

PerTabVIS : Project Update

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Project Introduction

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Progress

Future Work

14/11/2011



Periodic Table

- First proposed by [Dmitri Mendeleev, 1869]
 Reveals the relationship between elements
 Predicts the possible properties of the yet discovered ones
- Looks like...

Background

Vanadium

50.942

41

Nb

Niobium

92.906

73

Та

Tantalum 180.948

105

Db

Dubniu

(262)

| | Group 1a | | drogen 00794 | - atomic numbe - symbol - atomic weight (or mass numb of most stable isotope if in | r atomic n left-hand second is having the same colu- part deter column ha This a 1869, bef | dic table arrang number, starti corner and co by the numb e same numbe umn. Since the mines the che ave similar che irrangement of ore many of th |
|----------|-------------------------|---------------------|-----------------|---|--|--|
| Period 1 | Hydrogen 1.00794 | Group 2a | | parentheses) | elements filled in, r has been | Il logic of the whose exister most recently l isolated experi anthanide si |
| Period 2 | Lithium 6.941 | Beryllium 9.0122 | | | | 89–103) are They are pla read. |
| Period 3 | Na Sodium 22.9898 | Magnesium 24.305 | Group 3b | Group 4b | Group 5b | Group 6b |
| Period 4 | K | Ča | Sc | Ti | 23 V | Čr |

Scandium

44.956

39

Y

Yttrium

88.906

57-71*

Lanthanides

89-103**

Actinides

Titanium

47.87

40

Zr

Zirconium

91.22

72

Hf

Hafnium

178.49

104

Rf

(261)

iges the chemical elements in two ways. The first is by ting with hydrogen (atomic number = 1) in the upper continuing in ascending order from left to right. The nber of electrons in the outermost shell. Elements per of electrons in the outermost shell are placed in the ne number of electrons in the outermost shell in large semical nature of an element, elements in the same emical properties.

of the elements was devised by Dmitri Mendeleev in the elements now known were discovered. To maintain he table, Mendeleev allowed space for undiscovered ence he predicted. This space has since been partly by the addition of elements 104-112. Element 112 rimentally but not yet officially named. †

series (elements 57-71) and the actinide series re composed of elements with Group 3b chemical laced below the main body of the table to make it

Group

8

26

Fe

Iron

55.845

44

Ru

authenium

101.07

76

Os

Osmium 190.2

108

Hs

Hassium (265)

Group

8

27

Co

Cobalt

58.9332

Rh

Rhodium

102.905

77

Ir

Iridium 192.2

109

Mt

(268)

Meitneriu

Ds

(281)

Rg

(280)

(277)

Group

7b

25

Mn

Manganese 54.9380

43

Τс

echnetium

(98)

75

Re

Rhenium 186.2

107

Bh

Bohrium

(264)

Chromium

51.996

42

Mo

10lybden 95.94

w

Tungsten 183.84

106

Sq

eaborgiu

(266)

Noble Metals Nonmetals gases

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| em | in large e same leev in naintain | | | | | | | | Group 0 |
|----|--|-------------------------------|-------------------------------|---------------------------------|---------------------|--------------------------------|-----------------------------|-------------------------------|-----------------------|
| 1 | covered n partly ent 112 series | | | Group 3a | Group 4a | Group 5a | Group 6a | Group 7a | Helium 4.0026 |
| | hemical make it | | | 5 B Boron 10.811 | Carbon 12.011 | 7 Nitrogen 14.0067 | 8 Oxygen 15.9994 | 9 F Fluorine 18.9984 | 10 Neon 20.183 |
| | Group 8 | Group 1b | Group 2b | 13 Al Aluminum 26.9815 | Silicon 28.086 | Phosphorus 30.9738 | 16 S Sulfur 32.066 | Chlorine 35.453 | 18 Argon 39.948 |
| | Nickel S8.69 | Copper 63.546 | 2n Zn 2inc 65.39 | Gallium 69.72 | Germanium 72.61 | 33 As Arsenic 74.9216 | Selenium 78.96 | Bromine 79.904 | Krypton 83.80 |
| | Palladium | 47 Ag Silver 107.868 | Cadmium | 49 In Indium 114.82 | 50 Sn 118.71 | Sb Antimony 121.76 | Tellurium 127.60 | 53 lodine 126.9045 | 54 Xeon 131.29 |
| | Platinum 195.08 | 79 Au Gold 196.967 | B0 Hg Mercury 200.59 | TI Thallium 204.38 | Pb Lead 207.2 | 83 Bi Bismuth 208.98 | Polonium (210) | Astatine (210) | Radon (222) |
| Ī | 110 | 111 | 112† | | | | | | |

