Scientific Applications That Use Table Formatting
使用表格格式的科学应用程序

Introduction 简介

Tables are used to organize complex sets of information in a way that easy to read. Tables are often used in subjects like science to display empirical data, test results, statistics etc. In this project you will use tables, and advanced table formatting options to create a ***"Chemistry Reference Sheet"*** that has a customized periodic table and chemical formula sheet that focuses on the specific needs of your high-school chemistry course.

通常使用表格来组织复杂的信息以便读取。科学类科目通常用表格来表示数据、测试结果、统计等。在本项目中，将使用表格和高级表格创建"化学参考表"，包括高中阶段化学元素周期表和化学公式表。

Project Objective 项目目标

In this project you will create a customized periodic table that focuses only on the ***elements*** you will actually use in your high-school chemistry class. You will also customize the table to show important information that will help you write properly balanced chemical equations.

在此项目中，将创建一个定制的元素周期表，即在高中阶段化学课上实际使用的元素，并自定义表格，以便书写化学方程式。

Your **periodic table** will colour code different elemental groups (metals, metalloids, and non-metals), identify the ***chemical states*** of different ***elements*** at room temperature (solid, liquid, and gas), and identify which elements are ***representative elements*** and which elements are ***transitional metals.*** You will also add the elemental charge that results during a chemical reaction for each ***elemental family*** which is not usually included in most standard **periodic tables*****.*** The modifications to the basic **periodic table** template in this project will help you apply what you are learning in your chemistry course and will minimize the amount of information you need to memorize to complete projects in your chemistry classes.

定制元素周期表需按照以下要求：对不同的元素组（金属、类金属和非金属）进行颜色编码，确定不同元素在室温下（固体、液体和气体）的化学状态，并确定哪些元素是代表性元素，哪些元素是过渡金属，添加每个元素族在化学反应期间产生的元素电荷，这些元素族通常不包括在大多数标准周期表中。本项目中对常见元素周期表的修改将有助于你在化学课程中应用所学知识，并有助于减少化学课上需要死记硬背的部分。

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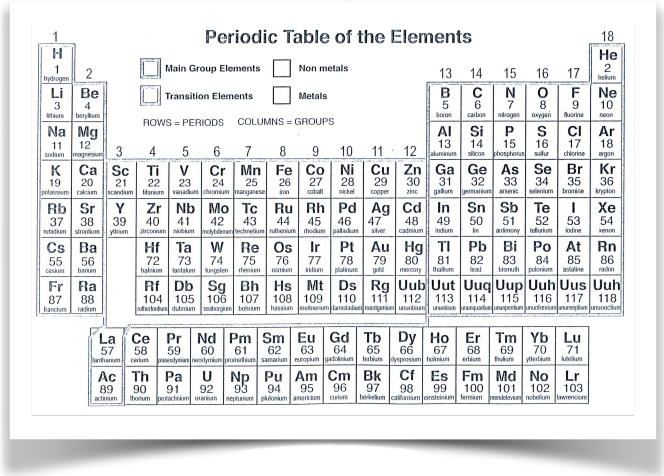
Periodic Table Reference 元素周期表

Look at the periodic table example below which is copied from a high-school chemistry text book. All 118 ***elements*** are shown including the ***Lanthanide***, ***Actinide***, and all of the ***radioactive elements*** are included in this **periodic table**; however due to the volatile nature of these elements, you will not use these types of ***elements*** in your high-school chemistry experiments. This specific **periodic table** example has a lot of information, but some of the information you won't need for a high-school chemistry course; however, there's information that you do need that is missing from this example that we can add to our customized **periodic table** template.

