Do Now Page 1

1. What bonding occurs between metals and non-metals? Ionic

2. What is the chemical formula of methane? CH_4 (C_nH_{2n+2})

3. What does DNA stand for? Deoxyribonucleic Acid

4. What is the constant speed equation? $Speed, s\ (m/s) = \frac{Distance,\ \ d\ (m)}{Time,\ \ t\ (s)}$

5. What is the chemical formula for an alkane with 117 carbon atoms? $C_{117}H_{236}$ (Heptadecahectane)

6. What is the atomic number of the largest predicted element? 184 (Uoq - Unoctquadium)

EDEx22

Welcome to Education Extravaganza

2022

Taught By: Neo Skinner and Tyler Rocha

Scientific Advisor: Ephram Matocha

#MAGNAPHYSICS

#MAGNACHEMISTRY

#MAGNABIOLOGY

EDEx22

Lesson 1
The Atom and Advanced Analysis Techniques

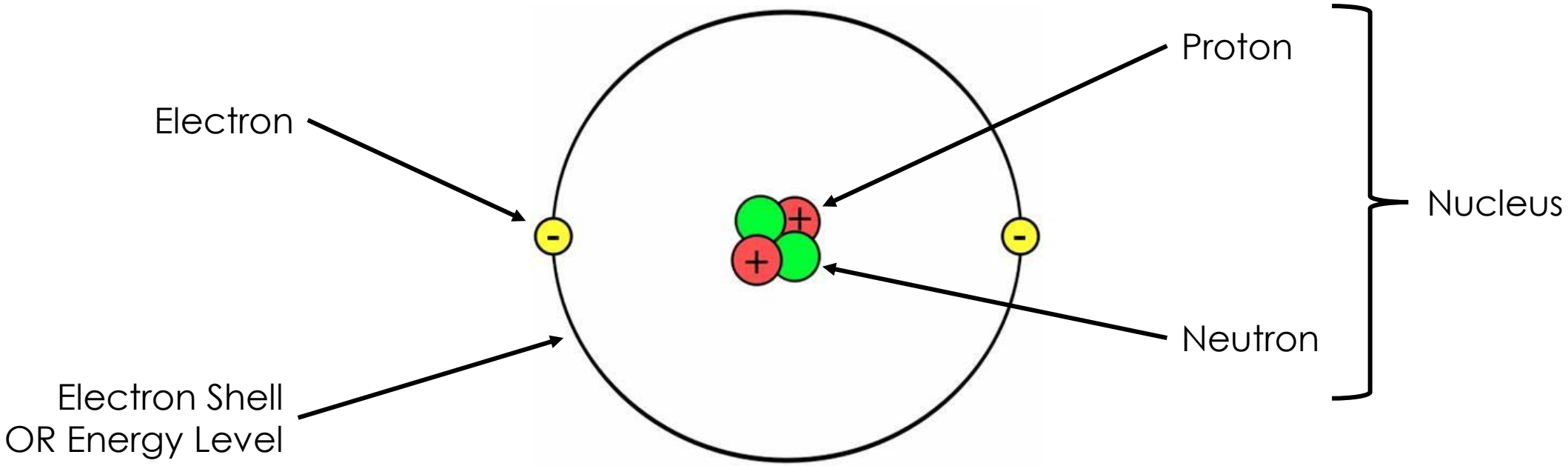
Physics

Taught By: Neo Skinner

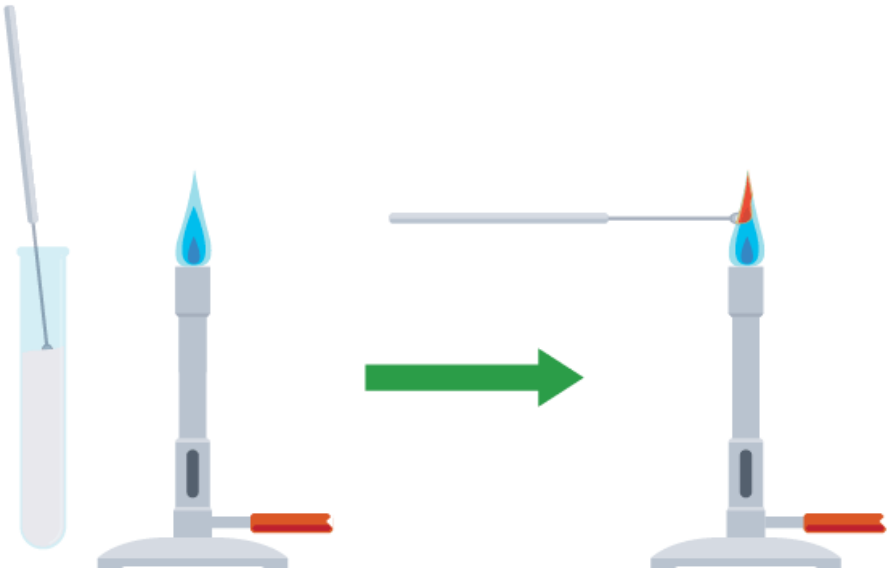
Scientific Advisors: Tyler Rocha and Ephram Matocha

