|  |
| --- |
| **Lesson Number – 19.2** |
| **Lesson Title – Specific Heat Capacity** |
| **Specification Reference** | **3.6.2.1** |
| **Learning Objectives** |
| The internal energy of a system is increased when energy is transferred to it by heating or when work is done on it (and vice versa), e.g. a qualitative treatment of the first law of thermodynamics.Calculations involving transfer of energy.For a change of temperature:  where *c* is specific heat capacity.Calculations including continuous flow. |
|  |
| **Opportunities for Assessment** |
| Page 312 questions |
| **Starter:** | Slide #1 enables a discussion on heat, temperature and energy. Recap last lesson and erode preconceptions on these topics |
| **Main:** | Slide #2 is a thought provoking questions. Higher level pupils can be asked for the advantages and disadvantages of oil filled radiators instead of water filled ones.Slide #3 is a simple definition and units check for specific heat capacity from GCSESlides #4 and #5 explain how to measure the specific heat capacity of the material by inversion. The main advantage for this is you do not need the mass of the material. This is an excellent demonstration if the equipment is available.Slides #6 - #8 work through the experiment. It makes an interesting discussion on error and uncertainties to consider why the end value attained by the students should have a bias due to heat loss.Slide #9 explains the difficulties and additional data needed to measure the specific heat capacity of liquids. This can form a nice extension practical although heating of oils is dangerous and not recommended unless kept below 60oCSlide #10 shows how to calculate the power for continuous heat flow. Students often find calculating the flow rate of water in a tube very difficult; taking time to do some worked examples on the board would be beneficial to some groups. |
| **Plenary:** | Slide #11 is a summary of the key points |

|  |  |
| --- | --- |
| **Homework:** | Page 312 questions, write up experiment |
| **Differentiation / Extension / S&C** |
| Links between the benefits of using oil filled radiators or water filled ones (e.g. for stand-alone systems or series systems) – Links to biology and the benefit for water in organisms to avoid temperature changes. |
| **Numeracy / Literacy** | **SMSC / Fundamental British Values** |
| Use of formula and calculations of SHC | Links between SHC and evolution, water in blood, water as a solvent |
| **RESOURCES:** |
| Class sets:* Various 1kg Metal blocks (With holes in for heater / thermometer)
* Thermometer (0-100oC)
* LV Power pack
* Immersion heater
* Voltmeter
* Ammeter
* Stop clock
* Insulation
 |
| **Risk Assessment** e.g. CLEAPSS card reference |
| Do not heat blocks beyond 60oC – risk of burnsDo not heat immersion heaters unless in blocks – Turn off when not in use – risk of burns |
| **Working Scientifically (HSW)** |
| N/A |