

# STAAR CHEMISTRY REFERENCE MATERIALS



## ATOMIC STRUCTURE

$$\text{Speed of light} = (\text{frequency})(\text{wavelength})$$

$$c = f\lambda$$

$$\text{Energy} = (\text{Planck's constant})(\text{frequency})$$

$$E_{\text{photon}} = hf$$

$$\text{Energy} = \frac{(\text{Planck's constant})(\text{speed of light})}{(\text{wavelength})}$$

$$E_{\text{photon}} = \frac{hc}{\lambda}$$

## BEHAVIOR OF GASES

$$\text{Total pressure of a gas} = \left( \begin{array}{l} \text{sum of the partial pressures} \\ \text{of the component gases} \end{array} \right)$$

$$P_T = P_1 + P_2 + P_3 + \dots$$

$$(\text{Pressure})(\text{volume}) = (\text{moles})(\text{ideal gas constant})(\text{temperature})$$

$$PV = nRT$$

$$\frac{(\text{Initial pressure})(\text{initial volume})}{(\text{Initial moles})(\text{initial temperature})} = \frac{(\text{final pressure})(\text{final volume})}{(\text{final moles})(\text{final temperature})}$$

$$\frac{P_1V_1}{n_1T_1} = \frac{P_2V_2}{n_2T_2}$$

$$(\text{Initial pressure})(\text{initial volume}) = (\text{final pressure})(\text{final volume})$$

$$P_1V_1 = P_2V_2$$

$$\frac{(\text{Initial volume})}{(\text{Initial temperature})} = \frac{(\text{final volume})}{(\text{final temperature})}$$

$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

$$\frac{(\text{Initial volume})}{(\text{Initial moles})} = \frac{(\text{final volume})}{(\text{final moles})}$$

$$\frac{V_1}{n_1} = \frac{V_2}{n_2}$$

## SOLUTIONS

$$\text{Molarity} = \frac{\text{moles of solute}}{\text{liter of solution}}$$

$$M = \frac{\text{mol}}{\text{L}}$$

$$\text{Ionization constant of water} = \left( \begin{array}{l} \text{hydrogen ion} \\ \text{concentration} \end{array} \right) \left( \begin{array}{l} \text{hydroxide ion} \\ \text{concentration} \end{array} \right)$$

$$K_w = [\text{H}^+][\text{OH}^-]$$

$$\left( \begin{array}{l} \text{Volume of} \\ \text{solution 1} \end{array} \right) \left( \begin{array}{l} \text{molarity of} \\ \text{solution 1} \end{array} \right) = \left( \begin{array}{l} \text{volume of} \\ \text{solution 2} \end{array} \right) \left( \begin{array}{l} \text{molarity of} \\ \text{solution 2} \end{array} \right)$$

$$V_1M_1 = V_2M_2$$

$$\text{pH} = -\log(\text{hydrogen ion concentration})$$

$$\text{pH} = -\log[\text{H}^+]$$

## THERMOCHEMISTRY

$$\text{Heat gained or lost} = (\text{mass}) \left( \begin{array}{l} \text{specific} \\ \text{heat} \end{array} \right) \left( \begin{array}{l} \text{change in} \\ \text{temperature} \end{array} \right)$$

$$Q = mc_p\Delta T$$

$$\text{Enthalpy of reaction} = \left( \begin{array}{l} \text{enthalpy} \\ \text{of products} \end{array} \right) - \left( \begin{array}{l} \text{enthalpy} \\ \text{of reactants} \end{array} \right)$$

$$\Delta H = \Delta H_f^{\circ}(\text{products}) - \Delta H_f^{\circ}(\text{reactants})$$

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## OTHER FORMULAS

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{m}{V}$$

$$\text{Percent error} = \left( \frac{\text{accepted value} - \text{experimental value}}{\text{accepted value}} \right) (100)$$

$$\text{Percent yield} = \left( \frac{\text{actual yield}}{\text{theoretical yield}} \right) (100)$$

