

Periodicity Cards

How do we know that our present periodic table is correct and complete? After all, throughout history people have thought they've found the "correct" answer. But we're confident that our modern periodic table has ALL of the elements in the correct order.

Print and cut out the cards, perhaps 4 or 6 sets for a class.

Ask pupils to arrange the cards in a line, in order of atomic mass.

Then look for patterns in the cards, e.g. read the Lithium card, then look along the line until you find another element that does similar things. Keep going with this idea until they realise that we can move the cards into 3 rows of 8, with each column containing elements that behave in similar ways.

The result should be pretty close to the first 3 rows of the modern periodic table without the transition metals. Gallium and Astatine are also missing (I couldn't think of any helpful properties to include, so I left them as gaps to be noticed. I've tweaked some atomic masses to make the exercise work.

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	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37	38	40	50	51	52	53	54

Point out that we have done this by spotting patterns in the properties of the elements – in this case, a periodicity of 8. Also point out that there are 2 gaps where we can see there ought to be elements.

Our cards have 3 of the alkali metals – what should the next alkali metal (rubidium) be like?

The modern periodic table has no gaps, and is arranged in order of atomic number (not atomic mass). It has elements with similar properties grouped together, and now that we know more about what's inside atoms we know that this table is a good way to arrange elements.

<p>Name: Lithium</p> <ul style="list-style-type: none">• Description: soft silvery metal• Properties: when put in water, it fizzes strongly and gives off hydrogen, producing an alkaline solution.• It takes TWO Lithium atoms to bond with one oxygen atom• Atomic mass: 7	<p>Name: Beryllium</p> <ul style="list-style-type: none">• Description: metal• It takes ONE beryllium atom to bond with one oxygen atom• Atomic mass: 9	<p>Name: Boron</p> <ul style="list-style-type: none">• Description: non-metal• Solid at room temperature• Atomic mass: 10
<p>Name: Carbon</p> <ul style="list-style-type: none">• Description: non-metal, not a very good conductor of electricity• It takes ONE carbon atom to bond with TWO oxygen atoms• Atomic mass: 12	<p>Name: Nitrogen</p> <ul style="list-style-type: none">• Description: non-metal, gas at room temperature.• 5 electrons in outer shell• Atomic mass: 14	<p>Name: Oxygen</p> <ul style="list-style-type: none">• Description: non-metal, gas at room temperature• 6 electrons in outer shell• Atomic mass: 16

<p>Name: Fluorine</p> <ul style="list-style-type: none">• Non-metal• Description: gas, extremely reactive• Strong smell• 7 electrons in outer shell• Atomic mass: 19	<p>Name: Neon</p> <ul style="list-style-type: none">• Description: colourless, odourless gas• Properties: doesn't react with anything• Atomic mass: 20	<p>Name: Sodium</p> <ul style="list-style-type: none">• Description: soft silvery metal• Properties: when put in water, it fizzes strongly and gives off hydrogen, producing an alkaline solution.• It takes TWO sodium atoms to bond with one oxygen atom• Atomic mass: 22
<p>Name: Magnesium</p> <ul style="list-style-type: none">• Description: metal• It takes ONE magnesium atom to bond with one oxygen atom• Atomic mass: 24	<p>Name: Aluminium</p> <ul style="list-style-type: none">• Description: light, easily-worked metal• It takes TWO aluminium atoms to bond with TWO oxygen atoms• Atomic mass: 27	<p>Name: Silicon</p> <ul style="list-style-type: none">• Description: non-metal, not a very good conductor of electricity• A semiconductor• It takes ONE silicon atom to bond with TWO oxygen atoms• Atomic mass: 28

<p>Name: Phosphorus</p> <ul style="list-style-type: none">• Description: non-metal, solid at room temperature.• 5 electrons in outer shell• Very reactive, will react spontaneously with atmospheric oxygen• Atomic mass: 31	<p>Name: Sulphur</p> <ul style="list-style-type: none">• Description: non-metal, solid at room temperature• 6 electrons in outer shell• Atomic mass: 32	<p>Name: Chlorine</p> <ul style="list-style-type: none">• Non-metal• Description: gas, very reactive• Strong smell• 7 electrons in outer shell• Atomic mass: 35
<p>Name: Argon</p> <ul style="list-style-type: none">• Description: colourless, odourless gas• Properties: doesn't react with anything• Atomic mass: 40	<p>Name: Potassium</p> <ul style="list-style-type: none">• Description: soft silvery metal• Properties: when put in water, it fizzes violently and gives off hydrogen, producing an alkaline solution.• It takes TWO Potassium atoms to bond with one oxygen atom• Atomic mass: 41	<p>Name: Calcium</p> <ul style="list-style-type: none">• Description: metal• It takes ONE calcium atom to bond with one oxygen atom• Atomic mass: 59

<p>Name: Germanium</p> <ul style="list-style-type: none">• Description: non-metal, not a very good conductor of electricity• A semiconductor• It takes ONE germanium atom to bond with TWO oxygen atoms• Atomic mass: 72	<p>Name: Selenium</p> <ul style="list-style-type: none">• Description: non-metal, solid at room temperature• 6 electrons in outer shell• “photoconductive” – it conducts electricity when light is shone onto it• Atomic mass: 79	<p>Name: Bromine</p> <ul style="list-style-type: none">• Non-metal• Description: liquid at room temperature, reactive• Strong smell• 7 electrons in outer shell• Atomic mass: 80
<p>Name: Krypton</p> <ul style="list-style-type: none">• Description: colourless, odourless gas• Properties: doesn’t react with anything• Atomic mass: 83		