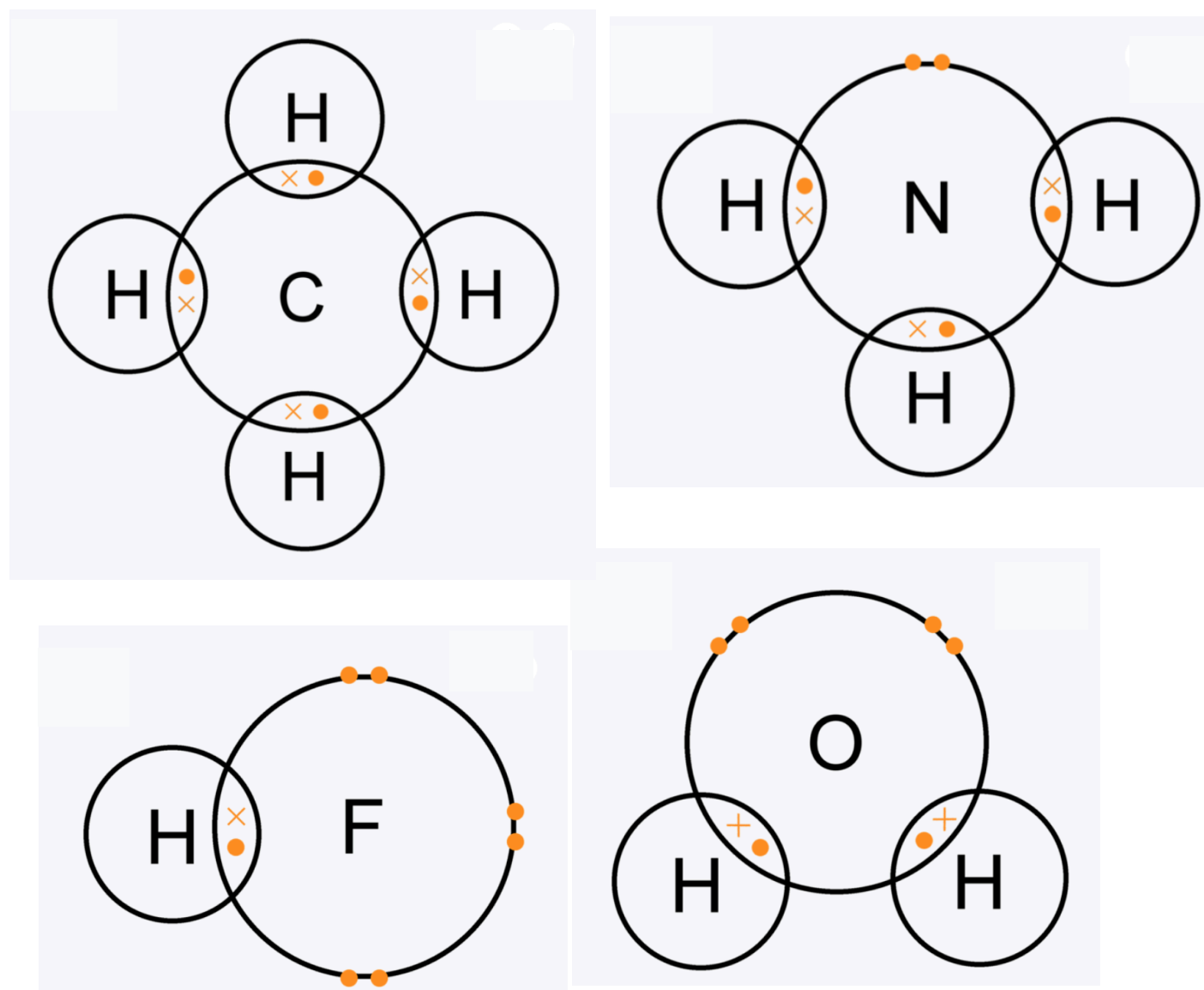
4. Oxygen has six electrons in its outer shell. Draw a dot and cross diagram of two hydrogen atoms bonded to an oxygen atom.



3. Draw a dot & cross diagram of one hydrogen and one chlorine atom bonded together

5. Molecules don't look like this really! List some differences between a real molecule and these diagrams.

Which molecules do you think are polar?



