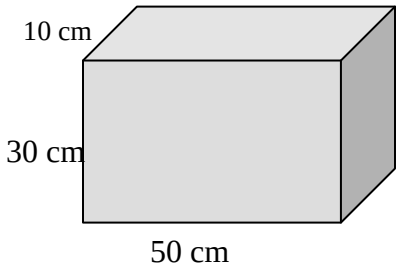
1. Converting Units



a) Calculate the volume of the cube in cm^3.

b) Convert the volume to m^3.

c) Convert: 18 Tg/yr to kg/hr and g/sec (1 Tg=10^{12} g)

2. Concentration and mixing ratio

Assume you have a cube whose sides' measure 1 meter (volume of 1 m^3). In that cube you have 40 balls. Four of these balls are green. What is the mixing ratio of the green balls in the cube? What is the concentration of the green balls in the cube?

Take the cube from the previous question and double its volume, with the number of balls remaining unchanged. What is the mixing ratio of the green balls in the cube? What is the concentration of the green balls in the cube?

Take the cube from the previous question and add 40 new balls (12 of them green), with the volume remaining at 2 m^3. What is the mixing ratio of the green balls in the cube? What is the concentration of the green balls in the cube?

3. Mixing ratio to concentration

The atmosphere contains approximately 385 ppmv carbon dioxide (CO_2). What is the concentration, in g/cm^3, of carbon dioxide? Assume that the density of air is 2.5×10^{19} molecules/cm^3.

Useful information: 1 mole = 6.02×10^{23} molecules;
Molecular weight of carbon dioxide is 44 g/mole

4. Concentration to Mixing Ratio

A detector measures 1.25×10^{-10} g/cm^3 of Ozone (O_3) on the roof of this building. What is the mixing ratio in ppbv? Assume that the density of air is 2.5×10^{19} molecules/cm^3.

Useful information: 1 mole = 6.02×10^{23} molecules;
Molecular weight of ozone is 48 g/mole