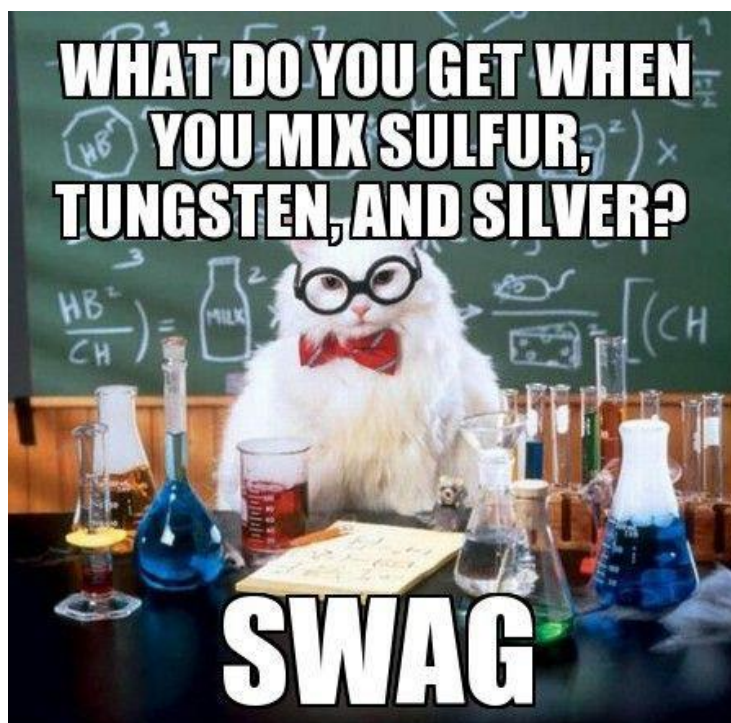




Unit 2: Matter

Practice Packet





VOCABULARY

For each word, provide a short but specific definition from YOUR OWN BRAIN! No boring textbook definitions. Write something to help you remember the word. Explain the word as if you were explaining it to an elementary school student. Give an example if you can. Don't use the words given in your definition!

Aqueous: _____

Chemical Change: _____

Chromatography: _____

Compound: _____

Diatomic element: _____

Distillation: _____

Element: _____

Filtration: _____

Gas: _____

Heterogeneous Mixture: _____

Homogeneous Mixture: _____

Liquid: _____

Matter: _____

Mixture: _____

Physical Change: _____

Solid: _____

Solution: _____



Lesson 1: Types of Matter

Objective:

Differentiate between compounds, mixtures and elements

Determine if a mixture is homogeneous or heterogeneous

1. Classify each of the following with the combination of terms listed below.

pure substance – element

mixture – homogeneous

pure substance – compound

mixture – heterogeneous

i.) **HCl (aq)**

ii.) **C₁₁H₂₂O₁₁ (s)**

iii.) **KBr (s)**

iv.) **soil**

v.) **Cl₂ (g)**

vi.) **CH₂(OH)₂ (aq)**

vii.) **Na (s)**

viii.) **Hg (l)**

8. Explain how you would determine if a substance is an:

element:

compound:

homogeneous mixture:

heterogeneous mixture:

Base your answer to questions 9-11 on the model below.



9. How would you classify this (element/compound/mixture)?



10. Could you separate this substance, and if so how (physically or chemically)? Explain.
11. Draw the resulting structure(s) after separation.

REGENTS PRACTICE

- Matter that is composed of two or more different elements chemically combined in a fixed proportion is classified as
 - a compound
 - an element
 - a mixture
 - a solution
- A compound differs from an element in that a compound
 - is homogeneous
 - has a definite composition
 - has a definite melting point
 - can be decomposed by a chemical reaction
- A compound differs from a mixture in that a compound always has a
 - homogeneous composition
 - maximum of two elements
 - minimum of three elements
 - heterogeneous composition
- A heterogeneous material may be
 - an element
 - a compound
 - a pure substance
 - a mixture
- Which statement is an identifying characteristic of a mixture?
 - a mixture can consist of a single element
 - a mixture can be separated by physical means
 - a mixture must have a definite composition by weight
 - a mixture must be homogeneous
- Which must be a mixture of substances?
 - solid
 - liquid
 - gas
 - solution