Notes!

GCSE Questions!

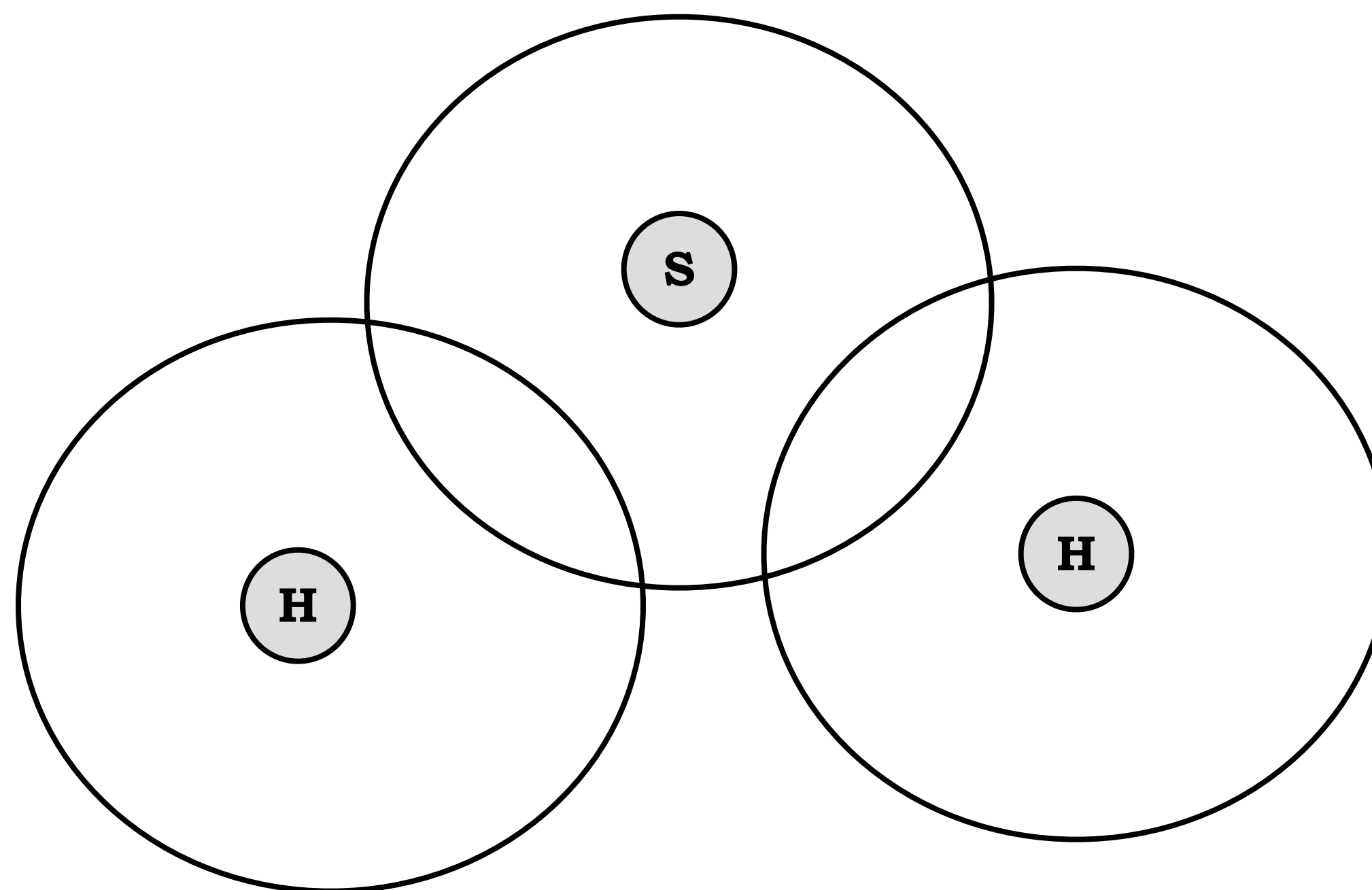
1. In a dot and cross diagram, what do the crosses represent?

