Properties of Common Substances

KEY TO SYMBOLS: Common names of substances are enclosed in parentheses.

(*) water solution of a pure substance (e) element (c) compound

| Name Perind 2 Maring Point (*) Being Point (*) Decima 2 mail attrick (% mail) Ch.(2004) 18,5 118,1 -2 attrick (% mail) N*N 27,3 28314 22 attrick (% mail) N*N 27,3 28314 28 attrick (% mail) N*N -185 descents have - attrick (% mail) N*N -185 descents have - attrick (% mail) N*N -185 descents have - attrick (% mail) N*N 2 572 (mail) x 250 (kol) 20 (kol) - basine (%) B 2075 6000 22 (Jown) x 250 (kol) 20 (kol) - basine (%) B 0.72 588 312 - calcine food displace (mail) Calcine food displace (mail) - - 233 - calcine food displace (mail) Calcine (mail) 0.000 (mail) - - 234 - calcine food displace (mail) Calcine (mail) 0.000 (mail) - - <th></th> <th></th> <th></th> <th></th> <th>Density</th> <th></th> | | | | | Density | |
|--|-------------------------------------|---|---------------------|----------------------------|--|--|
| sette attivine y Obj (Obj Height) Obj (Obj Height) Image of the setter of the sett | Name | Formula | Melting Point (°C) | Boiling Point (°C) | (g/cm³ or g/mL) | |
| alminuti () ampril ()() ()< | acetic acid (vinegar) (c) | CH₃COOH | 16.6 | 118.1 | — | |
| amenuics (s) Met, amenuics (s) Met, Met, Met, Met, Met, Met, Met, Met, | aluminum (e) | AI | 659.7 | 2519 | 2.7 | |
| amendum intrate (c) M+MC 1686 210 1.73 barrer (n) M -189 -185 5000000000000000000000000000000000000 | ammonia (c) | NH₃ | -77.8 | -33.4 | less dense than air | |
| algen(b) Ar -189 -185 determ han at main balance (b) As -7 572 (gright 250 (size) 20 (size) balance (b) Bs 2075 107 364 (size) branne (b) Bs 2075 600 237(size) 364 (size) branne (b) Bs 2075 58.8 312 500 cotium of mode (lander) (1) Ca(D) decomposet at 502° - 231 500 cotium of mode (lander) (1) Ca(D) Ca(D) 2360 2350 331 - cotium of mode (lander) (1) Ca(D) Ca(D) 2360 2350 331 - cotium of mode (lander) (1) Ca(D) Ca(D) 100 331 - | ammonium nitrate (c) | NH ₄ NO ₃ | 169.6 | 210 | 1.73 | |
| attent (c) As - - - S27 gray (J 22 (but 2) (but 2) (but 2) (but 2) (but 2) (but 1) | argon (e) | Ar | -189 | -185 | denser than air | |
| balan (e) Ba 727 1887 8.62 born (e) Be 723 4407 1.85 born (e) B 2032 4401 237(bront, 23.4) (elistic) cation (anothous (investore) (i) GAO 985 1444 15.5 cation (anothous (investore) (i) GAO 985 2830 33.3 cation (anothous (investore) (i) GAO 2800 33.3 cation (anothous (investore) (i) GAO 2800 33.3 cation (anothous (investore) (i) GAO 2800 33.1 cation (anothous (investore) (i) GAO 2800 33.1 cation (anothous (investore) (i) GAO 2800 33.1 cation (anothous (investore) (i) GAO 4402 2.3 cooper (i) GAO 1044 2552 955 cooper (i) GAO 4402 2.3 34.4 cooper (i) GAO 4404 34.4 37.4 down (i) GA 1.45 7.44 37.4 <td>arsenic (e)</td> <td>As</td> <td>—</td> <td>—</td> <td>5.727 (grey), 4.25 (black), 2.0 (yellow)</td> <td></td> | arsenic (e) | As | — | — | 5.727 (grey), 4.25 (black), 2.0 (yellow) | |
| beginn(*) Be 1280 24/11 1.185 born (*) B 2275 6000 42.712m, 2.34 (20m), 2.44 (20m), 2.4 | barium (e) | Ba | 727 | 1897 | 3.62 | |
| bonne (e) B 2075 4000 (2.7)[count, 2.4] (edica) calcum (f) GA 845 1464 1.55 calcum (f) GA 845 1464 1.55 calcum cohone (fine) GA 845 1464 1.55 calcum cohone (fine) GA 983 283 283 calcum cohone (fine) GA 983 283 381 283 cathor (sharon(fine) GA 983 283 381 283 cathor (sharon(fine) GA 1684 2852 2.25 285 cohone (share (sharon (| beryllium (e) | Be | 1280 | 2471 | 1.85 | |
| bounne (v) Gr. -7.2 58.8 1.12 cation of action of presentation of the start of the sta | boron (e) | В | 2075 | 4000 | 2.37(brown), 2.34 (yellow) | |
| calcum (t) G 885 1484 155 calcum calcuma (thorange) (t) GA(D), decomposes at 027C 2.33 calcum calcuma (thorange) (t) GA(D), decomposes at 027C 2.33 calcum calcuma (thorange) (t) GA(D), decomposes at 027C 2.34 calcum calcuma (thorange) (t) GC 2800 2800 2800 2800 cathorange (thorange) (t) C 4402 2800 2800 2800 cathorange (thorange) (t) C 4402 2400 225 8955 cathorange (thorange) (t) GL(NO ₂) coppet(t) antita (bustom) (t) GL(NO ₂) oppet(t) antita (bustom) (t) GL(NO ₂) oppet(t) antita (bustom) (t) GL(NO ₂) oppet(t) antita (bustom) (t) GL(NO ₂) | bromine (e) | Br ₂ | -7.2 | 58.8 | 3.12 | |
| calcun catoraba (imenstand) (i) GAO ₁ decompose at 820°C 2.23 Calcun bydood (spleted lime) (.) GAO 2360 2350 3.3 Calcun bydood (spleted lime) (.) GAO 2360 2350 3.3 Cabou (spread (spleted lime) (.) GAO 2480 2450 3.3 Cabou (spread (spleted lime) (.) GAO 4482 4482 2.23 Cabou (spread (spleted lime) (.) GAO 1064 2562 805 Copper (i) GAO 1064 2562 805 2.23 Copper (i) GAO 1064 2562 805 2.24 Copper (i) sufface (bustand (c)) GAO 114.5 78.4 0.769 2.24 Copper (i) sufface (bustand (c)) GAO 114.5 78.4 0.769 2.44 Sufface (c) GAO 114.5 0.760 1.34 1.34 Sufface (c) HG 1.960 1.960 1.960 1.960 1.960 Sufface (c) HG 1.960 | calcium <mark>(e)</mark> | Ca | 845 | 1484 | 1.55 | |
| clackun prodecing (s) clarkun order (mer)(s) Ca(Mb, Callwn order, mer)(s) Ca(Mb, Callwn order, mer)(s) Callwn order, mer)(s) Callwn order, mer)(s) carbon (dammen)(e) C 3500 3930 351 carbon (dammen)(e) C 3500 3930 351 carbon (dammen)(e) C 3400 3930 351 carbon (dammen, mer) C 3400 3930 351 carbon (dammen, mer) C 3400 3330 351 carbon (dammen, mer) C 3400 3300 351 coppert) (sintific) C(Mb,b) mer) 2423 3600 3600 coppert) (sintific) C(Mb,b) mer) 2430 | calcium carbonate (limestone) (c) | CaCO₃ | decomposes at 900°C | — | 2.93 | |