+ Until official names are given to new elements, names based on a Latin translation of the atomic number are used; e.g. ununbium (Latin unus '1' + unus '1' + bi- '2') for element 112.

| *LANTHANIDES | La La Lanthanum 138.91 | 58 Cerium 140.12 | 59 Pr Praseodymium 140.908 | Neodymium 144.24 | Promethium (145) | Samarium 150.36 | Europium 151.96 | Gadolinium 157.25 | Tb Terbium 158.925 | Dysprosium 162.50 | 67 HO Holmium 164.930 | 68 Er Erbium 167.26 | 69 Tm Thulium 168.934 | Ytterbium 173.04 | Lutetium 174.97 |
|--------------|---------------------------------|--------------------------------|-------------------------------------|------------------------------|--------------------------------|--------------------------------|--------------------------------|-----------------------------|--------------------------------|----------------------|----------------------------------|------------------------------|--------------------------------|---------------------|----------------------------------|
| **ACTINIDES | Actinium (227) | 70 Th Thorium 232.038 | 91 Pa Protactinium 231.036 | 92 U Uranium 238.03 | 93 Np Neptunium (237) | 94 Pu Plutonium (244) | 95 Am Americium (243) | 96 Cm Curium (247) | 97 Bk Berkelium (247) | Californium (251) | 99 Es Einsteinium (252) | Fermium (257) | Mendelevium (258) | Nobelium (259) | 103 Lr Lawrencium (262) |

