

PERIODIC TABLE OF THE ELEMENTS



# CONVEGNO 2019 SCI DIVISIONE DI DIDATTICA CHIMICA

I giovani alla scoperta degli elementi:  
Chemical Quest  
Elementi Chimici....Facciamoci un Selfie



BOLOGNA 2 e 3 dicembre 2019



# ORO!!!

Bravissima la squadra Italiana che ha conseguito un risultato eccellente e un ringraziamento a tutti per l'impegno e l'entusiasmo dimostrato

.....Prof Giorgio Cevasco



**Marco Bussetti**

Ieri alle 18:14 • 🌐

Complimenti alla squadra italiana che alle Olimpiadi Internazionali della Chimica a **#Parigi** ha conquistato una Medaglia d'Oro, due d'Argento e una Menzione d'Onore. Un risultato storico che giunge dopo venti anni esatti dall'ultimo successo nel 1999. Bravi!

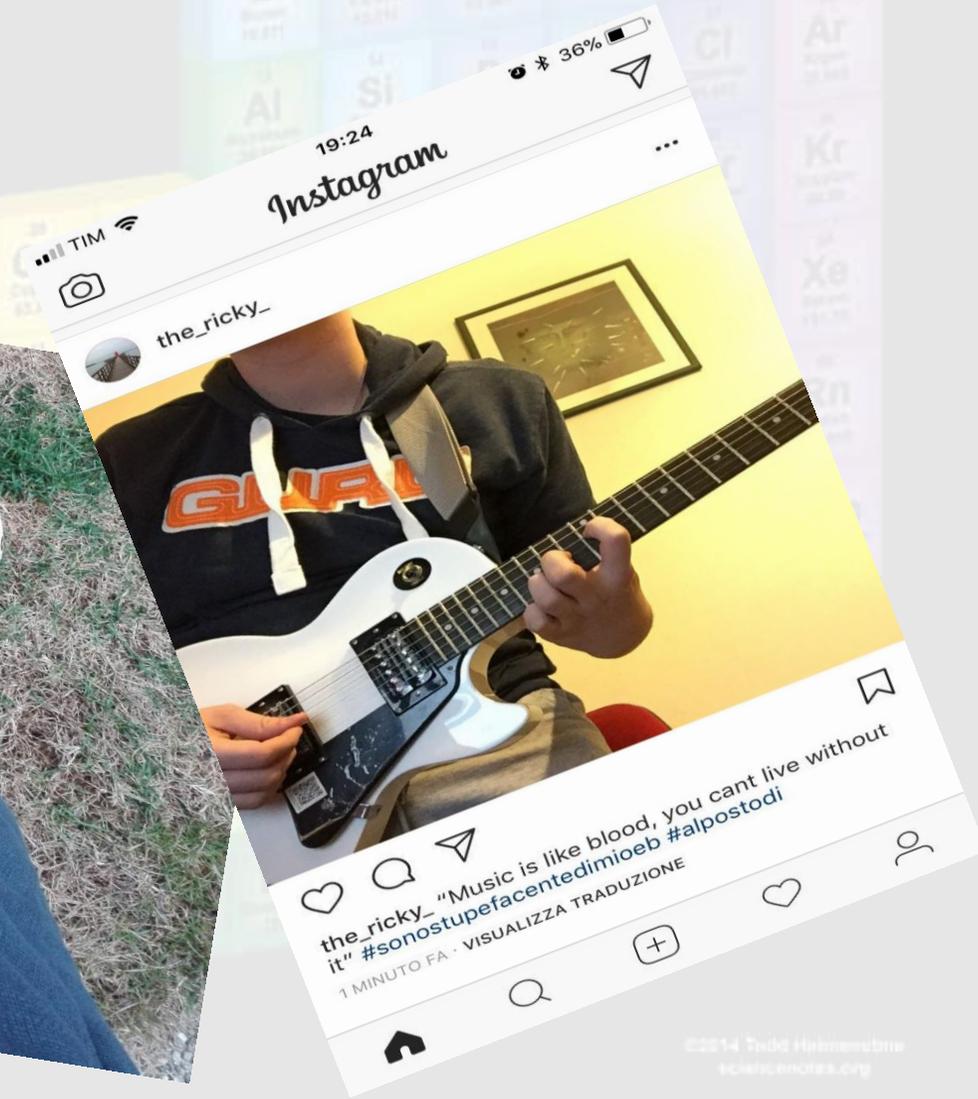
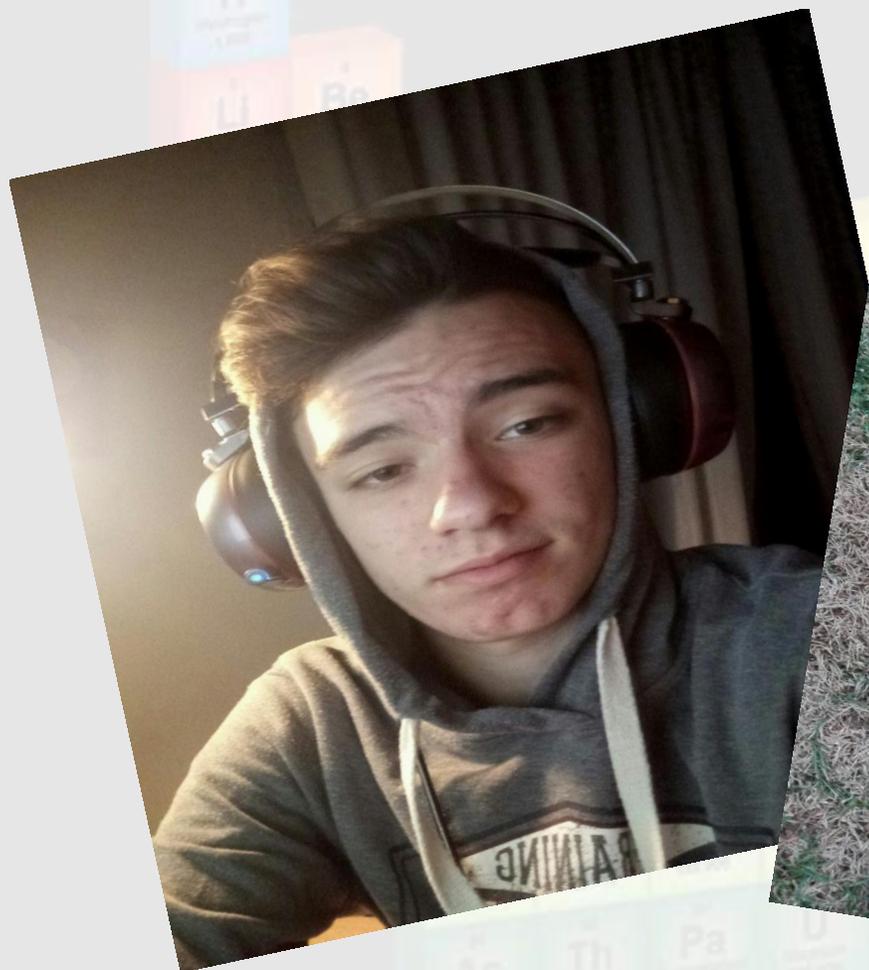


👍❤️😲 1.853

115 commenti • 253 condivisioni

COME SONO GLI STUDENTI DEL BIENNIO?

CHE INTERESSI HANNO?



# NELLA LORO VITA CHE POSTO OCCUPA LA CHIMICA?



1



2



3



4



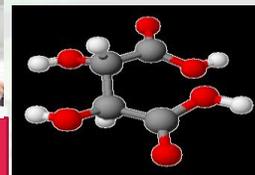
5



6



7



8

# PIANO LAUREE SCIENTIFICHE

Il Piano nazionale Lauree Scientifiche (PLS) è un progetto del MIUR essenzialmente mirato a sincronizzare il mondo della scuola e quello dell'Università.

A Padova sono attivi nove PLS, tra questi il PLS Chimica coordinato dalla prof.ssa Laura Orian, si distingue per la sua vivace creatività.

Nell'ultimo quadriennio ha creato una rete con 150 insegnanti delle scuole superiori coinvolgendoli in corsi di formazione, laboratori, convegni annuali e attività concrete di co progettazione che hanno visto con successo docenti universitari e di scuola fare divulgazione scientifica ad eventi come la Notte dei Ricercatori, Sperimentando e non ultimo.....



# YTMO UNIVERSITY SAN PIETROBURGO

..... la partecipazione con i  
più recenti lavori sulla tavola  
periodica realizzati sui banchi di  
scuola

“Elementi chimici....facciamoci  
un selfie”

e il gioco “Chemical quest”

