TABLES

The 22 amino acids used by life on Earth

|  |  |  |
| --- | --- | --- |
| **Amino Acid** | **Symbol** | **Chemical Formula** |
| Alanine | Ala | C3H7NO2 |
| Arginine | Arg | C6H14N4O2 |
| Asparagine | Asn | C4H8N2O3 |
| Aspartic Acid | Asp | C4H7NO4 |
| Cysteine | Cys | C3H7NO2S |
| Glutamic Acid | Glu | C5H9NO4 |
| Glutamine | Gln | C5H10N2O3 |
| Glycine | Gly | C2H5O2 |
| Histidine | His | C6H9N3O2 |
| Hydroxyproline | Hyp | C5H9NO3 |
| Isoleucine | Ile | C6H13NO2 |
| Leucine | Leu | C6H13NO2 |
| Lysine | Lys | C6H14N2O2 |
| Methionine | Met | C5H11NO2S |
| Phenylalanine | Phe | C9H11NO2 |
| Proline | Pro | C5H9NO2 |
| Pyroglutamatic Acid | Glp | C5H7NO3 |
| Serine | Ser | C3H7NO3 |
| Threonine | Thr | C4H9NO3 |
| Tryptophan | Trp | C11H12N2O2 |
| Tyrosine | Tyr | C9H11NO3 |
| Valine | Val | C5H11NO2 |

Link between amino acids and genetic code

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| TTT | Phe | TCT | Ser | TAT | Tyr | TGT | Cys |
| TTC | TCC | TAC | TGC |
| TTA | Leu | TCA | TAA | Stop | TGA | Stop |
| TTG | TCG | TAG | TGG | Trp |
| CTT | Leu | CCT | Pro | CAT | His | CGT | Arg |
| CTC | CCC | CAC | CGC |
| CTA | CCA | CAA | Gln | CGA |
| CTG | CCG | CAG | CGG |
| ATT | Ile | ACT | Thr | AAT | Asn | AGT | Ser |
| ATC | ACC | AAC | AGC |
| ATA | ACA | AAA | Lys | AGA | Arg |
| ATG | Met | ACG | AAG | AGG |
| GTT | Val | GCT | Ala | GAT | Asp | GGT | Gly |
| GTC | GCC | GAC | GGC |
| GTA | GCA | GAA | Glu | GGA |
| GTG | GCG | GAG | GGG |

Example of amino acid chains to form specific proteins to help reveal specific physical characteristics for a living organism

|  |  |
| --- | --- |
| **Amino acid chain** | **Colour** |
| Met – Ser – Thr – Gln - Phe | Red hair |
| Met – Ser – Thr – His – Leu | Blonde hair |
| Met – Pro – Thr – His – Phe | Black hair |
| Met – Pro – Thur – Gln – Leu | Brown hair |

Chemical compounds in a typical comet

|  |  |
| --- | --- |
| **Chemical Name** | **% by weight** |
| Water | 57.50 |
| Carbon dioxide | 14.00 |
| Carbon monoxide | 6.00 |
| Formaldehyde | 5.75 |
| Hydrogen cyanide | 5.75 |
| Carbon disulfide | 4.60 |
| Acetylene | 4.00 |
| Remaining 2.4% in elemental metals and other materials |

Chemicals found in space

|  |  |  |
| --- | --- | --- |
| **Year** | **Chemical Name** | **Formula** |
| 1970 | Hydrogen | H2 |
| 1963 | Hydroxyl | OH- |
| 1970 | Carbon monoxide | CO |
| 1940 | Cyanogen | CN |
| 1971 | Carbon monosulfide | CS |
| 1978 | Nitric oxide | NO |
| 1973 | Sulfur monoxide | SO |
| 1975 | Sulfur nitride | SN |
| 1937 | Methylidyne ion | CH+ |
| 1968 | Water | H2O |
| 1968 | Ammonia | NH3 |
| 1971 | Silicon monoxide | SiO |
| 1975 | Silicon sulfide | SiS |
| 1975 | Sulfur dioxide | SO2 |
| 1972 | Hydrogen sulfide | H2S |
| 1974 | Hydroinitrogenyl ion | N2H+ |
| 1976 | Formyl | HCO |
| 1970 | Hydrogen cyanide | HCN |
| 1978 | Methane | CH4 |
| 1969 | Formaldehyde | H2CO |
| 1975 | Cyanamide | NH2CN |
| 1970 | Methanol | CH3OH |
| 1976 | Cyanodiacetylene | HC4CN |
| 1977 | Ketene | CH2CO |
| 1970 | Formic acid | HCOOH |
| 1971 | Acetylaldehyde | CH3CHO |
| 1975 | Ethanol | CH3CH2OH |
| - | Ethyl Cyanide | CH3CH2CN |
| - | Glycine | C2H5O2N |

Composition of Carbonaceous Chondrites

|  |  |
| --- | --- |
| **Chemical Name** | **% by weight** |
| Silicates | 75 – 90 |
| Water | 1 - 21 |
| Metals | 0.1 – 3.5 |
| Carbon | 0.1 – 3.8 |
| Nitrogen | 0.01 – 0.3 |

The products of the Miller Experiment

|  |  |
| --- | --- |
| **Chemical Name** | **% by weight** |
| Tar | 85 |
| Carboxylic acids | 13.0 |
| Glycine | 1.05 |
| Alanine | 0.85 |
| Glutamic acid | Trace amounts |
| Aspartic acid | Trace amounts |
| Valine | Trace amounts |
| Leucine | Trace amounts |
| Serine | Trace amounts |
| Proline | Trace amounts |
| Treonine | Trace amounts |

Life solvents

|  |  |  |  |
| --- | --- | --- | --- |
| **Solvent** | **Formula** | **MP (°C)** | **BP (°C)** |
| Hydrogen | H2 | -259.2 | -252.87 |
| Helium | HE | -276.2 | -277.37 |
| Nitrogen | N2 | -210 | -195.80 |
| Oxygen | O2 | -216 | -182.96 |
| Argon | AR | -189.4 | -185.9 |
| Methane | CH4 | -182.5 | -161.5 |
| Ammonia | NH3 | -78 | -33 |
| Hydrogen fluoride | NF | -83 | 19 |
| Water | H2O | 0 | 100 |
| Data from *CRC’s Handbook of Chemistry and Physics*, 70th edition. 1989-90. |

Sun-like stars within 45 light years

(Yellow main-sequence only)

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | **Distance** | **Luminosity** | **Appa. Magni.** |
| Sun | 0 | 1 | -26.8 |
| Alpha Centauri A | 4.3 | 1.3 | 0.0 |
| Procyon A | 11 | 7 | 0.4 |
| Tau Ceti | 12 | 0.44 | 3.5 |
| Eta Cassiopeiae | 19 | 1.2 | 3.4 |
| Pi-3 Orionis | 25 | 3 | 3.2 |
| Beta TrA | 33 | 5 | 2.8 |
| Porrima | 36 | 8 | 2.7 |
| Luminosity relative to Sun. |