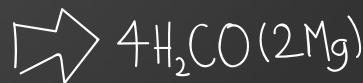
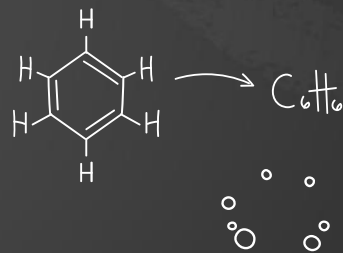
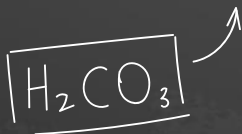
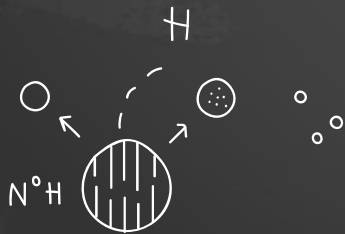
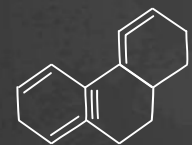




# Chemistry - 101

Let's continue the journey –  
December 20



# Periodic table of elements - properties of elements

Chemical properties of elements change periodically according to the charge of their nuclei

# Periodic table of the elements

group 1*																		18						
period	1	1	2												13	14	15	16	17	2				
	1	H																	5	6	7	8	9	10
	2	3	4											13	14	15	16	17	18					
	3	11	12	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18					
	4	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36					
	5	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54					
	6	55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86					
7	87	88	89	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118						

Alkali metals

Alkaline-earth metals

Transition metals

Other metals

Other nonmetals

Halogens

Noble gases

Rare-earth elements (21, 39, 57–71)  
and lanthanoid elements (57–71 only)

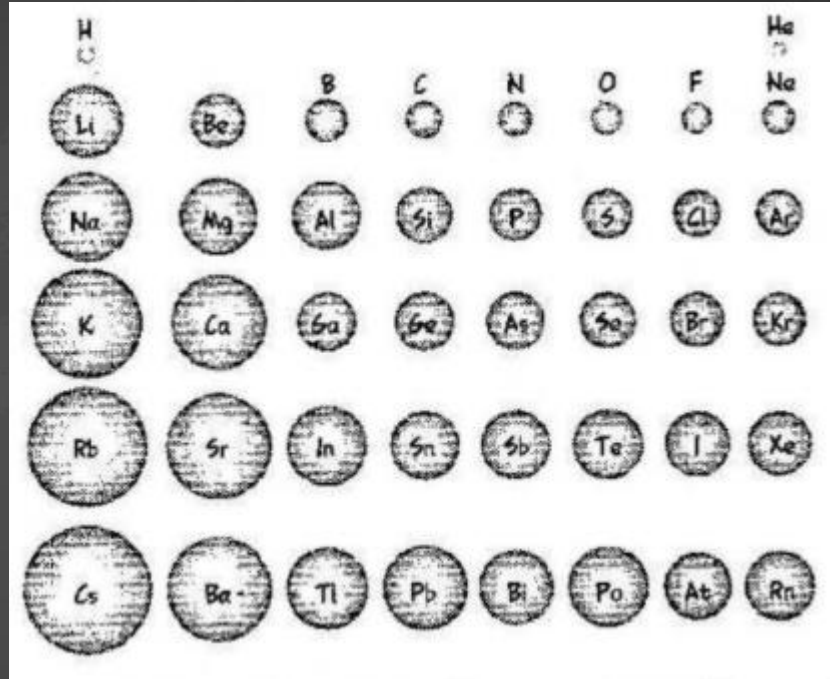
Actinoid elements

lanthanoid series 6	58	59	60	61	62	63	64	65	66	67	68	69	70	71
	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu
actinoid series 7	90	91	92	93	94	95	96	97	98	99	100	101	102	103
	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr

Going along a row from left to right, atoms get smaller, and moving down a column, they get bigger.

Moving to the right, the bigger charge of the nucleus pulls electrons closer in.

Going down a column, the outer electrons are in higher shells, hence farther away from the nucleus.



# Periodic table of the elements

Oxidizing and non-metallic properties

Reducing and metallic properties

Electronegativity

Reducing and metallic properties

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

# Metallic and non-metallic properties

## Properties of metals

- High density
- High melting and boiling points
- Good electrical conductivity
  - Shiny
  - Malleable (easy to shape)
- Ductile (easy to stretch into wires)
  - Reactive with nonmetals

## Properties of nonmetals

- Often liquid or gaseous at room temperature
  - Brittle when Solid
  - Dull-looking
- Poor electrical conductivity
- Reactive with metals (except for the last group)

This class uses the materials from the following books:

Larry Gonick and Graig Criddle “The cartoon guide to chemistry”

Manyuilov and Rodionov “Chemistry for children and adults”

Kuzmenko, Eremin, Popkov “Beginnings of chemistry”