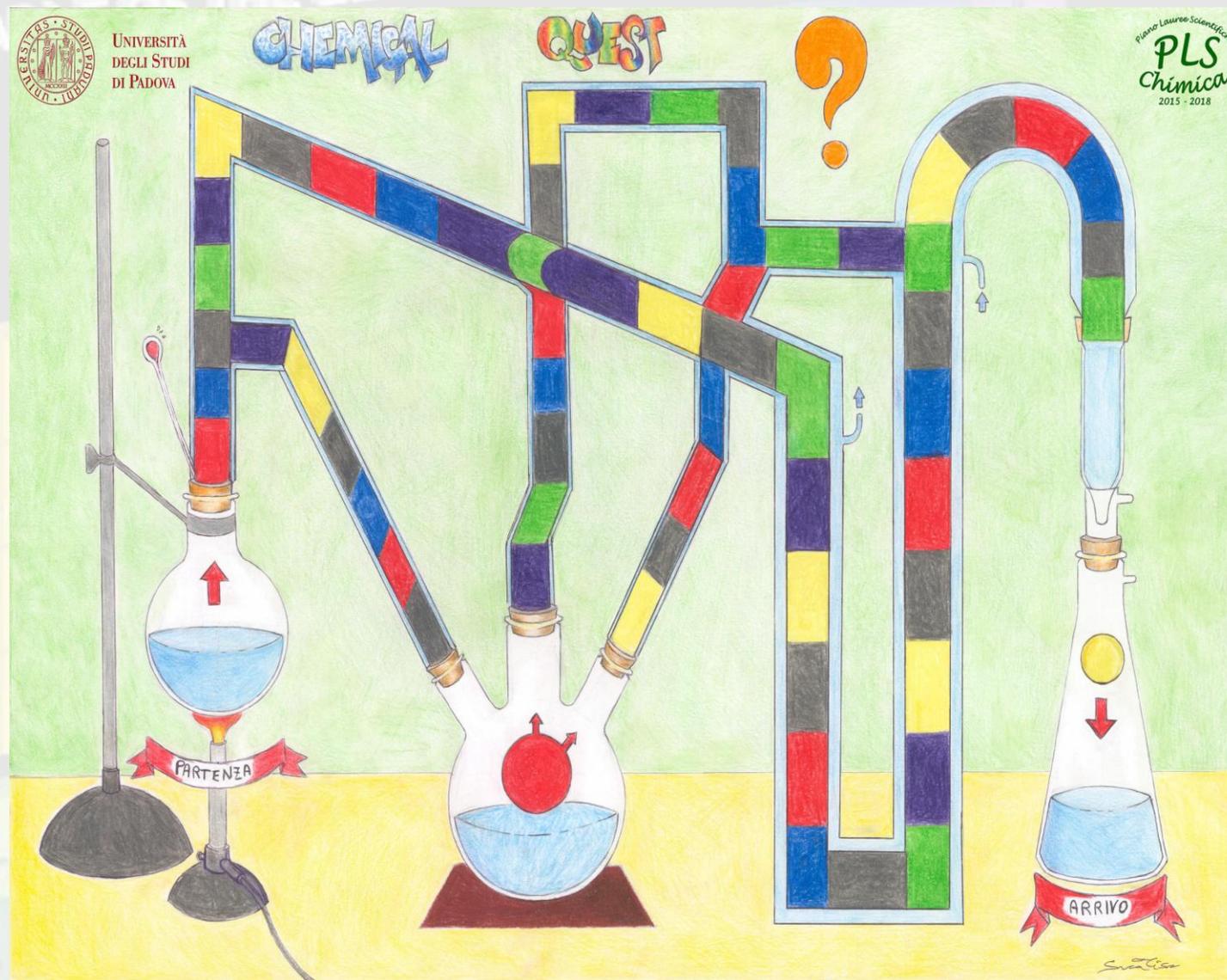


# CHEMICAL QUEST



E' un gioco a quiz basato su 102 elementi della tavola periodica, dall'Idrogeno al Nobelio, sviluppato in collaborazione tra docenti della scuola secondaria e del DiSC con lo scopo di aumentare l'interesse dei giovani studenti e degli adulti per la Chimica.

- Il gioco è una sfida tra squadre, spesso difficile, istruttiva, ma anche attraente e rilassante.
- La chimica e gli elementi sono il pretesto per conoscere musica, cinema, arte e storia, tecnologia e ovviamente tanta scienza!
- Tra domande precise, più o meno difficili, a volte assurde, lo scopo del gioco è quello di muoversi in un percorso all'interno di un coloratissimo *distillatore elettronico*, avanzando a turno in base al punteggio ottenuto con un super dado di gommapiuma.



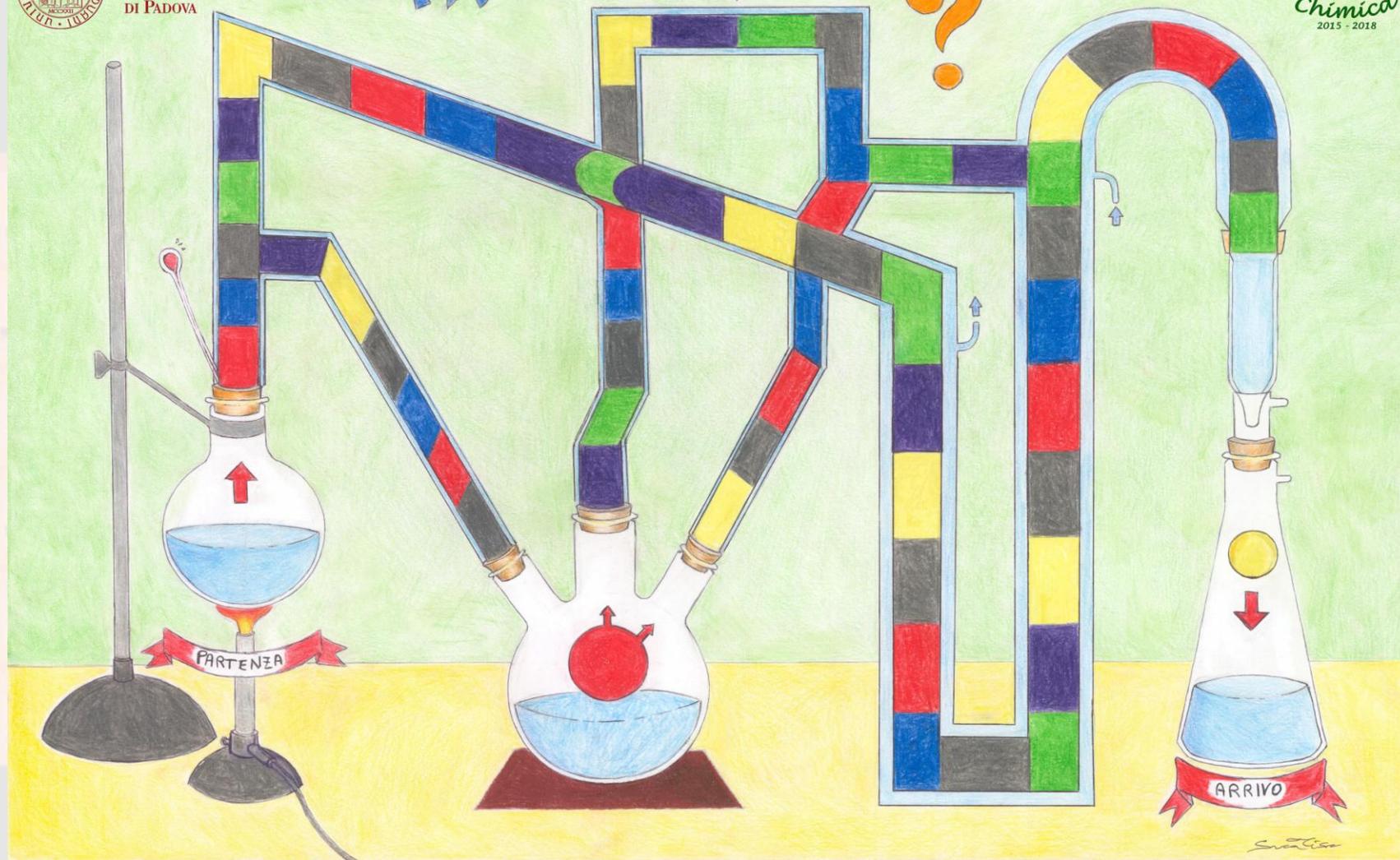


UNIVERSITÀ  
DEGLI STUDI  
DI PADOVA

# CHEMICAL QUEST



Piano Lauree Scientifiche  
**PLS**  
Chimica  
2015 - 2018



# NICKEL (Ni)

- ▶ The name "nickel" has scandinavian origins. It means:  
A. Worthless boy or *elf* B. Prince C. King
- ▶ The first commercial cinema in the US was opened in Pittsburg in 1904 and was called the "Nickelodeon".  
True False
- ▶ In which enzyme is nickel present in a complex with iron and sulphur?  
A. Hydrogenase B. Hydrolase C. Phosphokinase
- ▶ Where can we find nickel in the kitchen?  
A. In salami B. In kitchen utensils C. In common spices
- ▶ What is the common name for coins of low value made of nickel?