| claitun acke (lime) (c) Ca 2850 2850 3.3 cathon (graphine) (c) C 4402 4402 2.25 cathon (graphine) (c) C 4402 4402 2.25 cathon (graphine) (c) C 4402 4402 8.65 cathon (graphine) (c) Ca cathon (graphine) (c) Ca(MA) 0 cappel(f) (antate) Ca(MA) 0 cappel(f) (antate) Ca(MA) cappel(f) (antate) Ca(MA) paid (c) Art CaSB <td>calcium hydroxide (slaked lime) (c)</td> <td>Ca(OH)₂</td> <td>decomposes at 522°C</td> <td>—</td> <td>2.24</td> <td></td> | calcium hydroxide (slaked lime) (c) | Ca(OH) ₂ | decomposes at 522°C | — | 2.24 | |
| cathor (gamba) (e) C 3500 3303 3.51 cathor (gamba) (e) C 4492 4252 225 cathor (gamba) (e) C0, 1-01.5 3-44.6 determ than a) Copper (b) C0, 100.4 256.2 0.85 Copper (b) C0, 10.4 256.2 0.85 Copper (b) C0, 10.4 256.2 0.85 Copper (b) C0, C, 10.4 256.2 0.7 Copper (b) C0, C, 4.0 0.789 0.7 Comper (b) F.c. -270 188 Pido (c) Au 1063 2056 19.3 Pidotar (c) C4, Ag, B 146 demose thor italis 15.4 Nydoben (c) He -252 -253 much bis descetthan ali Nydoben (c) HG Notes Notes 14.5 Nydoben (c) HG 114 130.2 14.5 Nydoben (c) HG </td <td>calcium oxide (lime) (c)</td> <td>CaO</td> <td>2580</td> <td>2850</td> <td>3.3</td> <td></td> | calcium oxide (lime) (c) | CaO | 2580 | 2850 | 3.3 | |
| cathon dixed (γ) C 4442 4442 4422 225 cathon dixed (γ) Ω_{g} charmon dixed (γ) Ω_{g} -101.6 -34.6 determent an | carbon (diamond) <mark>(e)</mark> | C | 3500 | 3930 | 3.51 | |
| cathon divide () 00, copper () 0, -1016 -34.5 demer than al copper () 0, 1084 2562 8.95 copper () 0,00%,b copper () 0,00%,b 2.8 copper () 0,00%,b 2.8 copper () 0,00%,b 2.8 0.789 copper () 0,00%,b 2.8 0.789 fluorine () () () 0,00% 2.8693 glucox () () () -253 700% 1.8 heatan () He -252 -2633 1.85 1.85 pubragen () He -253 700% 1.14 1.8 1.8 pubragen () He -353 2861 7.86 1.9 pubragen () He 1.14 1.950 1.134 1.9 < | carbon (graphite) <mark>(e)</mark> | C | 4492 | 4492 | 2.25 | |
| choine (e) Cp -101.6 -3-46 denset han air copper (f) CG CGNObp copper (f) infrate (c) CGNObp copper (f) infrate (c) CGSOC54,0 chan (ety) slotholy (c) CGSOC54,0 inder (e) CGSOC54,0 igdd (e) Au 1063 2826 133.1 igdd (e) CGA,0 166. decomposes better it bols 1.54 benatuk (c) He 272.2 263.9 hydrogen (e) He 272.3 1.45 hydrogen eperoxide (c) HS0, 1.45 1.14 1.46 4.455 ibine (e) HS0, 1.53 2.061 3.76 hydrogen eperoxide (c) HS0, -0.2714 1750 | carbon dioxide (c) | CO2 | - | - | - | |
| copper (b) Cu 1084 2562 895 copper (b) CuSQ-SH_Q - - - copper (b) CuSQ-SH_Q decomposes at 150°C - 2.28 diman (effy attractional) (c) C,K+QH -114.5 78.4 0.789 fluorine (b) Au 1063 2856 19.3 glucos(c) C,K+QH 146 decomposes to 1000 1.44 Methan (effy attractional) (c) Fe,Q 1555 268.93 - Methan (effy attractional) (c) Fe,Q 1555 268.93 - Mydeogn (c) Hr -272.2 -268.93 - Mydeogn (c) Hr -272.2 -268.93 - Mydeogn (c) Hr -114 144 455 Mydeogn (c) Hr -273 much less decerthan air Mydeogn (c) Hr -144 1392 365 Fer 1535 2861 736 - Fer 179 1340 < | chlorine <mark>(e)</mark> | Cl ₂ | -101.6 | -34.6 | denser than air | |
| copper[] shifter (c) CU(NO)2 C- - - - - <td>copper (e)</td> <td>Cu</td> <td>1084</td> <td>2562</td> <td>8.95</td> <td></td> | copper (e) | Cu | 1084 | 2562 | 8.95 | |
| coppen(f) CCSQ,850,0 decomposes at 150° 2.28 fbuorine (e) F2 -270 -188 gdie (e) Au 1063 2856 113.3 gbursse (c) C.41,0,0, 146 decompose store it boils 15.4 belium (e) He -272.2 25839 benutite (c) F6,0, 1565 5.24 hydropher (add (f) HG varies varies varies hydropher (add (f) HG varies 143 4.495 hydropher (add (f) Hg,0, -0.4 150.2 14.5 hydropher (add (f) Hg,0, -0.4 150.2 14.5 hydropher (add (f) Hg,0, -0.4 150.2 14.5 icon (e) I 179 1340 0.534.4 ifort (e) Mg 0, 708 1412 2.3 imagestim (h) Mg 0, - inagestim (horde (c) Mg 0, | copper(II) nitrate (c) | Cu(NO ₃) ₂ | - | - | - | |
| ethan (ethy) alcoho) (c) C_2hoo 7.8.4 0.789 (polic (ethy) Fr 270 -188 (polic (eth) GL Mu 1063 2856 19.3 (plucos (c) C_4h_0A, 146 decomposes before it bits 15.4 Nellin (e) He 272.2 -268.93 phydoblor (alc (*) He -272.9 -263.3 mu less dense than al hydobgen (e) HL -259 -253 mu less dense than al hydobgen peroxide (r) H,0, -04 150.2 1.45 (other (e) Fe 1535 2861 7.86 (rot (e) Fe 1535 1107 11.34 (rot (e) Meg 651 1107 1.74 magnetis (r) Mgg 651 1107 1.74 magnetis (r) Mgg - 5.18 mercing (r) Mg 651 1107 1.74 magnetis (r) Meg <td< td=""><td>copper(II) sulfate (bluestone) (c)</td><td>CuSO₄•5H₂O</td><td>decomposes at 150°C</td><td>—</td><td>2.28</td><td></td></td<> | copper(II) sulfate (bluestone) (c) | CuSO ₄ •5H ₂ O | decomposes at 150°C | — | 2.28 | |
| function (e) gold (e) gold (e) gold (e) $ -$ gold (e) gold (e) gold (e)(G μ_1, ρ_n (F $\mu_n)$ 146285613.3plucase (r)(G μ_1, ρ_n (F $\mu_n)$ 146decompose Selven it balls15.4hematic (c)Fe ₂ O (F $\mu_n)$ 1565 $-$ 28930 $-$ hydrachior (ad (t)')HCI (F $\mu_n)$ variesvariesvarieshydragen (e)H2 (F $\mu_n)$ $-$ 25.3muchless dense than alhydragen (e)H2 (F $\mu_n)$ 11418444.95ionn (e)Fe153528617.86ionn (e)Fe153528617.86ionn (e)Mg65111071.74magnesism (hord (c)Mg (F $\mu_n)$ 14122.3magnesism (hord (c)Mg (F $\mu_n)$ 14122.3magnesism (hord (c)Mg (F $\mu_n)$ 1.45-magnesism (hord (c)Mg (F $\mu_n)$ magnesism (hord (c)Mg (F $\mu_n)$ magnesism (hord (c)Nk (F $\mu_n)$ 1.4552.913magnesism (hord (c)Nk (F $\mu_n)$ methane (c)Nk (F $\mu_n)$ <td>ethanol (ethyl alcohol) (c)</td> <td>C₂H₅OH</td> <td>-114.5</td> <td>78.4</td> <td>0.789</td> <td></td> | ethanol (ethyl alcohol) (c) | C ₂ H ₅ OH | -114.5 | 78.4 | 0.789 | |
| gdd(e)Au1063285619.3plause (·) $C_{\rm pl}_{\rm o}_{\rm 0}$ 146decomposes before it to its1.54hellun (·)He272.2268.93henatte (·)Fe_0_11555.24hydropen (o)HUvariesvarieswarieshydropen (o)Hy-259-253much less dense tha airhydropen peroxide (·)Hy,-0.4150.21.45lodine (o)Hy-1141844.95lodine (o)Fe153528617.86long (o)Fe153528611.13.4it hum (o)Ng65111071.74magnetim (e)Mg65111071.74magnetim (e)Mgmagnetim (e)Hg-389356.613.6menthare (r)Hg-248-246-methare (r)Ni145529138.90intragen doide (c)Ny-209.9-195.8sightly denser than airopser (o)Ny-218-181desere than airplating (r)Ny-209.9382421.41plating (r)Ny-21.85-161.5-methare (r)Ny-21.85-161.5-methare (r)Ny-21.85-161.5-methare (r)Ny-21.85-161.5-methare (r)Ny-21.85-161.5-methare (r) <td< td=""><td>fluorine (e)</td><td>F₂</td><td>-270</td><td>-188</td><td>-</td><td></td></td<> | fluorine (e) | F ₂ | -270 | -188 | - | |