Regents Chemistry Unit 2: Intro to Matter



7. Which substance can be decomposed by chemical means?
- i.) ammonia (NH_3) ii.) oxygen (O)
iii.) phosphorus (P) iv.) silicon (Si)
8. Which substance cannot be broken down by a chemical reaction?
- i.) ammonia (NH_3) ii.) argon (Ar) iii.) methane (CH_3) iv.) water (H_2O)
9. Two substances, A and Z, are to be identified. Substance A cannot be broken down by a chemical change. Substance Z can be broken down by a chemical change. What can be concluded about these substances?
- (1) Both substances are elements.
(2) Both substances are compounds.
(3) Substance A is an element and substance Z is a compound.
(4) Substance A is a compound and substance Z is an element.
10. Tetrachloromethane, CCl_4 , is classified as a
- (1) compound because the atoms of the elements are combined in a fixed proportion
(2) compound because the atoms of the elements are combined in a proportion that varies
(3) mixture because the atoms of the elements are combined in a fixed proportion
(4) mixture because the atoms of the elements are combined in a proportion that varies

11. The table below shows the mass and volume data for four samples of substances at the same temperature and pressure.

Masses and Volumes of Four Samples

| Sample | Mass (g) | Volume (mL) |
|--------|----------|-------------|
| A | 30. | 60. |
| B | 40. | 50. |
| C | 45 | 90. |
| D | 90. | 120. |

Which two samples could consist of the same substance?

_____ and _____

ASSESS YOURSELF ON THIS LESSON:

If you missed any regents practice questions you should see me for extra help and/or re-watch the lesson video assignment





Lesson 2: Separating a Mixture

Objective:

Determine how to separate a mixture

Develop a procedure to separate a mixture

Research question: What is the mass of each component in the mixture?

You have been given a mixture of salt and sand. Using what you have learned about mixtures, develop a procedure that you will use to physically separate them. List your procedures below and have them checked before conducting the lab activity.

Procedures:

Data Collection: *Construct a data table that you will use to collect your data.*



Discussion:

1. What methods did you use to separate your mixture?
2. What types of mixtures can be separated by filtration?
3. What types of mixtures can be separated by evaporation/boiling?

REGENTS PRACTICE

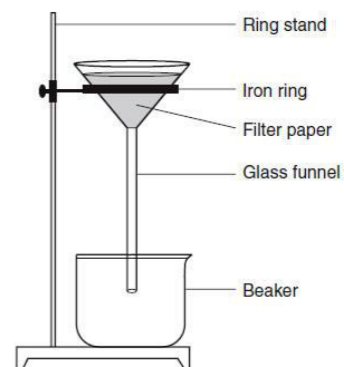
1. Using the information in the table, describe one property of the sand that would enable students to separate the sand from other components in the mixture?

Mass of the Components in Each Mixture

| Component | Mixture A (g) | Mixture B (g) |
|--------------------|---------------|---------------|
| NH ₄ Cl | 40. | 10. |
| sand | 1 | 31 |
| H ₂ O | 100. | 100. |

2. Describe the separation technique that could be used to separate two colorless liquids with varying boiling points.

3. Which mixture can be separated by using the equipment show?
 - a. NaCl_(aq) and SiO_{2(s)}
 - b. NaCl_(aq) and C₆H₁₂O_{6(aq)}
 - c. CO_{2(aq)} and NaCl_(aq)
 - d. CO_{2(aq)} and C₆H₁₂O_{6(aq)}



ASSESS YOURSELF ON THIS LESSON:

If you missed any regents practice questions you should see me for extra help and/or re-watch the lesson video assignment



Lesson 3: Particle Diagrams

Objective:

Differentiate between different types of particle diagrams

Construct particle diagrams for pure substances and mixtures

Classify each of the pictures below by placing the correct label in the blanks below:

A= Element

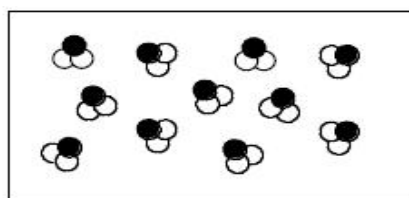
D= Mixture of compounds

B= Compound

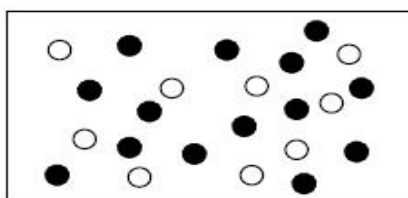
E= Mixture of elements and compounds

C= Mixture of elements

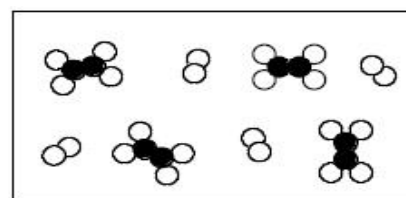
Each circle represents an atom and each different color represents a different kind of atom. If two atoms are touching then they are bonded together. *Then give an example for each (ex. #1 H₂O)*



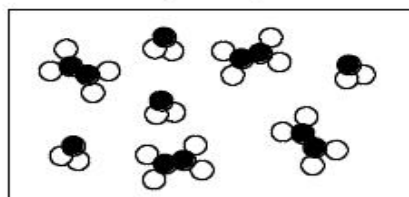
1) _____



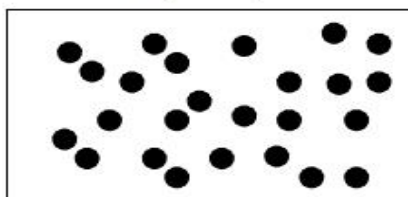
2) _____



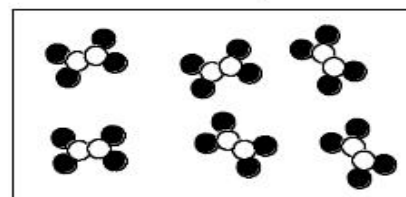
3) _____



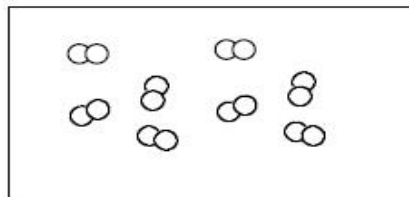
4) _____



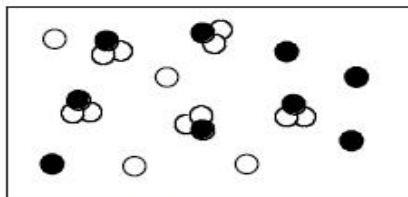
5) _____



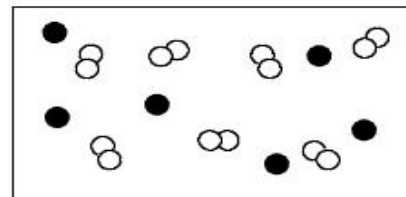
6) _____



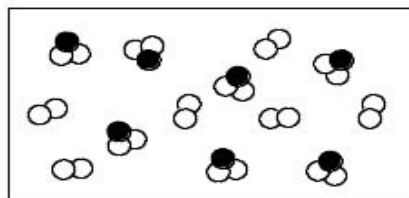
7) _____



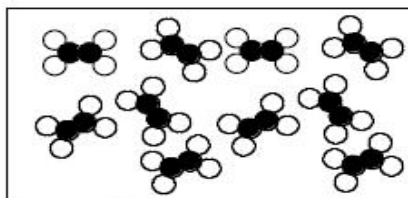
8) _____



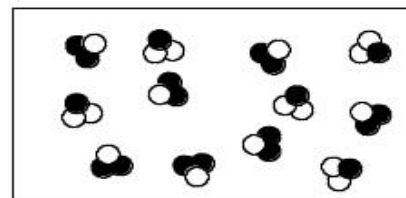
9) _____



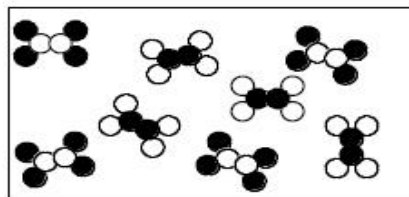
10) _____



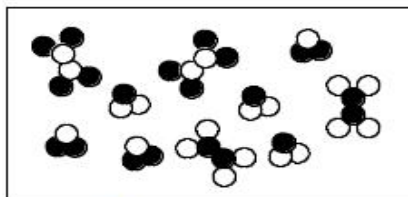
11) _____



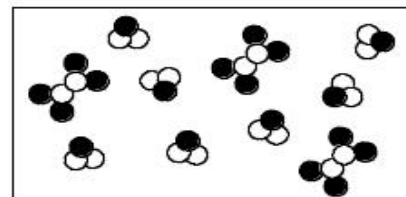
12) _____



13) _____



14) _____

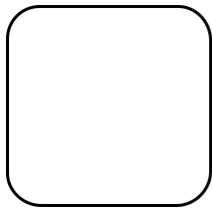


15) _____

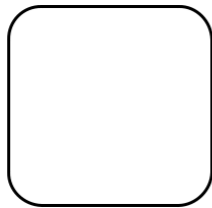


Drawing Particle Arrangements