看下面从高中化学课本上截取的元素周期表。所有118种元素包括镧系元素、锕系元素以及放射性元素均包含在本周期表中；然而，由于这些元素的挥发性，你不会在高中化学实验中使用这些类型的元素。此元素周期表涵盖很多信息，但有些信息是高中化学课程不需要的；但是，此表的确缺少一个高中阶段必须的信息，我们可以将其添加到定制的元素周期表中。



Reading Information On A Periodic Table 元素周期表读取

It is important to understand how to read the the information shown on a standard **periodic table**. Each block of a standard **periodic table** includes the **"Atomic Number"**. This is a number ranges from 1 to 118. The **"Atomic Number"** indicates the number of ***protons*** that are in the ***nucleus*** of the ***atom***. The **"Chemical Symbol"** is the abbreviated code given to an ***element***. Only the first letter of the **"Chemical Symbol"** is capitalized. The **"Element's Name"** is the actual name of the ***element***. The **"Atomic Mass"** number is the combined ***mass*** of all of the ***protons***, ***neutrons***, and ***elections*** in an ***atom***.

如何读取元素周期表信息非常重要。周期表的每一块都包括"原子序数"。这是一个从1到118之间的数字。"原子序数"表示原子核中质子的数量。"化学符号"是元素的缩写代码，"化学符号"的第一个字母大写。"元素名称"是元素的实际名称。"原子质量"是一个原子中所有质子、中子和电子的总质量。

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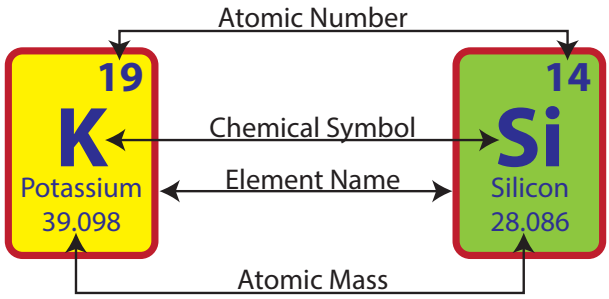
Using Numbers Correctly for Chemistry



(Subscript and Superscript)

There are three number styles that we need to consider when writing chemical equations in Chemistry. Each number style represents different numerical values in a chemical equation and needs to be used correctly. Using the wrong number style will completely change the chemical equation.

在化学中写化学方程式时，我们需要正确使用三种代表化学方程式中不同数值的数字，错误使用将改变化学方程式。

The Three (3) Number Styles Are:

Standard #	Subscript Number $_{\#}$	Superscript Number $^{\#}$
标准 #	下标 $_{\#}$	上标 $^{\#}$

A Standard Number indicates the number of ***molecules*** (a series of ***atoms*** bonded together) or of unbounded ***atoms***. A Subscript Number indicates the total quantity of ***atoms*** of a particular ***element*** in the structure of the ***molecule***. A Superscript number indicates the charge of an ***element*** or ***polyatomic ion***.

标准部分表示分子（一系列结合在一起的原子）或无界原子的数量。下标表示分子结构中特定元素的原子总数。上标数字表示元素或多原子离子的电荷。

The example below, which shows the balanced equation for water, displays how Standard and Subscript numbers are used to create a balanced c***hemical equation***. The example shows that there are two (2) Oxygen ***atoms*** bonded together, and that there are two (2) pairs of Hydrogen ***atoms***. The opposite side of the equation shows that there are two (2) water ***molecules*** and that each molecule has two (2) hydrogen ***atoms*** and one (1) oxygen ***atom***.

看下列如何使用标准和下标数创建平衡化学方程式。方程式左边是两（2）个氧原子和两（2）对氢原子，方程式右边是两（2）个水分子，每个分子有两（2）个氢原子和一（1）个氧原子。

$$O_2 + 2H_2 \rightleftharpoons 2H_2O$$

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In the example above, the balanced chemical equation for water, only standard numbers and subscript numbers were used; however in more complicated chemical equations superscript numbers are needed. In the example below we can see the equation for an aqueous ***solution*** of Sodium Carbonate. Carbonate is a **polyatomic ion** that is included in our project formula sheet of common ***chemical equations***. By using the ***electron*** charge values that we have added to our **periodic table** template we can quickly cross-reference and identify the charge that will result for a standard **atom** in a chemical reaction and the default charge of a **polyatomic ion**.