## CONSTANTS AND CONVERSIONS

$$\text{Avogadro's number} = 6.02 \times 10^{23} \text{ particles per mole}$$

$$h = \text{Planck's constant} = 6.63 \times 10^{-34} \text{ J} \cdot \text{s}$$

$$c = \text{speed of light} = 3.00 \times 10^8 \frac{\text{m}}{\text{s}}$$

$$K_w = \text{ionization constant of water} = 1.00 \times 10^{-14} \left( \frac{\text{mol}}{\text{L}} \right)^2$$

$$\text{alpha particle } (\alpha) = {}_2^4\text{He} \quad \text{beta particle } (\beta) = {}_{-1}^0\text{e} \quad \text{neutron} = {}_0^1\text{n}$$

$$\text{standard temperature and pressure (STP)} = 0^\circ\text{C and 1 atm}$$

$$0^\circ\text{C} = 273 \text{ K}$$

$$\text{volume of ideal gas at STP} = 22.4 \frac{\text{L}}{\text{mol}}$$

$$1 \text{ cm}^3 = 1 \text{ mL} = 1 \text{ cc}$$

$$1 \text{ atm} = 760 \text{ mm Hg} = 101.3 \text{ kPa}$$

$$R = \text{ideal gas constant} = 0.0821 \frac{\text{L} \cdot \text{atm}}{\text{mol} \cdot \text{K}} = 8.31 \frac{\text{L} \cdot \text{kPa}}{\text{mol} \cdot \text{K}} = 62.4 \frac{\text{L} \cdot \text{mm Hg}}{\text{mol} \cdot \text{K}}$$

$$1 \text{ calorie (cal)} = 4.18 \text{ joules (J)}$$

$$1000 \text{ calories (cal)} = 1 \text{ Calorie (Cal)} = 1 \text{ kilocalorie (kcal)}$$

## RULES FOR SIGNIFICANT FIGURES

1. Non-zero digits and zeros between non-zero digits are always significant.
2. Leading zeros are not significant.
3. Zeros to the right of all non-zero digits are only significant if a decimal point is shown.
4. For values written in scientific notation, the digits in the coefficient are significant.
5. In a common logarithm, there are as many digits after the decimal point as there are significant figures in the original number.

# STAAR CHEMISTRY REFERENCE MATERIALS

POLYATOMIC IONS		SOLUBILITY OF COMMON IONIC COMPOUNDS IN WATER		ACTIVITY SERIES
Acetate	$C_2H_3O_2^-$ , $CH_3COO^-$	<b>Soluble</b> <b>compounds contain</b> $C_2H_3O_2^-$ , $CH_3COO^-$	<b>Common exceptions</b> None	<b>Metal</b> Lithium
Ammonium	$NH_4^+$	$NH_4^+$	None	Potassium
Carbonate	$CO_3^{2-}$	$NO_3^-$	None	Barium
Chlorate	$ClO_3^-$	$CN^-$	None	Calcium
Chlorite	$ClO_2^-$	$ClO^-$	None	Sodium
Chromate	$CrO_4^{2-}$	$ClO_2^-$	None	Magnesium
Cyanide	$CN^-$	$ClO_3^-$	None	Aluminum
Dichromate	$Cr_2O_7^{2-}$	$ClO_4^-$	None	Manganese
Hydrogen carbonate	$HCO_3^-$	$Br^-$	Compounds of $Ag^+$ , $Pb^{2+}$ , and $Hg_2^{2+}$	Zinc
Hydroxide	$OH^-$	$Cl^-$	Compounds of $Ag^+$ , $Pb^{2+}$ , and $Hg_2^{2+}$	Chromium
Hypochlorite	$ClO^-$	$I^-$	Compounds of $Ag^+$ , $Pb^{2+}$ , and $Hg_2^{2+}$	Iron
Nitrate	$NO_3^-$	$SO_4^{2-}$	Compounds of $Sr^{2+}$ , $Ba^{2+}$ , $Pb^{2+}$ , and $Hg_2^{2+}$	Cobalt
Nitrite	$NO_2^-$	<b>Insoluble</b> <b>compounds contain</b> $CO_3^{2-}$	<b>Common exceptions</b> Compounds of $NH_4^+$ and the alkali metal cations	Nickel
Perchlorate	$ClO_4^-$	$PO_4^{3-}$	Compounds of $NH_4^+$ and the alkali metal cations	Tin
Permanganate	$MnO_4^-$	$CrO_4^{2-}$	Compounds of $NH_4^+$ and the alkali metal cations	Lead
Phosphate	$PO_4^{3-}$	$Cr_2O_7^{2-}$	Compounds of $NH_4^+$ and the alkali metal cations	(Hydrogen)
Sulfate	$SO_4^{2-}$	$OH^-$	Compounds of $NH_4^+$ , the alkali metal cations, $Ca^{2+}$ , $Sr^{2+}$ , and $Ba^{2+}$	Copper
Sulfite	$SO_3^{2-}$	$S^{2-}$	Compounds of $NH_4^+$ , the alkali metal cations, $Ca^{2+}$ , $Sr^{2+}$ , and $Ba^{2+}$	Mercury
				Silver
				Platinum
				Gold