#MAGNAPHYSICS

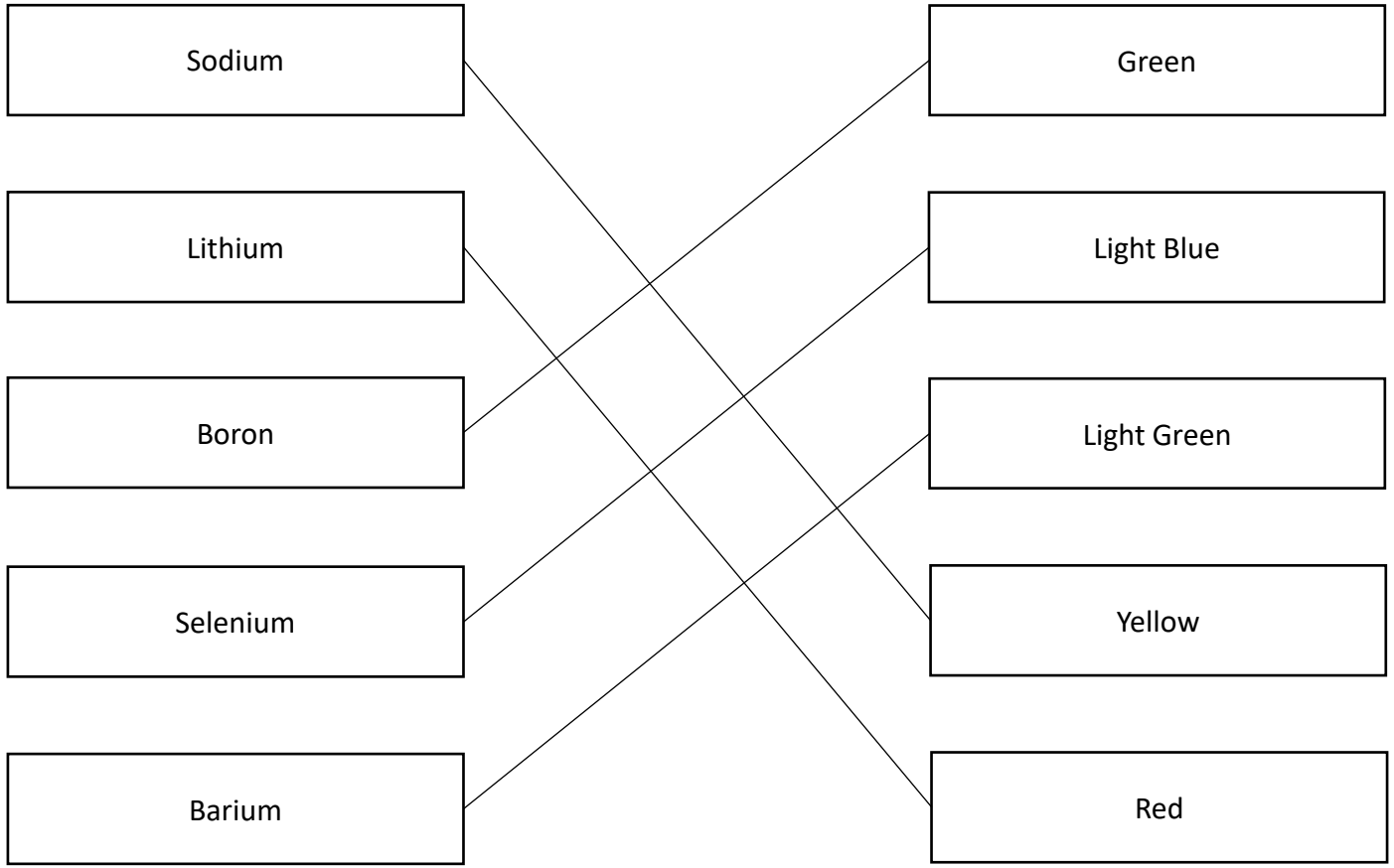
The Atom


Electron
Proton
Nucleus
Neutron
Electron Shell
OR Energy Level

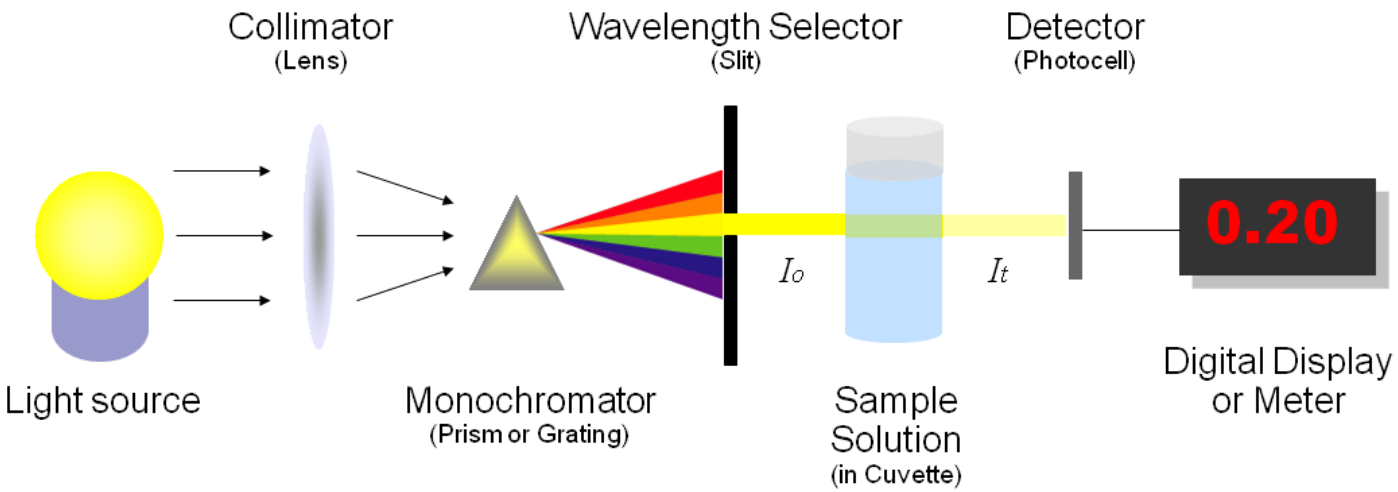
