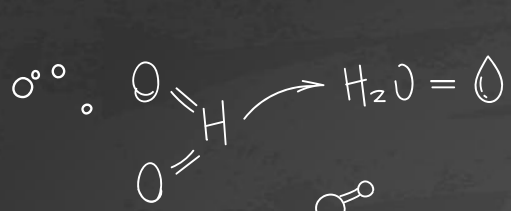
Chemistry - 101

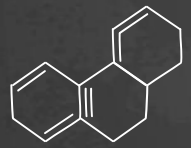
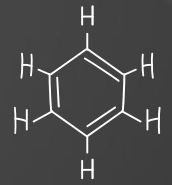
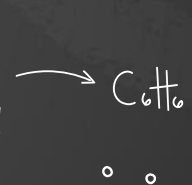
January 17

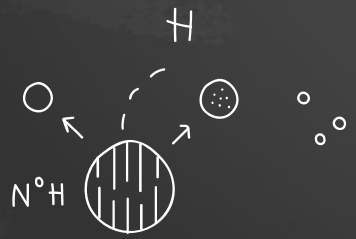


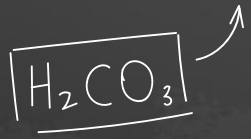




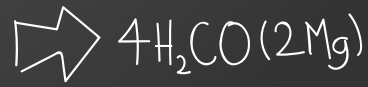


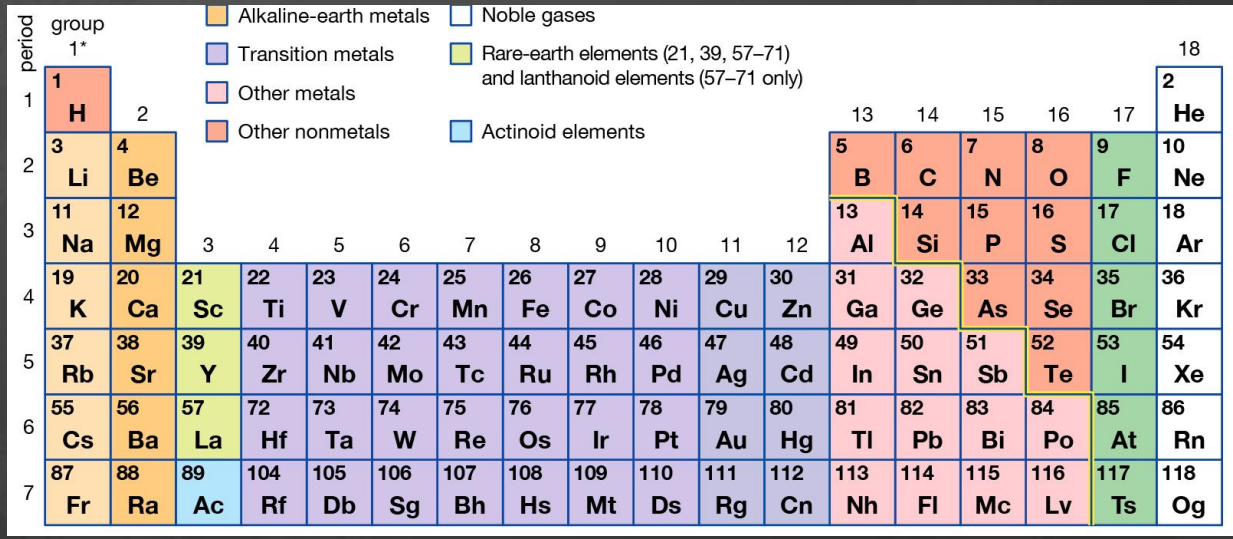







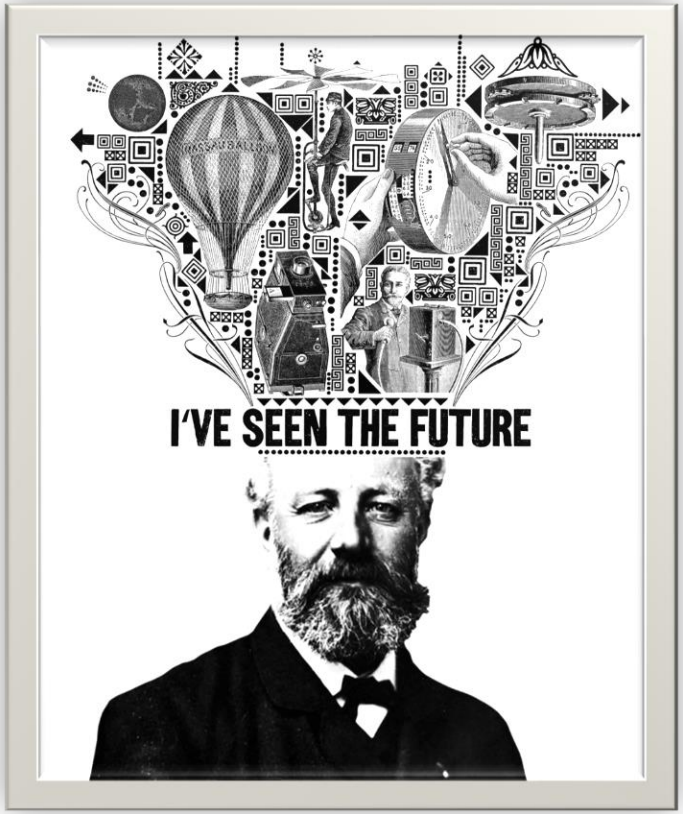







Alkaline-earth metals
Transition metals
Other metals
Other nonmetals
Noble gases
Rare-earth elements (21, 39, 57–71) and lanthanoid elements (57–71 only)
Actinoid elements
period
group 1*
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
1 H
2 He
3 Li
4 Be
5 B
6 C
7 N
8 O
9 F
10 Ne
11 Na
12 Mg
13 Al
14 Si
15 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
57 La
