Cambridge as level weathering process

Science, Physics

Weathering Process Physical Weathering Processes Freeze Thaw (Frost Shattering) Temperatures need to fluctuate above and below freezing. When the temperature drops below 0 degrees, water collected in rock cracks freezes and expands. When temperatures rise again the ice melts. Pressure created by expansion results in progressive weakening of the rock. At high altitudes frost-shattered material forms scree slopes. Heating & Cooling Thermal expansion & contraction of rock in response to rising and falling temperatures. The daily cycle of heating and cooling sets up stresses in the rock that cause it to disintegrate.

Occurs mostly in deserts where there is the greatest diurnal temperature range. Also occurs during bush fires. Wetting & Drying (Slaking) Rock is alternately wetted then dried. Minerals which make up clay rocks expand when wetted, then contract on drying-out. The stresses from repeated expansion and contraction cause the rock to disintegrate. This process commonly occurs on the intertidal zone of coasts. Exfoliation (Onion weathering/Spheroidal) Under warm conditions rock surfaces heat up and expand more than the main mass of the internal body of the rock.

Eventually the surface layers split off or spall from the lower layers, sometimes in slightly curved sheets like the layers of an onion. Seen especially in granite. Crystal Growth (Salt Weathering) Salt crystals, such as sodium carbonate and magnesium sulphate grow within spaces in a rock. It happens when saline water enters cracks in rocks then evaporates. The growing crystals prise the rock apart and small pieces break off. This process is especially effective in semi-arid areas and coastal regions. Pressure Release (Dilation) Not caused by elements of weather.

Occurs either when erosion removes a heavy covering of rock or when large ice sheets melt. The removal of great weight allows the rock layers beneath to expend. As they expand they also fracture to produce bedding planes parallel to the ground surface. The spaces between the bedding planes (joints) are now open to the influence of further weathering. Organic Action The breaking up of rock by plant roots and burrowing animals. Roots grow into cracks and lines of weakness & as they thicken exert increasing pressure and cause rocks to fracture.

Chemical Weathering Processes Hydrolysis The most common chemical weathering process. Carbonic acid in rain water releases hydrogen ions from the water which then combine with minerals in rocks causing them to break down. This is common in rocks containing feldspar e. g. granite. The end products weathered feldspar are clay minerals known as kaolinite. Kaolinite is an important component of fine bone China. Hydration This occurs when water is absorbed into the crystal structure of certain minerals and causes chemical changes e. g. nhydrite absorbs water to become gypsum which is soft and crumbly. Carbonation On contact with calcium carbonate (the main component of limestone), carbonic acid found in rain water creates calcium bicarbonate. As calcium bicarbonate is readily dissolved in water it is quickly transported away, leaving behind only the clay and quartz impurities of the limestone. This process is most common in regions with limestone geology. Solution Some minerals in rocks do not require a chemical reaction to become soluble e. g. rock slat readily dissolves in water. Oxidation

Some minerals in rocks react with oxygen dissolved in water to form oxides This process commonly occurs in rocks containing iron. Iron in its ferrous

from is changed by oxidation into its ferric from leading to the collapse of tis molecular structure. Commonly this is known as ‘ rust’. Chelation Lichens and decomposing organic matter in soil (humus) release organic acids. These acids attack certain minerals in rock, releasing iron and aluminium ions which are then transported way by water. The process of release is called chelation and the organic acids are known as chelating agents.