# STAAR CHEMISTRY REFERENCE MATERIALS

## PERIODIC TABLE OF THE ELEMENTS

1		2		3		4		5		6		7		8		9		10		11		12		13		14		15		16		17		18																																																																																																																																					
1A		2A		3B		4B		5B		6B		7B		8B		9B		10B		11B		12B		3A		4A		5A		6A		7A		8A																																																																																																																																					
1	<b>H</b> 1.008 Hydrogen	3	<b>Li</b> 6.941 Lithium	19	<b>K</b> 39.098 Potassium	21	<b>Sc</b> 44.956 Scandium	22	<b>Ti</b> 47.867 Titanium	23	<b>V</b> 50.942 Vanadium	24	<b>Cr</b> 51.996 Chromium	25	<b>Mn</b> 54.938 Manganese	26	<b>Fe</b> 55.845 Iron	27	<b>Co</b> 58.933 Cobalt	28	<b>Ni</b> 58.693 Nickel	29	<b>Cu</b> 63.546 Copper	30	<b>Zn</b> 65.38 Zinc	31	<b>Ga</b> 69.723 Gallium	32	<b>Ge</b> 72.64 Germanium	33	<b>As</b> 74.922 Arsenic	34	<b>Se</b> 78.96 Selenium	35	<b>Br</b> 79.904 Bromine	36	<b>Kr</b> 83.798 Krypton																																																																																																																																		
2	4 <b>Be</b> 9.012 Beryllium	10	<b>Ne</b> 20.180 Neon	18	<b>Ar</b> 39.948 Argon	36	<b>Kr</b> 83.798 Krypton	54	<b>Xe</b> 131.294 Xenon	86	<b>Rn</b> (222) Radon	102	<b>Nb</b> 92.906 Niobium	103	<b>Mo</b> 95.96 Molybdenum	104	<b>Tc</b> (98) Technetium	105	<b>Ru</b> 101.07 Ruthenium	106	<b>Rh</b> 102.906 Rhodium	107	<b>Pd</b> 106.42 Palladium	108	<b>Ag</b> 107.868 Silver	109	<b>Cd</b> 112.412 Cadmium	110	<b>In</b> 114.818 Indium	111	<b>Sn</b> 118.711 Tin	112	<b>Sb</b> 121.760 Antimony	113	<b>Te</b> 127.60 Tellurium	114	<b>I</b> 126.904 Iodine	115	<b>Ba</b> 137.328 Barium	116	<b>La</b> 138.905 Lanthanum	117	<b>Hf</b> 178.49 Hafnium	118	<b>Ta</b> 180.948 Tantalum	119	<b>W</b> 183.84 Tungsten	120	<b>Re</b> 186.207 Rhenium	121	<b>Os</b> 190.23 Osmium	122	<b>Ir</b> 192.217 Iridium	123	<b>Pt</b> 195.085 Platinum	124	<b>Au</b> 196.967 Gold	125	<b>Hg</b> 200.59 Mercury	126	<b>Tl</b> 204.383 Thallium	127	<b>Pb</b> 207.2 Lead	128	<b>Bi</b> 208.980 Bismuth	129	<b>Po</b> (209) Polonium	130	<b>At</b> (210) Astatine	131	<b>Rn</b> (222) Radon																																																																																																
3	11 <b>Na</b> 22.990 Sodium	17	<b>Mg</b> 24.305 Magnesium	25	<b>Al</b> 26.982 Aluminum	31	<b>Si</b> 28.086 Silicon	39	<b>Ca</b> 40.078 Calcium	47	<b>Sc</b> 44.956 Scandium	55	<b>Ti</b> 47.867 Titanium	63	<b>V</b> 50.942 Vanadium	71	<b>Cr</b> 51.996 Chromium	79	<b>Mn</b> 54.938 Manganese	87	<b>Fe</b> 55.845 Iron	95	<b>Co</b> 58.933 Cobalt	101	<b>Ni</b> 58.693 Nickel	107	<b>Cu</b> 63.546 Copper	113	<b>Zn</b> 65.38 Zinc	119	<b>Ga</b> 