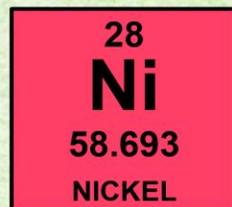
▶ A

▶ True

▶ A

▶ B

▶ Nickels



# LE SCHEDE DEL GIOCO

|                    |                   |                   |                     |                     |                    |                   |                    |                     |                    |                     |                     |                     |                     |                     |                    |                    |                     |                     |                     |                     |                     |                     |                    |                    |                    |                     |                    |                     |                     |                     |                     |                     |                    |                     |
|--------------------|-------------------|-------------------|---------------------|---------------------|--------------------|-------------------|--------------------|---------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|--------------------|--------------------|---------------------|--------------------|---------------------|---------------------|---------------------|---------------------|---------------------|--------------------|---------------------|
| 1<br>H<br>1.008    | 2<br>He<br>4.003  |                   |                     |                     |                    |                   |                    |                     |                    |                     |                     | 13<br>Al<br>26.981  | 14<br>Si<br>28.085  | 15<br>P<br>30.974   | 16<br>S<br>32.065  | 17<br>Cl<br>35.453 | 18<br>Ar<br>39.948  |                     |                     |                     |                     |                     |                    |                    |                    |                     |                    |                     |                     |                     |                     |                     |                    |                     |
| 3<br>Li<br>6.941   | 4<br>Be<br>9.012  | 5<br>B<br>10.811  | 6<br>C<br>12.011    | 7<br>N<br>14.007    | 8<br>O<br>15.999   | 9<br>F<br>18.998  | 10<br>Ne<br>20.180 | 11<br>Na<br>22.990  | 12<br>Mg<br>24.305 | 19<br>K<br>39.098   | 20<br>Ca<br>40.078  | 21<br>Sc<br>44.956  | 22<br>Ti<br>47.887  | 23<br>V<br>50.941   | 24<br>Cr<br>51.996 | 25<br>Mn<br>54.938 | 26<br>Fe<br>55.846  | 27<br>Co<br>58.933  | 28<br>Ni<br>58.693  | 29<br>Cu<br>63.546  | 30<br>Zn<br>65.409  | 31<br>Ga<br>69.723  | 32<br>Ge<br>72.64  | 33<br>As<br>74.922 | 34<br>Se<br>78.96  | 35<br>Br<br>79.904  | 36<br>Kr<br>83.798 |                     |                     |                     |                     |                     |                    |                     |
| 37<br>Rb<br>85.468 | 38<br>Sr<br>87.62 | 39<br>Y<br>88.906 | 40<br>Zr<br>91.224  | 41<br>Nb<br>92.906  | 42<br>Mo<br>95.94  | 43<br>Tc<br>98    | 44<br>Ru<br>101.07 | 45<br>Rh<br>102.905 | 46<br>Pd<br>106.42 | 47<br>Ag<br>107.868 | 48<br>Cd<br>112.411 | 49<br>In<br>114.818 | 50<br>Sn<br>118.710 | 51<br>Sb<br>121.760 | 52<br>Te<br>127.60 | 53<br>I<br>126.904 | 54<br>Xe<br>131.293 | 55<br>Cs<br>132.905 | 56<br>Ba<br>137.327 | 57<br>La<br>138.905 | 58<br>Ce<br>140.116 | 59<br>Pr<br>140.908 | 60<br>Nd<br>144.24 | 61<br>Pm<br>(145)  | 62<br>Sm<br>150.36 | 63<br>Eu<br>151.964 | 64<br>Gd<br>157.25 | 65<br>Tb<br>158.925 | 66<br>Dy<br>162.500 | 67<br>Ho<br>164.930 | 68<br>Er<br>167.259 | 69<br>Tm<br>168.934 | 70<br>Yb<br>173.04 | 71<br>Lu<br>174.967 |
| 87<br>Fr<br>(223)  | 88<br>Ra<br>(226) | 89<br>Ac<br>(227) | 90<br>Th<br>232.038 | 91<br>Pa<br>231.036 | 92<br>U<br>238.029 | 93<br>Np<br>(237) | 94<br>Pu<br>(244)  | 95<br>Am<br>(243)   | 96<br>Cm<br>(247)  | 97<br>Bk<br>(247)   | 98<br>Cf<br>(251)   | 99<br>Es<br>(252)   | 100<br>Fm<br>(257)  | 101<br>Md<br>(258)  | 102<br>No<br>(259) | 103<br>Lr<br>(262) |                     |                     |                     |                     |                     |                     |                    |                    |                    |                     |                    |                     |                     |                     |                     |                     |                    |                     |



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Padova Laurea Scientifica  
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# REGOLE DEL GIOCO

Ad ogni casella colorata in cui ci si ferma nel tabellone corrisponde una categoria di domande.

Il percorso da seguire viene deciso di volta in volta dalla squadra, che con il proprio segnalino, procede con lo scopo di conquistare nel suo pesafiltri perline di diversi colori, rispondendo esattamente ai quesiti.

Nel corso del gioco è possibile capitare su caselle grigie, che consentono di lanciare nuovamente il dado.



VINCE IL GIOCO LA SQUADRA CHE PER PRIMA ARRIVA ALLA BEUTA DEL DISTILLATO, CON 5 PERLINE DI DIVERSO COLORE NEL PROPRIO PESAFILTRI.

CHEMICAL QUEST È UN MODO DIVERTENTE PER IMPARARE QUALCOSA DI NUOVO SUGLI ELEMENTI ....INSIEME! !!!

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- ▶ The first commercial cinema in the US was opened in Pittsburgh in 1904 and was called the "Nickelodeon".  
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- ▶ What is the common name for coins of low value made of nickel?

---

- ▶ A
- ▶ True
- ▶ A
- ▶ B
- ▶ Nickels

28  
**Ni**  
58.693  
NICKEL

# HANNO GIOCATO CON NOI.....

Eric Scerri



Peter Atkins



# “ELEMENTI CHIMICI...FACCIAMOCI UN SELFIE”

PERIODIC TABLE OF THE ELEMENTS

| 1 | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 | 13 | 14  | 15  | 16  | 17  | 18  |     |
|---|----|----|----|----|----|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|
| 1 | H  |    |    |    |    |    |    |    |    |    |    |    |     |     |     |     | He  |     |
| 2 | Li | Be |    |    |    |    |    |    |    |    |    |    |     |     |     |     |     |     |
| 3 | Na | Mg |    |    |    |    |    |    |    |    |    | B  | C   | N   | O   | F   | Ne  |     |
| 4 | K  | Ca | Sc | Ti | V  | Cr | Mn | Fe | Co | Ni | Cu | Zn | Ga  | Ge  | As  | Se  | Br  | Kr  |
| 5 | Rb | Sr | Y  | Zr | Nb | Mo | Tc | Ru | Rh | Pd | Ag | Cd | In  | Sn  | Sb  | Te  | I   | Xe  |
| 6 | Cs | Ba |    | Hf | Ta | W  | Re | Os | Ir | Pt | Au | Hg | Tl  | Pb  | Bi  | Po  | At  | Rn  |
| 7 | Fr | Ra |    | Rf | Db | Sg | Bh | Hs | Mt | Ds | Rn | Cn | Uut | Uuq | Uup | Uuh | Uus | Uuo |
|   |    |    |    | La | Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy  | Ho  | Er  | Tm  | Yb  | Lu  |
|   |    |    |    | Ac | Th | Pa | U  | Np | Pu | Am | Cm | Bk | Cf  | Es  | Fm  | Md  | No  | Lr  |

PERIODIC TABLE OF THE ELEMENTS

# GLI STUDENTI PROTAGONISTI



# PERIODIC TABLE OF THE ELEMENTS

I LORO ELEMENTI...

