The conversion of energy from one form to another often affects the environment and the air we breath in many ways. Each liter of gasoline burned by a vehicle produces about 2.5 kg of CO2 An average car driven about 13,500 miles a year and consumes about 600 US gallons (1680 kg; 1 US gallon is 3.78541178 litres while an imperial gallon is 4.546092 litres) of gasoline emits about 12,000 lbm of CO2 to the atmosphere a year, which is about four times the weight of a typical car.Global climate change is due to the excessive use of fossil fuels (e.g., coal, petroleum products, and natural gas in electric power generation, transportation, buildings, and manufacturing), and it has been a concern in recent decades. Under normal conditions, vegetation consumes CO2 and releases O2 during photosynthesis, thus keeps the CO2 concentration in the atmosphere in check. A mature, growing tree consumes about 12 kg of CO2 a year and exhales enough oxygen to support a family of four. However, deforestation and the huge increase in CO2 production in recent decades has disturbed this balance. In a 1995 report, the earth world's leading climate scientists concluded that the earth has already warmed about 0.5?C during the last century, and they estimate that the earth's temperature will rise another 2?C by the year 2100. A rise of this magnitude can cause severe changes in weather patterns with storms and heavy rains and flooding at some parts and drought in others, major floods due to the melting of ice at the poles, loss of wetlands and coastal areas due to rising sea levels, variations in water supply, changes in the ecosystem due to the inability of some animal and plant species to adjust to the changes, increases in epidemic diseases due to the warmer temperatures, and adverse side effects on human health and socioeconomic conditions in some areas. The seriousness of these threats has moved the United Nations to establish a committee on climate change. A world summit in 1992 in Rio de Janeiro, Brazil, attracted world attention to the problem. 162 nations signed an agreement prepared by the committee in 1992 to control greenhouse gas emissions. In December 2011, countries agreed in Durban, South Africa, to forge a new deal forcing the biggest polluting countries to limit greenhouse gas emissions. The Kyoto Protocol was extended to allow five more years to finalize a wider agreement. The goal was complete producing a new, legally binding accord to cut greenhouse gas emissions by 2015 that would come into force by 2020. The conference included participants from 196 nations. The main result of the conference was the establishment of a goal to limit global warming to less than 2?C compared to preindustrial times. According to the agreement, human-made greenhouse emissions should be eliminated during the second half of the 21st century. Greenhouse gas emissions can be reduced by increasing conservation efforts, improving conversion efficiencies, and meet new energy demands by using renewable energy (e.g., hydroelectric, solar, wind, and geothermal energy) rather than fossil fuels.Smog is made-up mostly of ground-level ozone O3 , but also contains numerous other chemicals including carbon monoxide CO, particulate matter such as soot and dust, volatile organic compounds VOCs such as benzene, butane, and other hydrocarbons Unlike the useful ozone layer high in the stratosphere that protects the earth from the sun's harmful ultraviolet rays, ozone at ground level is a pollutant with several adverse health effects.A significant portion of the VOC or HC emissions is caused by the evaporation of fuels during refuelling or spillage during spit back or evaporation from gas tanks with faulty caps that do not close tightly Ozone and Smog Smog is the dark yellow or brown haze that builds up in a large, stagnant air mass and hangs over the populated areas on calm, hot summer days. Ground-level smog and ozone

form in urban areas with heavy traffic or industry, but the prevailing winds can transport them several hundred miles to other cities (i.e., pollution knows no boundaries, it is a global problem) Ozone irritates eyes and damages the air sacs in the lungs where oxygen and carbon dioxide are exchanged, causing eventual hardening of this soft and spongy tissue. Smog also contains suspended particulate matter (e.g., dust and soot emitted by vehicles and industrial facilities), which irritate the eyes and the lungs since they may carry acids and metals compounds such as acids and metals Acid Rain Fossil fuels are mixtures of various chemicals, including small amounts of sulfur.The Greenhouse Effect: Global Warming and Climate Change Glass at thicknesses encountered in practice transmits over 90 percent of radiation in the visible range and is practically opaque (non–transparent) to radiation in the longer wavelength infrared regions (i.e., allows the solar radiation to enter freely but blocks the infrared radiation emitted by the interior surfaces). The surface of the earth, which warms up during the day as it absorbs solar energy, cools down at night by radiating part of its energy into deep space as infrared radiation Carbon dioxide (CO_2), water vapour, and trace amounts of some other gases (e.g., methane and nitrogen oxides) act like a blanket and keep the earth warm at night by blocking the heat radiated from the earth, Fig. Many people die each year due to heart and lung diseases related to air pollution Hundreds of elements and compounds (e.g., benzene and formaldehyde are emitted during the combustion of coal, oil, natural gas, and wood in electric power plants, vehicles engines, furnaces, and even fireplaces).Some compounds are added to liquid fuels for various reasons (e.g., Methyl tertiary–butyl ether (MTBE) is added to raise the octane number of the fuel and to oxygenate the fuel in winter months to reduce urban smog).The largest source of air pollution is motor vehicles The pollutants released by vehicles are usually grouped as hydrocarbons (HC), nitrogen oxides (NO_x), and carbon monoxide (CO).Volcanic eruptions and hot springs also release sulphur oxides (the cause of the rotten egg smell) The sulphur oxides and nitric oxides react with water vapour and other chemicals high in the atmosphere in the presence of sunlight to form sulfuric and nitric acids (Fig.2.62).2.65).2.66).