

FYS3610 Exercises Week 35

Descriptive questions relevant for an oral examination:

- i) Draw a sketch of the height variation of temperature in the Earth's atmosphere from sea level to 300 km. Explain in general terms what are the physical mechanisms responsible for this structure. Annotate the different regions of the atmosphere by name.
- ii) Discuss barosperic density distribution. Derive the aerostatic equation. Derive the barometric law and the define the scale height.
- iii) Why is the atmosphere well mixed up to ~100km. Describe the diffusion processes below and above the homopause.
- iv) Why does $n(z)$ profiles for different gas species of different weight decay at a different rate above 100 km.
- v) Derive the expression for escape velocity. What is the energy/temperature needed for an oxygen atom to escape.
- vi) Describe the Maxwellian distribution function, and how it varies with temperature and particle mass.

Exercises:

- 1) What is the average molecular mass in the homosphere.
- 2) Discuss the to what extent we need to care about the centrifugal acceleration in the gravity acceleration.
- 3) What is the scale height at Earth near the tropopause, stratopause and the mesopause (Table 3 and Figure 9).
- 4) What is the scale height for the various species at 300 km altitude, and how does it vary with height?

Exercises from the book:

2.1-2.3