

Origin of the Elements

<div>The bottom number gives the \log_{10} of the solar system abundance shifted to 12 for H (Lodders 2003). r-process to s-process ratios are from Simmerer et al. (2004) Inspired by previous versions from Jennifer Johnson, Inese Ivans, and Anna Frebel (see http://blog.sdss.org/2017/01/09/origin-of-the-elements-in-the-solar-system/ and http://www.cosmic-origins.org/). This version by Andrew W. Steiner, awsteiner@utk.edu, python code (GPLv3) at https://github.com/awsteiner/nstar-plot/periodic.table.py There are significant uncertainties in some values that are not shown here. The origin of some elements is strongly isotope-dependent.</div>																		<div>2 He Helium 10.984±0.02</div>																	
<div>1 H Hydrogen 12</div>		<div>3 Li Lithium 3.35±0.06</div>		<div>4 Be Beryllium 1.48±0.08</div>														<div>5 B Boron 2.85±0.04</div>		<div>6 C Carbon 8.46±0.04</div>		<div>7 N Nitrogen 7.90±0.11</div>		<div>8 O Oxygen 8.76±0.05</div>		<div>9 F Fluorine 4.53±0.06</div>		<div>10 Ne Neon 7.95±0.10</div>							
<div>11 Na Sodium 6.37±0.03</div>		<div>12 Mg Magnesium 7.62±0.02</div>														<div>13 Al Aluminum 6.54±0.02</div>		<div>14 Si Silicon 7.61±0.02</div>		<div>15 P Phosphorus 5.54±0.04</div>		<div>16 S Sulfur 7.26±0.04</div>		<div>17 Cl Chlorine 5.33±0.06</div>		<div>18 Ar Argon 6.62±0.08</div>									
<div>19 K Potassium 5.18±0.05</div>		<div>20 Ca Calcium 6.41±0.03</div>		<div>21 Sc Scandium 3.15±0.04</div>		<div>22 Ti Titanium 5.00±0.03</div>		<div>23 V Vanadium 4.07±0.03</div>		<div>24 Cr Chromium 5.72±0.05</div>		<div>25 Mn Manganese 5.58±0.03</div>		<div>26 Fe Iron 7.54±0.03</div>		<div>27 Co Cobalt 4.98±0.03</div>		<div>28 Ni Nickel 6.29±0.03</div>		<div>29 Cu Copper 4.34±0.06</div>		<div>30 Zn Zinc 4.70±0.04</div>		<div>31 Ga Gallium 3.17±0.06</div>		<div>32 Ge Germanium 3.70±0.05</div>		<div>33 As Arsenic 2.40±0.05</div>		<div>34 Se Selenium 3.43±0.04</div>		<div>35 Br Bromine 2.67±0.09</div>		<div>36 Kr Krypton 3.36±0.08</div>	
<div>37 Rb Rubidium 2.43±0.06</div>		<div>38 Sr Strontium 2.99±0.04</div>		<div>39 Y Yttrium 2.28±0.03</div>		<div>40 Zr Zirconium 2.67±0.03</div>		<div>41 Nb Niobium 1.49±0.03</div>		<div>42 Mo Molybdenum 2.03±0.04</div>		<div>43 Tc Technetium</div>		<div>44 Ru Ruthenium 1.89±0.08</div>		<div>45 Rh Rhodium 1.18±0.03</div>		<div>46 Pd Palladium 1.77±0.03</div>		<div>47 Ag Silver 1.30±0.06</div>		<div>48 Cd Cadmium 1.81±0.03</div>		<div>49 In Indium 0.87±0.03</div>		<div>50 Sn Tin 2.19±0.04</div>		<div>51 Sb Antimony 1.14±0.07</div>		<div>52 Te Tellurium 2.30±0.04</div>		<div>53 I Iodine 1.61±0.12</div>		<div>54 Xe Xenon 2.35±0.02</div>	
<div>55 Cs Cesium 1.18±0.03</div>		<div>56 Ba Barium 2.25±0.03</div>				<div>72 Hf Hafnium 0.84±0.04</div>		<div>73 Ta Tantalum -0.06±0.03</div>		<div>74 W Tungsten 0.72±0.03</div>		<div>75 Re Rhenium 0.33±0.04</div>		<div>76 Os Osmium 1.44±0.03</div>		<div>77 Ir Iridium 1.42±0.03</div>		<div>78 Pt Platinum 1.75±0.03</div>		<div>79 Au Gold 0.91±0.06</div>		<div>80 Hg Mercury 1.23±0.18</div>		<div>81 Tl Thallium 0.88±0.04</div>		<div>82 Pb Lead 2.13±0.04</div>		<div>83 Bi Bismuth 0.76±0.03</div>		<div>84 Po Polonium</div>		<div>85 At Astatine</div>		<div>86 Rn Radon</div>	
<div>87 Fr Francium</div>		<div>88 Ra Radium</div>				<div>104 Rf Rutherfordium</div>		<div>105 Db Dubnium</div>		<div>106 Sg Seaborgium</div>		<div>107 Bh Bohrium</div>		<div>108 Hs Hassium</div>		<div>109 Mt Meitnerium</div>		<div>110 Ds Darmstadtium</div>		<div>111 Rg Roentgenium</div>		<div>112 Cn Copernicium</div>		<div>113 Nh Nihonium</div>		<div>114 Fl Flerovium</div>		<div>115 Mc Moscovium</div>		<div>116 Lv Livermorium</div>		<div>117 Ts Tennessine</div>		<div>118 Og Oganesson</div>	

57 La Lanthanum 1.25±0.06	58 Ce Cerium 1.68±0.02	59 Pr Praseodymium 0.85±0.03	60 Nd Neodymium 1.54±0.03	61 Pm Promethium	62 Sm Samarium 1.02±0.04	63 Eu Europium 0.60±0.04	64 Gd Gadolinium 1.13±0.02	65 Tb Terbium 0.38±0.03	66 Dy Dysprosium 1.21±0.04	67 Ho Holmium 0.56±0.02	68 Er Erbium 1.02±0.03	69 Tm Thulium 0.18±0.06	70 Yb Ytterbium 1.01±0.03	71 Lu Lutetium 0.16±0.06
89 Ac Actinium	90 Th Thorium 0.16±0.04	91 Pa Protactinium -0.42±0.04	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

big bang
 cosmic rays
 stellar evolution
 supernovae
 white dwarfs
 r-process
 s-process