69.723 Gallium	125	<b>Ge</b> 72.64 Germanium	131	<b>As</b> 74.922 Arsenic	137	<b>Se</b> 78.96 Selenium	143	<b>Br</b> 79.904 Bromine	149	<b>Kr</b> 83.798 Krypton	155	<b>Rb</b> 85.468 Rubidium	161	<b>Sr</b> 87.62 Strontium	167	<b>Y</b> 88.906 Yttrium	173	<b>Zr</b> 91.224 Zirconium	179	<b>Nb</b> 92.906 Niobium	185	<b>Mo</b> 95.96 Molybdenum	191	<b>Tc</b> (98) Technetium	197	<b>Ru</b> 101.07 Ruthenium	203	<b>Rh</b> 102.906 Rhodium	209	<b>Pd</b> 106.42 Palladium	215	<b>Ag</b> 107.868 Silver	221	<b>Cd</b> 112.412 Cadmium	227	<b>In</b> 114.818 Indium	233	<b>Sn</b> 118.711 Tin	239	<b>Sb</b> 121.760 Antimony	245	<b>Te</b> 127.60 Tellurium	251	<b>I</b> 126.904 Iodine	257	<b>Xe</b> 131.294 Xenon	263	<b>Ba</b> 137.328 Barium	269	<b>La</b> 138.905 Lanthanum	275	<b>Hf</b> 178.49 Hafnium	281	<b>Ta</b> 180.948 Tantalum	287	<b>W</b> 183.84 Tungsten	293	<b>Re</b> 186.207 Rhenium	299	<b>Os</b> 190.23 Osmium	305	<b>Ir</b> 192.217 Iridium	311	<b>Pt</b> 195.085 Platinum	317	<b>Au</b> 196.967 Gold	323	<b>Hg</b> 200.59 Mercury	329	<b>Tl</b> 204.383 Thallium	335	<b>Pb</b> 207.2 Lead	341	<b>Bi</b> 208.980 Bismuth	347	<b>Po</b> (209) Polonium	353	<b>At</b> (210) Astatine	359	<b>Rn</b> (222) Radon																																																								
4	18 <b>K</b> 39.098 Potassium	24	<b>Ca</b> 40.078 Calcium	32	<b>Sc</b> 44.956 Scandium	40	<b>Ti</b> 47.867 Titanium	48	<b>V</b> 50.942 Vanadium	56	<b>Cr</b> 51.996 Chromium	64	<b>Mn</b> 54.938 Manganese	72	<b>Fe</b> 55.845 Iron	80	<b>Co</b> 58.933 Cobalt	88	<b>Ni</b> 58.693 Nickel	96	<b>Cu</b> 63.546 Copper	104	<b>Zn</b> 65.38 Zinc	112	<b>Ga</b> 69.723 Gallium	120	<b>Ge</b> 72.64 Germanium	128	<b>As</b> 74.922 Arsenic	136	<b>Se</b> 78.96 Selenium	144	<b>Br</b> 79.904 Bromine	152	<b>Kr</b> 83.798 Krypton	160	<b>Rb</b> 85.468 Rubidium	168	<b>Sr</b> 87.62 Strontium	176	<b>Y</b> 88.906 Yttrium	184	<b>Zr</b> 91.224 Zirconium	192	<b>Nb</b> 92.906 Niobium	200	<b>Mo</b> 95.96 Molybdenum	208	<b>Tc</b> (98) Technetium	216	<b>Ru</b> 101.07 Ruthenium	224	<b>Rh</b> 102.906 Rhodium	232	<b>Pd</b> 106.42 Palladium	240	<b>Ag</b> 107.868 Silver	248	<b>Cd</b> 112.412 Cadmium	256	<b>In</b> 114.818 Indium	264	<b>Sn</b> 118.711 Tin	272	<b>Sb</b> 121.760 Antimony	280	<b>Te</b> 127.60 Tellurium	288	<b>I</b> 126.904 Iodine	296	<b>Xe</b> 131.294 Xenon	304	<b>Ba</b> 137.328 Barium	312	<b>La</b> 138.905 Lanthanum	320	<b>Hf</b> 178.49 Hafnium	328	<b>Ta</b> 180.948 Tantalum	336	<b>W</b> 183.84 Tungsten	344	<b>Re</b> 186.207 Rhenium	352	<b>Os</b> 190.23 Osmium	360	<b>Ir</b> 192.217 Iridium	368	<b>Pt</b> 195.085 Platinum	376	<b>Au</b> 196.967 Gold	384	<b>Hg</b> 200.59 Mercury	392	<b>Tl</b> 204.383 Thallium	400	<b>Pb</b> 207.2 Lead	408	<b>Bi</b> 208.980 Bismuth	416	<b>Po</b> (209) Polonium	424	<b>At</b> (210) Astatine	432	<b>Rn</b> (222) Radon																																																														
