

Week commencing 18th May

Students need to be able to:

- State properties of metals and non-metal elements
- Describe what the reactivity series is and how it can be generated
- Write word equations for displacement reactions

Tasks overview:

Task 1: “Metal and non-metal properties WITH ANSWERS” (resource available on website and instructions within powerpoint)

Task 2: Displacement disco (instructions in powerpoint)

Task 3: Writing displacement reactions (instructions in powerpoint)

This is the equivalent of three science lessons in school (minus some practical work)

Metals and non-metals

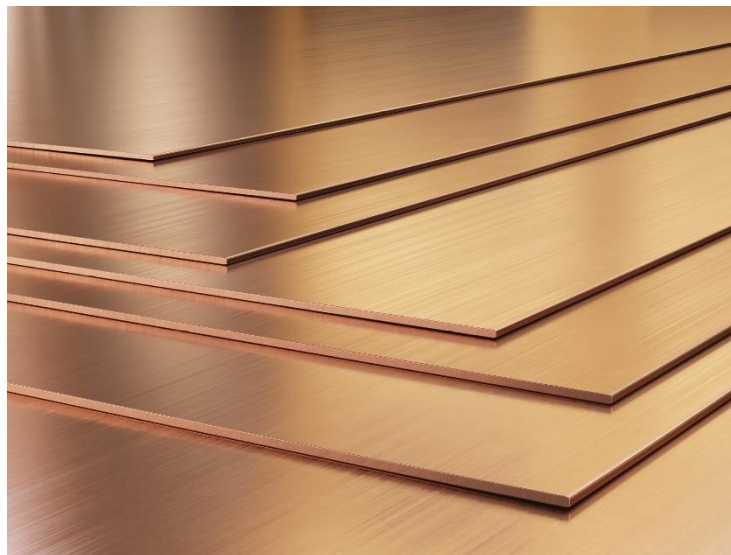
Dev: Recall the properties of metals and non-metals

Sec: Use observations to draw conclusions about whether a material is a metal or non-metal

Exc: Explain why the semi-metals (or metalloids) are placed where they are in the periodic table



IRON



COPPER



OXYGEN



RUST

Decide which are metals and which are non-metals? How did you make your decisions?

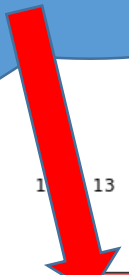
Observations

Maybe you knew metals are normally shiny?

Maybe you knew oxygen was a non-metal because it is a gas at room temperature and metals are usually solid at room temperature?

Maybe you used a periodic table to check as in our last Chemistry topic you learnt about the stairs!???

Maybe you remembered rust is iron oxide and therefore the iron (metal) has bonded to oxygen so it is a new material and is actually a compound now so can't be classed as a metal?



The periodic table is shown with elements color-coded: blue for metals, yellow for non-metals, and red for metalloids. The word "Metals" is written in large black letters across the middle of the table.

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	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
5	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
6	55 Cs	56 Ba		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
7	87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Uub	113 Uut	114 Fl	115 Uup	116 Lv	117 Uus	118 Uuo
Lanthanides			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	71 Lu	
Actinides			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	103 Lr	

Task 1: Sorting metal and non-metal properties

The document titled “metals and non-metals properties WITH ANSWERS” is what you need. There are answers in this document so don't look at them yet!

You could print the sheets and cut out the cards to sort them into metals and non metals. If you cant print, you could look at the different properties and create a table of metals Vs non-metals.

You should know some of them but you may need to research some of the properties. A good website to help get you started it:

<https://www.bbc.co.uk/bitesize/guides/z84wjxs/revision/4>

The Reactivity Series

Dev: State what the reactivity series is

Sec: Explain how the reactivity series is generated

Exc: Use the reactivity series to predict whether a reaction will happen or not.

The reactivity series

Watch the video – don't panic about the bit at the end about positive ions (that's a bit beyond us at the moment! Let save something for GCSE!)

<https://www.youtube.com/watch?v=TGPPPFczOj0>

So the reactivity series is literally just a list of metals (and non-metals in this one) in order of most reactive (at the top) to least reactive (at the bottom).

But why is this so important!?

Potassium	Most reactive	K
Sodium		Na
Calcium		Ca
Magnesium		Mg
Aluminium		Al
Carbon		C
Zinc		Zn
Iron		Fe
Tin		Sn
Lead		Pb
Hydrogen		H
Copper		Cu
Silver		Ag
Gold		Au
Platinum	Least reactive	Pt

Displacement Disco!

In the video you are about to watch, copper (the man) is dancing with sulfate (the girl).

If you look at the reactivity series you will see copper is near the bottom – so not very reactive.