The Flame Test

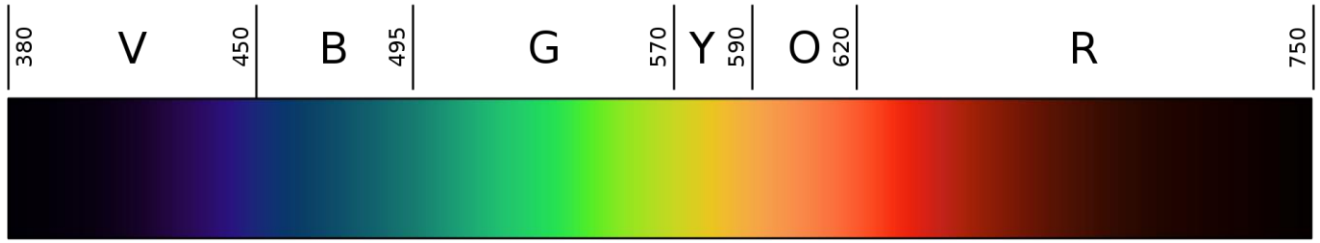


Progress Check Page 3



Spectroscopy





Mastery Questions Page 3

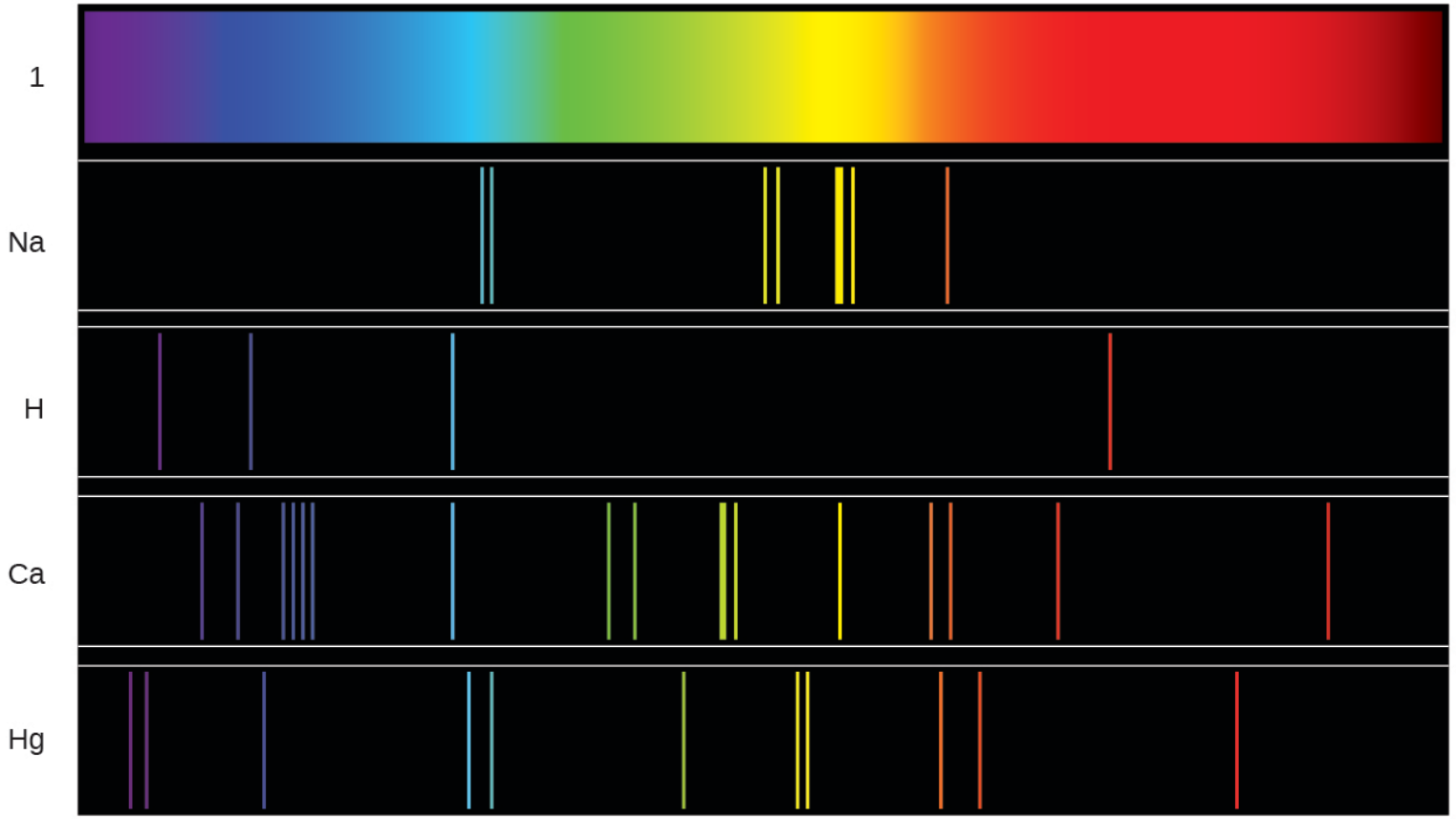
1. Prism (1)

