

Science 9

Unit 2: Chemical Reactions Worksheet 9: Metals, Nonmetals and Metalloids



Metals, Nonmetals and Metalloids:

Most periodic table contain a staircase line which allows you to identify which elements are metals, nonmetals and metalloids

| | | | | | | | | | | | | | | | | | | | | | | |
|----|----|--------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-----------|------------|--|--|--|----|
| H | | | | | | | | | | | | | | | | | nonmetals | | | | | He |
| Li | Be | metals | | | | | | | | | | B | C | N | O | F | Ne | | | | | |
| 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 | Sb | Te | I | Xe | | | | | |
| Cs | Ba | La | Hf | Ta | W | Re | Os | Ir | Pt | Au | Hg | Tl | Pb | Bi | Po | At | Rn | | | | | |
| Fr | Ra | Ac | Rf | Ha | Sg | Ns | Hz | Mt | | | | | | | | | | metalloids | | | | |

| | | | | | | | | | | | | | |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Ce | Pr | Nd | Pm | Sm | Eu | Gd | Tb | Dy | Ho | Er | Tm | Yb | Lu |
| Th | Pa | U | Np | Pu | Am | Cm | Bk | Cf | Es | Fm | Md | No | Lr |

Metals:

- Metals are good conductors of heat and electricity.
- Metals have a metallic luster (shiny).
- Metals are ductile (can be stretched into thin wires).
- Metals are malleable (can be pounded into thin sheets).
- A chemical property of metal is its reaction with water which results in corrosion.

| | | | | | | | | | | | | | | | | | | | | | | | |
|--------------------------------|-------------------------------------|---------------------------------|-------------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------------------|-----------------------------------|---------------------------------|----------------------------------|--------------------------------|-------------------------------|--|--|--|--|--|--|--|---------------------------------|
| IIA (2) | | | | | | | | | | | | | | | | | | | | | | | |
| 3 Li Lithium 6.939 | 4 Be Beryllium 9.0122 | | | | | | | | | | | | | | | | | | | | | | 13 Al Aluminum 26.9815 |
| 11 Na Sodium 22.9898 | 12 Mg Magnesium 24.312 | IIIB (3) | IVB (4) | VB (5) | VIB (6) | VII B (7) | VIII B (8) (9) (10) | | | IB (11) | IIB (12) | | | | | | | | | | | | |
| 19 K Potassium 39.102 | 20 Ca Calcium 40.08 | 21 Sc Scandium 44.956 | 22 Ti Titanium 47.90 | 23 V Vanadium 50.942 | 24 Cr Chromium 51.996 | 25 Mn Manganese 54.9380 | 26 Fe Iron 55.847 | 27 Co Cobalt 58.9332 | 28 Ni Nickel 58.71 | 29 Cu Copper 63.546 | 30 Zn Zinc 65.37 | 31 Ga Gallium 69.72 | | | | | | | | | | | |
| 37 Rb Rubidium 85.47 | 38 Sr Strontium 87.62 | 39 Y Yttrium 88.905 | 40 Zr Zirconium 91.22 | 41 Nb Niobium 92.906 | 42 Mo Molybdenum 95.94 | 43 Tc Technetium (99) | 44 Ru Ruthenium 101.07 | 45 Rh Rhodium 102.905 | 46 Pd Palladium 106.4 | 47 Ag Silver 107.868 | 48 Cd Cadmium 112.40 | 49 In Indium 114.82 | 50 Sn Tin 118.69 | | | | | | | | | | |
| 55 Cs Cesium 132.905 | 56 Ba Barium 137.34 | 57 La Lanthanum 138.91 | 72 Hf Hafnium 178.49 | 73 Ta Tantalum 180.948 | 74 W Tungsten 183.85 | 75 Re Rhenium 186.2 | 76 Os Osmium 190.2 | 77 Ir Iridium 192.2 | 78 Pt Platinum 195.09 | 79 Au Gold 196.967 | 80 Hg Mercury 200.59 | 81 Tl Thallium 204.37 | 82 Pb Lead 207.19 | 83 Bi Bismuth 208.980 | 84 Po Polonium (210) | | | | | | | | |
| 87 Fr Francium (223) | 88 Ra Radium (226) | 89 Ac Actinium (227) | 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 Uun Ununium (269) | 111 Uuu Ununium (272) | 112 Uub Ununium (277) | | | | | | | | | | | | |
| 58 Ce Cerium 140.12 | 59 Pr Praseodymium 140.907 | 60 Nd Neodymium 144.24 | 61 Pm Promethium (145) | 62 Sm Samarium 150.35 | 63 Eu Europium 151.96 | 64 Gd Gadolinium 157.25 | 65 Tb Terbium 158.924 | 66 Dy Dysprosium 162.50 | 67 Ho Holmium 164.930 | 68 Er Erbium 167.26 | 69 Tm Thulium 168.934 | 70 Yb Ytterbium 173.04 | 71 Lu Lutetium 174.97 | | | | | | | | | | |
| 90 Th Thorium 232.038 | 91 Pa Protactinium (231) | 92 U Uranium 238.03 | 93 Np Neptunium (237) | 94 Pu Plutonium (242) | 95 Am Americium (243) | 96 Cm Curium (247) | 97 Bk Berkelium (247) | 98 Cf Californium (251) | 99 Es Einsteinium (254) | 100 Fm Fermium (257) | 101 Md Mendelevium (258) | 102 No Nobelium (259) | 103 Lr Lawrencium (260) | | | | | | | | | | |