5	25 <b>Rb</b> 85.468 Rubidium	31	<b>Sr</b> 87.62 Strontium	39	<b>Y</b> 88.906 Yttrium	47	<b>Zr</b> 91.224 Zirconium	55	<b>Nb</b> 92.906 Niobium	63	<b>Mo</b> 95.96 Molybdenum	71	<b>Tc</b> (98) Technetium	79	<b>Ru</b> 101.07 Ruthenium	87	<b>Rh</b> 102.906 Rhodium	95	<b>Pd</b> 106.42 Palladium	103	<b>Ag</b> 107.868 Silver	111	<b>Cd</b> 112.412 Cadmium	119	<b>In</b> 114.818 Indium	127	<b>Sn</b> 118.711 Tin	135	<b>Sb</b> 121.760 Antimony	143	<b>Te</b> 127.60 Tellurium	151	<b>I</b> 126.904 Iodine	159	<b>Xe</b> 131.294 Xenon	167	<b>Ba</b> 137.328 Barium	175	<b>La</b> 138.905 Lanthanum	183	<b>Hf</b> 178.49 Hafnium	191	<b>Ta</b> 180.948 Tantalum	199	<b>W</b> 183.84 Tungsten	207	<b>Re</b> 186.207 Rhenium	215	<b>Os</b> 190.23 Osmium	223	<b>Ir</b> 192.217 Iridium	231	<b>Pt</b> 195.085 Platinum	239	<b>Au</b> 196.967 Gold	247	<b>Hg</b> 200.59 Mercury	255	<b>Tl</b> 204.383 Thallium	263	<b>Pb</b> 207.2 Lead	271	<b>Bi</b> 208.980 Bismuth	279	<b>Po</b> (209) Polonium	287	<b>At</b> (210) Astatine	295	<b>Rn</b> (222) Radon																																																																																																		
6	32 <b>Cs</b> 132.905 Cesium	38	<b>Ba</b> 137.328 Barium	46	<b>Lu</b> 174.967 Lutetium	54	<b>Hf</b> 178.49 Hafnium	62	<b>Ta</b> 180.948 Tantalum	70	<b>W</b> 183.84 Tungsten	78	<b>Re</b> 186.207 Rhenium	86	<b>Os</b> 190.23 Osmium	94	<b>Ir</b> 192.217 Iridium	102	<b>Pt</b> 195.085 Platinum	110	<b>Au</b> 196.967 Gold	118	<b>Hg</b> 200.59 Mercury	126	<b>Tl</b> 204.383 Thallium	134	<b>Pb</b> 207.2 Lead	142	<b>Bi</b> 208.980 Bismuth	150	<b>Po</b> (209) Polonium	158	<b>At</b> (210) Astatine	166	<b>Rn</b> (222) Radon	174	<b>Fr</b> (223) Francium	182	<b>Ra</b> (226) Radium	190	<b>Ac</b> (227) Actinium	198	<b>Th</b> 232.038 Thorium	206	<b>Pa</b> 231.036 Protactinium	214	<b>U</b> 238.029 Uranium	222	<b>Np</b> (237) Neptunium	230	<b>Pu</b> (244) Plutonium	238	<b>Am</b> (243) Americium	246	<b>Cm</b> (247) Curium	254	<b>Bk</b> (247) Berkelium	262	<b>Cf</b> (251) Californium	270	<b>Es</b> (252) Einsteinium	278	<b>Fm</b> (257) Fermium	286	<b>Md</b> (258) Mendelevium	294	<b>No</b> (259) Nobelium	302	<b>Lr</b> (262) Lawrencium	310	<b>Rf</b> (267) Rutherfordium	318	<b>Db</b> (268) Dubnium	326	<b>Sg</b> (271) Seaborgium	334	<b>Bh</b> (272) Bohrium	342	<b>Hs</b> (270) Hassium	350	<b>Mt</b> (276) Meitnerium	358	<b>Ds</b> (281) Darmstadtium	366	<b>Rg</b> (280) Roentgenium																																																																																		