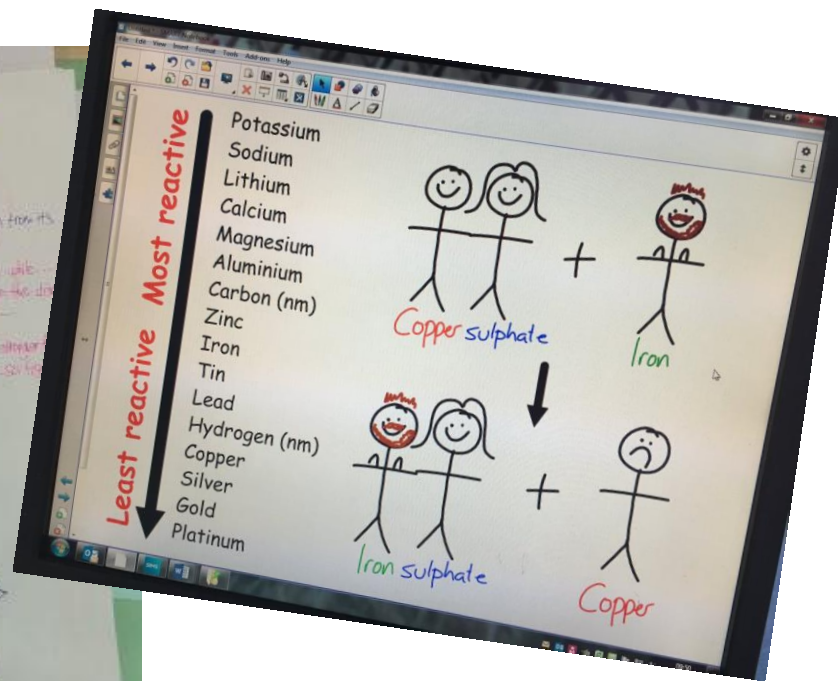
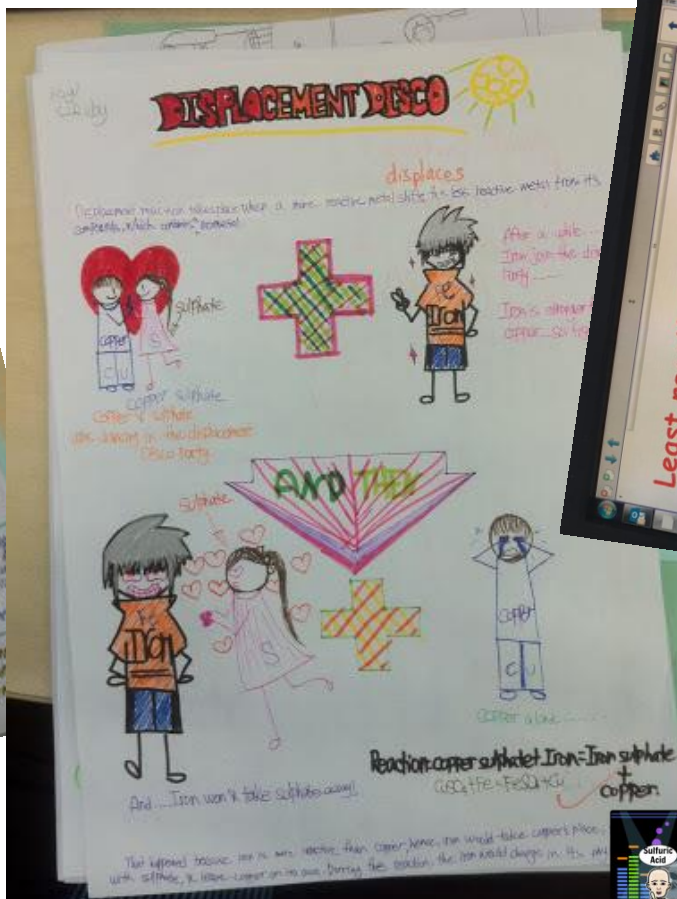
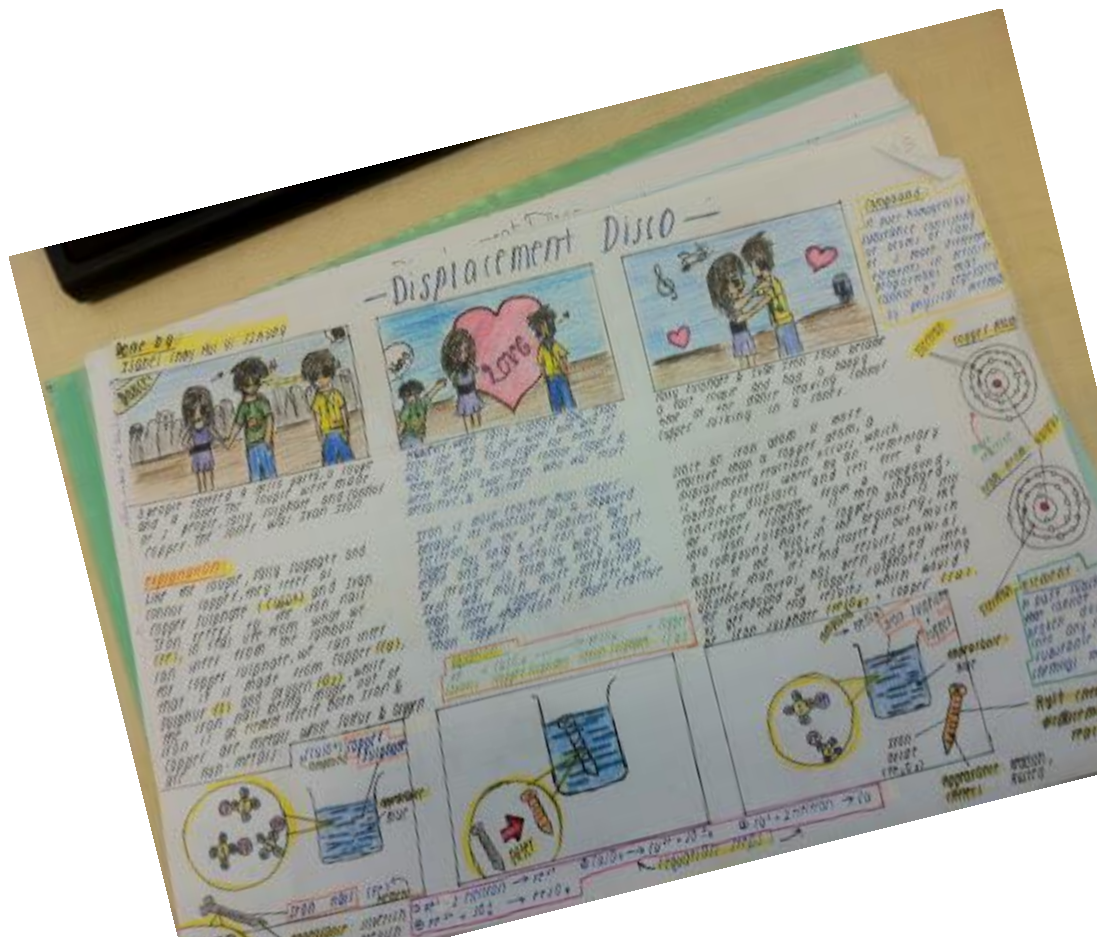
Another man (zinc) then walks in. He is more reactive than copper so steals the girl! I'm not sure why the copper isn't more angry to be honest!