| glusse () C_{H} , Q_{h} 146 decompose before it tools 1.54 hematite () He -2722 -28639 $-$ hydotohic cad(') HCI varies varies Varies hydotohic cad(') HCI varies varies varies hydotohic cad(') HCI varies varies varies hydotohic cad(') HCI -259 53 much less dense than air hydotohic cad(') H20 -0.4 1502 1.45 lodne (e) h2 114 184 4.95 locne (e) h2 114 184 4.95 read() Pb 327.4 1750 1134 magnetitic (s) Mg L2 2.3 2.6 1.6 magnetitic (s) Mg L2 708 1412 2.3 2.6 magnetitic (s) Mg L2 708 3.6 1.36 2.6 1.6 2.6 1.6 2.6 1.6 2.6 1.6 2.6 </td <td>gold (e)</td> <td>Au</td> <td>1063</td> <td>2856</td> <td>19.3</td> <td></td> | gold (e) | Au | 1063 | 2856 | 19.3 | |
| helium (e) He -222 -26893 $$ -24 hydrochic add (*) HO Varies Varies Varies hydrochic add (*) HO Varies Varies Varies hydrochic add (*) HQ -253 much less dense than ai Instruments hydrochic add (*) Hydrochic add (*) -253 much less dense than ai Instruments hydrochic add (*) Hydrochic add (*) -2683 -2683 much less dense than ai lochic (e) Hydrochic add (*) Hydrochic add (*) -2683 -2683 lead (e) Hydrochic add (*) Hydrochic add (*) -2683 -2683 lead (e) Hydrochic add (*) Hydrochic add (*) -1134 -134 magnesium choide (c) MgCl ₂ -08 -1615 $$ magnesium choide (c) MgCl ₂ -288 -246 $$ magnesium choide (c) N -1825 -1615 $$ notad (e) N -2999 -1958 | glucose (c) | C ₆ H ₁₂ O ₆ | 146 | decomposes before it boils | 1.54 | |
| Inertatic (c) Fe_{0}_{3} 1555 $$ 5.24 hydrochlori (adi (*) HQ varies varies varies hydrochlori (adi (*) H $_{0}_{2}$ -0.4 150.2 1.45 lodne (e) b_{1}_{2} -0.4 150.2 1.45 lodne (e) b_{1}_{2} 114 184 495 lonn (e) Fe 1535 2261 7.86 lead (r) Pb 327.4 1750 11.34 magnesim (h) Mgr, 651 1107 1.74 magnesim (bic) Mgr, -38.9 356.5 13.6 metray (e) Mgr, -38.9 356.5 13.6 metray (e) Mgr, -248 -246 - neot (e) Ni 1455 2313 8190 intragen (boxide (c) NQ, - - - neot (e) NQ, - - - - nethare (c) NQ, - - | helium (e) | He | -272.2 | -268.93 | - | |
| hydrochnic add (*) HCI varies varies varies hydrogen (e) Hy ~259 ~253 much less forms than in hydrogen peroxide (c) Hy02 ~0.4 150.2 1.45 ionn (e) Fe 1535 2861 7.65 ionn (e) Fe 1535 2861 7.65 ithum (e) Ui 179 1340 0.534 ithum (e) Mg 651 1107 1.74 magnetsum (holnd (c) MgCb 708 1412 2.3 magnetsum (holnd (c) MgCb 708 1412 2.3 metrary (e) Hig ~38.9 356.6 13.6 metrary (e) NN 1455 2913 8.90 nitrogen dioxide (c) Ny ~209.9 ~15.8 sightly denser than ai oxygen (e) Ny -209.9 ~16.8 sightly denser than ai oxygen (e) Oy ~176 ~12 denser than ai oxygen (e) Oy </td <td>hematite (c)</td> <td>Fe₂O₃</td> <td>1565</td> <td>—</td> <td>5.24</td> <td></td> | hematite (c) | Fe ₂ O ₃ | 1565 | — | 5.24 | |
| hydrogen (e) H ₂ -259 -253 much less dense than air hydrogen perxole (c) H ₂ -0.4 150.2 1.45 lodine (e) I ₂ 114 184 4.95 lodine (e) Fe 1535 2861 7.86 lead (p) Pb 327.4 1750 11.34 lithum (e) II 179 1340 0.534 magnesitin (e) Mg 651 1107 1.74 magnesitin (e) Fe.9.4 - - - 5.18 magnetitic (c) Fe.9.4 - - - 5.18 methane (c) Hg -38.9 356.5 13.6 - methane (c) Ne -248 -246 - - nickel (e) Ni 1455 2913 890 1010 nickel (e) Ng -218 -112 denser than air nickel (e) Ng -219.5 -112 denser than air | hydrochloric acid (*) | HCI | varies | varies | varies | |
| hydrogen peroxide (c)H- β_2 -0.4150.214.4lodine (e)l21141844.95iron (e)Fe153526617.86lead (q)Pb327.4175011.34lithum (e)Li17913400.534magnesium (b)Mg65111071.74magnesium chicide (c)MgC, Fe,O4,70814122.3magnesium chicide (c)Hg-38.9356.613.6metcury (e)Hg-38.9356.613.6metcury (e)Ni1455291.38.90intragen dixide (c)Ni1455291.38.90intragen dixide (c)Ni1455291.38.90intragen dixide (c)Nocosone (e)0.2-218-112denser than airoxogen (e)0.2-218-112denser than airpolatinum (e)Pt1769382.421.41polatinum (e)K63.57590.86propare (.)Si1410326.52.33sillon dixide (sillor)(.)SiO.71660sodum (holde (table salt) (c)NaC891146.52.16sodum (holde (table salt) (c)NaC891146.52.16sodum (holde (table salt) (c)NaC891146.52.16sodum (holde (table salt) (c)NaC891146.52.16sodum (holde (table salt) (c) <t< td=""><td>hydrogen <mark>(e)</mark></td><td>H₂</td><td>-259</td><td>-253</td><td>much less dense than air</td><td></td></t<> | hydrogen <mark>(e)</mark> | H ₂ | -259 | -253 | much less dense than air | |
| | hydrogen peroxide (c) | H ₂ O ₂ | -0.4 | 150.2 | 1.45 | |
| | iodine <mark>(e)</mark> | Ι ₂ | 114 | 184 | 4.95 | |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | iron (e) | Fe | 1535 | 2861 | 7.86 | |
| Ithium (e) U 179 1340 0.534 magnesium (e) Mg 651 1107 1.74 magnesium chloride (c) MgC ₂ 708 1412 2.3 magnesium chloride (c) Fe ₂ O ₄ - - 5.18 - metrury (e) Hg -38.9 356.6 13.6 - metrury (e) Ne -248 -246 - - nickel (e) Ni 1455 2913 8.90 - nitrogen dioxide (c) NO2 - - - - oxygen (e) O2 -218 -183 slightly less dense than air ozone (e) O3 -192.5 -112 denser than air polygen (b) Q - - - - otassis G3 -192.5 759 0.86 - polygen (e) Q2 -218 -183 slightly less dense than air - potassim (e) K 635.5 | lead (e) | Pb | 327.4 | 1750 | 11.34 | |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | lithium (e) | Li | 179 | 1340 | 0.534 | |