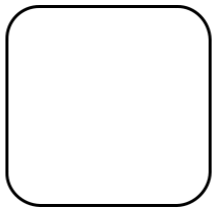
16.) Draw a particle diagram for each of the following below. *Then give an example for each.*



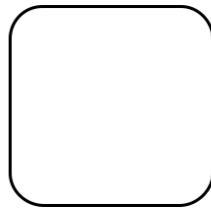
pure diatomic element



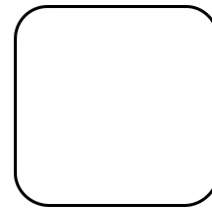
pure diatomic compound



mixture of two elements



mixture of an element & a compound



mixture of two diatomic elements & a compound

REGENTS PRACTICE

1. Use the following key for the question below:



Draw 4 molecules of compound X₂Z in the box on the right



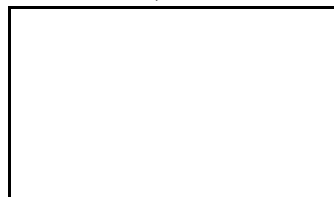
2. Use the following key for the next two questions.



Draw 8 atoms of element X



Draw a Homogeneous mixture of element Z with element X (10 atoms of each element).



ASSESS YOURSELF ON THIS LESSON:

If you missed any regents practice questions you should see me for extra help and/or re-watch the lesson video assignment


LESSON 4: PROPERTIES AND CHANGES OF MATTER
Objective:

Differentiate between physical and chemical changes

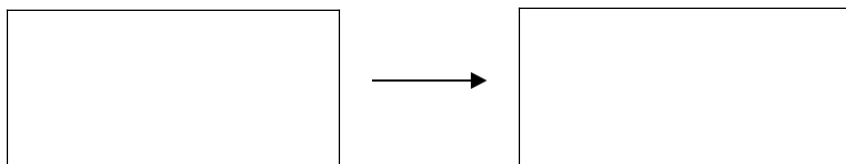
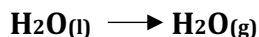
Determine the phase of a substance @ STP using table S

Construct particle diagrams for solids, liquids and gases

Directions: Complete the chart to the best of your ability.