2. Red (1)

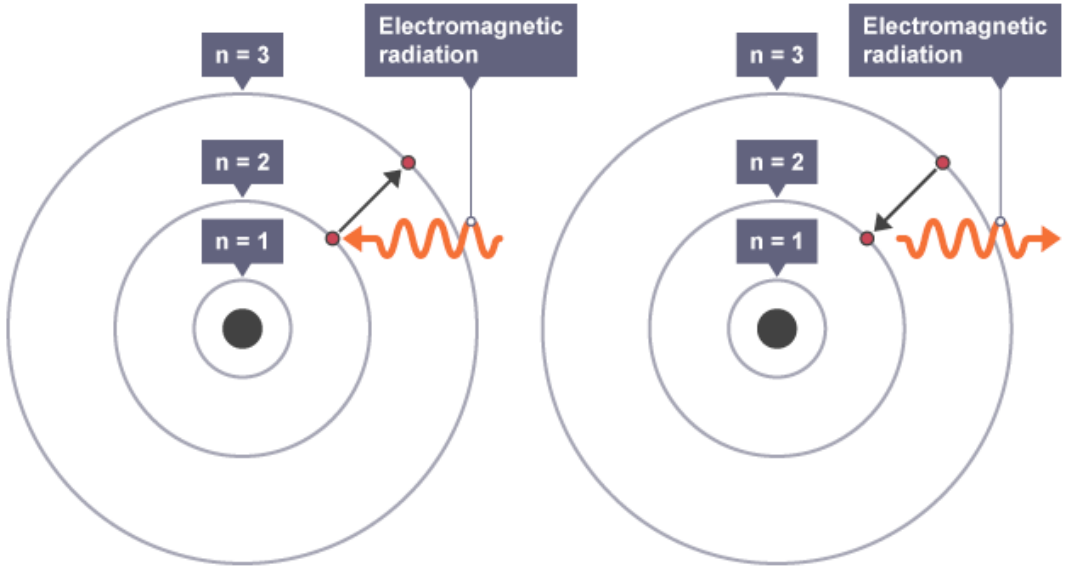
3. Each point worth 1 mark – maximum of 3:
   Colours can be too **similar**
   Not all elements change the colour
   Only **metal ions** can be used
   Some compounds are **unsafe** to test
   Qualitative data

4. Each point worth 1 mark – maximum of 5:
   Flame Test:
   Colours can be too **similar**
   Not all elements change the colour
   Only **metal ions** can be used
   Some compounds are **unsafe** to test
   Qualitative data
   Spectroscopy:
   Produces a **spectrum** or component colours
   Spectrum is **unique**
   Quantitative data

The Emission Spectrum



Electron Excitation



Deliberate Practice

Q1.

(a) decreases

correct order only

1

increases

1

(b) (i) intensity (of transmitted light) depends on thickness

or

to enable a valid comparison

or

it is a control variable

accept absorption depends on thickness

it would affect the results is insufficient

fair test is insufficient

1

(ii) transmits the least light

or

absorbs the most light

accept very little light is transmitted

*do **not** accept transmits none of the light*

*do **not** accept absorbs all of the light*

any reference to heat negates this mark

1

[4]

Q2.

electron

1

atom

1

nucleus

1

orbit

1

[4]

Q3.

(a) atoms with the same number of protons

allow atoms of the same element

1

but with a different number of neutrons

1

(b) protons = 11

1

neutrons = 12

1

(c) electrons falling to a lower energy level

1

[5]