|       |       |       |        |        |        |        |        |       |       |        |        |        |        |       |        |        |        |        |        |        |        |       |        |       |        |        |        |        |        |       |        |        |       |        |        |         |        |         |         |         |         |         |         |         |         |         |         |         |         |         |        |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |        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| 1     | 2     |       |        |        |        |        |        |       |       |        |        | 3      | 4      | 5     | 6      | 7      | 8      | 9      | 10     | 11     | 12     | 13    | 14     | 15    | 16     | 17     | 18     | 19     | 20     |       |        |        |       |        |        |         |        |         |         | 21      | 22      | 23      | 24      | 25      | 26      | 27      | 28      | 29      | 30      | 31      | 32     | 33      | 34      | 35      | 36      | 37      | 38      | 39      | 40      |         |         |         |         |         |         |         |         |         |         | 41      | 42      | 43      | 44      | 45      | 46      | 47      | 48      | 49      | 50      | 51      | 52      | 53      | 54      | 55      | 56      | 57      | 58      | 59      | 60      | 61      | 62      | 63      | 64      | 65      | 66      | 67      | 68      | 69      | 70      | 71      | 72      | 73      | 74      | 75      | 76      | 77      | 78      | 79      | 80      | 81      | 82      | 83      | 84      | 85      | 86      | 87      | 88      | 89      | 90      | 91      | 92      | 93      | 94      | 95      | 96      | 97      | 98      | 99      | 100     | 101     | 102     | 103     | 104     | 105     | 106     | 107     | 108     | 109     | 110     | 111     | 112     | 113     | 114     | 115     | 116     | 117     | 118     | 119     | 120     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |         |
| H     | Li    | Be    | Na     | Mg     | Al     | Si     | P      | S     | Cl    | Ar     | K      | Ca     | Sc     | Ti    | V      | Cr     | Mn     | Fe     | Co     | Ni     | Cu     | Zn    | Ga     | Ge    | As     | Se     | Br     | Kr     | Rb     | Sr    | Y      | Zr     | Nb    | Mo     | Tc     | Ru      | Rh     | Pd      | Ag      | Cd      | In      | Sn      | Pb      | Bi      | Po      | At      | Rn      | Cs      | Ba      | La      | Ce     | Pr      | Nd      | Pm      | Sm      | Eu      | Gd      | Tb      | Dy      | Ho      | Er      | Tm      | Yb      | Lu      | Fr      | Ra      | Ac      | Th      | Pa      | U       | Np      | Pu      | Am      | Cm      | Bk      | Cf      | Es      | Fm      | Md      | No      | Lr      | Uut     | Fu      | Uup     | Lv      | Uus     | Uuo     |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |         |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |   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       |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |          |         |
| 1.008 | 6.941 | 9.012 | 22.990 | 24.305 | 26.982 | 28.086 | 30.974 | 32.06 | 35.45 | 39.948 | 39.098 | 40.078 | 44.956 | 47.88 | 50.942 | 52.004 | 54.938 | 55.845 | 58.933 | 58.933 | 63.546 | 65.38 | 69.723 | 72.64 | 74.922 | 78.971 | 79.904 | 83.905 | 85.468 | 87.62 | 91.224 | 92.906 | 95.94 | 97.907 | 101.07 | 102.905 | 106.42 | 107.868 | 112.411 | 114.818 | 118.710 | 121.757 | 124.905 | 127.601 | 132.905 | 137.327 | 140.908 | 144.913 | 148.909 | 152.906 | 157.25 | 160.930 | 164.930 | 168.930 | 172.937 | 177.037 | 180.938 | 184.938 | 188.938 | 192.938 | 196.938 | 198.938 | 200.938 | 204.938 | 208.938 | 212.938 | 216.938 | 220.938 | 223.938 | 227.938 | 231.938 | 235.938 | 238.938 | 242.938 | 246.938 | 250.938 | 254.938 | 258.938 | 262.938 | 266.938 | 270.938 | 274.938 | 278.938 | 282.938 | 286.938 | 290.938 | 294.938 | 298.938 | 302.938 | 306.938 | 310.938 | 314.938 | 318.938 | 322.938 | 326.938 | 330.938 | 334.938 | 338.938 | 342.938 | 346.938 | 350.938 | 354.938 | 358.938 | 362.938 | 366.938 | 370.938 | 374.938 | 378.938 | 382.938 | 386.938 | 390.938 | 394.938 | 398.938 | 402.938 | 406.938 | 410.938 | 414.938 | 418.938 | 422.938 | 426.938 | 430.938 | 434.938 | 438.938 | 442.938 | 446.938 | 450.938 | 454.938 | 458.938 | 462.938 | 466.938 | 470.938 | 474.938 | 478.938 | 482.938 | 486.938 | 490.938 | 494.938 | 498.938 | 502.938 | 506.938 | 510.938 | 514.938 | 518.938 | 522.938 | 526.938 | 530.938 | 534.938 | 538.938 | 542.938 | 546.938 | 550.938 | 554.938 | 558.938 | 562.938 | 566.938 | 570.938 | 574.938 | 578.938 | 582.938 | 586.938 | 590.938 | 594.938 | 598.938 | 602.938 | 606.938 | 610.938 | 614.938 | 618.938 | 622.938 | 626.938 | 630.938 | 634.938 | 638.938 | 642.938 | 646.938 | 650.938 | 654.938 | 658.938 | 662.938 | 666.938 | 670.938 | 674.938 | 678.938 | 682.938 | 686.938 | 690.938 | 694.938 | 698.938 | 702.938 | 706.938 | 710.938 | 714.938 | 718.938 | 722.938 | 726.938 | 730.938 | 734.938 | 738.938 | 742.938 | 746.938 | 750.938 | 754.938 | 758.938 | 762.938 | 766.938 | 770.938 | 774.938 | 778.938 | 782.938 | 786.938 | 790.938 | 794.938 | 798.938 | 802.938 | 806.938 | 810.938 | 814.938 | 818.938 | 822.938 | 826.938 | 830.938 | 834.938 | 838.938 | 842.938 | 846.938 | 850.938 | 854.938 | 858.938 | 862.938 | 866.938 | 870.938 | 874.938 | 878.938 | 882.938 | 886.938 | 890.938 | 894.938 | 898.938 | 902.938 | 906.938 | 910.938 | 914.938 | 918.938 | 922.938 | 926.938 | 930.938 | 934.938 | 938.938 | 942.938 | 946.938 | 950.938 | 954.938 | 958.938 | 962.938 | 966.938 | 970.938 | 974.938 | 978.938 | 982.938 | 986.938 | 990.938 | 994.938 | 998.938 | 1002.938 | 1006.938 | 1010.938 | 1014.938 | 1018.938 | 1022.938 | 1026.938 | 1030.938 | 1034.938 | 1038.938 | 1042.938 | 1046.938 | 1050.938 | 1054.938 | 1058.938 | 1062.938 | 1066.938 | 1070.938 | 1074.938 | 1078.938 | 1082.938 | 1086.938 | 1090.938 | 1094.938 | 1098.938 | 1102.938 | 1106.938 | 1110.938 | 1114.938 | 1118.938 | 1122.938 | 1126.938 | 1130.938 | 1134.938 | 1138.938 | 1142.938 | 1146.938 | 1150.938 | 1154.938 | 1158.938 | 1162.938 | 1166.938 | 1170.938 | 1174.938 | 1178.938 | 1182.938 | 1186.938 | 1190.938 | 1194.938 | 1198.938 | 1202.938 | 1206.938 | 1210.938 | 1214.938 | 1218.938 | 1222.938 | 1226.938 | 1230.938 | 1234.938 | 1238.938 | 1242.938 | 1246.938 | 1250.938 | 1254.938 | 1258.938 | 1262.938 | 1266.938 | 1270.938 | 1274.938 | 1278.938 | 1282.938 | 1286.938 | 1290.938 | 1294.938 | 1298.938 | 1302.938 | 1306.938 | 1310.938 | 1314.938 | 1318.938 | 1322.938 | 1326.938 | 1330.938 | 1334.938 | 1338.938 | 1342.938 | 1346.938 | 1350.938 | 1354.938 | 1358.938 | 1362.938 | 1366.938 | 1370.938 | 1374.938 | 1378.938 | 1382.938 | 1386.938 | 1390.938 | 1394.938 | 1398.938 | 1402.938 | 1406.938 | 1410.938 | 1414.938 | 1418.938 | 1422.938 | 1426.938 | 1430.938 | 1434.938 | 1438.938 | 1442.938 | 1446.938 | 1450.938 | 1454.938 | 1458.938 | 1462.938 | 1466.938 | 1470.938 | 1474.938 | 1478.938 | 1482.938 | 1486.938 | 1490.938 | 1494.938 | 1498.938 | 1502.938 | 1506.938 | 1510.938 | 1514.938 | 1518.938 | 1522.938 | 1526.938 | 1530.938 | 1534.938 | 1538.938 | 1542.938 | 1546.938 | 1550.938 | 1554.938 | 1558.938 | 1562.938 | 1566.938 | 1570.938 | 1574.938 | 1578.938 | 1582.938 | 1586.938 | 1590.938 | 1594.938 | 1598.938 | 1602.938 | 1606.938 | 1610.938 | 1614.938 | 1618.938 | 1622.938 | 1626.938 | 1630.938 | 1634.938 | 1638.938 | 1642.938 | 1646.938 | 1650.938 | 1654.938 | 1658.938 | 1662.938 | 1666.938 | 1670.938 | 1674.938 | 1678.938 | 1682.938 | 1686.938 | 1690.938 | 1694.938 | 1698.938 | 1702.938 | 1706.938 | 1710.938 | 1714.938 | 1718.938 | 1722.938 | 1726.938 | 1730.938 | 1734.938 | 1738.938 | 1742.938 | 1746.938 | 1750.938 | 1754.938 | 1758.938 | 1762.938 | 1766.938 | 1770.938 | 1774.938 | 1778.938 | 1782.938 | 1786.938 | 1790.938 | 1794.938 | 1798.938 | 1802.938 | 1806.938 | 1810.938 | 1814.938 | 1818.938 | 1822.938 | 1826.938 | 1830.938 | 1834.938 | 1838.938 | 1842.938 | 1846.938 | 1850.938 | 1854.938 | 1858.938 | 1862.938 | 1866.938 | 1870.938 | 1874.938 | 1878.938 | 1882.938 | 1886.938 | 1890.938 | 1894.938 | 1898.938 | 1902.938 | 1906.938 | 1910.938 | 1914.938 | 1918.938 | 1922.938 | 1926.938 | 1930.938 | 1934.938 | 1938.938 | 1942.938 | 1946.938 | 1950.938 | 1954.938 | 1958.938 | 1962.938 | 1966.938 | 1970.938 | 1974.938 | 1978.938 | 1982.938 | 1986.938 | 1990.938 | 1994.938 | 1998.938 | 2002.938 | 2006.938 | 2010.938 | 2014.938 | 2018.938 | 2022.938 | 2026.938 | 2030.938 | 2034.938 | 2038.938 | 2042.938 | 2046.938 | 2050.938 | 2054.938 | 2058.938 | 2062.938 | 2066.938 | 2070.938 | 2074.938 | 2078.938 | 2082.938 | 2086.938 | 2090.938 | 2094.938 | 2098.938 | 2102.938 | 2106.938 | 2110.938 | 2114.938 | 2118.938 | 2122.938 | 2126.938 | 2130.938 | 2134.938 | 2138.938 | 2142.938 | 2146.938 | 2150.938 | 2154.938 | 2158.938 | 2162.938 | 2166.938 | 2170.938 | 2174.938 | 2178.938 | 2182.938 | 2186.938 | 2190.938 | 2194.938 | 2198.938 | 2202.938 | 2206.938 | 2210.938 | 2214.938 | 2218.938 | 2222.938 | 2226.938 | 2230.938 | 2234.938 | 2238.938 | 2242.938 | 2246.938 | 2250.938 | 2254.938 | 2258.938 | 2262.938 | 2266.938 | 2270.938 | 2274.938 | 2278.938 | 2282.938 | 2286.938 | 2290.938 | 2294.938 | 2298.938 | 2302.938 | 2306.938 | 2310.938 | 2314.938 | 2318.938 | 2322.938 | 2326.938 | 2330.938 | 2334.938 | 2338.938 | 2342.938 | 2346.938 | 2350.938 | 2354.938 | 2358.938 | 2362.938 | 2366.938 | 2370.938 | 2374.938 | 2378.938 | 2382.938 | 2386.938 | 2390.938 | 2394.938 | 2398.938 | 2402.938 | 2406.938 | 2410.938 | 2414.938 | 2418.938 | 2422.938 | 2426.938 | 2430.938 | 2434.938 | 2438.938 | 2442.938 | 2446.938 | 2450.938 | 2454.938 | 2458.938 | 2462.938 | 2466.938 | 2470.938 | 2474.938 | 2478.938 | 2482.938 | 2486.938 | 2490.938 | 2494.938 | 2498.938 | 2502.938 | 2506.938 | 2510.938 | 2514.938 | 2518.938 | 2522.938 | 2526.938 | 2530.938 | 2534.938 | 2538.938 | 2542.938 | 2546.938 | 2550.938 | 2554.938 | 2558.938 | 2562.938 | 2566.938 | 2570.938 | 2574.938 | 2578.938 | 2582.938 | 2586.938 | 2590.938 | 2594.938 | 2598.938 | 2602.938 | 2606.938 | 2610.938 | 2614.938 | 2618.938 | 2622.938 | 2626.938 | 2630.938 | 2634.938 | 2638.938 | 2642.938 | 2646.938 | 2650.938 | 2654.938 | 2658.938 | 2662.938 | 2666.938 | 2670.938 | 2674.938 | 2678.938 | 2682.938 | 2686.938 | 2690.938 | 2694.938 | 2698.938 | 2702.938 | 2706.938 | 2710.938 | 2714.938 | 2718.938 | 2722.938 | 2726.938 | 2730.938 | 2734.938 | 2738.938 | 2742.938 | 2746.938 | 2750.938 | 2754.938 | 2758.938 | 2762.938 | 2766.938 | 2770.938 | 2774.938 | 2778.938 | 2782.938 | 2786.938 | 2790.938 | 2794.938 | 2798.938 | 2802.938 | 2806.938 | 2810.938 | 2814.938 | 2818.938 | 2822.938 | 2826.938 | 2830.938 | 2834.938 | 2838.938 | 2842.938 | 2846.938 | 2850.938 | 2854.938 | 2858.938 | 2862.938 | 2866.938 | 2870.938 | 2874.938 | 2878.938 | 2882.938 | 2886.938 | 2890.938 | 2894.938 | 2898.938 | 2902.938 | 2906.938 | 2910.938 | 2914.938 | 2918.938 | 2922.938 | 2926.938 | 2930.938 | 2934.938 | 2938.938 | 2942.938 | 2946.938 | 2950.938 | 2954.938 | 2958.938 | 2962.938 | 2966.938 | 2970.938 | 2974.938 | 2978.938 | 2982.938 | 2986.938 | 2990.938 | 2994.938 | 2998.938 | 3002.938 | 3006.938 | 3010.938 | 3014.938 | 3018.938 | 3022.938 | 3026.938 | 3030.938 | 3034.938 | 3038.938 | 3042.938 | 3046.938 | 3050.938 | 3054.938 | 3058.938 | 3062.938 | 3066.938 | 3070.938 | 3074.938 | 3078.938 | 3082.938 | 3086.938 | 3090.938 | 3094.938 | 3098.938 | 3102.938 | 3106.938 | 3110.938 | 3114.938 | 3118.938 | 3122.938 | 3126.938 | 3130.938 | 3134.938 | 3138.938 | 3142.938 | 3146.938 | 3150.938 | 3154.938 | 3158.938 | 3162.938 | 3166.938 | 3170.938 | 3174.938 | 3178.938 | 3182.938 | 3186.938 | 3190.938 | 3194.938 | 3198.938 | 3202.938 | 3206.938 | 3210.938 | 3214.938 | 3218.938 | 3222.938 | 3226.938 | 3230.938 | 3234.938 | 3238.938 | 3242.938 | 3246.938 | 3250.938 | 3254.938 | 3258.938 | 3262.938 | 3266.938 | 3270.938 | 3274.938 | 3278.938 | 3282.938 | 3286.938 | 3290.938 | 3294.938 | 3298.938 | 3302.938 | 3306.938 | 3310.938 | 3314.938 | 3318.938 | 3322.938 | 3326.938 | 3330.938 | 3334.938 | 3338.938 | 3342.938 | 3346.938 | 3350.938 | 3354.938 | 3358.938 | 3362.938 | 3366.938 | 3370.938 | 3374.938 | 3378.93 |