| 1) Situation | Type of Change (P or C) | Explanation: (choose A or B for each below) A.) (Physical: Still the same substance) B.) (chemical: A new substance formed) |
|--|----------------------------|---|
| 2) Water freezing | | |
| 3) Decomposing of a dead organism | | |
| 4) Rusting (corroding) of a nail | | |
| 5) Melting ice off a windshield | | |
| 6) Combustion (burning) of gasoline | | |
| 7) $\text{H}_2\text{O (g)} \rightarrow \text{H}_2\text{O (l)}$ | | |
| 8) $\text{NaCl (s)} \xrightarrow{\text{H}_2\text{O}} \text{NaCl (aq)}$ | | |

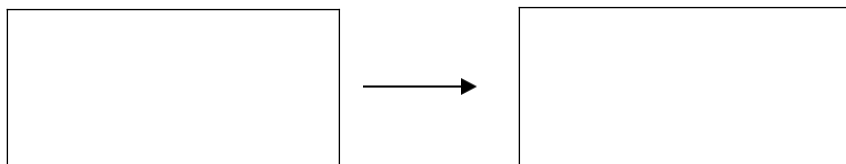
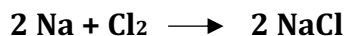
9. Draw a model (particle diagram) for the following change:



Is this a physical or chemical change? _____



10. Draw a model (particle diagram) for the following change:



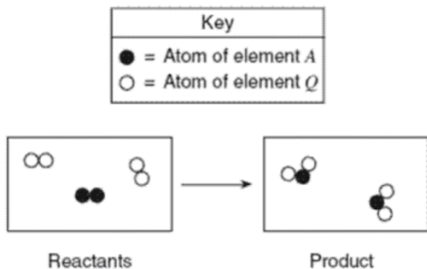
Is this a physical or chemical change?

11. Where can you find STP conditions in your Reference Table? Table _____
 12. Standard temperature = _____ °C or _____ K
 13. Standard pressure = _____ kPa or _____ atm

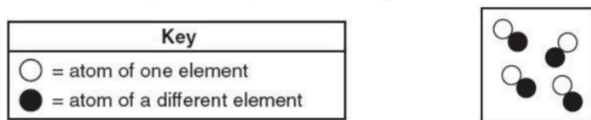
14. Using table S in your reference table, what phase of matter would the following be at STP?
 Gallium (Ga)
 Lithium (Li)
 Hydrogen (H)

REGENTS PRACTICE

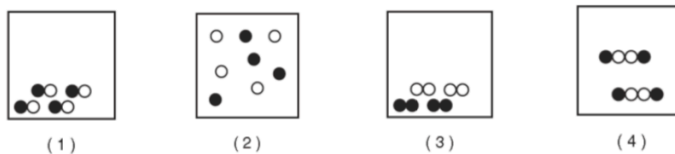
13. The diagram below represents the starting materials (reactants) and ending materials (products) after a change has taken place. Was the change physical or chemical? Explain.



14. Given the particle diagram representing four molecules of a substance:



Which particle diagram best represents this same substance after a physical change has taken place?



ASSESS YOURSELF ON THIS LESSON:

If you missed any regents practice questions you should see me for extra help and/or re-watch the lesson video assignment


LESSON 5: INTRODUCTION TO THE PERIODIC TABLE
Objective:

Differentiate between groups and periods

Indicate position of metals, metalloids, nonmetals, and noble gases on the period table

Be able to read and write compound formulas

Reading Compound Formulas Practice

Directions: Count the atoms present in the different compounds by using the coefficients and subscripts

| Example | Type of atom | Number of atoms | Total number of atoms |
|--------------------------------------|--------------|-----------------|-----------------------|
| 1) 3 CaCl ₂ | Ca Cl | | |
| 2) K ₂ CO ₃ | | | |
| 3) 3 Cu ₂ SO ₄ | | | |
| 4) Na ₂ CrO ₄ | | | |
| 5) 4 CaCO ₃ | | | |
| 6) 2 Al ₂ O ₃ | | | |
| 7) 4 NH ₄ OH | | | |