Do Now Page 9

1. How many chambers does the heart have? 4

2. What is Avogadro's constant? 6.022×10^{23} ($6.02214076 \times 10^{23}$)

3. What protein naturally seals cuts, creating scabs? Fibrinogen

4. What form of current is distributed through the UK mains power grid? Alternating Current (AC)

5. What is the largest particle accelerator? The Large Hadron Collider (LHC – CERN)

6. What is the category of particle that pions are a part of? Hadrons (Mesons)

EDEx22

Lesson 2
The Periodic Table

Chemistry

Taught By: Neo Skinner

Scientific Advisors: Tyler Rocha and Ephram Matocha

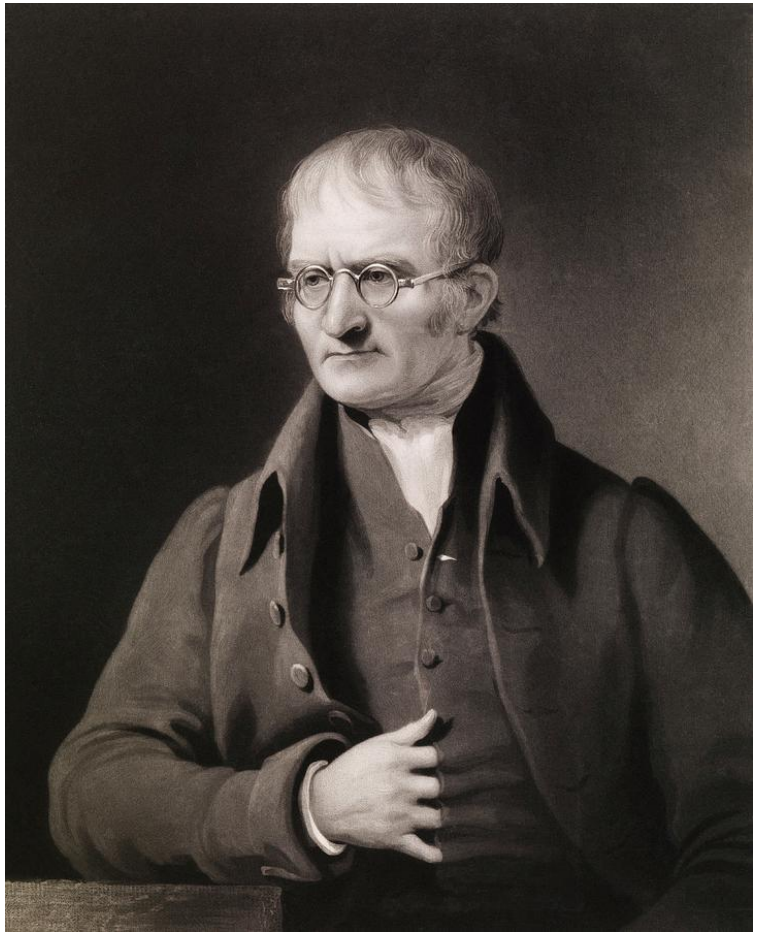
#MAGNACHEMISTRY

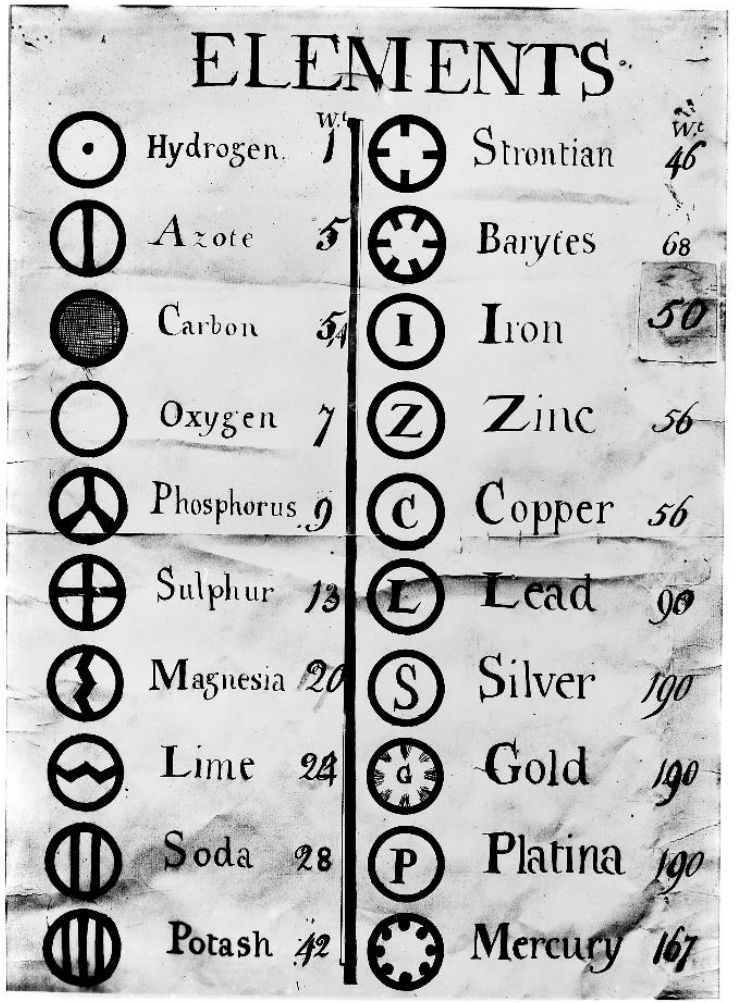
The Periodic Table

Alkali Metals 1	2											3	4	5	6	Halogens 7	Noble Gases 0/8
1 **H** Hydrogen 1																	4 **He** Helium 2
7 **Li** Lithium 3	9 **Be** Beryllium 4											11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
23 **Na** Sodium 11	24 **Mg** Magnesium 12											27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35.5 **Cl** Chlorine 17	40 **Ar** Argon 18
39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	63.5 **Cu** Copper 29	65 **Zn** Zinc 30	70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	[98] **Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
133 **Cs** Caesium 55	137 **Ba** Barium 56	175 **Lu** Lutetium 71	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	[209] **Po** Polonium 84	[210] **At** Astatine 85	[222] **Rn** Radon 86
[223] **Fr** Francium 87	[226] **Ra** Radium 88	[266] **Lr** Lawrencium 103	[261] **Rf** Rutherfordium 104	[262] **Db** Dubnium 105	[266] **Sg** Seaborgium 106	[264] **Bh** Bohrium 107	[277] **Hs** Hassium 108	[268] **Mt** Meitnerium 109	[271] **Ds** Darmstadium 110	[272] **Rg** Roentgenium 111	[285] **Cn** Copernicium 112	[286] **Nh** Nihonium 113	[289] **Fl** Flerovium 114	[289] **Mc** Moscovium 115	[293] **Lv** Livermorium 116	[294] **Ts** Tennessine 117	[294] **Og** Oganesson 118

Lanthanides	139 **La** Lanthanum 57	140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	[145] **Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	163 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70
Actinides	[227] **Ac** Actinium 89	232 **Th** Thorium 90	231 **Pa** Protactinium 91	238 **U** Uranium 92	[237] **Np** Neptunium 93	[244 **Pu** Plutonium 94	243 **Am** Americium 95	[247] **Cm** Curium 96	[247] **Bk** Berkelium 97	[251] **Cf** Californium 98	[252] **Es** Einsteinium 99	[257] **Fm** Fermium 100	[258] **Md** Mendelevium 101	[259] **No** Nobellium 102