| magnetise (c)MgG270814122.3magnetise (c) $Fe_{2}O_{4}$ 518mercury (e)htg-38.9356.613.6methane (r)CH4-182.5-161.5-neon (e)Ne-248-246-nickel (e)Ni145529138.90nitrogen (abxide (c)NO2nitrogen (abxide (c)NO2cozone (e)O3-192.5-112denser than airplatinum (e)Pt176938242141platinum (e)K63.57590.86probasilic (c)C, ³ H2potestimic (e)C, ³ H2potassim (e)K63.57590.86propane (c)C, ³ H2selenium (e)Si141032652.33silcon (e)Si141032652.33silcon (e)Ag961216210.5sodum (horide (silica) (c)Na(180114652.16sodum (horide (silica) (c)Na(289816552.56suffur (e)Na97.58920.971sodum (horide (c)NaF98816552.56suffur (prinstone) (e)Sa112.8444.62.07tin (e)Sn231.926027.31unal (e)U1130413119.05 <td< td=""><td>magnesium (e)</td><td>Mg</td><td>651</td><td>1107</td><td>1.74</td><td></td></td<> | magnesium (e) | Mg | 651 | 1107 | 1.74 | |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | magnesium chloride (c) | MgCl ₂ | 708 | 1412 | 2.3 | |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | magnetite (c) | Fe ₃ O ₄ | — | — | 5.18 | |
| methane (c) CH4 -182.5 -161.5 neon (e) Ne -248 -246 introgen (e) nickel (e) Ni 1455 2913 8.90 introgen (e) nitrogen (e) N2 -209.9 195.8 slightly less dense than air introgen (e) oxygen (e) 02 -218 -183 slightly denser than air potence (e) 03 -192.5 -112 denser than air potence (e) 04 1769 3824 2141 potence (c) (C2Ha)n - - - potence (c) (C3Ha) - - - potence (c) C4Ha 63.5 75.9 0.86 propane (c) C5Ha - - - - selenium (e) Si 1410 3265 2.33 - silcon dioxide (silca)(c) Si02 1600 - - - silcon dioxide (silca)(c) Na 97.5 | mercury (e) | Hg | -38.9 | 356.6 | 13.6 | |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | methane (c) | CH ₄ | -182.5 | -161.5 | — | |
| $\begin{array}{ c c c c c c c c c c c c c c c c c c c$ | neon <mark>(e)</mark> | Ne | -248 | -246 | - | |
| nitrogen (e)N2-209-195.8slightly less dense than airnitrogen dioxide (c)NO2oxygen (e)O2-218-183Slightly denser than airozone (e)O3-192.5-112denser than airozone (e)Pt1769382.421.41platinum (e)Pt1769382.421.41optextlylene (polythene) (c)(C,H4)potassium (e)K63.57590.86propane (c)C,5Hg42.17selenium (e)Se217684.94.81silicon (e)Si141032652.33silicon (e)SiQ21600silue (e)Ag961216210.5sodium (e)Na97.58920.971sodium fluoride (table salt) (c)NaC180114652.16sodium fluoride (c)NaF98816952.56surcos (sugar) (c)C1,2H201170decomposes at 186°C1.59surfur (rimstone) (e)Ti166632874.5uranium (e)U1130413119.05uranium (e)Ke-111.9-001.00vare (c)Ke-111.9-07.1- | nickel <mark>(e)</mark> | Ni | 1455 | 2913 | 8.90 | |
| nitrogen dioxide (c)NO2oxygen (e) O_2 -218-183slightly denser than airozone (e) O_3 -192.5-112denser than airplatinum (e)Pt1769382421.41polyetylene (oblythene) (c)(C,H_a)npotassium (e)K63.57590.86propane (c)C,gHaselenium (e)Se21.7684.94.81silicon dioxide (slita) (c)SiQ1600silicon dioxide (slita) (c)SiQ1600silver (e)Ag961216210.5sodium (e)Na97.58920.971sodium (c)NaCl80114652.16sodium (c)Sn21.92.561.59sucrose (sugar) (c)C ₁₂ H ₂₂ O ₁₁ 170decomposes at 186°C1.59sutrose (sugar) (c)Sn23.1926027.31trailum (e)Ti166632874.51.59uranium (e)U1130413119.05water (c)H ₂ O01001.001.00vater (e)Xe-111.9-017.1-vater (e)Xe-111.9-017.1 | nitrogen <mark>(e)</mark> | N ₂ | -209.9 | -195.8 | slightly less dense than air | |
| $\begin{array}{ c c c c c c } \hline 0_2 & -218 & -183 & slightly denser than air \\ \hline ozone (e) & 0_3 & -192.5 & -112 & denser than air \\ \hline otherwise (b) & 0_1 & 1769 & 3824 & 21.41 & \\ \hline otherwise (b) & (C_2H_4)n & - & - & - & \\ \hline otherwise (b) & K & 63.5 & 759 & 0.86 & \\ \hline propane (c) & C_5H_6 & - & -42.17 & - & \\ \hline selenium (e) & Se & 217 & 684.9 & 4.81 & \\ \hline slicon (e) & Si & 1410 & 3265 & 2.33 & \\ \hline slicon dioxide (silica) (c) & SiO_2 & 1600 & - & & \\ \hline solum (e) & Si & 1410 & 3265 & 2.33 & \\ \hline slicon dioxide (silica) (c) & SiO_2 & 1600 & - & & & \\ \hline solum (e) & Na & 97.5 & 892 & 0.971 & \\ \hline sodium (horide (table salt) (c) & NaCl & 801 & 1465 & 2.16 & \\ \hline sodium (norde (c) & SiO_2 & 112.8 & 444.6 & 2.07 & \\ \hline sutrose (sugar) (c) & C_{12}H_2O_{11} & 170 & decomposes at 186°C & 1.59 & \\ \hline sutrose (sugar) (c) & Ti & 1666 & 3287 & 4.5 & \\ \hline tin (e) & Sn & 231.9 & 2602 & 7.31 & \\ \hline tin (e) & Wa & 1130 & 4131 & 19.05 & \\ \hline water (c) & H_2O & 0 & 100 & 1.00 & \\ \hline water (c) & H_2O & 0 & 100 & 1.00 & \\ \hline water (c) & Xe & -111.9 & -107.1 & - & \\ \hline zin (e) & Zn & 419 & 907 & 7.14 & \\ \hline \end{array}$ | nitrogen dioxide (c) | NO ₂ | - | - | _ | |
| ozone (e) 0_3 -192.5-112denser than airplatinum (e)Pt1769382421.41polyethylene (polythene) (c)(C2H_p)npotassium (e)K63.57590.86propane (c) C_3H_8 42.17-selenium (e)Se217684.94.81silicon (e)Si141032652.33silicon dioxide (silica) (c)SiO21600sodium (e)Ag961216210.5sodium (e)NaCl80114652.16sodium fuloride (table sait) (c)NaCl8011465sodium fuloride (c)NaF98816952.56surdose (sugar) (c) $C_{1,2H_{2,0}1_1}$ 170decomposes at 186°C1.59surdose (sugar) (c)Sn231.926027.31titanium (e)Ti166632874.51.59uranium (e)U1130413119.05water (c)HgC001001.00water (c)Xe-111.9-107.1-zeno (e)Xe-111.9-107.1-zeno (e)Xe-111.99077.14 | oxygen <mark>(e)</mark> | 0 ₂ | -218 | -183 | slightly denser than air | |
| platium (e)Pt1769382421.41polyethylene (polythene) (c) $(C_2H_4)n$ potassium (e)K63.57590.86propane (c) C_3H_8 42.17selenium (e)Se217684.94.81silicon (e)Si141032652.33silicon dixide (silica) (c)SiO_21600sodium (e)Ag961216210.5sodium (e)Na97.58920.971sodium (e)NaCl80114652.16sodium (c)NaGl80116952.56sucrose (sugar) (c) $C_1H_{22}O_{11}$ 170decomposes at 186°C1.59sufur (brimstone) (e)Sn231.926027.31tit nuim (e)U1130413119.05uranium (e)U1130413119.05uranium (e)Ke-111.9-107.1-zeno (e)Xe-111.9-107.1-zeno (e)Xe-111.99077.14 | ozone (e) | 03 | -192.5 | -112 | denser than air | |
