STAAR Science Tutorial 05 TEK 6.6A: Metal Classification

TEK 6.6A: Compare metals, nonmetals, and metalloids using physical properties such as luster, conductivity, or malleability.

Metal Classification

• Most versions of the periodic table include color coding for the three metal classifications for the elements: metals, metalloids, and non-metals. Other periodic tables, like the one used on the STAAR test, use a zigzag dividing line to show the location of the metalloids.

							Me	tal										
	1						Me	tall	oid									18
1	1 H Hydrogen 1.008	2					Noi	n-M	leta	1			13	14	15	16	17	2 He He Ium 4.003
2	3 Li 6.941	4 Be 9.012	Metal Class Dividing Lir								e-		5 B 10.811	6 C Cathon 12.011	7 N N Brogen 140.007	8 O 0nget 15.999	9 F 18.998	10 Ne 20.180
3	11 Na ^{Sodhm}	12 Mg Magietim 24:305	3	4	5	6	7	8	9	10	11	12	13 Al Akmin tim 26.962	14 Si 28.086	15 P Phosphores 30,974	16 S 32.065	17 CI 35.463	18 Ar 39.948
	19 K 29.098	20 Ca cabhm 40.078	21 Sc Sca a d Am 44.956	22 Ti ^{Than him} 47.68	23 V Vanad km 50.942	24 Cr ©1 rom Nm 51.996	25 Mn Manganese 54.938	26 Fe	27 Co 58,933	28 Ni 58.69	29 Cu ^{C opper} 53.546	30 Zn ^{Zho} 65.39	31 Ga ^{Galkm} 69.723	32 Ge Ge maxim 72.81	33 As Ase 10 74.922	34 Se Se b i km 78.98	35 Br ^{Brom he} 79,904	36 Kr 83,80
	37 Rb 85.488	38 Sr Stortim 87.62	39 Y Yttalam \$8.906	40 Zr 21000 km 91.224	41 Nb Nb D km 92.906	42 Mo 100 (bde 11m 95.94	43 Tc Techiettim (98)	44 Ru 101.07	45 Rh 102.906	46 Pd Pailed tra 106.42	47 Ag 107.883	48 Cd ^{C adm lum} 112.411	49 In 114,818	50 Sn 118 710	51 Sb Asthony 121.75	52 Te Te lutum 127.80	53 126.904	54 Xe ^{% 101} ^{131.29}
	55 Cs ^{Cest} 132,905	56 Ba ^{Baitum} 137.327	•	72 Hf 178.49	73 Ta Tai talim 180,948	74 W Tugata 183.85	75 Re ^{Riesinm} 198.207	76 Os 0 cm km 190.23	77 Ir 192.22	78 Pt 195.08	79 Au 198.987	80 Hg Menuy 200.59	81 TI Thallum 204.383	82 Pb 207.2	83 Bi 508.98	84 Po Poble km (209)	85 At Astatue (210)	86 Rn Pados (222)
,	87 Fr Francism (223)	88 Ra 226.025	4	104 Rf Futerscillin (281)	105 Db Dibilits (282)	106 Sg Seaboglim (283)	107 Bh ^{Bolden} (262)	108 Hs Hasskim (285)	109 Mt Netrentm (288)	110 Uun	111 Uuu (272)	112 Uub (272)		114 Uuq Uuruqradkm		116 Uuh		118 Uuo UIIIocthm
			l	57 La Lattiaum 138.906	58 Ce 0 e m m 140.115	59 Pr Prase odjim kin 140.908	60 Nd Ne odym lum 144.24	61 Pm Promietu Am (145)	62 Sm Samathm 150.38	63 Eu Buop km 151.985	64 Gd Gado ID Mm 157 25	65 Tb Te d Mm 158.925	66 Dy 162.50	67 Ho Holm Nm 164,930	68 Er Edition 167.26	69 Tm 168.934	70 Yb ^{Ytte folum} 173.04	71 Lu Lute tum 174.967
			L	89 Ac Acts him 227.028	90 Th Thoritim 232.038	91 Pa Potacta a m 231.036	92 U U an Im 238.029	93 Np Neptilikm 237.048	94 Pu Pitto Jam (244)	95 Am Am e nomm (243)	96 Cm (247)	97 Bk ^{Benke∎m} (247)	98 Cf cattor km (251)	99 Es En sten hm (252)	100 Fm (257)	101 Md Meidekviim (258)	102 No Nobe Bim (259)	103 Lr Law e i dun (280)

• Metals occupy most of the periodic table. They are coded as blue in the textbook's periodic table. Metals generally have a "metallic" luster, and conduct heat and electricity well. They are usually **malleable**, meaning they can be beat into shapes (like an iron horseshoe), and **ductile**, meaning it can be drawn into a shape (like copper wire). All metals except mercury are solids at room temperature.

- Metalloids occupy a diagonal strip of elements between the metals on the left side of the periodic table and the non-metals on the right side, including boron, silicon, arsenic, tellurium and astatine to the right of the dividing line, and antimony, germanium and polonium to the left of the line. They are coded green in the textbook's periodic table. All metalloids are solid at room temperature. Metalloids generally have properties between the metals and nonmetals. They can conduct electricity, but not as well as metals, and only under certain circumstances. Unlike metals, most metalloids are brittle, not ductile. Semi-conductors used in electronic devices are made from the metalloids silicon and germanium.
- <u>Non-metals</u> include gases like hydrogen, oxygen, nitrogen, fluorine, chlorine and the noble gases, and solids like carbon, phosphorus, sulfur, and iodine, as well as one liquid (bromine). They are coded yellow in the textbook's periodic table, and are located to the right of the metalloid dividing line (except hydrogen, at the upper left corner of the periodic table). Non-metals do not conduct heat or electricity well. When solid, they are usually <u>brittle</u>. The nonmetal elements hydrogen, carbon, oxygen, nitrogen, sulfur and phosphorus are essential to life.

Practice Problems

1.	Elements that conduct electricity and heat well are						
2.	Elements that do not conduct electricity and heat well are						
3.	Semi-conductors are often made from						
4.	Ductile and malleable elements are						
5.	Brittle elements are either or						
6.	ements that have a blend of properties between metals and non-metals						
	are						
7.	Most of the elements essential to life are						
8.	The elements touching the zig-zag line are						
9.	Elements on the right side of the periodic table are						
10.	Elements on the left side of the periodic table are						
11.	The element sodium (Na) is a						
12.	The element silicon (Si) is a						
13.	The element oxygen (O) is a						
14.	The element aluminum (Al) is a						
15.	The element hydrogen (H) is a						
16.	The element potassium (K) is a						
17.	The element germanium (Ge) is a						