**18.2 The Atmosphere and Essential Gases.**

**The Composition of clean, dry air near sea level.**

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| Gas | Content by Amount  (mol %) | Total mass in Atmosphere  (x 1012 tonnes) |
| Nitrogen | **78.09** | **3900** |
| Oxygen | **20.94** | **1200** |
| Argon | **00.93** | **6.7** |
| Carbon dioxide | **00.035** | **2.5** |
| Neon | **00.0018** | **0.065** |
| Helium | **00.00052** | **0.004** |
| Methane | **00.00015** | **0.0042** |
| Krypton | **00.0001** | **0.017** |
| Carbon monoxide | **00.00001** | **0.0006** |
| Ozone | **00.000002** | **0.003** |
| Nitrogen(IV) oxide | **00.0000001** | **0.000013** |
| Others | **Very small amounts** |  |

* Oxygen (21% in the atmosphere) is required for respiration in plants and animals.
* Carbon dioxide (just 0.035%) provides directly or indirectly, all food used by plants and animals. In photosynthesis carbon dioxide is used by plants to produce glucose and oxygen.
* Through the process of photosynthesis and respiration, both oxygen and carbon dioxide are cycled in nature. This process is known as the carbon-oxygen cycle.
* The cycling of oxygen and carbon dioxide by photosynthesis and respiration is quite rapid. Carbon dioxide is also returned by the decomposition of dead organic material, but is a much slower process.
* Other process that can contribute include:
  + Volcanic action and the burning of fossil fuels, which add carbon dioxide to the atmosphere.
  + The production of coal, oil and gas from dead organisms and the formation of calcium carbonate from dead coral and marine animals, which removes carbon from the cycle.

The amount of carbon present in the cycle at any particular time depends on the rate at which it enters and leaves at that time. At present, atmospheric carbon dioxide levels are increasing due to various factors including the rapid rate at which we are burning fossil fuels.

**Nitrogen.**

* All living organisms need nitrogen to produce essential large biomolecules such as proteins and DNA.
* Although 78% of the atmosphere is nitrogen most organisms cannot use it in this form.
* Life on this plant depends on a few species of microorganisms that can break the strong triple covalent bond to form simple nitrogen-containing ions such as ammonium (NH4+) or nitrate (NO3-) ions. These can be used by plants to make more complex nitrogen-containing molecules. Animals must then rely on these molecules from plants for their nitrogen source.