7	39 <b>Fr</b> (223) Francium	45	<b>Ra</b> (226) Radium	53	<b>Ac</b> (227) Actinium	61	<b>Th</b> 232.038 Thorium	69	<b>Pa</b> 231.036 Protactinium	77	<b>U</b> 238.029 Uranium	85	<b>Np</b> (237) Neptunium	93	<b>Pu</b> (244) Plutonium	101	<b>Am</b> (243) Americium	109	<b>Cm</b> (247) Curium	117	<b>Bk</b> (247) Berkelium	125	<b>Cf</b> (251) Californium	133	<b>Es</b> (252) Einsteinium	141	<b>Fm</b> (257) Fermium	149	<b>Md</b> (258) Mendelevium	157	<b>No</b> (259) Nobelium	165	<b>Lr</b> (262) Lawrencium	173	<b>Rf</b> (267) Rutherfordium	181	<b>Db</b> (268) Dubnium	189	<b>Sg</b> (271) Seaborgium	197	<b>Bh</b> (272) Bohrium	205	<b>Hs</b> (270) Hassium	213	<b>Mt</b> (276) Meitnerium	221	<b>Ds</b> (281) Darmstadtium	229	<b>Rg</b> (280) Roentgenium	237	<b>Uu</b> (286) Ununseptium	245	<b>Uub</b> (288) Ununbium	253	<b>Uut</b> (289) Ununtrium	261	<b>Uuq</b> (291) Ununquadium	269	<b>Uup</b> (293) Ununpentium	277	<b>Uuq</b> (295) Ununhexium	285	<b>Uuh</b> (297) Ununheptium	293	<b>Uuo</b> (299) Ununoctium	301	<b>Uuq</b> (301) Ununquadium	309	<b>Uuh</b> (303) Ununheptium	317	<b>Uuo</b> (305) Ununoctium	325	<b>Uuq</b> (307) Ununquadium	333	<b>Uuh</b> (309) Ununheptium	341	<b>Uuo</b> (311) Ununoctium	349	<b>Uuq</b> (313) Ununquadium	357	<b>Uuh</b> (315) Ununheptium	365	<b>Uuo</b> (317) Ununoctium	373	<b>Uuq</b> (319) Ununquadium	381	<b>Uuh</b> (321) Ununheptium	389	<b>Uuo</b> (323) Ununoctium	397	<b>Uuq</b> (325) Ununquadium	405	<b>Uuh</b> (327) Ununheptium	413	<b>Uuo</b> (329) Ununoctium	421	<b>Uuq</b> (331) Ununquadium	429	<b>Uuh</b> (333) Ununheptium	437	<b>Uuo</b> (335) Ununoctium	445	<b>Uuq</b> (337) Ununquadium	453	<b>Uuh</b> (339) Ununheptium	461	<b>Uuo</b> (341) Ununoctium	469	<b>Uuq</b> (343) Ununquadium	477	<b>Uuh</b> (345) Ununheptium	485	<b>Uuo</b> (347) Ununoctium	493	<b>Uuq</b> (349) Ununquadium	501	<b>Uuh</b> (351) Ununheptium	509	<b>Uuo</b> (353) Ununoctium	517	<b>Uuq</b> (355) Ununquadium	525	<b>Uuh</b> (357) Ununheptium	533	<b>Uuo</b> (359) Ununoctium	541	<b>Uuq</b> (361) Ununquadium	549	<b>Uuh</b> (363) Ununheptium	557	<b>Uuo</b> (365) Ununoctium	565	<b>Uuq</b> (367) Ununquadium	573	<b>Uuh</b> (369) Ununheptium	581	<b>Uuo</b> (371) Ununoctium	589	<b>Uuq</b> (373) Ununquadium	597	<b>Uuh</b> (375) Ununheptium	605	<b>Uuo</b> (377) Ununoctium	613	<b>Uuq</b> (379) Ununquadium	621	<b>Uuh</b> (381) Ununheptium	629	<b>Uuo</b> (383) Ununoctium	637	<b>Uuq</b> (385) Ununquadium	645	<b>Uuh</b> (387) Ununheptium	653	<b>Uuo</b> (389) Ununoctium	661	<b>Uuq</b> (391) Ununquadium	669	<b>Uuh</b> (393) Ununheptium	677	<b>Uuo</b> (395) Ununoctium	685	<b>Uuq</b> (397) Ununquadium	693	<b>Uuh</b> (399) Ununheptium	701	<b>Uuo</b> (401) Ununoctium

Mass numbers in parentheses are those of the most stable or most common isotope.

Lanthanide Series

Actinide Series