| polythylene (polythene) (c)(C_2H_q)npotassium (e)K 63.5 759 0.86 propane (c)C_3H_8 42.17 selenium (e)Se 217 684.9 4.81 silicon (e)Si 1410 3265 2.33 silicon dixide (silica) (c)SiO_2 1600 silver (e)Ag961 2162 10.5 sodium (e)Na97.5 892 0.971 sodium (e)Na97.5 892 0.971 sodium floride (table salt) (c)NaCl 801 1465 2.16 sodium floride (c)Sa112.8 444.6 2.07 suffur (prixosher) (e)Sn 231.9 2602 7.31 titanium (e)Ti 1666 3287 4.5 unanium (e)H $_2O$ 0100 1.00 water (c)Ke -111.9 -107.1 $-$ zinc (e)Zn 419 907 7.14 | platinum (e) | Pt | 1769 | 3824 | 21.41 | |
| protassium (e)K63.57590.86propane (c)C_3Hg42.17selenium (e)Se217684.94.81silicon (e)Si141032652.33silicon dioxide (silica) (c)SiO21600silver (e)Ag961216210.5sodium (e)Na97.58920.971sodium (horide (table salt) (c)NaCl80114652.16sodium fluoride (c)NaF98816952.56sutrose (sugar) (c)C ₁₂ H ₂₂ O ₁₁ 170decomposes at 186°C1.59sulfur (brimstone) (e)Sa112.8444.62.07tin (e)Ti166632874.51.00tin (e)U1130413119.051.00water (c)HgO01001.001.00xenon (e)Xe-111.9-107.1zin (e)Xe-111.99077.14 | polyethylene (polythene) (c) | (C ₂ H ₄)n | _ | _ | | |
| $\begin{array}{c c c c c c c c c c c c c c c c c c c $ | potassium <mark>(e)</mark> | K | 63.5 | 759 | 0.86 | |
| selenium (e)Se217684.94.81silicon (e)Si141032652.33silicon dioxide (silica) (c)SiO21600silver (e)Ag961216210.5sodium (e)Na97.58920.971sodium (loide (table salt) (c)NaCl80114652.16sodium fluoride (c)NaF98816952.56sucrose (sugar) (c) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.59sulfur (brimstone) (e)Sa231.926027.31titanium (e)Ti166632874.51.00uranium (e)U1130413119.051.00water (c)H2O01001.001.00xenon (e)Xe-111.9-107.1zinc (e)Zn4199077.14- | propane (c) | C₃H ₈ | - | -42.17 | - | |
| silicon (e)Si141032652.33silicon dioxide (silica) (c)SiO21600silver (e)Ag961216210.510.5sodium (e)Na97.58920.9711sodium chloride (table salt) (c)NaCl80114652.16sodium fluoride (c)NaF98816952.561.59suffur (brimstone) (e) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.591suffur (brimstone) (e)Sn231.926027.311titanium (e)Ti166632874.51uranium (e)U1130413119.051water (c)H2OO1001.001.00xenon (e)Xe-111.9-107.1zinc (e)Zn4199077.141 | selenium (e) | Se | 217 | 684.9 | 4.81 | |
| silicon dioxide (silica) (c)SiO21600silver (e)Ag961216210.500sodium (e)Na97.58920.9710sodium chloride (table salt) (c)NaCl80114652.160sodium fluoride (c)NaF98816952.560sucrose (sugar) (c) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.590sulfur (brimstone) (e)Sa231.926027.310titanium (e)Ti166632874.500uranium (e)U1130413119.0500xenon (e)Xe-111.9-107.11.00zinc (e)Zn4199077.140 | silicon (e) | Si | 1410 | 3265 | 2.33 | |
| silver (e)Ag961216210.5sodium (e)Na97.58920.971sodium chorde (table sait) (c)NaCl80114652.16sodium fluoride (c)NaF98816952.56sucrose (sugar) (c) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.59sulfur (brimstone) (e)S8112.8444.62.07tin (e)Sn231.926027.31titanium (e)Ti166632874.5uranium (e)U1130413119.05water (c)H2O01001.00xenon (e)Xe-111.9-107.1zinc (e)Zn4199077.14 | silicon dioxide (silica) (c) | SiO ₂ | 1600 | — | - | |
| sodium (e)Na97.58920.971sodium floride (table salt) (c)NaCl80114652.16sodium fluoride (c)NaF98816952.56sucrose (sugar) (c) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.59sulfur (brimstone) (e)Sa112.8444.62.07tin (e)Sn231.926027.31uranium (e)U1130413119.05water (c)H ₂ O01001.00xenon (e)Xe-111.9-107.1-zinc (e)Zn4199077.14 | silver (e) | Ag | 961 | 2162 | 10.5 | |
| sodium chloride (table salt) (c)NaCl80114652.16sodium fluoride (c)NaF98816952.56sucrose (sugar) (c) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.59sulfur (brimstone) (e)S112.8444.62.07tin (e)Sn231.926027.31titanium (e)Ti166632874.5uranium (e)U1130413119.05water (c)H ₂ O01001.00xenon (e)Xe-111.9-107.1-zinc (e)Zn4199077.14 | sodium (e) | Na | 97.5 | 892 | 0.971 | |
| sodium fluoride (c)NaF98816952.56sucrose (sugar) (c) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.59sulfur (brimstone) (e) S_8 112.8444.62.07tin (e)Sn231.926027.31titanium (e)Ti166632874.5uranium (e)U1130413119.05water (c) H_2O 01001.00xenon (e)Xe-111.9-107.1-zinc (e)Zn4199077.14 | sodium chloride (table salt) (c) | NaCl | 801 | 1465 | 2.16 | |
| sucrose (sugar) (c) $C_{12}H_{22}O_{11}$ 170decomposes at 186°C1.59sulfur (brimstone) (e) S_8 112.8444.62.07tin (e)Sn231.926027.31titanium (e)Ti166632874.5uranium (e)U1130413119.05water (c)H2001001.00xenon (e)Xe-111.9-107.1-zinc (e)Zn4199077.14 | sodium fluoride (c) | NaF | 988 | 1695 | 2.56 | |
| sultur (brimstone) (e) S ₈ 112.8 444.6 2.07 tin (e) Sn 231.9 2602 7.31 titanium (e) Ti 1666 3287 4.5 uranium (e) U 1130 4131 19.05 water (c) H ₂ O O 100 1.00 xenon (e) Xe -111.9 -107.1 zinc (e) Zn 419 907 7.14 | sucrose (sugar) (c) | C ₁₂ H ₂₂ O ₁₁ | 170 | decomposes at 186°C | 1.59 | |
| tin (e) Sn 231.9 2602 7.31 titanium (e) Ti 1666 3287 4.5 uranium (e) U 1130 4131 19.05 water (c) H ₂ O O 100 1.00 xenon (e) Xe -111.9 -107.1 - zinc (e) Zn 419 907 7.14 | sultur (brimstone) <mark>(e)</mark> | S ₈ | 112.8 | 444.6 | 2.07 | |
| titanium (e) Ti 1666 3287 4.5 uranium (e) U 1130 4131 19.05 water (c) H ₂ O O 100 1.00 xenon (e) Xe -111.9 -107.1 - zinc (e) Zn 419 907 7.14 | tin (e) | Sn | 231.9 | 2602 | 7.31 | |
| uranium (e) U 1130 4131 19.05 water (c) H ₂ O 0 100 1.00 xenon (e) Xe -111.9 -107.1 - zinc (e) Zn 419 907 7.14 | titanium <mark>(e)</mark> | Ti | 1666 | 3287 | 4.5 | |
| water (c) H ₂ O 0 100 1.00 xenon (e) Xe -111.9 -107.1 - zinc (e) Zn 419 907 7.14 | uranium (e) | U | 1130 | 4131 | 19.05 | |
| xenon (e) Xe -111.9 -107.1 zinc (e) Zn 419 907 7.14 | water (c) | H ₂ O | 0 | 100 | 1.00 | |
| zinc (e) Zn 419 907 7.14 | xenon (e) | Xe | -111.9 | -107.1 | - | |
| | zinc (e) | Zn | 419 | 907 | 7.14 | |