John Dalton



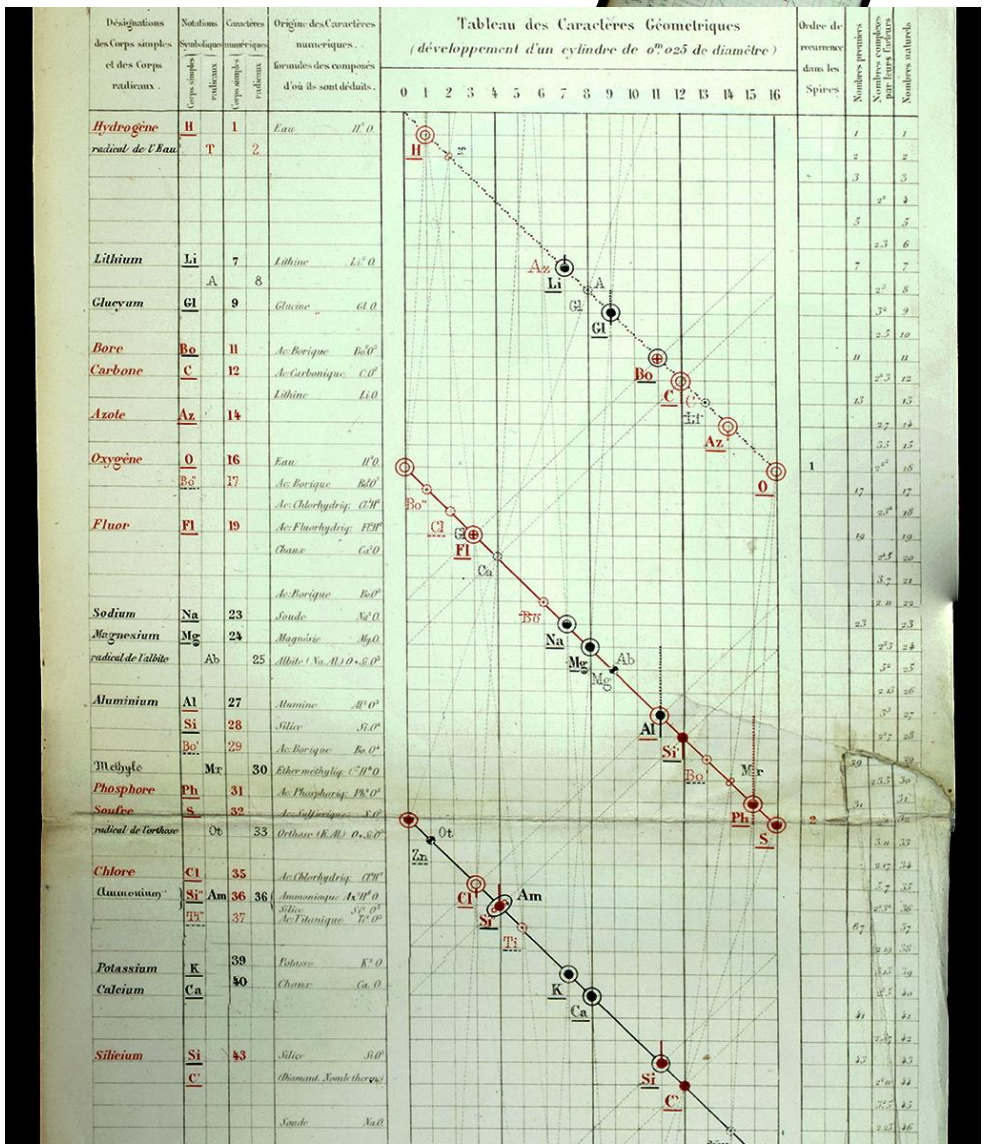

ELEMENTS
W.t
Hydrogen 1
Azote 5
Carbon 5,4
Oxygen 7
Phosphorus 9
Sulphur 13
Magnesia 20
Lime 24
Soda 28
Potash 42
W.t
Strontian 46
Barytes 68
Iron 50
Zinc 56
Copper 56
Lead 90
Silver 190
Gold 190
Platina 190
Mercury 167

Johann Wolfgang Döbereiner

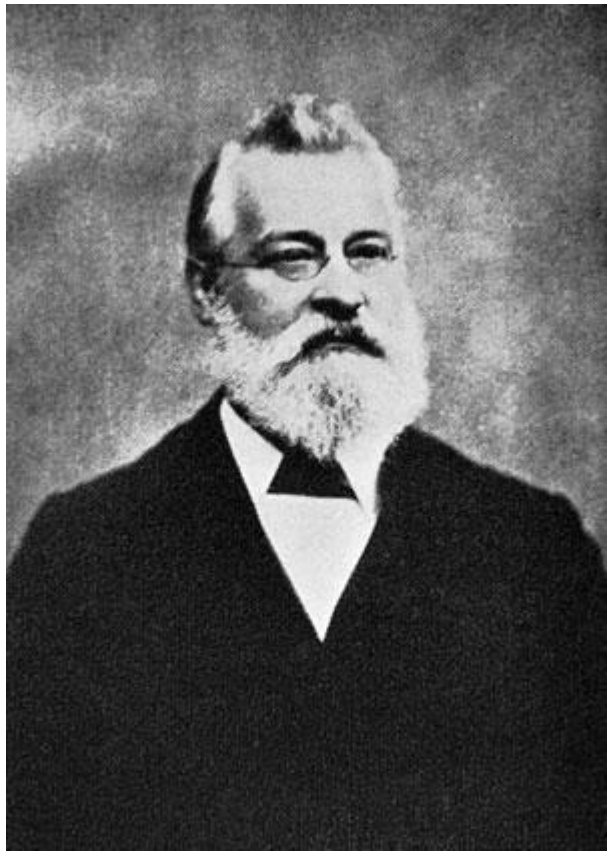
Atomic Mass (1850)			Atomic Number		
Li	7		Li	3	
Na	23	$\frac{7+39}{2} = 23$	Na	11	$\frac{3+19}{2} = 11$
K	39		K	19	
Ca	40		Ca	20	
Sr	87	$\frac{40+137}{2} = 88.5$	Sr	38	$\frac{20+56}{2} = 38$
Ba	137		Ba	56	
P	31		P	15	
As	75	$\frac{31+122}{2} = 76.5$	As	33	$\frac{15+51}{2} = 33$
Sb	122		Sb	51	
S	32		S	16	
Se	78	$\frac{32+128}{2} = 80$	Se	34	$\frac{16+52}{2} = 34$
Te	128		Te	52	
Cl	35.5		Cl	17	
Br	80	$\frac{35.5+127}{2} = 81.25$	Br	35	$\frac{17+53}{2} = 35$
I	127		I	53	