| | | | |
|---|--|--|--|
| 8) $\text{Pb}(\text{NO}_3)_2$ | | | |
| 9) 2NaHCO_3 | | | |
| 10) $3\text{H}_3\text{PO}_4$ | | | |
| 11) $(\text{NH}_4)_3\text{PO}_4$ | | | |
| 12) $\text{Ba}_3(\text{PO}_4)_2$ | | | |
| 13) $\text{NH}_4\text{C}_2\text{H}_3\text{O}_2$ | | | |
| 14) $3\text{Ba}(\text{OH})_2$ | | | |
| 15) $\text{CH}_3\text{CH}_2\text{OH}$ | | | |
| 16) $4\text{Ca}(\text{ClO}_3)_2$ | | | |
| 17) $\text{Al}_2(\text{SO}_4)_3$ | | | |
| 18) $3(\text{NH}_4)_2\text{SO}_4$ | | | |

Regents Chemistry Unit 2: Intro to Matter



| | | | |
|--|--|--|--|
| 19) $4 \text{ Al}_2(\text{CO}_3)_3$ | | | |
| 20) $2 (\text{NH}_4)_2\text{Cr}_2\text{O}_7$ | | | |

Energy Changes

| Change | Endothermic or Exothermic? | Heat absorbed or Heat released? |
|---|----------------------------|---------------------------------|
| $\text{CO}_2(\text{s}) \rightarrow \text{CO}_2(\text{g})$ | | |
| $\text{H}_2\text{O}(\text{l}) \rightarrow \text{H}_2\text{O}(\text{s})$ | | |
| $\text{H}_2 \rightarrow \text{H} + \text{H}$ | | |

Scientific Notation Review

Convert the following numbers to Scientific Notation

$$4,713,000,000 = \underline{\hspace{2cm}}$$

$$0.000093091 = \underline{\hspace{2cm}}$$

Convert the following numbers decimal form (standard notation)