DEFINITIONS: deliquescent: able to absorb water from the air to form a concentrated solution sublime: to form a vapour directly from a solid

| Appearance | |
|---|--|
| (at room temperature: 20°C) | Comments |
| colourless liquid with pungent smell | used in the manufacture of cellulose ethanoate; vinegar is a 5 to 7 percent solution in water |
| silver-white metal | used in aircraft, cooking utensils, and electrical apparatus |
| very soluble gas with pungent smell | used as refrigerant and in manufacture of resins, explosives, and fertilizers |
| white, soluble, crystalline salt | used in explosives and as a fertilizer |
| inert gas | used in electric lights |
| grey, black, or yellow solid | used in semiconductors and alloys; compounds are very poisonous and are used in medicine and as pesticides |
| silver-white solid | used in X-ray diagnosis |
| hard, white metal | used for corrosion-resistant alloys |
| brown, amphorous powder or yellow crystals | used for hardening steel and for producing enamels and glasses |
| red-brown liquid | used to make certain pain-relieving drugs; liquid causes severe chemical burns; vapour is harmful to lungs |
| soft, white metal that tarnishes easily | very abundant; essential to life |
| white solid | main ingredient in chalk and marble |
| white solid | aqueous solution used to test for CO ₂ |
| white solid | used in cement and for marking lines on playing fields |
| colourless, solid crystals | very hard; used for drilling through rock |
| grey-black solid | very soft; used in lubricants, pencil leads, and electrical apparatus |
| colourless gas with a faint tingling smell and taste | does not support combustion and is denser than air; used in fire extinguishers and as a refrigerant at -78.5° C |
| green gas | poisonous; used to kill harmful organisms in water |
| shiny, reddish solid | soft metal; good conductor of heat |
| | |
| blue, solid crystals | used in pesticides |
| colourless liquid | derived from fermentation of sugar; used as solvent or fuel; found in wine |
| greenish yellow gas | similar to chlorine |
| shiny, yellow solid | very soft metal; highly resistant to tarnishing |
| white solid | simple sugar; human body converts most sugars and starches to glucose |
| nonflammable inert gas | used as refrigerant; provides inert atmosphere for welding; used to fill air ships and balloons |
| rusty red colour | found in iron ore and rusted iron |
| colourless liquid | corrosive acid; properties vary according to concentration |
| colourless gas | highly flammable; liquid form used as rocket fuel |
| colourless liquid | thick and syrupy when pure; an antiseptic |
| violet-black, solid crystals | crystals sublime readily to form poisonous violet vapour |
| shiny, silver solid | rusts readily; soft when pure |
| shiny, blue-white solid | soft metal; forms poisonous compounds |
| silver-white metal (least dense solid known) | used in alloys; its salts have various medical uses |
| light, silvery-white metal that tarnishes easily in air | used in alloys and photography; compounds used in medicine; essential to life |
| white, deliquescent substance | |
| sniny, black, crystalline solid | strongly magnetic |
| shiny, silvery liquid | only liquid metal; forms poisonous compounds |
| odouriess, tiammable gas formed from decaying organic matter | main constituent in natural gas |
| colouriess, odouriess gas | discharge of electricity at low pressures through neon produces an intense orange-red glow |
| silvery-white, magnetic metal that resists corrosion | used for nickel plating and coinage, in alloys, and as a catalyst |
| Colouriess gas | win not burn of support burning, makes up 80 percent of an |
| DIOWII gds | Causes redustri-brown to total a local maler up 20 percent of air |
| huish as | must be present for building to take plate, makes up 20 percent 01 dill used for purifying air and water and in bleaching: atmospheric layer blocks most of the Sup's ultraviolet light |
| cilver.white colid | used in jawallary: alloyad with cobalt, used in pacamakars |
| tough wayy thermonlactic material | used in jewenery, anoyed with toolat, used in pateniakers |
| silvery, white soft highly reactive alkali metal | porymer of eurypiene, used as insulating material, nexture and creminany resistant |
| colourless gas | Essential to an inte, found in an inving matter, saits used in refiniters |
| pon-metal recembling sulfur: silvery-grey crystalline solid | naminuture, used as needs the standard rubbar and rubba alass; used in photoalastric calls and semiconductors |
| steel grey metalloid similar to carbon in its chemical properties | used in manufacture of hubber and hubby glass, used in photoerecture cens and semiconductors |
| bard granular nowder: insoluble in water | used in puter form in semiconductors and analysis and in the form of sincates in glass |
| shiny white solid | main constal bast-known conductor of electricity |
| soft silvery-white metal: very reactive | used in preparation of organic compounds as coolant and in some types of nuclear reactors |
| white crystalline solid | used to season or preserve foods |
| colourless, crystalline substance | used in water fluoridation and as an insecticide |
| white solid | made from sugar cane or sugar beets |
| vellow solid | used to make dves, pesticides, and other chemicals |
| shiny, slightly vellow solid | soft metal: rust resistant |
| lustrous white solid | allovs are widely used in the aerospace industry |
| metallic grev solid | used as a nuclear fuel (usually converted into plutonium) |
| colourless liquid | good solvent for non-greasy matter |
| inert gas | used in fluorescent tubes and light bulbs |
| hard, bluish-white metal | used in alloys such as brass and galvanized iron |
| | , |