在上例中，水的平衡化学方程式仅使用标准数和下标数；然而，在更复杂的化学方程式中还需要上标数字。下例中，我们可以看到碳酸钠水溶液的方程式。碳酸盐是一种多原子离子。通过使用我们添加到元素周期表中的电子电荷值，我们可以快速交叉引用并确定化学反应中标准原子的电荷和多原子离子的默认电荷。

$$2Na^{+} + CO_3^{2-} + H_2O \rightleftharpoons Na_2CO_3 + H_2O$$

Therefore based on our project, we can conclude that Carbonate has a charge of ***negative*** two (2), and by looking at our customized **periodic table** we are able to determine that when Sodium reacts it will have a charge of **positive** one (1). In order to balance the chemical equation two (2) sodium atoms are needed for every Carbonate molecule.

我们可以得出结论，碳酸盐的电荷为负二（2），通过查看我们定制的元素周期表，我们可以确定当钠发生反应时，它的电荷为正一（1）。为了平衡化学方程式，每个碳酸盐分子需要两（2）个钠原子。

Project Instructions 项目说明

-Change the paper type to A4 Landscape (a horizontal orientation)
将纸张类型更改为A4横向（水平方向）
-Create a header with your last name auto page #
使用你的姓氏创建自动页数#
-Customize the title, (Your name)'s Periodic Table
自定义元素周期表标题（你的姓名）
-Create a footer with the schools name
创建带有学校名称的页脚
-Use tables to effectively organize information
使用表格有效地组织信息

- The design of the periodic table in this project has 5 rows and 18 columns
- 本项目元素周期表设计为5行18列

-Enter all the information into your table before formatting to avoid making mistakes
在格式化之前将所有信息输入表格，以避免出错

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-Format the text in the periodic table correctly based on the provided example
根据提供的示例正确设置周期表中的文本格式

- Use a legible font (Arial) 使用易读字体（Arial）
- Chemical Symbol (12 pt. font size) 化学符号（12磅字体大小）
- Atomic Number (12 pt. font size) 原子序数（12磅字体大小）
- Elemental Name (5 pt. font size) 元素名称（5磅字体大小）

-Use table formatting properties to color-code different types of Elements
使用表格格式属性对不同类型的元素进行颜色编码

- Metals **(Yellow shading)** 金属 （黄色）
- Metalloids **(Light Orange shading)** 类金属 （浅橙色）
- Non Metals **(Light Green shading)** 非金属 （浅绿色）
- Representative Elements **(Red Outline)** 代表元素 （红色）
- Transitional Elements **(Blue Outline)** 过渡元素 （蓝色）

-Identify the chemical state of all elements at room temperature
确定所有元素在室温下的化学状态

- If the element is a gas at temperature ***(Use Italics and the color red)***
- 如果该元素在一定温度下为气体**（使用斜体和红色）**
- If the element is a liquid at room temperature **(Use Bold and the color blue)**
- 如果该元素在室温下为液体**（使用粗体和蓝色）**
- If the element is a solid at room temperature **(Use the color black)**
- 如果元件在室温下为固体**（使用黑色）**

-Create a legend for your periodic table using a table
使用表格为元素周期表创建图例

- The design of the legend has 5 rows and 5 columns
- 图例设计为5行5列

-Hide all unused cells, boarders, etc. in the design by using custom properties
使用自定义属性隐藏设计中所有未使用的单元格、边框等

-Create a formula reference guide on page two (2)
在第二（2）页上创建参考公式

-The formula guide uses tables to organize information
使用表格组织参考公式

- The design of the formula guide has 11 rows and 4 columns
- 参考公式设计为11行4列

-Type all the chemical formulas correctly
正确输入所有化学式

-Use subscript and superscript correctly to type each chemical equation
正确使用下标和上标输入每个化学方程式

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-Create an MLA citation for the project
使用MLA格式

- The title of the textbook used by the school is Pearson Chemistry
- 学校使用的教科书的名称是Pearson Chemistry
- It was published in Boston, Massachusetts, U.S.A.
- 该书在美国马萨诸塞州波士顿出版
- It was published by the company Pearson Education in the year 2012
- 该书于2012年由 Pearson Education 公司出版
- The book was written by the authors Antony C. Wilbraham, Dennis D. Staley, Michael S. Matta, and Edward L. Waterman
- 这本书是作者的作者是Antony C. Wilbraham, Dennis D. Staley, Michael S. Matta, and Edward L. Waterman

