Gases from Air: Teacher Notes

The major running cost of the process is energy for the compressors.

Many oxygen plants are built at the site of the consumer – eg a steel works.

Demand for oxygen is greater than that for nitrogen whereas nitrogen is the more abundant gas in the air. So to make enough oxygen to fulfil demand, some nitrogen has to be discarded.

The chemicals used to absorb water and carbon dioxide are molecular sieves. Absorption takes place in two pre-purification units (PPUs). While one is in use, the molecular sieves in the other are being regenerated by blowing waste nitrogen from the column through them.

Liquid air is used as a refrigerant for food, in preference to liquid nitrogen. This is because, when it evaporates, air is formed which can be breathed. Liquid nitrogen produces nitrogen gas on evaporation. This would suffocate through lack of oxygen any workers breathing it in. Liquid air is often made by mixing liquid nitrogen and liquid oxygen in the ratio 4:1.

The air which enters the lower distillation column is not, strictly speaking, a liquid but a highly compressed near-critical gas. The final expansion of this fluid as it enters the lower distillation column actually causes liquefaction.

The pressure in the lower column is about 5.3 atmospheres and in the upper column 1.3 atmospheres.

The oxygen-rich liquid which collects in the base of the lower column contains about 38% oxygen.