- Electrons
- Neutrons
- Protons

2. What is a polar bond?

- A bond where electrons overlap
- A bond where electrons are not shared equally
- A bond where one electron is removed

3. Complete the dot and cross diagram to show a molecule of hydrogen sulphide.



14.01*	8	16.00*	9	19.00	10	20.18
N		O		F		Ne
nitrogen		oxygen		fluorine		neon
5	30.97	16	32.06*	17	35.45*	18
P		S		Cl		Ar
phosphorus		sulfur		chlorine		argon

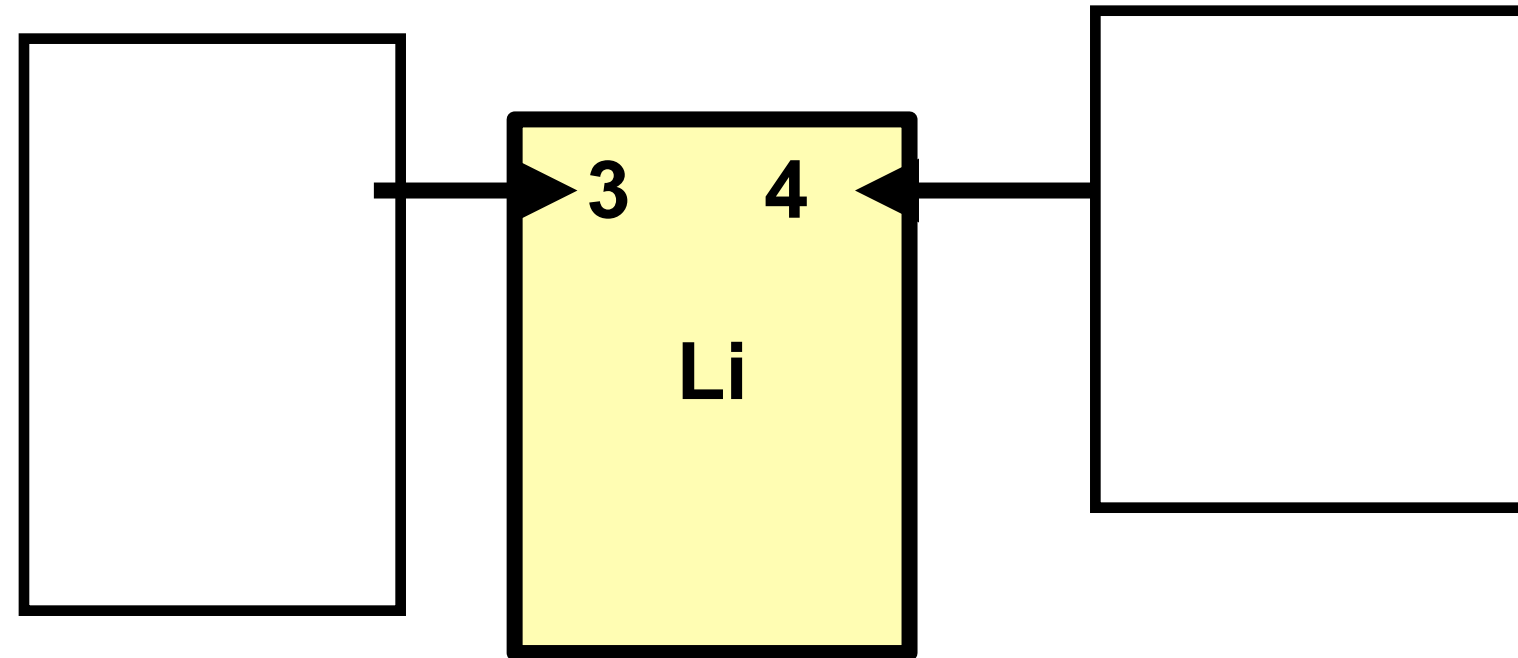
Use the periodic table shown to help you



Theatre of Science The Periodic Table 5: Radioactive Elements

To join in bring: Scissors, paper, felt pen.