| Element | Symbol | Atomic Number | Element | Symbol | Atomic Number | Element | Symbol | Atomic Number | Element | Symbol | Atomic Number | Element | Symbol | Atomic Number | Element | Symbol | Atomic Number | Element | Symbol | Atomic Number | Element | Symbol | Atomic |
|-----------|--------|------------------|--------------|--------|------------------|-------------|--------|------------------|-----------|--------|------------------|-------------|--------|------------------|--------------|--------|------------------|---------------|--------|------------------|-----------|--------|--------|
| Actinium | Ac | 89 | Cadmium | Cđ | 48 | Einsteinium | Es | 99 | Holmium | Но | 67 | Meitnerium | Mt | 109 | Phosphorus | P | 15 | Ruthenium | Ru | 44 | Terbium | Tb | 65 |
| Aluminum | Al | 13 | Calcium | Ca | 20 | Element 112 | - | 112 | Hydrogen | н | 1 | Mendelevium | Md | 101 | Platinum | Pt | 78 | Rutherfordium | RÍ | 104 | Thallium | TI | 81 |
| Americium | Am | 95 | Californium | Cf | 98 | Erbium | Er | 68 | Indum | in | 49 | Mercury | Ha | 80 | Plutonium | Pu | 94 | Samarium | Sm | 62 | Thorium | Th | 90 |
| Antimony | Sb | 51 | Carbon | C | 6 | Europium | Eu | 63 | lodine | 1 | 53 | Molybdenum | Mo | 42 | Polonium | Po | 84 | Scandium | Sc | 21 | Thulium | Tm | 69 |
| Argon | Ar | 18 | Cerium | Ce | 58 | Fermium | Fm | 100 | Iridium | lr. | 77 | Neodymium | Nd | 60 | Potassium | ĸ | 19 | Seaborgium | Sq | 106 | Tin | Sm | 50 |
| Arsenic | As | 33 | Cesium | Cs | 55 | Fluorine | F | 9 | Iron | Fe | 26 | Neon | Ne | 10 | Praseodymium | n Fr | 59 | Selenium | Se | 34 | Titanium | Ti | 22 |
| Astatine | At | 85 | Chlorine | CI | 17 | Francium | Fr | 87 | Krypton | Kr | 36 | Neptunium | Np | 93 | Promethium | Pm | 61 | Silicon | Si | 14 | Tungsten | w | 7.4 |
| Barium | 8.0 | 56 | Chromium | Gr | 24 | Gadolinium | Gđ | 64 | Lanthanum | La | 57 | Nickel | 14 | 28 | Protactinium | Pa | 91 | Silver | Ag | 47 | Uranium | U | 92 |
| Berkelium | 8k | 97 | Cobalt | Co | 27 | Gallium | Ga | 31 | Lawrendum | Lr | 103 | Nicbium | Nb | 41 | Radium | Ra | 88 | Sodium | Na | 11 | Vanadium | v | 23 |
| Beryllium | Be | 4 | Copper | Cu | 29 | Germanium | Ge | 32 | Lead | Pb | 82 | Nitrogen | 14 | 7 | Radon | Rn | 86 | Strontium | Sr | 38 | Xenon | Xe | 54 |
| Bismuth | Bì | 83 | Curium | Cm | 96 | Gold | Au | 79 | Lithium | Li | 3 | Nobelium | No | 102 | Rhenium | Re | 75 | Sulfur | \$ | 16 | Ytterbium | Yb | 70 |
| Bohrium | Eh | 107 | Darmstadtium | n Ds | 110 | Hafnium | Hf | 72 | Lutetium | Lu | 71 | Osmium | Os | 76 | Rhodium | Fth | 45 | Tantalum | Ta | 73 | Yttmium | Y | 39 |
| Boron | 8 | 5 | Dubnium | Db | 105 | Hassium | Hs | 108 | Magnesium | Mg | 12 | Oxygen | 0 | 8 | Roentgenium | Rg | 111 | Technetium | Tc | 43 | Znc | Zn | 30 |
| Bromine | Br | 35 | Dysprosium | Dy | 66 | Helium | He | 2 | Manganese | Mn | 25 | Palladium | Pd | 46 | Rubidium | Rb : | 37 | Tellutium | Te | 52 | Zirconium | Zr | 40 |

Catherine Hawkes, Cat & Mouse

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Period 5

Period 6

Period 7

Potassium

Rb

Ruhidium

85.47

55

Cs

Cesium 132,905

87

Fr

Francium (223)

39.098

Calcium

40.08

38

Sr

Strontium

87.62

56

Ba

Barium

88

Ra

Radium

(226)

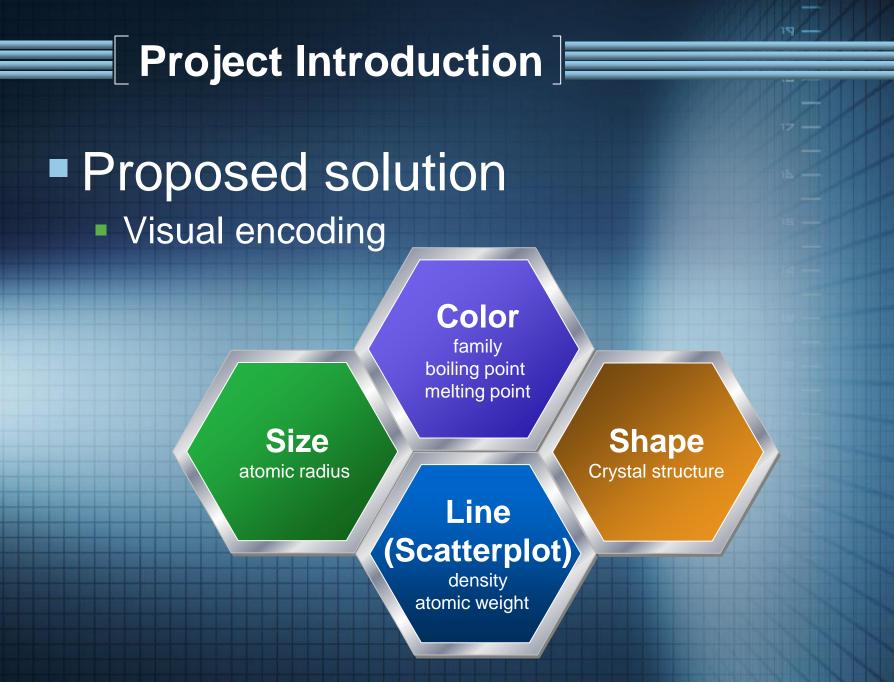
137.33

Project Introduction]

