NAME

PeriodicTable

SYNOPSIS

```
use PeriodicTable;

use PeriodicTable qw(:all);
```

DESCRIPTION

PeriodicTable module provides the following functions:

GetElementMostAbundantNaturalIsotopeData, GetElementMostAbundantNaturalIsotopeMass, GetElementMostAbundantNaturalIsotopeMassNumber, GetElementNaturalIsotopeAbundance, GetElementNaturalIsotopeCount, GetElementNaturalIsotopeMass, GetElementNaturalIsotopesData, GetElementPropertiesData, GetElementPropertiesNames, GetElementPropertiesNamesAndUnits, GetElementPropertyUnits, GetElements, GetElementsByAmericanStyleGroupLabel, GetElementsByEuropeanStyleGroupLabel, GetElementsByGroupName, GetElementsByGroupNumber, GetElementsByPeriodNumber, GetIUPACGroupNumberFromAmericanStyleGroupLabel, GetIUPACGroupNumberFromEuropeanStyleGroupLabel, IsElement, IsElementNaturalIsotopeMassNumber, IsElementProperty

METHODS

GetElements

```
@ElementSymbols = GetElements();
$ElementSymbolsRef = GetElements();
```

Returns an array or a reference to an array of known element symbols

GetElementsByGroupName

```
@ElementSymbols = GetElementsByGroupName($GroupName);
$ElementSymbolsRef = GetElementsByGroupName($GroupName);
```

Returns an array or a reference to an array of element symbols for a specified *GroupName*. Supported *GroupName* values are: *Alkali metals, Alkaline earth metals, Coinage metals, Pnictogens, Chalcogens, Halogens, Noble gases*; Additionally, usage of *Lanthanides* (Lanthanoids) and *Actinides* (Actinoids) is also supported.

GetElementsByGroupNumber

```
@ElementSymbols = GetElementsByGroupNumber($GroupNumber);
$ElementSymbolsRef = GetElementsByGroupNumber($GroupNumber);
```

Returns an array or a reference to an array of element symbols for a specified *GroupNumber*

GetElementsByAmericanStyleGroupLabel

```
@ElementSymbols = GetElementsByAmericanStyleGroupLabel($GroupLabel);
$ElementSymbolsRef = GetElementsByAmericanStyleGroupLabel($GroupLabel);
```

Returns an array or a reference to an array of element symbols for a specified American style *GroupLabel*. Valid values for Amercian style group labels: *IA to VIIIA, IB to VIIIB, VIII*.

GetElementsByEuropeanStyleGroupLabel

```
@ElementSymbols = GetElementsByEuropeanStyleGroupLabel($GroupLabel);
$ElementSymbolsRef = GetElementsByEuropeanStyleGroupLabel($GroupLabel);
```

Returns an array or a reference to an array of element symbols for a specified European style *GroupLabel*. Valid values for European style group labels: *IA to VIIIA, IB to VIIIB, VIII*.

GetElementsByPeriodNumber

```
@ElementSymbols = GetElementsByPeriodNumber($PeriodNumber);
$ElementSymbolsRef = GetElementsByPeriodNumber($PeriodNumber);
```

Returns an array or a reference to an array of element symbols for a specified *PeriodNumber*.

GetElementMostAbundantNaturalIsotopeData

```
@IsotopeData = GetElementMostAbundantNaturalIsotopeData(
               $ElementID);
$IsotopeDataRef = GetElementMostAbundantNaturalIsotopeData(
               $ElementID);
```

Returns an array or reference to an array containing data for most abundant isotope of an element specfied by element symbol or atomic number. Isotope data arrays contain these values: *AtomicNumber, IsotopeSymbol, MassNumber, RelativeAtomicMass, and NaturalAbundance*.

GetElementMostAbundantNaturalIsotopeMassNumber

```
$MassNumber = GetElementMostAbundantNaturalIsotopeMassNumber($ElementID);
```

Returns mass number of most abundant natural isotope of an element specfied by element symbol or atomic number

GetElementNaturalIsotopeCount

```
$IsotopeCount = GetElementNaturalIsotopeCount($ElementID);
```

Returns natural isotope count for an element specfied by element symbol or atomic number

GetElementNaturalIsotopesData

```
$DataHashRef = GetElementNaturalIsotopesData($ElementID,
               [$MassNumber]);
```

Reurns a reference to a hash containingall available isotope data for an element specified using element symbol or aromic number; an optional mass number indicates retrieve data for a specific isotope

GetElementNaturalIsotopeAbundance

```
$Abundance = GetElementNaturalIsotopeAbundance($ElementID,
             $MassNumber);
```

Returns percent abundance of natural isotope for an element with specfic mass number.