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
89 Ac
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

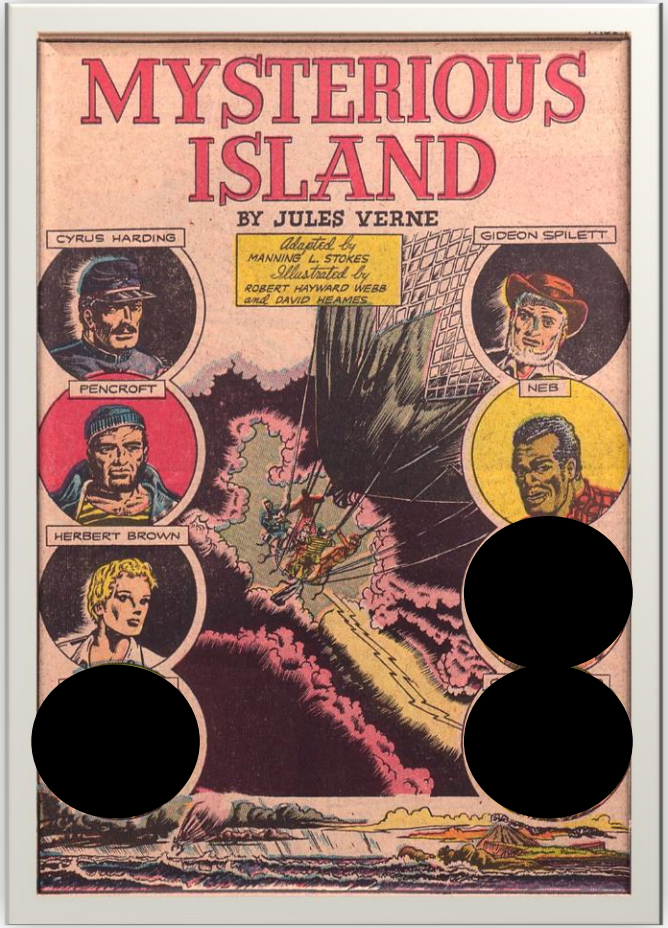
Jules Verne (1828 – 1905)



Silhouette de Jules Verne dessinée, peu de temps avant s

1898, 70 years old, more volumes of *Extraordinary Voyages* are still to come

The Mysterious Island 1874

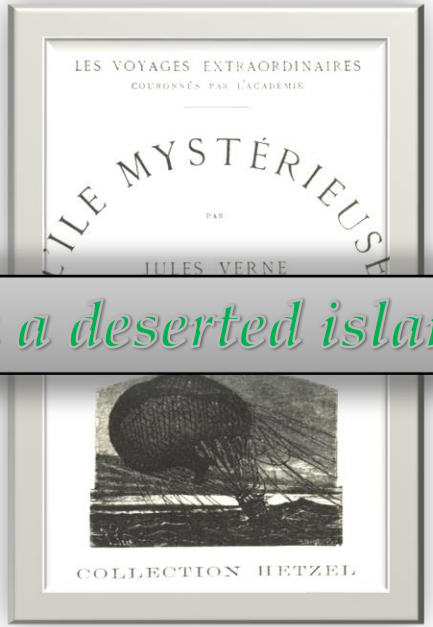


Some achievements of the castaways

- Fire
- Building materials
- Pottery
- Glass
- Sulfuric acid
- Nitric acid
- Soap
- Explosives

Some terms the reader needs to know:

Pyrites, coal, flint, sulphuret of iron, sulphate of iron, sulphate of alumina, azote of potash, salt of niter, saltpeter, carbonate of lime, quick lime, glycerine, slacking, calcination, decant, evaporated, crystallization…



