











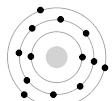

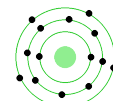
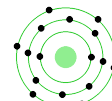
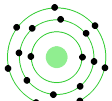
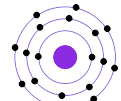
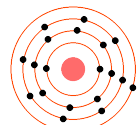
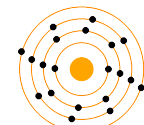
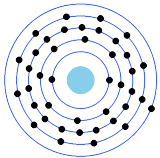
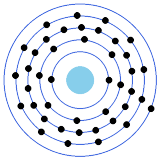
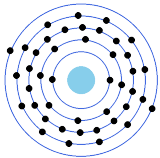

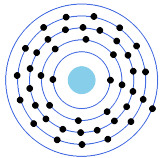
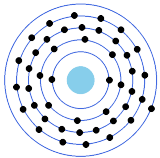
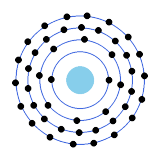
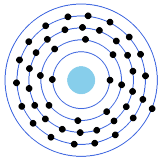
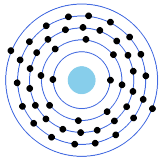
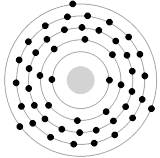
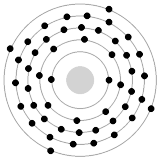
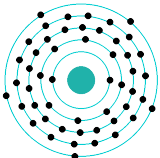


<div>1</div> <div>Fuel</div> <div>H</div> <div>1.008</div> <div>Used as rocket fuel and in hydrogen cars and fusion</div> <div>Hydrogen</div> <div>  </div> <div>Hydrogen is the lightest element and makes up 73.9% of the universe's visible matter</div>	<div>2</div> <div>Balloons</div> <div>He</div> <div>4.0026</div> <div>Used in balloons and as inert atmosphere for</div> <div>Helium</div> <div>  </div> <div>Helium has the lowest boiling point at 4.22K and becomes superfluid with zero viscosity</div>	<div>3</div> <div>Batteries</div> <div>Li</div> <div>7.0</div> <div>Used in rechargeable batteries and mood</div> <div>Lithium</div> <div>  </div> <div>Lithium is the lightest metal that can float on water while violently reacting with it</div>	<div>4</div> <div>Alloys</div> <div>Be</div> <div>9.0122</div> <div>Used in aerospace alloys and nuclear reactors</div> <div>Beryllium</div> <div>  </div> <div>Beryllium is 6 times stronger than steel but weighs only 25% as much, yet highly toxic</div>
<div>5</div> <div>Ceramics</div> <div>B</div> <div>10.81</div> <div>Used in ceramics, glass, and as neutron absorber</div> <div>Boron</div> <div>  </div> <div>Boron is the hardest element but essential for plants and harder than most metals when pure</div>	<div>6</div> <div>Steel</div> <div>C</div> <div>12.011</div> <div>Essential for all life and used in steel production</div> <div>Carbon</div> <div>  </div> <div>Carbon is highest for 2 hundred million compounds, melting point of 3823K, and over 500 allotropes</div>	<div>7</div> <div>Fertilizer</div> <div>N</div> <div>14.007</div> <div>Used in fertilizers and as liquid nitrogen coolant</div> <div>Nitrogen</div> <div>  </div> <div>Nitrogen makes up 78% of Earth's atmosphere but is completely inert at room temperature</div>	<div>8</div> <div>Breathing</div> <div>O</div> <div>15.999</div> <div>Essential for breathing and used in steel</div> <div>Oxygen</div> <div>  </div> <div>Oxygen is Earth's most abundant element at 46% of crust mass and paramagnetic both gas and liquid</div>
<div>9</div> <div>Toothpaste</div> <div>F</div> <div>18.998</div> <div>Used in toothpaste and water fluoridation</div> <div>Fluorine</div> <div>  </div> <div>Fluorine is the most reactive element that can corrode glass and concrete on contact</div>	<div>10</div> <div>Lighting</div> <div>Ne</div> <div>20.18</div> <div>Used in neon signs and as inert gas in lighting</div> <div>Neon</div> <div>  </div> <div>Neon produces the most intense light discharge creating the classic orange-red glow</div>	<div>11</div> <div>Salt</div> <div>Na</div> <div>22.99</div> <div>Used in table salt and street lighting</div> <div>Sodium</div> <div>  </div> <div>Sodium lamps are so efficient that one can outshine 100 incandescent bulbs combined</div>	<div>12</div> <div>Flares</div> <div>Mg</div> <div>24.305</div> <div>Used in flares, alloys, and as dietary supplement</div> <div>Magnesium</div> <div>  </div> <div>Magnesium burns with 3000K white light so bright it can cause permanent eye damage</div>
<div>13</div> <div>Cans</div> <div>Al</div> <div>26.982</div> <div>Used in beverage cans, foil, and aircraft parts</div> <div>Aluminum</div> <div>  </div> <div>Aluminum was worth more than gold until 1890s before efficient electrolytic extraction</div>	<div>14</div> <div>Chips</div> <div>Si</div> <div>28.085</div> <div>Used in computer chips, glass, and construction</div> <div>Silicon</div> <div>  </div> <div>Silicon makes up 27% of Earth's crust and enabled the entire computer age revolution</div>	<div>15</div> <div>Matches</div> <div>P</div> <div>30.974</div> <div>Used in fertilizers, matches, and DNA</div> <div>Phosphorus</div> <div>  </div> <div>Phosphorus colored white glows green in darkness but is essential for life despite being toxic</div>	<div>16</div> <div>Gunpowder</div> <div>S</div> <div>32.07</div> <div>Used in rubber vulcanization and</div> <div>Sulfur</div> <div>  </div> <div>Sulfur is second for forming 30+ allotropes and creates yellow crystals in volcanic regions</div>
<div>17</div> <div>Disinfectant</div> <div>Cl</div> <div>35.45</div> <div>Used in pool disinfection and PVC production</div> <div>Chlorine</div> <div>  </div> <div>Chlorine has the highest electron affinity (349 kJ/mol) and was WWI's first poison gas</div>	<div>18</div> <div>Inert</div> <div>Ar</div> <div>39.9</div> <div>Used in welding and incandescent light bulbs</div> <div>Argon</div> <div>  </div> <div>Argon was Earth's first isolated noble gas and makes up nearly 1% of our atmosphere</div>	<div>19</div> <div>Soap</div> <div>K</div> <div>39.098</div> <div>Used in fertilizers and soap production</div> <div>Potassium</div> <div>  </div> <div>Potassium is so violently reactive it ignites spontaneously and must be stored in oil</div>	<div>20</div> <div>Bones</div> <div>Ca</div> <div>40.08</div> <div>Used in concrete production and car</div> <div>Calcium</div> <div>  </div> <div>Calcium phosphate comprises 70% of bone mass giving vertebrates their rigid structure</div>