H						He
Li	Be	B	C	N	O	F	Ne
Na	Mg	Al	Si	**P**	**S**	**Cl**	Ar
K	**Ca**	Ga	Ge	**As**	**Se**	**Br**	Kr
Rb	**Sr**	In	Sn	**Sb**	**Te**	**I**	Xe
Cs	**Ba**	Tl	Pb	Bi	Po	At	Rn

Alexandre Emile Béguyer de Chancourtois

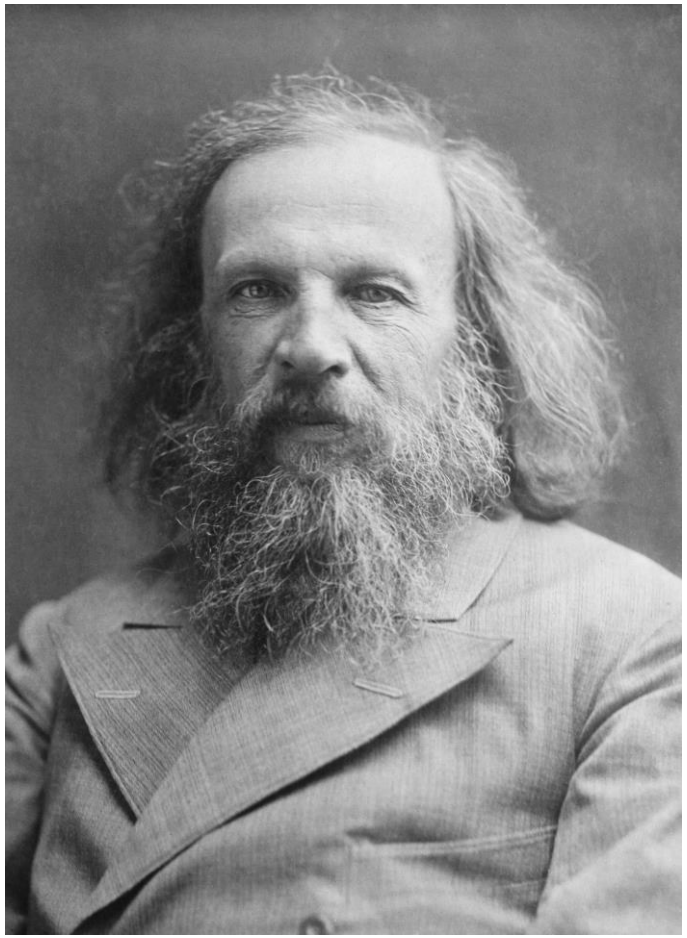


John Newlands



No.		No.		No.		No.		No.		No.		No.		No.	
H	1	F	8	Cl	15	Co & Ni	22	Br	29	Pd	36	I	42	Pt & Ir	50
Li	2	Na	9	K	16	Cu	23	Rb	30	Ag	37	Cs	44	Os	51
G	3	Mg	10	Ca	17	Zn	24	Sr	31	Cd	38	Ba & V	45	Hg	52
Bo	4	Al	11	Cr	19	Y	25	Ce & La	33	U	40	Ta	46	Tl	53
C	5	Si	12	Ti	18	In	26	Zr	32	Sn	39	W	47	Pb	54
N	6	P	13	Mn	20	As	27	Di & Mo	34	Sb	41	Nb	48	Bi	55
O	7	S	14	Fe	21	Se	28	Ro & Ru	35	Te	43	Au	49	Th	56

Dmitri Mendeleev



Reihen	Gruppe I. — R^1O	Gruppe II. — RO	Gruppe III. — R^2O^3	Gruppe IV. RH^4 RO^2	Gruppe V. RH^3 R^2O^5	Gruppe VI. RH^2 RO^3	Gruppe VII. RH R^2O^7	Gruppe VIII. — RO^4
1	H=1							
2	Li=7	Be=9,4	B=11	C=12	N=14	O=16	F=19	
3	Na=23	Mg=24	Al=27,3	Si=28	P=31	S=32	Cl=35,5	
4	K=39	Ca=40	—=44	Ti=48	V=51	Cr=52	Mn=55	Fe=56, Co=59, Ni=59, Cu=63.
5	(Cu=63)	Zn=65	—=68	—=72	As=75	Se=78	Br=80	
6	Rb=85	Sr=87	?Yt=88	Zr=90	Nb=94	Mo=96	—=100	Ru=104, Rh=104, Pd=106, Ag=108.
7	(Ag=108)	Cd=112	In=113	Sn=118	Sb=122	Te=125	J=127	
8	Cs=133	Ba=137	?Di=138	?Ce=140	—	—	—	— — — —
9	(—)	—	—	—	—	—	—	
10	—	—	?Er=178	?La=180	Ta=182	W=184	—	Os=195, Ir=197, Pt=198, Au=199.
11	(Au=199)	Hg=200	Tl=204	Pb=207	Bi=208	—	—	
12	—	—	—	Th=231	—	U=240	—	— — — —