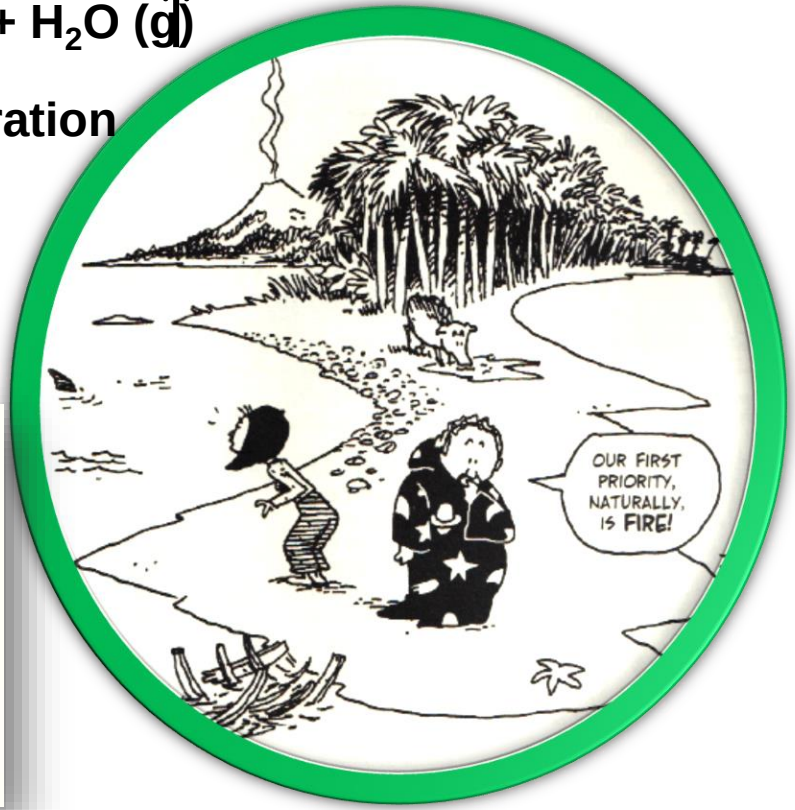
On a deserted island…

Combustion

Our priority naturally is Fire!

$$CH_2O(s) + O_2(g) \xrightarrow{\Delta} CO_2(g)\uparrow + H_2O\,(g)\uparrow$$

Water evaporation



Let's make a better fuel – charcoal

Limit access of oxygen – burn in a pit using wood and coconut shells

$$CH_2O(s) \xrightarrow{\Delta} C(s) + H_2O\,(g)\uparrow$$

Let's use charcoal to make our dinner

Build a stove and fuel it with charcoal

$$C(s) + O_2(g) \rightarrow CO_2(g)\uparrow$$

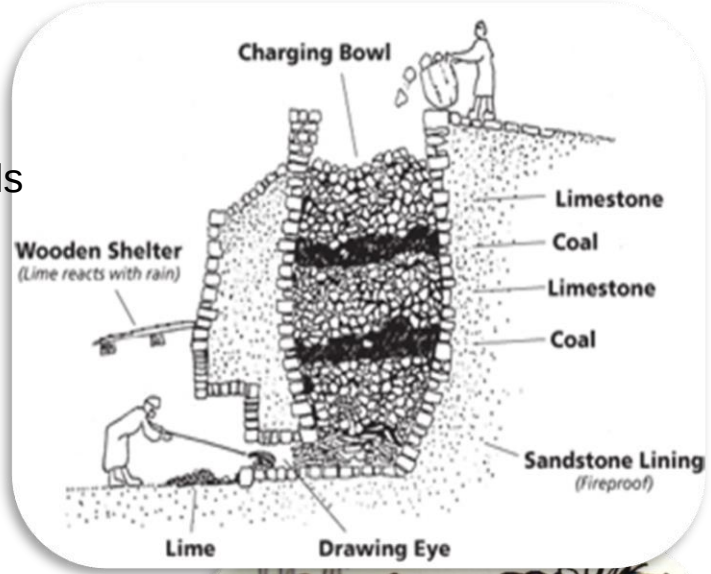
Building materials

Collect limestone, chalk, and/or seashells

calcination

limestone $\xrightarrow{\Delta}$ Quick lime

$$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)\uparrow$$



Slacked lime

$$CaO(s) + H_2O(l) \rightarrow Ca(OH)_2(aq)$$

$$Ca(OH)_2(s) + CO_2(g) \rightarrow CaCO_3(s) + H_2O(g$$

Limestone
Again!

Mixing CaO together with volcanic ash makes Roman cement.
Add water, sand and pebbles – concrete! Let's build!

Castaways mixed lime and sand to make mortar for their brick house

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”
http://school-collection.edu.ru (experiments)