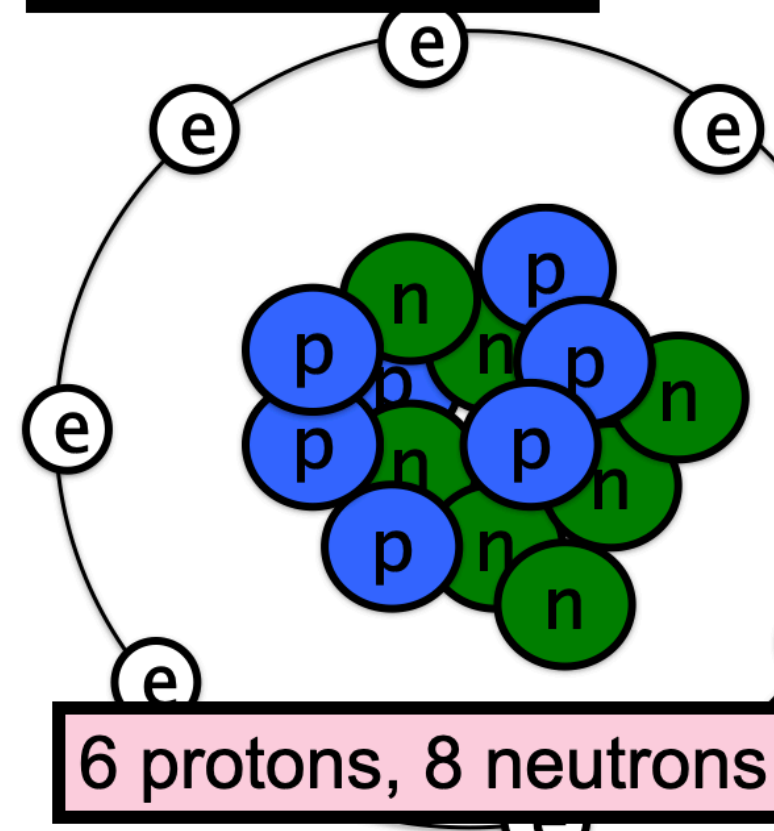
1. What do these numbers on the periodic table mean?!



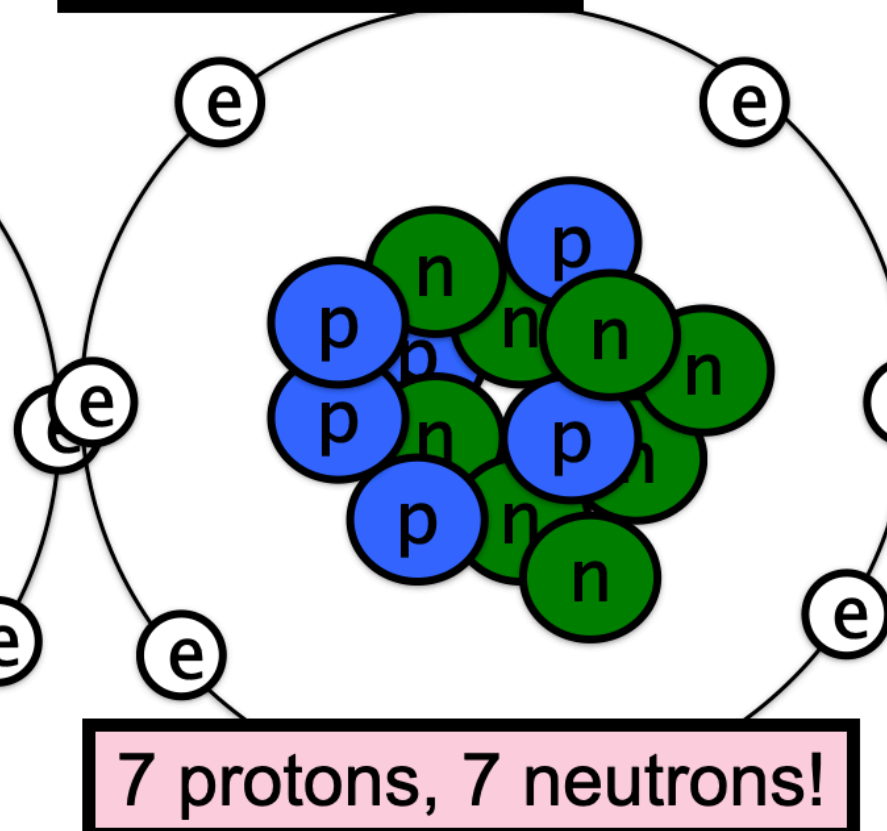
And what are they called?