$$7.6278 \times 10^{-5} = \underline{\hspace{2cm}}$$

$$2.301 \times 10^7 = \underline{\hspace{2cm}}$$



Periodic Table Coloring

Periodic Table of the Elements

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|-----------------------------------|------------------------------------|--------------------------------------|----------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|--|---------------------------------------|--------------------------------------|--|------------------------------------|---------------------------------------|------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|--|-----------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|----------------------------------|--------------------------------------|--|--------------------------------------|---------------------------------------|--------------------------------------|--------------------------------------|---------------------------------------|---------------------------------------|-------------------------------------|--|--------------------------------------|--|---|--|---------------------------------------|--|--------------------------------------|---------------------------------------|--------------------------------------|-----------------------------------|--|---------------------------------------|-------------------------------------|------------------------------------|--------------------------------------|--------------------------------------|----------------------|--------------------------------------|--|--------------------------------------|---------------------------------------|-------------------------------------|---------------------------------------|--|------------------------------------|---------------------------------------|--|----------------------------------|---------------------------------------|--|--|-------------------------------------|--|--------------------------------------|---------------------|--|--------------------------------------|---|--------------------------------------|--------------------------------------|---|---|--|--|---|---|---|--|---|--|---|--------------------------------------|--|---|--|---------------------------------------|--|---|---------------------------------------|--|---------------------------------------|--------------------------------------|---------------------------------------|---|--|--|---------------------------------------|--|--------------------------------------|---|---|---|--------------------------------------|---|---|---|--|--|---|---|
| 1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1 H Hydrogen 1.008 | 2 He Helium 4.003 | 3 Li Lithium 6.941 | 4 Be Beryllium 9.012 | 5 B Boron 10.811 | 6 C Carbon 12.011 | 7 N Nitrogen 14.007 | 8 O Oxygen 15.999 | 9 F Fluorine 18.998 | 10 Ne Neon 20.180 | 11 Na Sodium 22.990 | 12 Mg Magnesium 24.305 | 13 Al Aluminum 26.982 | 14 Si Silicon 28.086 | 15 P Phosphorus 30.974 | 16 S Sulfur 32.066 | 17 Cl Chlorine 35.453 | 18 Ar Argon 39.948 | 19 K Potassium 39.098 | 20 Ca Calcium 40.078 | 21 Sc Scandium 44.956 | 22 Ti Titanium 47.867 | 23 V Vanadium 50.942 | 24 Cr Chromium 51.996 | 25 Mn Manganese 54.938 | 26 Fe Iron 55.845 | 27 Co Cobalt 58.933 | 28 Ni Nickel 58.693 | 29 Cu Copper 63.546 | 30 Zn Zinc 65.38 | 31 Ga Gallium 69.723 | 32 Ge Germanium 72.631 | 33 As Arsenic 74.922 | 34 Se Selenium 78.971 | 35 Br Bromine 79.904 | 36 Kr Krypton 84.798 | 37 Rb Rubidium 84.468 | 38 Sr Strontium 87.62 | 39 Y Yttrium 88.906 | 40 Zr Zirconium 91.224 | 41 Nb Niobium 92.906 | 42 Mo Molybdenum 95.95 | 43 Tc Technetium 98.907 | 44 Ru Ruthenium 101.07 | 45 Rh Rhodium 102.906 | 46 Pd Palladium 106.42 | 47 Ag Silver 107.868 | 48 Cd Cadmium 112.414 | 49 In Indium 114.818 | 50 Sn Tin 118.711 | 51 Sb Antimony 121.760 | 52 Te Tellurium 127.6 | 53 I Iodine 126.904 | 54 Xe Xenon 131.29 | 55 Cs Cesium 132.905 | 56 Ba Barium 137.328 | 57-71 Lanthanides | 72 Hf Hafnium 178.49 | 73 Ta Tantalum 180.948 | 74 W Tungsten 183.84 | 75 Re Rhenium 186.207 | 76 Os Osmium 190.23 | 77 Ir Iridium 192.217 | 78 Pt Platinum 195.085 | 79 Au Gold 196.967 | 80 Hg Mercury 200.592 | 81 Tl Thallium 204.383 | 82 Pb Lead 207.2 | 83 Bi Bismuth 208.980 | 84 Po Polonium [208.982] | 85 At Astatine 209.987 | 86 Rn Radon 222.018 | 87 Fr Francium 223.020 | 88 Ra Radium 226.025 | 89-103 Actinides | 104 Rf Rutherfordium [261] | 105 Db Dubnium [262] | 106 Sg Seaborgium [266] | 107 Bh Bohrium [264] | 108 Hs Hassium [269] | 109 Mt Meitnerium [268] | 110 Ds Darmstadtium [269] | 111 Rg Roentgenium [272] | 112 Cn Copernicium [277] | 113 Uut Ununtrium unknown | 114 Fli Flerovium [289] | 115 Uup Ununpentium unknown | 116 Lv Livermorium [298] | 117 Uus Ununseptium unknown | 118 Uuo Ununoctium unknown | 57 La Lanthanum 138.905 | 58 Ce Cerium 140.116 | 59 Pr Praseodymium 140.908 | 60 Nd Neodymium 144.243 | 61 Pm Promethium 144.913 | 62 Sm Samarium 150.36 | 63 Eu Europium 151.964 | 64 Gd Gadolinium 157.25 | 65 Tb Terbium 158.925 | 66 Dy Dysprosium 162.500 | 67 Ho Holmium 164.930 | 68 Er Erbium 167.259 | 69 Tm Thulium 168.934 | 70 Yb Ytterbium 173.055 | 71 Lu Lutetium 174.967 | 89 Ac Actinium 227.028 | 90 Th Thorium 232.038 | 91 Pa Protactinium 231.036 | 92 U Uranium 238.029 | 93 Np Neptunium 237.048 | 94 Pu Plutonium 244.064 | 95 Am Americium 243.061 | 96 Cm Curium 247.070 | 97 Bk Berkelium 247.070 | 98 Cf Californium 251.080 | 99 Es Einsteinium [254] | 100 Fm Fermium 257.095 | 101 Md Mendelevium 258.1 | 102 No Nobelium 259.101 | 103 Lr Lawrencium [262] |

KEY

- Metals –
- Metalloids –
- Nonmetals –
- Noble Gases –