

Chapter 14: Gas-Vapor Mixtures and Air-Conditioning

Additional Problems

14-1S. Air at room temperature 70 F (21 C) is compressed from 14.7 psia to 110 psia (101 kPa to 758 kPa) by a small utility air compressor attached to a 10 ft³ (0.283 m³) tank. The flow rate of the air at the compressor inlet is measured at 10.6 ft³/m (0.005 m³/s). After the tank is filled the compressor turns off and the air in the tank cools back to room temperature. Calculate the amount of water that condenses in the bottom of the tank in liters. The relative humidity in the room is 60%.

Make reasonable assumptions if there is any missing information.

14-2S. Air at room temperature 70 F with a relative humidity of 55% is compressed from 14.7 psia to 200 psia by a large multistage compressor in an industrial operation. The volumetric flow rate at the inlet of the compressor is estimated to be 300 ft³/min. The exit temperature of the air is measured at 200 F. Calculate the relative humidity of the air a) immediately after leaving the compressor, b) after the air cools in a large pressure tank, and c) the amount of water, if any, collected in a water trap at the bottom of the tank in a 24 hour period.

Make reasonable assumptions if there is any missing information.