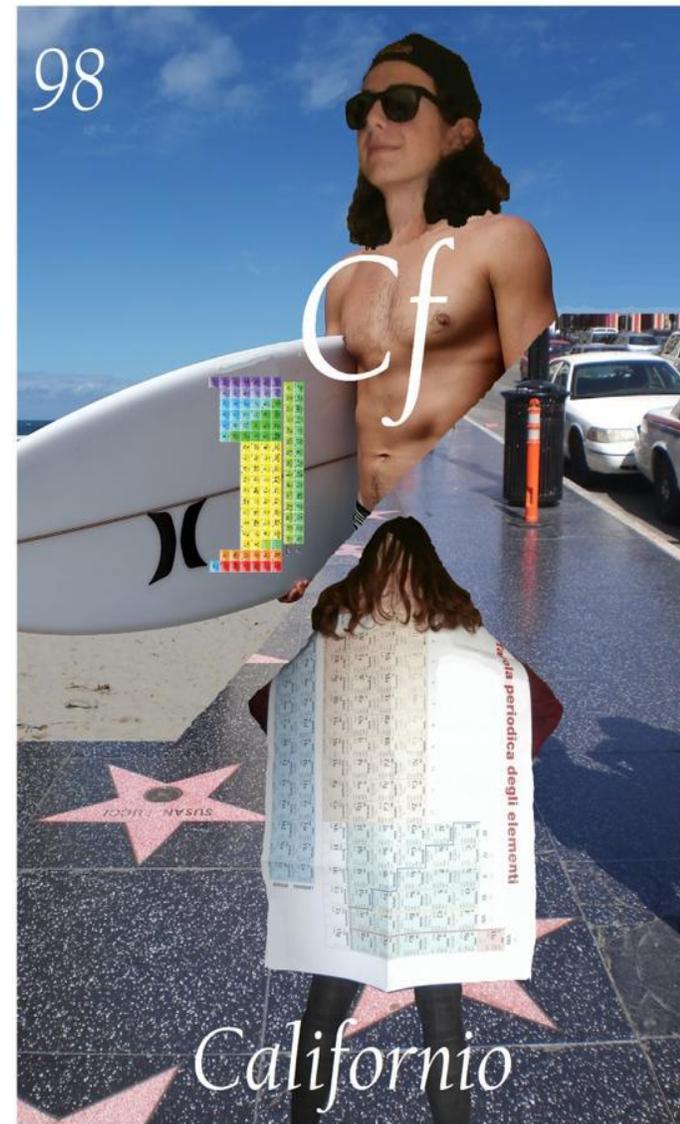
PERIODIC TABLE OF THE ELEMENTS



TABLE OF THE ELEMENTS



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PERIODIC TABLE OF

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|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |     |    |     |             |     |          |     |            |     |    |     |    |     |    |     |    |     |    |     |    |     |              |     |         |     |           |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----|----|-----|-------------|-----|----------|-----|------------|-----|----|-----|----|-----|----|-----|----|-----|----|-----|----|-----|--------------|-----|---------|-----|-----------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| 1  | H  | 2  | He |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    | 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 |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 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 |    |    |    |    |
| 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        |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 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 |
| 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 | 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 |    |    |
| 55 | Cs | 56 | Ba | 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         | 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 |    |    |    |    |    |    |    |    |
| 73 | Fr | 74 | Ra | 75 | Ac | 76 | Th | 77 | Pa | 78 | U  | 79 | Np | 80 | Pu | 81 | Am | 82 | Cm | 83 | Bk | 84 | Cf | 85 | Es | 86  | Fm | 87  | Mendelevium | 88  | Nobelium | 89  | Lawrencium | 90  | Rf | 91  | Db | 92  | Sg | 93  | Bh | 94  | Hs | 95  | Mt | 96  | Darmstadtium | 97  | Bohrium | 98  | Oganesson |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 87 | Fr | 88 | Ra | 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 | Mendelevium | 102 | Nobelium | 103 | Lawrencium | 104 | Rf | 105 | Db | 106 | Sg | 107 | Bh | 108 | Hs | 109 | Mt | 110 | Darmstadtium | 111 | Bohrium | 112 | Oganesson |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |





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PERIODIC TABLE OF THE ELEMENTS