Using Star Maps

Star maps help you find your way around the night sky, just like road maps help you find your way around a city. The three star maps on these pages show the night sky in fall, winter, and spring. Notice that each star map is a circle. The circumference of the circle represents the horizon. The centre of the circle is the point directly overhead, called the zenith.

Choosing and Orienting a Star Map

To use a star map, first choose the star map that is appropriate for the season. Then, match its direction to the sky. For example, if you are facing east, rotate the map so that E is at the bottom. The time of night is important, too. The maps tell you what time to look at the sky so the map matches what you see.

Locating Stars and Constellations

Suppose that you are facing north in the fall. Rotate the fall map so that N is at the bottom. The area of the sky just above the N is the northern sky. Start by identifying bright constellations. Here, you can see the constellations Ursa Major (the Big Dipper), Ursa Minor (the Little Dipper), and Cassiopeia. Once you can identify the bright constellations, try to identify their fainter neighbours.

How would you find the bright star Betelgeuse in the fall? The fall star map shows Betelgeuse close to the horizon in the east. Therefore, make sure that you are facing east. Hold the fall star map so that E is at the bottom. You will see Betelgeuse just above the horizon.







Instant Practice—Star Maps

- 1. Which direction would you face if you wanted to see Leo in January?
- 2. Name two constellations that you can see in the winter but not in the spring.
- **3.** Write an e-mail to a friend, describing how to use a star map to locate the star Deneb in the spring.

Chemistry References

Names, Formulas, and Charges of Some Polyatomic lons

| Name | Formula |
|---------------------------------|--|
| Acetate | CH₃COO- |
| Ammonium | NH_4^+ |
| Carbonate | CO ₃ ^{2–} |
| Chlorate | CIO₃⁻ |
| Chlorite | CIO ₂ - |
| Chromate | Cr0 ₄ ^{2–} |
| Cyanide | CN⁻ |
| Dichromate | Cr ₂ O ₇ ²⁻ |
| Hydrogen carbonate, bicarbonate | HCO ₃ − |
| Hydrogen sulfate, bisulfate | HSO4_ |
| Hydrogen sulfide, bisulfide | HS⁻ |
| Hydrogen sulfite, bisulfite | HSO₃ [_] |
| Hydroxide | 0H- |
| Hypochlorite | CIO- |
| Nitrate | NO₃ [−] |
| Nitrite | NO ₂ − |
| Perchlorate | CIO ₄ - |
| Permanganate | MnO₄ [−] |
| Phosphate | P04 ³⁻ |
| Phosphite | P033- |
| Sulfate | S04 ²⁻ |
| Sulfite | 50 ₃ ²⁻ |

Electron Arrangements of the First 20 Elements

| Atom | | | lon | | | |
|--|--|--|--|--|---|--|
| Н | 1р | 1 | H⁺ | 1 p | 0 | |
| | | | H⁻ | 1р | 2 | |
| He | 2 p | 2 | He | Does not f | orm an ion | |
| Li | Зр | 2, 1 | Li+ | Зр | 2 | |
| Be | 4 p | 2, 2 | Be ²⁺ | 4 p | 2 | |
| В | 5 p | 2, 3 | B ³⁺ | 5 p | 2 | |
| С | 6 p | 2, 4 | C ⁴⁻ | 6 p | 2, 8 | |
| Ν | 7 p | 2, 5 | N³− | 7 p | 2, 8 | |
| 0 | 8 p | 2, 6 | 02- | 8 p | 2, 8 | |
| F | 9 p | 2, 7 | F- | 9 p | 2, 8 | |
| | | | | Does not form an ion | | |
| Ne | 10 p | 2, 8 | Ne | Does not f | orm an ion | |
| Ne Na | 10 р 11 р | 2, 8 2, 8, 1 | Ne Na⁺ | Does not f 11 p | orm an ion 2, 8 | |
| Ne Na Mg | 10 р 11 р 12 р | 2, 8 2, 8, 1 2, 8, 2 | Ne Na ⁺ Mg ²⁺ | Does not f 11 p 12 p | orm an ion 2, 8 2, 8 | |
| Ne Na Mg Al | 10 р 11 р 12 р 13 р | 2, 8 2, 8, 1 2, 8, 2 2, 8, 3 | Ne Na ⁺ Mg ²⁺ Al ³⁺ | Does not f 11 p 12 p 13 p | orm an ion 2, 8 2, 8 2, 8 | |
| Ne Na Mg Al Si | 10 р 11 р 12 р 13 р 14 р | 2, 8 2, 8, 1 2, 8, 2 2, 8, 3 2, 8, 4 | Ne Na ⁺ Mg ²⁺ Al ³⁺ Si ⁴⁻ | Does not f 11 p 12 p 13 p 14 p | orm an ion 2, 8 2, 8 2, 8 2, 8 | |
| Ne Na Mg Al Si P | 10 p 11 p 12 p 13 p 14 p 15 p | 2, 8 2, 8, 1 2, 8, 2 2, 8, 3 2, 8, 4 2, 8, 5 | Ne Na ⁺ Mg ²⁺ Al ³⁺ Si ⁴⁻ P ³⁻ | Does not f 11 p 12 p 13 p 14 p 15 p | orm an ion 2, 8 2, 8 2, 8 2, 8, 8 2, 8, 8 | |
| Ne Na Mg Al Si P S | 10 p 11 p 12 p 13 p 14 p 15 p 16 p | 2, 8 2, 8, 1 2, 8, 2 2, 8, 3 2, 8, 4 2, 8, 5 2, 8, 6 | Ne Na ⁺ Mg ²⁺ Al ³⁺ Si ⁴⁻ P ³⁻ S ²⁻ | Does not f 11 p 12 p 13 p 14 p 15 p 16 p | 2, 8 2, 8 2, 8 2, 8 2, 8, 8 2, 8, 8 2, 8, 8 | |
| Ne Na Mg Al Si P S Cl | 10 p 11 p 12 p 13 p 14 p 15 p 16 p 17 p | 2, 8 2, 8, 1 2, 8, 2 2, 8, 3 2, 8, 4 2, 8, 5 2, 8, 6 2, 8, 7 | Ne Na ⁺ Mg ²⁺ Al ³⁺ Si ^{4–} P ^{3–} S ^{2–} Cl [–] | Does not f 11 p 12 p 13 p 14 p 15 p 16 p 17 p | orm an ion 2, 8 2, 8 2, 8 2, 8, 8 2, 8, 8 2, 8, 8 2, 8, 8 | |
| Ne Na Mg Al Si P S Cl Ar | 10 p 11 p 12 p 13 p 14 p 15 p 16 p 17 p 18 p | 2, 8 2, 8, 1 2, 8, 2 2, 8, 3 2, 8, 4 2, 8, 5 2, 8, 6 2, 8, 7 2, 8, 8 | Ne Na ⁺ Mg ²⁺ Al ³⁺ Si ⁴⁻ P ³⁻ S ²⁻ Cl ⁻ Ar | Does not f 11 p 12 p 13 p 14 p 15 p 16 p 17 p Does not f | orm an ion 2, 8 2, 8 2, 8, 8 2, 8, 8 2, 8, 8 2, 8, 8 2, 8, 8 2, 8, 8 | |
| Ne Na Mg Al Si P S Cl Ar | 10 p 11 p 12 p 13 p 14 p 15 p 16 p 17 p 18 p 19 p | 2, 8 2, 8, 1 2, 8, 2 2, 8, 3 2, 8, 4 2, 8, 5 2, 8, 6 2, 8, 7 2, 8, 8 | Ne Na ⁺ Mg ²⁺ Al ³⁺ Si ⁴⁻ P ³⁻ S ²⁻ Cl ⁻ Ar K ⁺ | Does not f 11 p 12 p 13 p 14 p 15 p 16 p 17 p Does not f 19 p | 2, 8 2, 8 2, 8 2, 8 2, 8, 8 2, 8, 8 2, 8, 8 2, 8, 8 2, 8, 8 orm an ion | |