<div>21</div> <div>Aerospace</div> <div>Sc</div> <div>44.956</div> <div>Used in aerospace alloys and baseball bats</div> <div>Scandium</div> <div>Scandium is paradoxically rarer than many 'rare earth' elements despite being lighter</div>	<div>22</div> <div>Implants</div> <div>Ti</div> <div>47.867</div> <div>Used in aircraft, medical implants, and paints</div> <div>Titanium</div> <div>Titanium has the highest strength-to-weight ratio of all metals at 45% lighter than steel</div>	<div>23</div> <div>Pigments</div> <div>V</div> <div>50.942</div> <div>Used in steel alloys and as catalyst</div> <div>Vanadium</div> <div>Vanadium can exist in 5 different oxidation states creating rainbow-colored solutions</div>	<div>24</div> <div>Plating</div> <div>Cr</div> <div>51.996</div> <div>Used in stainless steel and chrome plating</div> <div>Chromium</div> <div>Chromium gives rubies red and emeralds green color while being the hardest pure metal</div>
<div>25</div> <div>Electrodes</div> <div>Mn</div> <div>54.938</div> <div>Used in steel production and battery electrodes</div> <div>Manganese</div> <div>Manganese nodules carpet vast ocean floors containing trillions of tons of the element</div>	<div>26</div> <div>Construction</div> <div>Fe</div> <div>55.84</div> <div>Used in construction, tools, and magnets</div> <div>Iron</div> <div>Iron comprises 32.1% of Earth's total mass with most concentrated in the molten core</div>	<div>27</div> <div>Glass</div> <div>Co</div> <div>58.933</div> <div>Used in magnets, catalysts, and blue glass</div> <div>Cobalt</div> <div>Cobalt blue glass has been prized for 4000 years and retains color at 1000°C heat</div>	<div>28</div> <div>Currency</div> <div>Ni</div> <div>58.693</div> <div>Used in coins, batteries, and stainless steel</div> <div>Nickel</div> <div>Nickel-62 has the highest binding energy per nucleon at 8.8 MeV, making it the most stable isotope</div>
<div>29</div> <div>Wiring</div> <div>Cu</div> <div>63.55</div> <div>Used in electrical wiring and plumbing pipes</div> <div>Copper</div> <div>Copper naturally kills bacteria and viruses within hours making it self-sterilizing</div>	<div>30</div> <div>Galvanizing</div> <div>Zn</div> <div>65.4</div> <div>Used in galvanizing steel and brass alloys</div> <div>Zinc</div> <div>Zinc deficiency causes loss of taste/smell and affects 2 billion people worldwide</div>	<div>31</div> <div>LEDs</div> <div>Ga</div> <div>69.723</div> <div>Used in semiconductors and LEDs</div> <div>Gallium</div> <div>Gallium melts at 29.8°C in hand temperature but boils at 2400°C with the widest liquid range</div>	<div>32</div> <div>Transistors</div> <div>Ge</div> <div>72.63</div> <div>Used in fiber optics and transistors</div> <div>Germanium</div> <div>Germanium was predicted by Mendeleev 15 years before discovery with exact properties</div>
<div>33</div> <div>Preservatives</div> <div>As</div> <div>74.922</div> <div>Used in wood preservatives and</div> <div>Arsenic</div> <div>Arsenic has been humanity's poison of choice for over 2000 years earning 'King of Poisons'</div>	<div>34</div> <div>Photoconductors</div> <div>Se</div> <div>78.97</div> <div>Used in photoconductors and glass coloring</div> <div>Selenium</div> <div>Selenium deficiency causes fatal white muscle disease but it is toxic in excess amounts</div>	<div>35</div> <div>Antiseptic</div> <div>Br</div> <div>79.9</div> <div>Used as antiseptic and in flame retardants</div> <div>Bromine</div> <div>Bromine is the only liquid non-metal but it evaporates quickly from 1 mL to 3 liters of toxic gas</div>	<div>36</div> <div>Windows</div> <div>Kr</div> <div>83.8</div> <div>Used in energy-efficient windows and lasers</div> <div>Krypton</div> <div>Krypton was used in ultra-bright airport runway lighting systems and old camera flashes</div>
<div>37</div> <div>Clocks</div> <div>Rb</div> <div>85.468</div> <div>Used in atomic clocks and medical tracers</div> <div>Rubidium</div> <div>Rubidium ignites spontaneously in air and was used in early vacuum tubes for electronics</div>	<div>38</div> <div>Fireworks</div> <div>Sr</div> <div>87.62</div> <div>Used in fireworks and flares for red color</div> <div>Strontium</div> <div>Strontium-90 fallout creates the brilliant red in fireworks but is dangerously radioactive</div>	<div>39</div> <div>Cladding</div> <div>Y</div> <div>88.906</div> <div>Used in lasers and as cancer treatment</div> <div>Yttrium</div> <div>Yttrium with barium carbon oxide or YBCO makes the highest temperature superconductors at</div>	<div>40</div> <div>Ceramics</div> <div>Zr</div> <div>91.22</div> <div>Used in nuclear reactors and ceramics</div> <div>Zirconium</div> <div>Zirconium is virtually immune to corrosion up to 1270K and used in nuclear reactors</div>