# PERIODIC TABLE OF THE ELEMENTS

<https://pls.sienze.unipd.it/tavolaperiodica/TavoIPeriodica.html>

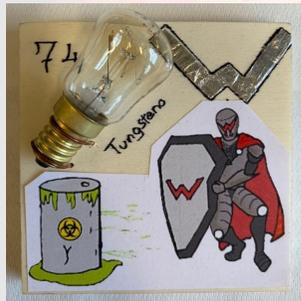


# PERIODIC TABLE OF THE ELEMENTS

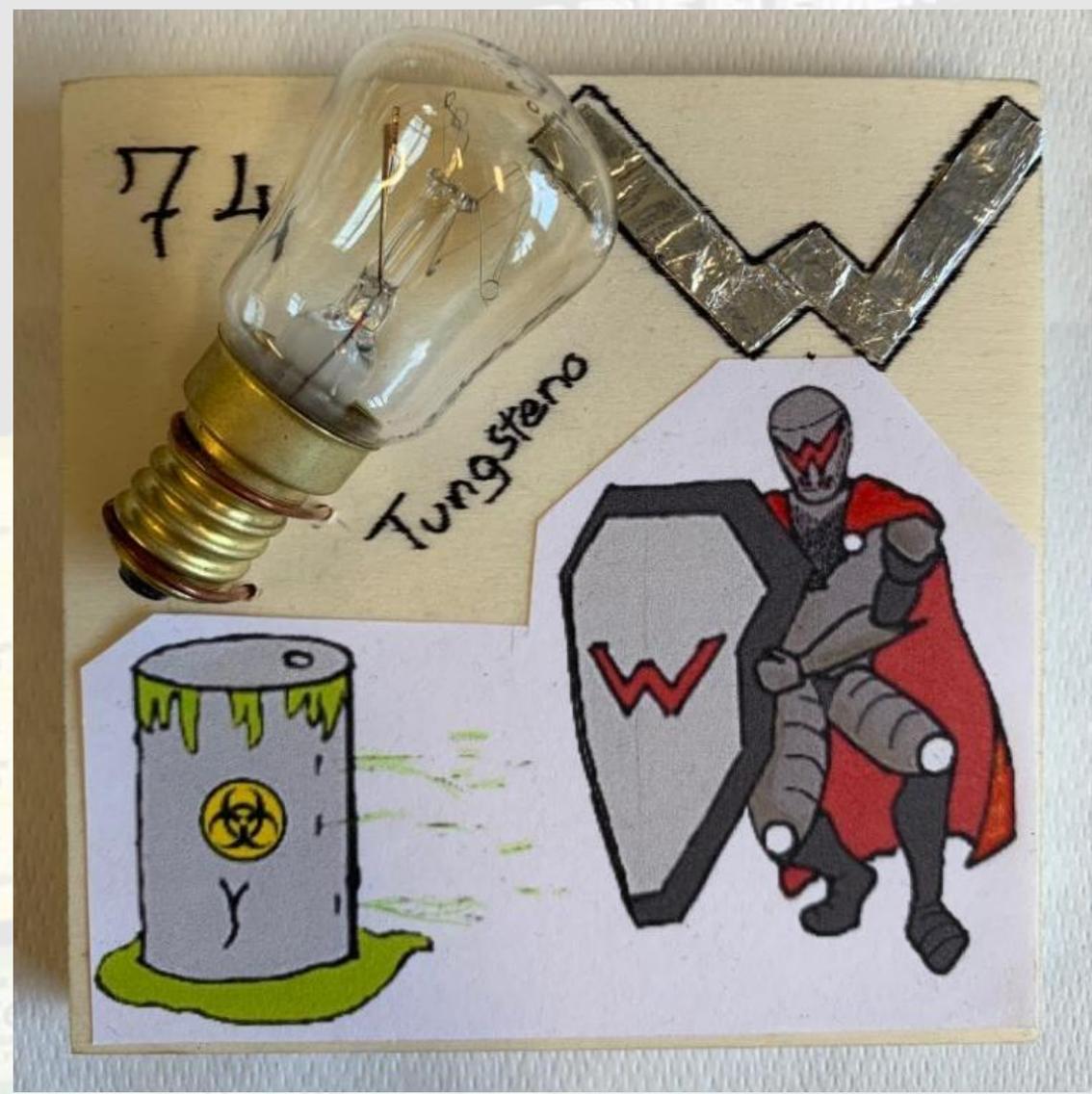
....COMING SOON



# PERIODIC TABLE OF THE ELEMENTS



# PERIODIC ELEMENTS



|    |    |
|----|----|
| H  | He |
| Li | Be |
| Na | Mg |
| K  | Ca |
| Rb | Sr |
| Cs | Ba |
| Fr | Ra |

|    |    |
|----|----|
| Sc | Ti |
| Y  | Zr |
| Hf |    |
| Rf |    |

|     |    |     |     |
|-----|----|-----|-----|
| N   | O  | F   | Ne  |
| P   | S  | Cl  | Ar  |
| As  | Se | Br  | Kr  |
| Sb  | Te | I   | Xe  |
| Bi  | Po | At  | Rn  |
| Uup | Lv | Uus | Uuo |
| Tm  | Yb | Lu  |     |
| Md  | No | Lr  |     |

# ELEMENTS



|    |    |
|----|----|
| H  | He |
| Li | Be |
| Na | Mg |
| K  | Ca |
| Rb | Sr |
| Cs | Ba |
| Fr | Ra |

|     |    |     |     |
|-----|----|-----|-----|
| N   | O  | F   | Ne  |
| P   | S  | Cl  | Ar  |
| As  | Se | Br  | Kr  |
| Sb  | Te | I   | Xe  |
| Bi  | Po | At  | Rn  |
| Uup | Lv | Uus | Uuo |

|    |    |    |   |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|
| Sc | Ti |    |   |    |    |    |    |    |    |    |    |    |    |    |
| Y  | Zr |    |   |    |    |    |    |    |    |    |    |    |    |    |
| Hf |    |    |   |    |    |    |    |    |    |    |    |    |    |    |
| Rf |    |    |   |    |    |    |    |    |    |    |    |    |    |    |
| La | Ce |    |   |    |    |    |    |    |    |    |    |    |    |    |
| Ac | Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |

|    |    |    |
|----|----|----|
| Tm | Yb | Lu |
| Md | No | Lr |



|    |    |
|----|----|
| H  | He |
| Li | Be |
| Na | Mg |
| K  | Ca |
| Rb | Sr |
| Cs | Ba |
| Fr | Ra |
| La | Ce |
| Ac | Th |

|     |    |     |     |
|-----|----|-----|-----|
| N   | O  | F   | Ne  |
| P   | S  | Cl  | Ar  |
| As  | Se | Br  | Kr  |
| Sb  | Te | I   | Xe  |
| Bi  | Po | At  | Rn  |
| Uup | Lv | Uus | Uuo |
| Tm  | Yb | Lu  |     |
| Md  | No | Lr  |     |

# PERIODIC ELEMENTS





|                                  |                                |                                    |                                 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
|----------------------------------|--------------------------------|------------------------------------|---------------------------------|--------------------------------|--------------------------------|--------------------------------|-----------------------------|--------------------------------|----------------------------------|----------------------------------|------------------------------|----------------------------------|-------------------------------|---------------------------------|
| 1<br>H<br>Hydrogen<br>1.008      | 2<br>He<br>Helium<br>4.003     |                                    |                                 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 3<br>Li<br>Lithium<br>6.941      | 4<br>Be<br>Beryllium<br>9.012  |                                    |                                 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 5<br>Na<br>Sodium<br>22.990      | 6<br>Mg<br>Magnesium<br>24.305 |                                    |                                 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 7<br>K<br>Potassium<br>39.098    | 8<br>Ca<br>Calcium<br>40.078   | 9<br>Sc<br>Scandium<br>44.956      | 10<br>Ti<br>Titanium<br>47.88   |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 11<br>Rb<br>Rubidium<br>85.468   | 12<br>Sr<br>Strontium<br>87.62 | 13<br>Y<br>Yttrium<br>88.906       | 14<br>Zr<br>Zirconium<br>91.224 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 15<br>Cs<br>Cesium<br>132.905    | 16<br>Ba<br>Barium<br>137.327  | 17<br>Hf<br>Hafnium<br>178.49      |                                 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 18<br>Fr<br>Francium<br>[223]    | 19<br>Ra<br>Radium<br>[226]    | 20<br>Rf<br>Rutherfordium<br>[261] |                                 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 21<br>La<br>Lanthanum<br>138.905 | 22<br>Ce<br>Cerium<br>140.12   |                                    |                                 |                                |                                |                                |                             |                                |                                  |                                  |                              |                                  |                               |                                 |
| 23<br>Ac<br>Actinium<br>[227]    | 24<br>Th<br>Thorium<br>[232]   | 25<br>Pa<br>Protactinium<br>[231]  | 26<br>U<br>Uranium<br>[238]     | 27<br>Np<br>Neptunium<br>[237] | 28<br>Pu<br>Plutonium<br>[244] | 29<br>Am<br>Americium<br>[243] | 30<br>Cm<br>Curium<br>[247] | 31<br>Bk<br>Berkelium<br>[247] | 32<br>Cf<br>Californium<br>[251] | 33<br>Es<br>Einsteinium<br>[252] | 34<br>Fm<br>Fermium<br>[257] | 35<br>Md<br>Mendelevium<br>[258] | 36<br>No<br>Nobelium<br>[259] | 37<br>Lr<br>Lawrencium<br>[262] |