When you are done your assignment save the document as:
按照以下格式命名文档:
“First Name”_“Last Name”_ Chemistry.docx

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Note: *The correct spelling for all of the elements in this project have been provided below. You can copy and paste the element's name from the table below when completing your project.*
注：下面提供了该项目中所有元素的正确拼写供直接粘贴复制使用。

Atomic Number	Chemical Symbol	Chemical Name	Row	Column
1	H	Hydrogen	1	1
2	He	Helium	1	18
3	Li	Lithium	2	1
4	Be	Beryllium	2	2
5	B	Boron	2	13
6	C	Carbon	2	14
7	N	Nitrogen	2	15
8	O	Oxygen	2	16
9	F	Fluorine	2	17
10	Ne	Neon	2	18
11	Na	Sodium	3	1
12	Mg	Magnesium	3	2
13	Al	Aluminum	3	13
14	Si	Silicon	3	14
15	P	Phosphorus	3	15
16	S	Sulfur	3	16
17	Cl	Chlorine	3	17
18	Ar	Argon	3	18
19	K	Potassium	4	1
20	Ca	Calcium	4	2
21	Sc	Scandium	4	3
22	Ti	Titanium	4	4
23	V	Vanadium	4	5
24	Cr	Chromium	4	6
25	Mn	Manganese	4	7
26	Fe	Iron	4	8
27	Co	Cobalt	4	9
28	Ni	Nickel	4	10
29	Cu	Copper	4	11
30	Zn	Zinc	4	12
31	Ga	Gallium	4	13
32	Ge	Germanium	4	14
33	As	Arsenic	4	15
34	Se	Selenium	4	16
35	Br	Bromine	4	17
36	Kr	Krypton	4	18

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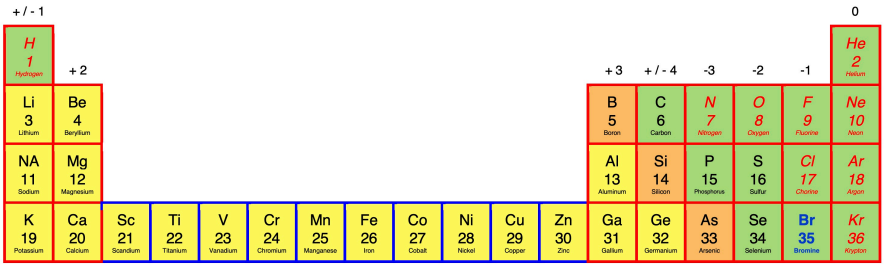
Project: Chemistry Reference Sheet - Page 1 (Front)

Last Name auto page #

(Your Name Here)'s Periodic Table



Legend

ROWS = PERIODS COLUMNS = GROUPS

Representative Elements	Non Metal	*Gas at room temperature*
Transition Metals	Metals	**Liquid at room temperature**
	Metalloids	Solid at room temperature

Footer Section (School Name Goes Here)

Project: Chemistry Reference Sheet - Page 2 (Back)

Last Name auto page #

My Formula Sheet

Common Chemical Formulas:		Common Polyatomic Ions:	
Ammonia	NH_3	Ammonium	NH_4^+
Benzene	C_6H_6	Carbonate	CO_3^{2-}
Carbon Dioxide	CO_2	Chlorite	ClO_2^-
Dihydrogen Monoxide	H_2O	Chlorate	ClO_3^-
Ethane	C_2H_6	Hydrogen sulfate	HSO_4^-
Hydrochloric Acid	HCl	Nitrite	NO_2^-
Methane	CH_4	Nitrate	NO_3^-
Nitrogen	N_2	Peroxide	O_2^{2-}
Oxygen	O_2	Phosphate	PO_4^{3-}
Sodium Chloride	NaCl	Sulfate	SO_4^{2-}

(The authors last name, first initial). (*The Title of the Book)*. (The City The Book Was Published in): (The company that published the book), (The year the book was published). Print.

Footer Section (School Name Goes Here)