GetElementMostAbundantNaturalIsotopeMass

```
$RelativeAtomicMass = GetElementMostAbundantNaturalIsotopeMass(
                      $ElementID);
```

Returns relative atomic mass of most abundant isotope for an element specified using element symbol or aromic number.

GetElementNaturalIsotopeMass

```
$RelativeAtomicMass = GetElementNaturalIsotopeMass($ElementID,
                      $MassNumber);
```

Returns relative atomic mass of an element with specfic mass number.

GetElementPropertiesData

```
$PropertyDataHashRef = GetElementPropertiesData($ElementID);
```

Returns a reference to a hash containing all available properties data for an element specified using element symbol or atomic number.

GetElementPropertyName

```
$PropertyValue = GetElement<PropertyName>($ElementID);
```

Returns value of an element for a element specified using element symbol or atomic number.

These functions are not defined in this modules; these are implemented on-the-fly using Perl's AUTOLOAD funcionality.

Here is the list of known element *property names*: AllenElectronegativity, AllredRochowElectronegativity, AtomicNumber, AtomicRadiusCalculated, AtomicRadiusEmpirical, AtomicWeight, Block, BoilingPoint, BondLength, BrinellHardness, BulkModulus, Classification, CoefficientOfLinearExpansion, Color, CommonValences, LowestCommonValence, HighestCommonValence, CommonOxidationNumbers, LowestCommonOxidationNumber, HighestCommonOxidationNumber, CovalentRadiusEmpirical, CriticalTemperature, DensityOfSolid, DiscoveredAt, DiscoveredBy, DiscoveredWhen, ElectricalResistivity, ElectronAffinity, ElementName, ElementSymbol, EnthalpyOfAtmization, EnthalpyOfFusion, EnthalpyOfVaporization, FirstIonizationEnergy, GroundStateConfiguration, GroundStateLevel, GroupName, GroupNumber, NaturalIsotopeData, MeltingPoint, MineralHardness, MolarVolume, MullikenJaffeElectronegativity, OriginOfName, PaulingElectronegativity, PeriodNumber, PoissonsRatio, Reflectivity, RefractiveIndex, RigidityModulus, SandersonElectronegativity, StandardState, SuperconductionTemperature, ThermalConductivity, VanderWaalsRadius, VelocityOfSound, VickersHardness, YoungsModulus.

GetElementPropertiesNames

```
@PropertyNames = GetElementPropertiesNames([$Mode]);
$PropertyNamesRef = GetElementPropertiesNames([$Mode]);
```

Returns names of all available element properties. Optional mode parameter controls grouping of property names; Possible values: *ByGroup or Alphabetical*. Default: *ByGroup*.

GetElementPropertiesNamesAndUnits

```
$NameUnitsHashRef = GetElementPropertiesNamesAndUnits();
```

Returns a reference to a hash of property names and units of all available element properties. Names with no units contains empty strings.

GetElementPropertyUnits

```
$Units = GetElementPropertyUnits($PropertyName);
```

Returns units for a specific element property name. An empty string is returned for a property with no units.

GetIUPACGroupNumberFromAmericanStyleGroupLabel

```
$GroupNumber = GetIUPACGroupNumberFromAmericanStyleGroupLabel(
               $GroupLabel);
```

Returns IUPAC group numbers of a specific American style group label. A comma delimited string is returned for group VIII or VIIIB.

GetIUPACGroupNumberFromEuropeanStyleGroupLabel

```
$GroupNumber = GetIUPACGroupNumberFromEuropeanStyleGroupLabel(
               $GroupLabel);
```

Returns IUPAC group numbers of a specific European style group label. A comma delimited string is returned for group VIII or VIIIA.

IsElement

```
$Status = IsElement($ElementID);
```

Returns 1 or 0 based on whether it's a known element symbol or atomic number.

IsElementNaturalIsotopeMassNumber

```
$Status = IsElementNaturalIsotopeMassNumber($ElementID, $MassNumber);
```

Returns 1 or 0 based on whether it's a valid mass number for an element symbol or atomic number.

IsElementProperty

```
$Status = IsElementProperty($PropertyName);
```

Returns 1 or 0 based on whether it's a valid property name.

AUTHOR

Manish Sud <msud@san.rr.com>

SEE ALSO

AminoAcids.pm, NucleicAcids.pm

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