Acid-Base Indicators



Numerical Answers and Answers to Practice Problems

Unit 1

- Section 1.2 Review page 27
- **5.** bunchgrass, 2543 units; grasshopper, 254.3 units; spotted frog, 25.43 units; red-tailed hawk, 2.543 units

Section 2.1 Review page 55 3. 121

Chapter 2 Review pages 84-85 12. 60 years 13. 111.1 days

Chapter 3 Review pages 122-12312. 65 million years ago

Unit 1 Review pages 128-131 1. d 2. d 3. a 4. c 5. a 32. b 33. b. 34. d 35. b

Unit 2

- **Section 4.2 Review page 159 6.** 5.02 g/cm³
- Chapter 4 Review pages 174-175 10. 105 g 17. a. 7.13 g/cm³ b. 0.001 43 g/cm³ c. 2.70 g/cm³

22. $d = 1.36 \text{ g/cm}^3$

Section 5.2 Review page 193 5. 3 levels

Section 5.4 Review page 211 2. 5 valence electrons

Chapter 5 Review pages 216-217

13. a. 3 p, 4 n, 3 e; metal
b. 15 p, 15 n, 15 e; non-metal
c. 13 p, 15 n, 13 e; metal
d. 6 p, 7 n, 6 e; non-metal
e. 14 p, 14 n, 14 e; metalloid
f. 17 p, 18 n, 17 e; non-metal
18. a. 1 b. 3 c. 7 d. 2
e. 5 f. 2 g. 4 h. 6

Chapter 6 Review pages 254-255

- 9. a. 2 electrons lost
 - **b.** 3 electrons lost
 - **c.** 2 electrons gained
- **d.** 1 electron gained
- **17.a.** 2 **b.** 5 **c.** 6 **d.** 9

28. b.

Electron Arrangements and Bond Angles

| Compound | Formula | No. of Valence Electrons in Covalent Bonds | No. of Valence Electrons Not in Covalent Bonds | Bond Angle |
|----------|------------------|---|---|---------------|
| Methane | CH ₄ | 8 | 0 | 109.5° |
| Ammonia | NH ₃ | 6 | 2 | 107.0° |
| Water | H _z 0 | 4 | 4 | 104.5° |

Unit 2 Review pages 260-263

b 2.c 3.a 4.d 5.c
 7. 2.5 g/cm³
 8. 19.7 g
 15. a. 6 p, 7 n, 6 e
 b. 24 p, 28 n, 24 e
 c. 16 p, 16 n, 16 e
 d. 7 p, 7 n, 7 e
 34. b 35. d 36. d 37. a 38. d

Unit 3

Section 7.3 Review page 290 8. a. June 21 **b.** March 21, September 22

d. June 21

Chapter 7 Review pages 312-313

31. a. 31.4 km/s **b.** 62.8 km/s **c.** 1 h 46 min

Chapter 8 Review pages 356-357

12. 20% absorbed by atmosphere, 30% reflected, 50% absorbed by Earth's surface

30. a. d = 120 m, $v_{max} = 8.3$ cm/s

Chapter 9 Review pages 386-387

- **21.** 71.4 km/s/Mpc
- **31. a.** 11.7 h **b.** 9.37 years
 - **c.** 26.1 years
 - **d.** 58.9 years

Unit 3 Review pages 392-395

1. c **2.** d **3.** b **4.** a **5.** b **6.** a. C **b.** A **c.** D **d.** B

10

Magnitude and Distance of Stars

| Star | Apparent Magnitude | Absolute Magnitude | Distance (light- years) |
|----------------|-----------------------|-----------------------|-------------------------------|
| Star A | -26 | 4.7 | 0.000 02 |
| Sirius | -1.5 | 1.4 | 9.0 |
| Alpha Centauri | -0.01 | 4.4 | 4.3 |
| Rigel | 0.1 | -7.0 | 800 |
| Betelgeuse | 0.4 | -5.0 | 520 |
| Capella | 0.8 | -0.8 | 42 |
| | | | |

34. c **35.** b **36.** d **37.** a

Unit 4

Section 11.3 Review page 465 4. 3.5 V 7. a. 3 • 2.0 V, or 4 • 1.5 V

8. b. 6 J/C

Section 11.4 Review page 471 1. 15 Ω **2.** 0.15 V **3.** 13.5 A

Section 12.2 Review page 500

- **5.** 39%
- **6.** 0.0192 kW•h
- **8. a.** incandescent, \$8.45; compact fluorescent, \$16.00

Section 12.3 Review page 505

4. nuclear: 50%; other: 2.5%; wind: 1%; gas: 14.5%; coal: 15%; hydro: 17%
8. 20 968 MW

Chapter 12 Review pages 518-519

12. \$20.40

- **19.** 22%
- **20.** 7.2 kW

Unit 4 Review pages 524-527

- **1.** d **2.** c **3.** d **4.** b **14.** $V_1 = 3.0 \text{ V}, V_2 = V_3 = 1.5 \text{ V}, V_4 = 3.0 \text{ V}$ **16.** 10 kW•h **17.** \$1.51 **21.** c **32.** d **33.** h **34.** c
- **31.**c **32.**d **33.**b **34.**a

Answers to Practice Problems

Chapter 4 page 157

- **1.** 2.70 g/cm^3
- **2.** 1.06 g/cm^3
- **3.** $1.43 \times 10^{-3} \text{ g/cm}^3$
- **4.** 6.2 g/cm^3
- **5.** $D = 0.67 \text{ g/cm}^3$; it will float on water

Chapter 11 page 468

- **1.** 10 Ω
- **2.** 82.8 Ω
- **3.** 10.6 Ω
- **4.** When potential difference doubles, current doubles.
- **5.** 0.15 A
- **6.** 3.0 V

Chapter 12 page 495

- **1. a.** 1.300 kW
- **b.** 0.060 kW
- **c.** 0.900 kW
- **2. a.** 0.08 h
- **b.** 0.33 h
- **c.** 1.2 h
- **3.** 3.75 kW•h **4.** \$65.21
- **5.** 4¢

Chapter 12 page 498

- **1.**74%
- **2.** 3.64%
- **3.** 3036.8 MW
- **4.** 160 kW•h