2. Atoms with the same number of protons but different numbers of neutrons are called _____

How does this...



Turn into this?



Notes on beta decay?

Blank box for notes on beta decay.

Americium-241 has 95 protons and 146 neutrons. If it loses an alpha particle (2 protons and 2 neutrons) what new element is made?

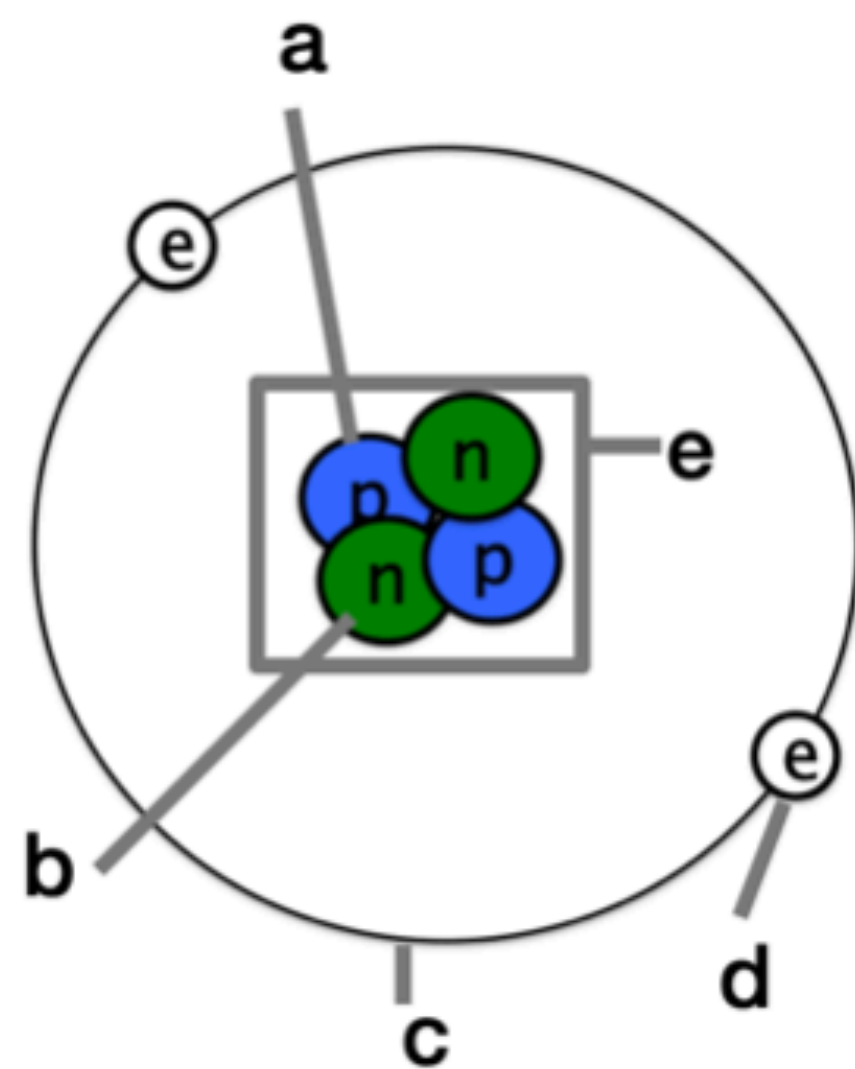
Notes on alpha decay?

Blank box for notes on alpha decay.

92	93	94	95	96	97	98
U	Np	Pu	Am	Cm	Bk	Cf
uranium	neptunium	plutonium	americium	curium	berkelium	californium

GCSE Questions!

- 1) What particles are found in the nucleus of an atom?
- Electrons and protons
 - Neutrons and electrons
 - Protons and neutrons
 - Protons, neutrons and electrons



2. The diagram shows a helium atom. Which part of the atom is the same as an alpha particle?
- _____

3. What can you do to change how fast a radioactive substance decays?

- Nothing
- Freeze it
- Boil it
- Keep it in a jar of oil
- Keep it in a box lined with lead

4. During beta decay an electron is given off. Where does the electron come from?

- The outer shell
- The inner shell
- The nucleus



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