



Year: 10

Topic: 3.3 MAKING USE OF ENERGY

Knowledge and Understanding to be developed:

This topic explores the idea that temperature differences can lead to the transfer of thermal energy by conduction, convection and radiation. It uses the molecular model of matter to explain the differences in the mechanism of thermal energy transfer by these three methods. It uses the ideas developed to discuss the efficiency and cost effectiveness of different methods of reducing thermal energy losses in the domestic situation.

Mathematical Skills

There are a number of opportunities for the development of mathematical skills in this topic. These include applying the relationship between density, mass and volume; calculating the cost effectiveness and efficiency of different methods of reducing energy loss from the home. These topics afford learners the opportunity to recognise and use expressions in decimal form; to recognise expressions in standard form; to use ratios, fractions and percentages; to change the subject of an equation; to substitute numerical values into algebraic equations using appropriate units for physical quantities; to calculate areas of rectangles and volumes of cubes.

Key Terms to be learned this topic:

Elements	Compounds
Mixture	atom
Chromatography	Distillation
Relative formula mass	mole
Percentage composition	Reacting mass
	Percentage yield

**Learning Objectives and Outcomes:
Students should be able to :**

- (a) how temperature differences lead to the transfer of energy thermally by conduction, convection and radiation
 - (b) the equation: $\rho = \frac{m}{V}$ mass density volume and explain the differences in density between the three states of matter in terms of the arrangements of the atoms or molecules
 - (c) conduction using a model of molecular motion and account for the better conduction in metals by the presence of mobile electrons
 - (d) convection in liquids and gases in terms of molecular behaviour and variations in volume and density
 - (e) how energy loss from houses can be restricted e.g. loft insulation, double glazing, cavity wall insulation and draught excluders
 - (f) the cost effectiveness and efficiency of different methods of reducing energy loss from the home, to compare their effectiveness; use data to compare the economics of domestic insulation techniques, including calculating the payback time; the economic and environmental issues surrounding controlling energy loss
 - (g) how data can be obtained and used to investigate the cost of using a variety of energy sources for heating and transport
- SPECIFIED PRACTICAL WORK**
- Investigation of the methods of heat transfer
 - Determination of the density of liquids and solids (regular and irregular)