It started as copper with sulfate and the zinc separate. But then became zinc with sulfate and the copper separate. Or as a word equation:



The zinc “displaced” the copper because it was the more reactive metal. This is called a displacement reaction

https://www.youtube.com/watch?v=z1gjah_R_go



Task 2: Create a poster or story board to show the displacement reaction. A more reactive metal must steal the less reactive metal. Try to include:

- The displacement reaction word equation
- Information about what the reactivity series actually is
- Something to show the more reactive metal being more reactive (like big biceps or some abs!)



Example 1

Iron sulfate + magnesium $\rightarrow$?

If you look at the reactivity series you can see magnesium is more reactive than iron. Therefore it will “steal” the sulfate away.

Iron sulfate + magnesium $\rightarrow$ magnesium sulfate + iron

Example 2

Potassium chloride + iron $\rightarrow$?

If you look at the reactivity series you will see iron is NOT more reactive than potassium. Therefore it CANNOT steal. So the equation doesn't change.

Potassium chloride + iron $\rightarrow$ potassium chloride + iron

Task 3: Writing displacement reactions

Complete the equations:

Aluminium sulfate + calcium →
_____ + _____

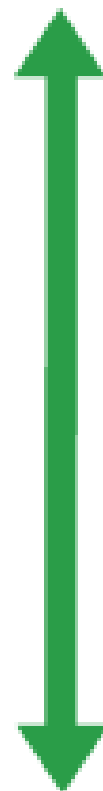
Copper chloride + _____ →
Magnesium chloride + _____

_____ nitrate + sodium →
_____ + _____

Challenge: Can you write any of your own?

Potassium
Sodium
Calcium
Magnesium
Aluminium
Carbon
Zinc
Iron
Tin
Lead
Hydrogen
Copper
Silver
Gold
Platinum

Most reactive



Least reactive

K
Na
Ca
Mg
Al
C
Zn
Fe
Sn
Pb
H
Cu
Ag
Au
Pt