|                                |                                 |                                  |                                 |                                     |                                 |                                 |                                 |                                 |                                  |                                |                                  |                                  |                                |                                   |                                  |                                  |                                     |                                 |                                  |                                |                               |                                  |                                    |                                   |                                   |                                 |                                 |                                 |                                   |                                    |                                   |
|--------------------------------|---------------------------------|----------------------------------|---------------------------------|-------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|----------------------------------|--------------------------------|----------------------------------|----------------------------------|--------------------------------|-----------------------------------|----------------------------------|----------------------------------|-------------------------------------|---------------------------------|----------------------------------|--------------------------------|-------------------------------|----------------------------------|------------------------------------|-----------------------------------|-----------------------------------|---------------------------------|---------------------------------|---------------------------------|-----------------------------------|------------------------------------|-----------------------------------|
| 1<br>H<br>Hydrogen<br>1.008    | 2<br>He<br>Helium<br>4.003      |                                  |                                 |                                     |                                 |                                 |                                 |                                 |                                  |                                |                                  |                                  |                                |                                   |                                  |                                  |                                     |                                 |                                  |                                |                               |                                  |                                    |                                   |                                   |                                 |                                 |                                 |                                   |                                    |                                   |
| 3<br>Li<br>Lithium<br>6.941    | 4<br>Be<br>Beryllium<br>9.012   | 5<br>B<br>Boron<br>10.811        | 6<br>C<br>Carbon<br>12.011      | 7<br>N<br>Nitrogen<br>14.007        | 8<br>O<br>Oxygen<br>15.999      | 9<br>F<br>Fluorine<br>18.998    | 10<br>Ne<br>Neon<br>20.180      |                                 |                                  |                                |                                  |                                  |                                |                                   |                                  |                                  |                                     |                                 |                                  |                                |                               |                                  |                                    |                                   |                                   |                                 |                                 |                                 |                                   |                                    |                                   |
| 11<br>Na<br>Sodium<br>22.990   | 12<br>Mg<br>Magnesium<br>24.305 | 13<br>Al<br>Aluminum<br>26.982   | 14<br>Si<br>Silicon<br>28.086   | 15<br>P<br>Phosphorus<br>30.974     | 16<br>S<br>Sulfur<br>32.06      | 17<br>Cl<br>Chlorine<br>35.45   | 18<br>Ar<br>Argon<br>39.948     |                                 |                                  |                                |                                  |                                  |                                |                                   |                                  |                                  |                                     |                                 |                                  |                                |                               |                                  |                                    |                                   |                                   |                                 |                                 |                                 |                                   |                                    |                                   |
| 19<br>K<br>Potassium<br>39.098 | 20<br>Ca<br>Calcium<br>40.078   | 21<br>Sc<br>Scandium<br>44.956   | 22<br>Ti<br>Titanium<br>47.88   | 23<br>V<br>Vanadium<br>50.942       | 24<br>Cr<br>Chromium<br>51.996  | 25<br>Mn<br>Manganese<br>54.938 | 26<br>Fe<br>Iron<br>55.845      | 27<br>Co<br>Cobalt<br>58.933    | 28<br>Ni<br>Nickel<br>58.693     | 29<br>Cu<br>Copper<br>63.546   | 30<br>Zn<br>Zinc<br>65.38        | 31<br>Ga<br>Gallium<br>69.723    | 32<br>Ge<br>Germanium<br>72.63 | 33<br>As<br>Arsenic<br>74.922     | 34<br>Se<br>Selenium<br>78.96    | 35<br>Br<br>Bromine<br>79.904    | 36<br>Kr<br>Krypton<br>83.8         |                                 |                                  |                                |                               |                                  |                                    |                                   |                                   |                                 |                                 |                                 |                                   |                                    |                                   |
| 37<br>Rb<br>Rubidium<br>85.468 | 38<br>Sr<br>Strontium<br>87.62  | 39<br>Y<br>Yttrium<br>88.906     | 40<br>Zr<br>Zirconium<br>91.224 | 41<br>Nb<br>Niobium<br>92.906       | 42<br>Mo<br>Molybdenum<br>95.94 | 43<br>Tc<br>Technetium<br>[98]  | 44<br>Ru<br>Ruthenium<br>101.07 | 45<br>Rh<br>Rhodium<br>102.905  | 46<br>Pd<br>Palladium<br>106.36  | 47<br>Ag<br>Silver<br>107.868  | 48<br>Cd<br>Cadmium<br>112.411   | 49<br>In<br>Indium<br>114.818    | 50<br>Sn<br>Tin<br>118.710     | 51<br>Sb<br>Antimony<br>121.757   | 52<br>Te<br>Tellurium<br>127.6   | 53<br>I<br>Iodine<br>126.905     | 54<br>Xe<br>Xenon<br>131.29         |                                 |                                  |                                |                               |                                  |                                    |                                   |                                   |                                 |                                 |                                 |                                   |                                    |                                   |
| 55<br>Cs<br>Cesium<br>132.905  | 56<br>Ba<br>Barium<br>137.327   | 57<br>La<br>Lanthanum<br>138.905 | 58<br>Ce<br>Cerium<br>140.12    | 59<br>Pr<br>Praseodymium<br>140.908 | 60<br>Nd<br>Neodymium<br>144.24 | 61<br>Pm<br>Promethium<br>[145] | 62<br>Sm<br>Samarium<br>150.36  | 63<br>Eu<br>Europium<br>151.964 | 64<br>Gd<br>Gadolinium<br>157.25 | 65<br>Tb<br>Terbium<br>158.925 | 66<br>Dy<br>Dysprosium<br>162.50 | 67<br>Ho<br>Holmium<br>164.930   | 68<br>Er<br>Erbium<br>167.259  | 69<br>Tm<br>Thulium<br>168.934    | 70<br>Yb<br>Ytterbium<br>173.054 | 71<br>Lu<br>Lutetium<br>174.967  | 72<br>Hf<br>Hafnium<br>178.49       | 73<br>Ta<br>Tantalum<br>180.948 | 74<br>W<br>Tungsten<br>183.84    | 75<br>Re<br>Rhenium<br>186.207 | 76<br>Os<br>Osmium<br>190.23  | 77<br>Ir<br>Iridium<br>192.222   | 78<br>Pt<br>Platinum<br>195.084    | 79<br>Au<br>Gold<br>196.967       | 80<br>Hg<br>Mercury<br>200.59     | 81<br>Tl<br>Thallium<br>204.387 | 82<br>Pb<br>Lead<br>207.2       | 83<br>Bi<br>Bismuth<br>208.980  | 84<br>Po<br>Polonium<br>[209]     | 85<br>At<br>Astatine<br>[210]      | 86<br>Rn<br>Radon<br>[222]        |
| 87<br>Fr<br>Francium<br>[223]  | 88<br>Ra<br>Radium<br>[226]     | 89<br>Ac<br>Actinium<br>[227]    | 90<br>Th<br>Thorium<br>[232]    | 91<br>Pa<br>Protactinium<br>[231]   | 92<br>U<br>Uranium<br>[238]     | 93<br>Np<br>Neptunium<br>[237]  | 94<br>Pu<br>Plutonium<br>[244]  | 95<br>Am<br>Americium<br>[243]  | 96<br>Cm<br>Curium<br>[247]      | 97<br>Bk<br>Berkelium<br>[247] | 98<br>Cf<br>Californium<br>[251] | 99<br>Es<br>Einsteinium<br>[252] | 100<br>Fm<br>Fermium<br>[257]  | 101<br>Md<br>Mendelevium<br>[258] | 102<br>No<br>Nobelium<br>[259]   | 103<br>Lr<br>Lawrencium<br>[262] | 104<br>Rf<br>Rutherfordium<br>[261] | 105<br>Db<br>Dubnium<br>[262]   | 106<br>Sg<br>Seaborgium<br>[263] | 107<br>Bh<br>Bohrium<br>[264]  | 108<br>Hs<br>Hassium<br>[265] | 109<br>Mt<br>Meitnerium<br>[266] | 110<br>Ds<br>Darmstadtium<br>[267] | 111<br>Rg<br>Roentgenium<br>[268] | 112<br>Cn<br>Copernicium<br>[269] | 113<br>Nh<br>Nihonium<br>[270]  | 114<br>Fl<br>Flerovium<br>[277] | 115<br>Mc<br>Moscovium<br>[278] | 116<br>Lv<br>Livermorium<br>[277] | 117<br>Uus<br>Ununseptium<br>[278] | 118<br>Uuo<br>Ununoctium<br>[277] |

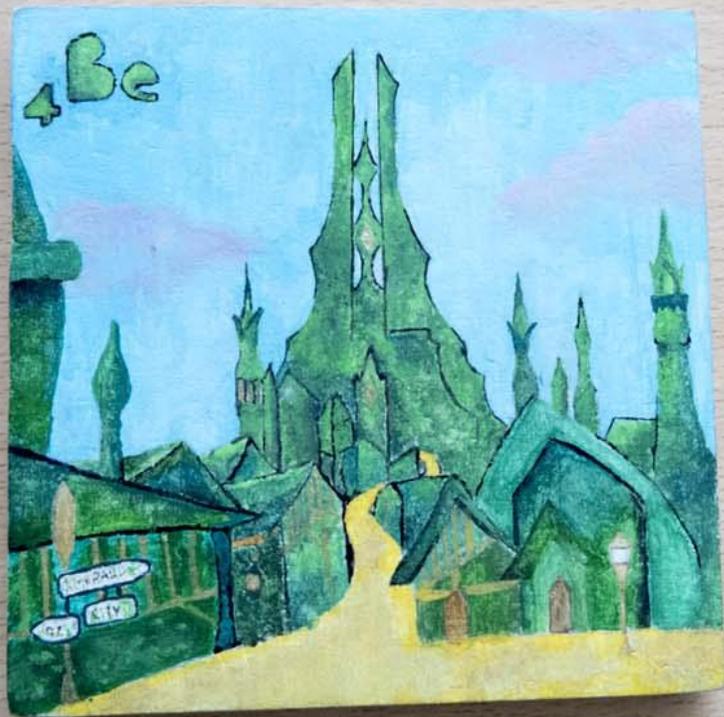
|   |    |    |    |    |  |  |  |  |  |  |  |  |
|---|----|----|----|----|--|--|--|--|--|--|--|--|
| 1 | H  |    |    |    |  |  |  |  |  |  |  |  |
| 2 | Li | Be |    |    |  |  |  |  |  |  |  |  |
| 3 | Na | Mg |    |    |  |  |  |  |  |  |  |  |
| 4 | K  | Ca | Sc | Ti |  |  |  |  |  |  |  |  |
| 5 | Rb | Sr | Y  | Zr |  |  |  |  |  |  |  |  |
| 6 | Cs | Ba |    | Hf |  |  |  |  |  |  |  |  |
| 7 | Fr | Ra |    | Rf |  |  |  |  |  |  |  |  |
| 8 |    |    | La | Ce |  |  |  |  |  |  |  |  |
| 9 |    |    | Ac | Th |  |  |  |  |  |  |  |  |

|    |    |    |    |    |     |    |    |
|----|----|----|----|----|-----|----|----|
| 18 | Ar | Kr | Xe | Rn | Uuo |    |    |
| 17 | Cl | Br | I  | At |     |    |    |
| 16 | S  | Se | Te | Po |     |    |    |
| 15 | P  | As | Sb | Bi |     |    |    |
| 14 | Si | Ge | Sn | Pb |     |    |    |
| 13 | Al | Ga | In | Tl |     |    |    |
| 12 | Mg | Zn | Cd | Hg |     |    |    |
| 11 | Na | K  | Rb | Cs | Fr  |    |    |
| 10 | Ne | Ar | Kr | Xe | Rn  |    |    |
| 9  | F  | Cl | Br | I  | At  |    |    |
| 8  | O  | S  | Se | Te | Po  |    |    |
| 7  | N  | P  | As | Sb | Bi  |    |    |
| 6  | C  | Si | Ge | Sn | Pb  |    |    |
| 5  | B  | Al | Ga | In | Tl  |    |    |
| 4  | Be | Mg | Zn | Cd | Hg  |    |    |
| 3  | Li | Na | K  | Rb | Cs  | Fr |    |
| 2  | He | Ne | Ar | Kr | Xe  | Rn |    |
| 1  | H  | Li | Na | K  | Rb  | Cs | Fr |