Domain & Task

- PerTabVIS is to provide a visualized and interactive way for general use.
- Show the basic information of periodic table
 - Effective encoding method.
- Allow users to see and compare whatever they are interested in.
 - Easy to use.

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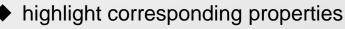
Project Introduction

Proposed solution View methods

Single

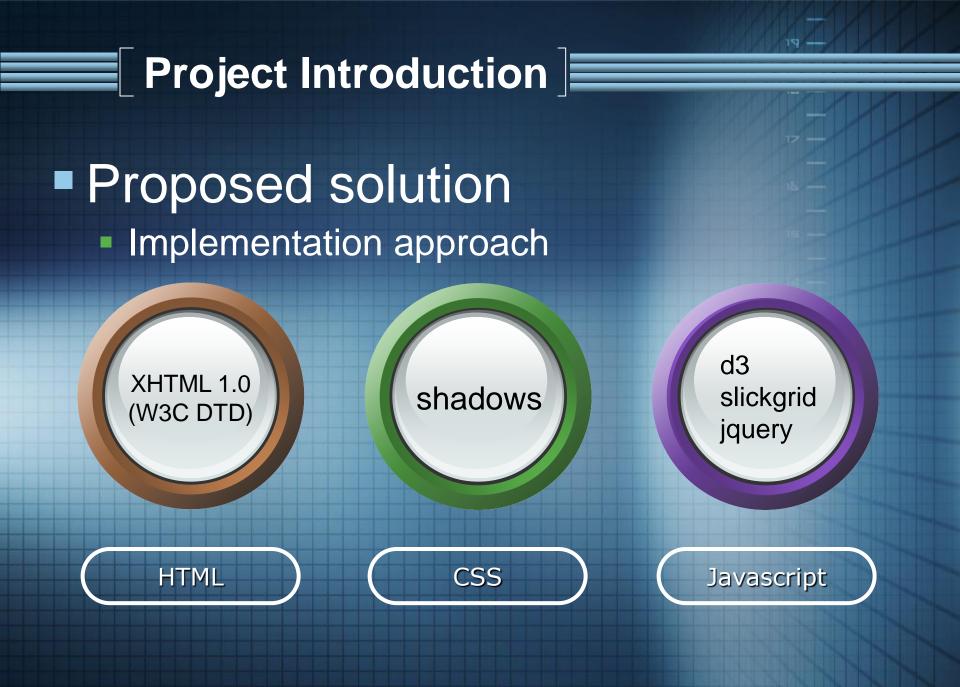
Multiple

elements periodic table
elements property table



- select and filter the corresponding objects in different panels
- show the elements properties in either table or parallel coordinates

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Dataset extraction

 Get original dataset from "elements" example on the Improvise website and Wikipedia