<div>41</div> <div>Superalloys</div> <div>Nb</div> <div>92.906</div> <div>Used in jet engines and MRI scanners</div> <div>Niobium</div> <div>  </div> <div>Niobium is superconducting below 9K and was originally called columbium in America</div>	<div>42</div> <div>Lubricants</div> <div>Mo</div> <div>95.95</div> <div>Used in steel alloys and high-temp lubricants</div> <div>Molybdenum</div> <div>  </div> <div>Molybdenum has the 6th highest melting point at 2896K and strengthens steel dramatically</div>	<div>43</div> <div>Isotope</div> <div>Tc</div> <div>[96.906]</div> <div>Used in medical imaging and as tracer</div> <div>Technetium</div> <div>  </div> <div>Technetium was the first artificially created element filling Mendeleev's predicted gap </div>	<div>44</div> <div>Electronics</div> <div>Ru</div> <div>101.1</div> <div>Used in electrical contacts and hard disks</div> <div>Ruthenium</div> <div>  </div> <div>Ruthenium is the scarcest platinum group metal</div>
<div>45</div> <div>Jewelry</div> <div>Rh</div> <div>102.91</div> <div>Used in catalytic converters and jewelry</div> <div>Rhodium</div> <div>  </div> <div>Rhodium is the most expensive precious metal at about \$250 per gram, rarer than gold</div>	<div>46</div> <div>Dentistry</div> <div>Pd</div> <div>106.42</div> <div>Used in catalytic converters and dentistry</div> <div>Palladium</div> <div>  </div> <div>Palladium can absorb 900 times its volume in hydrogen like a metallic sponge</div>	<div>47</div> <div>Photography</div> <div>Ag</div> <div>107.868</div> <div>Used in jewelry, mirrors, and photography</div> <div>Silver</div> <div>  </div> <div>Silver has the highest electrical conductivity of all elements at room temperature</div>	<div>48</div> <div>Panels</div> <div>Cd</div> <div>112.41</div> <div>Used in batteries, pigments, and solar</div> <div>Cadmium</div> <div>  </div> <div>Cadmium red paint was banned after causing severe poisoning in artists for decades</div>
<div>49</div> <div>Displays</div> <div>In</div> <div>114.818</div> <div>Used in semiconductors and LCD screens</div> <div>Indium</div> <div>  </div> <div>Indium is softer than lead and can be scratched with a fingernail despite being metal</div>	<div>50</div> <div>Soldering</div> <div>Sn</div> <div>118.71</div> <div>Used in solder, cans, and bronze alloys</div> <div>Tin</div> <div>  </div> <div>Tin produces a distinctive 'tin cry' scream when bent due to crystal twinning</div>	<div>51</div> <div>Flame-retardant</div> <div>Sb</div> <div>121.76</div> <div>Used in flame retardants and semiconductors</div> <div>Antimony</div> <div>  </div> <div>Antimony makes Fluoroantimonic acid, the strongest, 10 quintillion times stronger than sulfuric acid</div>	