# PERIODIC ELEMENTS

|     |               |
|-----|---------------|
| 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  | Ba            |
| 56  | La            |
| 57  | Ce            |
| 58  | Pr            |
| 59  | Nd            |
| 60  | Pm            |
| 61  | Sm            |
| 62  | Eu            |
| 63  | Gd            |
| 64  | Tm            |
| 65  | Yb            |
| 66  | Lu            |
| 67  | Hf            |
| 68  | Ta            |
| 69  | W             |
| 70  | Re            |
| 71  | Os            |
| 72  | Ir            |
| 73  | Pt            |
| 74  | Au            |
| 75  | Hg            |
| 76  | Tl            |
| 77  | Pb            |
| 78  | Bi            |
| 79  | Po            |
| 80  | At            |
| 81  | Rn            |
| 82  | Fr            |
| 83  | Ra            |
| 84  | Ac            |
| 85  | Th            |
| 86  | Pa            |
| 87  | U             |
| 88  | Np            |
| 89  | Pu            |
| 90  | Am            |
| 91  | Cm            |
| 92  | Bk            |
| 93  | Cf            |
| 94  | Es            |
| 95  | Fm            |
| 96  | Mendelevium   |
| 97  | Nobelium      |
| 98  | Lawrencium    |
| 99  | Rutherfordium |
| 100 | Dubnium       |
| 101 | Roentgenium   |
| 102 | Copernicium   |
| 103 | Nihonium      |
| 104 | Flerovium     |
| 105 | Moscovium     |
| 106 | Livermorium   |
| 107 | Tennessine    |
| 108 | Oganesson     |



|     |               |
|-----|---------------|
| 19  | F             |
| 20  | Ne            |
| 21  | Na            |
| 22  | Mg            |
| 23  | Al            |
| 24  | Si            |
| 25  | P             |
| 26  | S             |
| 27  | Cl            |
| 28  | Ar            |
| 29  | K             |
| 30  | Ca            |
| 31  | Sc            |
| 32  | Ti            |
| 33  | V             |
| 34  | Cr            |
| 35  | Mn            |
| 36  | Fe            |
| 37  | Co            |
| 38  | Ni            |
| 39  | Cu            |
| 40  | Zn            |
| 41  | Ga            |
| 42  | Ge            |
| 43  | As            |
| 44  | Se            |
| 45  | Br            |
| 46  | Kr            |
| 47  | Rb            |
| 48  | Sr            |
| 49  | Y             |
| 50  | Zr            |
| 51  | Nb            |
| 52  | Mo            |
| 53  | Tc            |
| 54  | Ru            |
| 55  | Rh            |
| 56  | Pd            |
| 57  | Ag            |
| 58  | Cd            |
| 59  | In            |
| 60  | Sn            |
| 61  | Sb            |
| 62  | Te            |
| 63  | I             |
| 64  | Xe            |
| 65  | Ba            |
| 66  | La            |
| 67  | Ce            |
| 68  | Pr            |
| 69  | Nd            |
| 70  | Pm            |
| 71  | Sm            |
| 72  | Eu            |
| 73  | Gd            |
| 74  | Tm            |
| 75  | Yb            |
| 76  | Lu            |
| 77  | Hf            |
| 78  | Ta            |
| 79  | W             |
| 80  | Re            |
| 81  | Os            |
| 82  | Ir            |
| 83  | Pt            |
| 84  | Au            |
| 85  | Hg            |
| 86  | Tl            |
| 87  | Pb            |
| 88  | Bi            |
| 89  | Po            |
| 90  | At            |
| 91  | Rn            |
| 92  | Fr            |
| 93  | Ra            |
| 94  | Ac            |
| 95  | Th            |
| 96  | Pa            |
| 97  | U             |
| 98  | Np            |
| 99  | Pu            |
| 100 | Am            |
| 101 | Cm            |
| 102 | Bk            |
| 103 | Cf            |
| 104 | Es            |
| 105 | Fm            |
| 106 | Mendelevium   |
| 107 | Nobelium      |
| 108 | Lawrencium    |
| 109 | Rutherfordium |
| 110 | Dubnium       |
| 111 | Roentgenium   |
| 112 | Copernicium   |
| 113 | Nihonium      |
| 114 | Flerovium     |
| 115 | Moscovium     |
| 116 | Livermorium   |
| 117 | Tennessine    |
| 118 | Oganesson     |

# PERIODIC ELEMENTS



|    |
|----|
| H  |
| Li |
| Na |
| K  |
| Rb |
| Cs |
| Fr |

|     |
|-----|
| He  |
| Ne  |
| Ar  |
| Kr  |
| Xe  |
| Rn  |
| Uuo |
| Lu  |
| Lr  |

|    |    |    |   |    |    |
|----|----|----|---|----|----|
| Ac | Th | Pa | U | Np | Pu |
|----|----|----|---|----|----|

# PERIODIC ELEMENTS



|    |
|----|
| H  |
| Li |
| Na |
| K  |
| Rb |
| Cs |
| Fr |

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| He  |
| Ne  |
| Ar  |
| Kr  |
| Xe  |
| Rn  |
| Uuo |
| Lu  |
| Lr  |

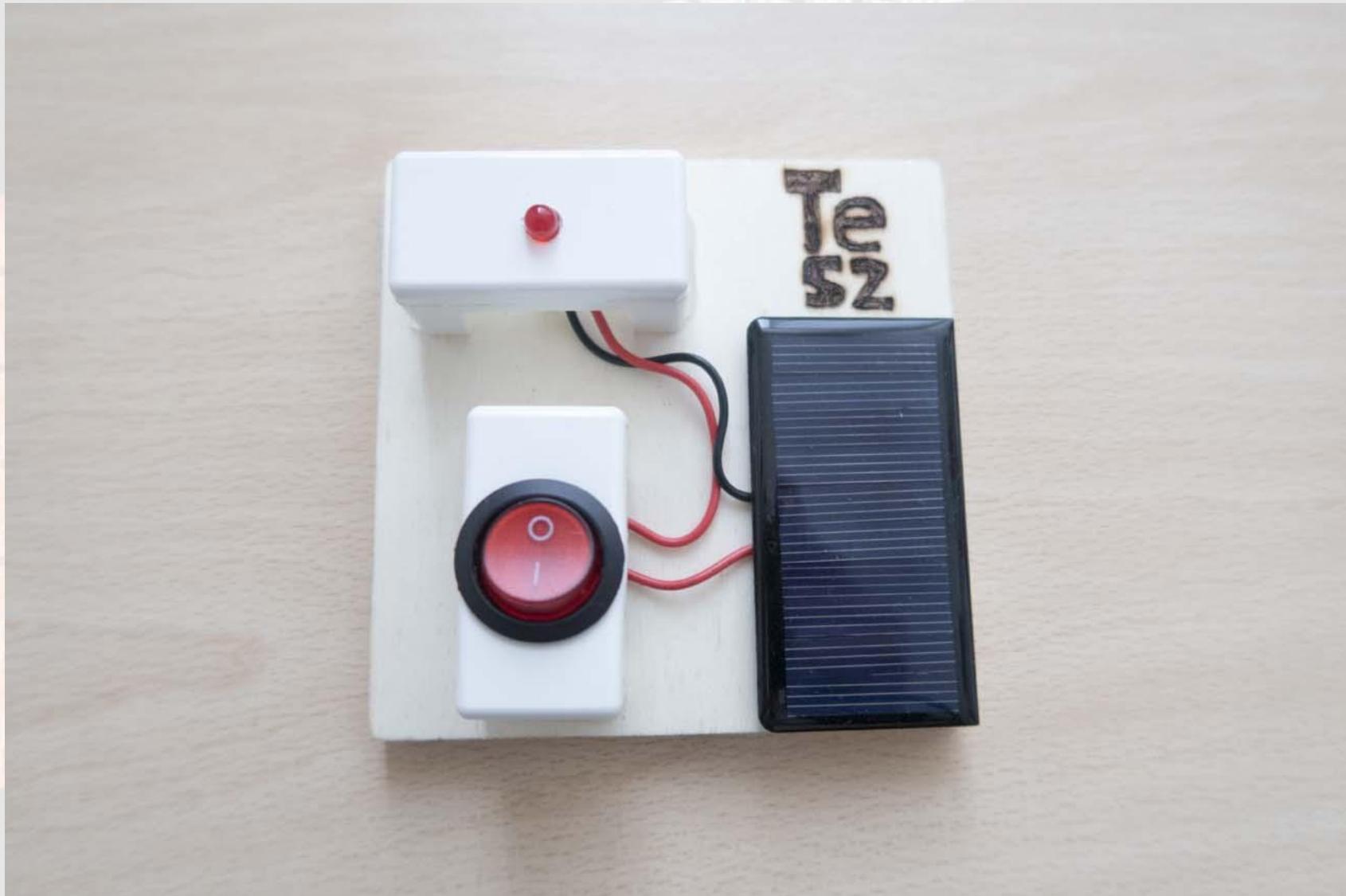
|    |    |    |   |    |    |
|----|----|----|---|----|----|
| Ac | Th | Pa | U | Np | Pu |
|----|----|----|---|----|----|

# TRANSITION ELEMENTS



|    |    |    |    |    |     |     |
|----|----|----|----|----|-----|-----|
| He | Ne | Ar | Kr | Xe | Rn  | Uuo |
| F  | Cl | Br | I  | At | Jus | Lu  |
| Li | Na | K  | Rb | Cs | Fr  | Lr  |
| H  | H  | H  | H  | H  | H   | H   |

# TELETYPE ELEMENTS



PERIODIC ELEMENTS

|    |
|----|
| H  |
| Li |
| Na |
| K  |
| Rb |
| Cs |
| Fr |

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| He  |
| Ne  |
| Ar  |
| Kr  |
| Xe  |
| Rn  |
| Uuo |
| Lu  |
| Lr  |



|    |    |    |   |    |    |
|----|----|----|---|----|----|
| Ac | Th | Pa | U | Np | Pu |
|----|----|----|---|----|----|