Abstract dataset for general use

| | Atomic Number | Sy | Name | Famil | Atomic We | Boiling P | Melting P | Density | Heat of | Heat of F | Atomic Ra | Crystal S |
|---|---------------|----|-----------|-------|------------|-----------|-----------|---------|---------|-----------|-----------|--------------|
| | 1 | Н | hydrogen | 0 | 1.00794 | -252.7 | -259.2 | 0.071 | 0.108 | 0.014 | 0.79 | hexagonal |
| | 2 | He | helium | 9 | 4.002602 | -268.9 | -269.7 | 0.126 | 0.02 | 0.005 | 0.49 | hexagonal |
| | 3 | Li | lithium | 1 | 6.941 | 1330 | 180.5 | 0.53 | 32.48 | 0.72 | 2.05 | body-cent |
| | 4 | Be | beryllium | 2 | 9.0123182 | 2770 | 1277 | 1.85 | 73.9 | 2.8 | 1.40 | hexagonal |
| | 5 | В | boron | 4 | 10.811 | NaN | 2030 | 2.34 | 128 | 5.3 | 1.17 | rhombohedral |
| | 6 | С | carbon | 5 | 12.0107 | 4830 | 3727 | 2.26 | 171.7 | NaN | 0.91 | hexagonal |
| | 7 | Ν | nitrogen | 6 | 14.00674 | -195.8 | -210 | 0.81 | 0.666 | 0.086 | 0.75 | hexagonal |
| | 8 | 0 | oxygen | 7 | 15.9994 | -183 | -218.8 | 1.14 | 0.815 | 0.053 | 0.65 | cubic |
| | 9 | F | fluorine | 8 | 18.9984032 | -188.2 | -219.6 | 1.505 | 0.755 | 0.061 | 0.57 | cubic |
| | 10 | Ne | neon | 9 | 20.1797 | -246 | -248.6 | 1.2 | 0.422 | 0.08 | 0.51 | face-cent |
| | 11 | Na | sodium | 1 | 22.98977 | 892 | 97.8 | 0.97 | 24.12 | 0.62 | 2.23 | body-cent |
| | 12 | Mg | magnesium | 2 | 24.305 | 1107 | 650 | 1.74 | 32, 517 | 2.14 | 1.72 | hexagonal |
| _ | 13 | A1 | aluminum | 4 | 26.981538 | 2450 | 660 | 2.7 | 67.9 | 2.55 | 1.82 | face-cent |
| | 14 | Si | silicon | 5 | 28.0855 | 2680 | 1410 | 2.33 | 40.6 | 11.1 | 1.46 | face-cent |
| | 15 | Р | phosph | 6 | 30.973762 | NaN | NaN | NaN | NaN | NaN | 1.23 | monoclinic |
| | 16 | S | sulfur | 7 | 32.066 | 444.6 | 119 | 2.07 | 3.01 | 0.34 | 1.09 | orthorhombic |
| | 17 | C1 | cllorine | 8 | 35.4527 | -34.7 | -101 | 1.56 | 2.44 | 0.77 | 0.97 | orthorhombic |
| - | 18 | Ar | Arargon | 9 | 39.948 | -185.8 | 189.4 | 1.4 | 1.56 | 0.281 | 0.88 | facce-cen |
| | 19 | Κ | potassium | 1 | 39.0983 | 760 | 63.7 | 0.86 | 18.9 | 0.55 | 2.77 | body-cent |
| | 20 | Ca | calcium | 2 | 40.078 | 1440 | 838 | 1.55 | 36.74 | 2.1 | 2.23 | face-cent |