Series	Zero Group	Group I	Group II	Group III	Group IV	Group V	Group VI	Group VII	Group VIII
0	*x*								
1		*y* Hydrogen H=1·008							
2	Helium He=4·0	Lithium Li=7·03	Beryllium Be=9·1	Boron B=11·0	Carbon C=12·0	Nitrogen N=14·04	Oxygen O=16·00	Fluorine F=19·0	
3	Neon Ne=19·9	Sodium Na=23·05	Magnesium Mg=24·1	Aluminium Al=27·0	Silicon Si=28·4	Phosphorus P=31·0	Sulphur S=32·06	Chlorine Cl=35·45	
4	Argon Ar=38	Potassium K=39·1	Calcium Ca=40·1	Scandium Sc=44·1	Titanium Ti=48·1	Vanadium V=51·4	Chromium Cr=52·1	Manganese Ma=55·0	Iron Fe=55·9 / Cobalt Co=59 / Nickel Ni=59 / (Cu)
5		Copper Cu=63·6	Zinc Zn=65·4	Gallium Ga=70·0	Germanium Ge=72·3	Arsenic As=75·0	Selenium Se=79	Bromine Br=79·95	
6	Krypton Kr=81·8	Rubidium Rb=85·4	Strontium Sr=87·6	Yttrium Y=89·0	Zirconium Zr=90·6	Niobium Nb=94·0	Molybdenum Mo=96·0	—	Ruthenium Ru=101·7 / Rhodium Rh=103·0 / Palladium Pd=106·5 / (Ag)
7		Silver Ag=107·9	Cadmium Cd=112·4	Indium In=114·0	Tin Sn=119·0	Antimony Sb=120·0	Tellurium Te=127	Iodine I=127	
8	Xenon Xe=128	Cæsium Cs=132·9	Barium Ba=137·4	Lanthanum La=139	Cerium Ce=140	—	—		— — — (—)
9		—	—		—	—	—	—	
10	—	—	—	Ytterbium Yb=173	—	Tantalum Ta=183	Tungsten W=184	—	Osmium Os=191 / Iridium Ir=193 / Platinum Pt=194·9 / (Au)
11		Gold Au=197·2	Mercury Hg=200·0	Thallium Tl=204·1	Lead Pb=206·9	Bismuth Bi=208	—	—	
12	—	—	Radium Rd=224	—	Thorium Th=233	—	Uranium U=239		

Progress Check Page 12

John Newlands	1864
Dmitri Mendeleev	1869
John Dalton	1806

Reading the Periodic Table

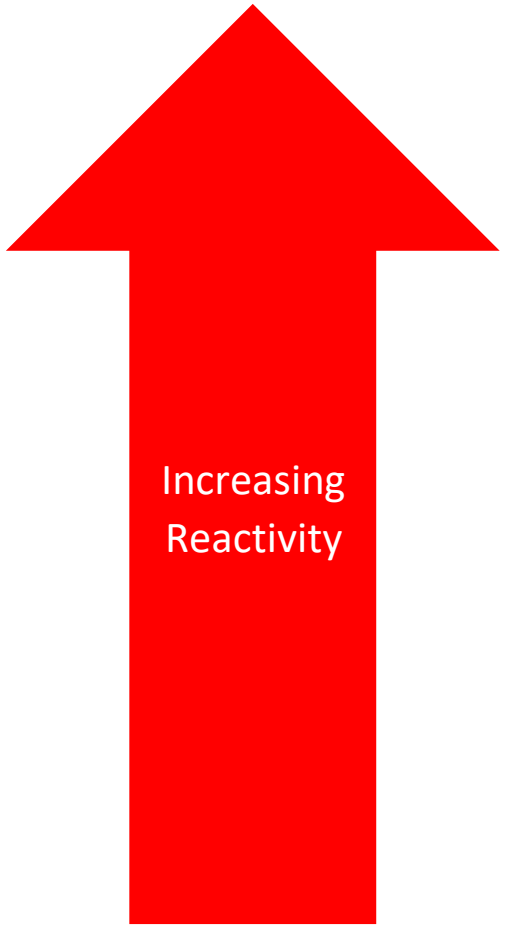
Atomic Number Range	Period	Elements in Period
0-2	1	2
2-10	2	8
11-18	3	8
19-36	4	18
37-54	5	18
55-86	6	32
87-118	7	32

Mastery Questions Page 12

1. Dmitri Mendeleev (1)
2. Increasing atomic number (1)
3. Period 5 (1)
4. Each point worth 1 mark – maximum of 3:
   Hydrogen is in a group with the halogens
   allow whereas in the modern version H is on its own
   Only **seven groups** as there is no Group 8/0 so no noble gases, therefore fewer elements
   Halogens are in **Group 1**
   allow but are located in Group 7 in the modern table
   Other elements are in one **group higher**
   allow for example oxygen is in Group 7 instead of Group 6
   The modern table only has two elements in the **top period**
   The modern table does **not** have the elements in order of **atomic mass**
   allow but in order of increasing atomic number
   Metals and non-metals **not** at opposite ends

The Reactivity Series

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



Deliberate Practice Page 13

Q1.

(a) argon / Ar

1

(b) (i) 0

1

(ii) unreactive

1
[3]

Q2.

(a) (i) 2,4 drawn (as dots / crosses / e^-)

1

(ii) Water (vapour) / steam

allow hydrogen oxide / H_2O

*do **not** accept hydroxide*

1
[2]

Q3.

(a) Cu

1

2 CuO + C ➔ **2** Cu + CO_2

*allow 2 CuO + C ➔ Cu_2 + CO_2 for **1** mark*

1

(b) (i) iron is more reactive (than copper)

1

iron is cheap(er than copper)

*allow cheaper **or** uses less energy than electrolysis*

1

(ii) any **two** from:

- copper / ions move **or** are attracted to the negative electrode / *cathode*
- where they are reduced **or** gain (two) electrons
- *where they form copper (metal / atoms)*

2

[6]

Timeline Page 17

Do Now Page 18

1. What electromagnetic ray is also a form of radiation? Gamma (γ)

2. What is the photosynthesis equation? Carbon dioxide + Water → Glucose + Oxygen ($6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$)

3. What is the name of the sixth chemical element? Carbon (12 - C)

4. Which force keeps objects on Earth? Gravity

5. How many bonds are there in a sulfuric acid molecule? 6 (H_2SO_4)

6. What is ATP (in one word)? Energy (Adenosine triphosphate - $C_{10}H_{16}N_5O_{13}P_3$)

EDEx22

Lesson 3
DNA and Protein Synthesis

Biology

Taught By: Tyler Rocha

Scientific Advisors: Neo Skinner and Ephram Matocha