Nonmetals

- Non-metals are poor conductors of heat and electricity.
- Non-metals are not ductile or malleable.
- Solid non-metals are brittle and break easily.
- They are dull.
- Many non-metals are gases.

| IA (1) | IVA (14) | VA (15) | VIA (16) | VIIA (17) | VIIIA (18) |
|-------------------------------|------------------------------|----------------------------------|-------------------------------|--------------------------------|------------------------------|
| 1 H Hydrogen 1.00797 | 6 C Carbon 12.01115 | 7 N Nitrogen 14.0067 | 8 O Oxygen 15.9994 | 9 F Fluorine 18.9984 | 2 He Helium 4.0026 |
| | | 15 P Phosphorus 30.9738 | 16 S Sulfur 32.064 | 17 Cl Chlorine 35.453 | 10 Ne Neon 20.183 |
| | | | 34 Se Selenium 78.96 | 35 Br Bromine 79.904 | 18 Ar Argon 39.948 |
| | | | | 53 I Iodine 126.9044 | 36 Kr Krypton 83.80 |
| | | | | | 54 Xe Xenon 131.30 |
| | | | | | 86 Rn Radon (222) |

Metalloids:

- These elements are found along the stair-step line that distinguishes metals from non-metals.
- Metalloids (metal-like) have properties of both metals and non-metals.
- They are solids that can be shiny or dull.
- They conduct heat and electricity better than non-metals but not as well as metals.
- They are ductile and malleable.

| IIIA (13) | |
|--------------------------------|---------------------------------|
| 5 B Boron 10.811 | |
| 14 Si Silicon 28.086 | |
| 32 Ge Germanium 72.59 | 33 As Arsenic 74.9216 |
| 51 Sb Antimony 121.75 | 52 Te Tellurium 127.60 |
| | 85 At Astatine (210) |

PART A: Multiple Choice

1. Which group contains the most elements?
(A) Transition elements
(B) Nonmetals
(C) Metalloids
(D) Metals
2. Most metals are NOT
(A) Ductile.
(B) Malleable.
(C) Liquid at room temperature.
(D) Good conductors of heat and electricity
3. The most useful property of metalloids is their
(A) Varying ability to conduct electric current.
(B) Softness and malleability.
(C) Tendency to be unreactive.
(D) Ability to be pulled out into long wires.
4. Which group of elements shares characteristics with both metals and nonmetals?
(A) Halogens
(B) Lanthanides
(C) Salts
(D) Metalloids

5. Carbon and other nonmetals are found in which area of the periodic table?
- (A) On the left-most side
 - (B) On the right side
 - (C) In the middle column of the periodic table
 - (D) In the bottom rows
6. As you move from left to right across the periodic table, elements
- (A) Become less metallic.
 - (B) Have a lower atomic weight.
 - (C) Have a lower atomic number.
 - (D) Become more metallic
7. The three main groups of elements are metals, nonmetals, and
- (A) Noble gases.
 - (B) Isotopes.
 - (C) Alkali metals.
 - (D) Metalloids
8. Most elements are
- (A) Metals.
 - (B) Metalloids.
 - (C) Nonmetals.
 - (D) Semiconductors.
9. Most nonmetals are
- (A) Brittle.
 - (B) Metalloids.
 - (C) Good conductors.
 - (D) Shiny.
10. Which element is a metalloids.?
- (A) Carbon
 - (B) Sodium
 - (C) Silicon
 - (D) Uranium
11. Metals tend to be
- (A) Gases.
 - (B) Dull.
 - (C) Good conductors of heat.
 - (D) Brittle
12. The elements to the right of the zigzag line on the periodic table are called
- (A) Metalloids.
 - (B) Conductors.
 - (C) Metals.
 - (D) Nonmetals.
13. Most metals are
- (A) Solid at room temperature.
 - (B) Bad conductors of electric current.
 - (C) Dull.
 - (D) Not malleable.

14. Sulfur is NOT ductile, and NOT malleable. Is sulfur a metal, nonmetal, or metalloid?
- (A) Metal
 (B) Metalloid
 (C) Nonmetal
 (D) None of the above are correct
15. Which is true about metals?
- (A) They are ductile
 (B) They are malleable
 (C) They are good conductors of electricity and heat
 (D) All of the above
16. Silicon (#14) can conduct electricity sometimes, but not other times. It is NOT malleable. What is true about silicon?
- (A) It is a metal
 (B) It is a metalloid
 (C) It is a nonmetal
 (D) It is not found anywhere on earth
17. What is O?
- (A) Metal
 (B) Metalloid
 (C) Nonmetal
 (D) None of the above
18. The only metal that is a liquid at room temperature is ____.
- (A) Copper
 (B) Silver
 (C) Mercury
 (D) Sodium

PART B: WRITTEN RESPONSE

1. Most of the elements that form a zigzag line in the periodic table belong to one major group. What is that group, and what kinds of properties do its elements tend to have?

Periodic Table of the Elements (Top Section)

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|----|----|----|--|--|--|--|--|----|
| | 1 | | | | | | | | | | | | | | | | | 18 |
| 1 | | 2 | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | |
| 3 | | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | |

2. Write an "X" in the correct column to indicate whether the element is a metal, nonmetal or metalloid.

| | ELEMENT | METAL | NONMETAL | METALLOID |
|-----|----------------|--------------|-----------------|------------------|
| (A) | aluminum | | | |
| (B) | calcium | | | |
| (C) | antimony | | | |
| (D) | cesium | | | |
| (E) | carbon | | | |
| (F) | manganese | | | |
| (G) | fluorine | | | |
| (H) | silicon | | | |