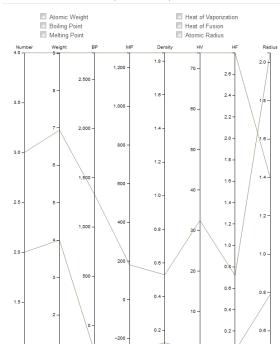
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| Select Property | Н | | | | | | | | | | | | | | | | | He | Ì | | | | Prope | rties v.s | . Proper | ties | | |
|---|-----------|-----------|--------------|-----------|-------------------|-----------|-------------------|-----------|-------------------|-----------|------------------|-----------|------------------|------------|------------------|------------|----------------|------------|----------|--------|------------------------------|---------|-------|-----------|----------|---------------------------------------|---------|-------|
| Atomic Weight Boiling Point Melting Point | Li | Be | | | | | | | | | | | B | <u>C</u> | N | <u>0</u> | E | Ne | | 8 | Atomic Boiling Melting | Point | | | | Heat of Va Heat of Fu Atomic Ra | usion | |
| Heat of Vaporization Heat of Fusion | <u>Na</u> | Mg | | | | | | | | | | | AI | <u>Si</u> | P | | <u>CI</u> | Ar | N 4.0 | lumber | Weight 9 7 | E | iP | MP | Density | нv | HF 7 | Ra |
| Atomic Radius | ĸ | <u>Ca</u> | Sc | П | V | Cr | Mn | Fe | <u>Co</u> | Ni | <u>Cu</u> | Zn | Ga | Ge | As | <u>Se</u> | Br | Kr | | | | 2,500 - | 1,20 | 0 - | 1.8 - | 70 - | 2.6 - | 2.0 |
| | Rb | <u>Sr</u> | Y | Zr | Nb | Mo | Tc | Ru | <u>Rh</u> | Pd | Ag | Cd | ln | <u>Sn</u> | <u>Sb</u> | Te | Ţ | <u>Xe</u> | 3.6 | 5 - | 8 - | | 1,00 | 0 - | 1.6 - | 60 - | 2.4 - | 1/8 - |
| | <u>Cs</u> | Ba | <u>La-Lu</u> | Hf | Ta | W | <u>Re</u> | <u>Os</u> | ī | <u>Pt</u> | <u>Au</u> | Ha | П | <u>Pb</u> | Bi | <u>Po</u> | <u>At</u> | <u>Rn</u> | | | 7- | 2,000 - | | | 1.4 - | | 2.2 - | V |
| | Er | <u>Ra</u> | <u>Ac-Lr</u> | Rf | Db | <u>Sg</u> | Bh | <u>Hs</u> | <u>Mt</u> | <u>Ds</u> | Rg | <u>Cn</u> | <u>Uut</u> | <u>Uua</u> | <u>Uup</u> | <u>Uuh</u> | <u>Uus</u> | <u>Uuo</u> | 3.0 | | | | 80 | 0 - | | 50 - | 2.0 - | 1.6 - |
| Family | | | | | | _ | _ | _ | | _ | _ | _ | _ | | | | | | • | | e - | 1,500 - | 60 | 0 - | 1.2 - | | 1.8 - | 1.4 - |
| Hydrogen | | La | Ce | Pr | Nd | Pm | <u>Sm</u> | Eu | Gd | Tb | Dy | Ho | Er | Im | Yb | Lu | | | 2.6 | 5 | _ | | | | 1.0 - | 40 - | 1.4 - | |
| Alkali Metals Alkaline Earth Metals Transition Metals | | Ac | Th | <u>Pa</u> | U | Np | Pu | Am | <u>Cm</u> | Bk | <u>Cf</u> | Es | Em | Md | No | Ŀr | | | 2.0 | | | 1,000 - | 40 | 0 - | 0.8 - | 30 - | 1.2 - | 1.2 - |
| Boron Group Carbon Group Nitrogen Group | | | | | | | | Ele | ements | s Prope | ərty | | | | | | | | 2.0 | | 4- | | | | , | | 1.0 - | 1.0 - |
| Chalcogens Halogens Nobel Gases | Name H | | Atomic 1 | Num | Atomic 1.00794 | - | Boiling -252.7 | | Melting -259.2 | | Density 0.071 | | Heat of 0.108 | Vapo | Heat of 0.014 | | Atomic 0.79 | Radi | 2.0 | | 3- | 500 - | 20 | 0+ | 0.8- | 20 - | 0.8 - | 1.0 - |
| Lanthanides | He | | 2 | | 4.002602 | | -268.9 | | -269.7 | | 0.126 | | 0.02 | | 0.005 | | 0.49 | | | | | | | | 0.4 - | | 0.6 - | 0.8 - |
| Actinides | Li Be | | 3 | | 6.941 9.012318 | | 1330 2770 | | 180.5 1277 | | 0.53 | | 32.48 73.9 | | 0.72 | | 2.05 | | 1.6 | 5 - | | | | 0 - | 0.4 | 10 - | 0.4 - | |
| | | | | | | | | | | | | | | | | | | | | | 2 - | \ | | | | | | |



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Future Work

To-do list

- How about if there is no value for a property? Or say that it doesn't exist.
- Comparison for any element with any property.
- Corresponding connection among different panels.
 - Compatibility and performance under different browsers.



| Browser | Perform | nance |
|---------|---------|----------|
| | Speed | Validity |
| Chrome | Fast | High |
| IE | Fast | Low |
| Firefox | Low | High |
| Opera | Fast | Low |

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Thank You !