Answer sheet

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IG Teaching Hubs Chemistry Worksheets

Lesson 74 – Worksheet 1

**1** **a** Viscosity increases as boiling point increases.

**b** Ease of ignition decreases as boiling point increases.

**c** Colour becomes darker as boiling point increases.

**2** **a** Difficulty described, e.g., achieving or maintaining the required temperatures.

**b** Relevant improvement to address the problem identified in part **a**, e.g., use electric heater.

Lesson 74 – Worksheet 2

**1** Students cut out the cards.

**2** Correct order (top to bottom): refinery gases, gasoline (petrol), kerosene, diesel oil, fuel oil, bitumen.

**3** Correct order (top to bottom): domestic heating and cooking, fuel for cars, fuel for aircraft, fuel for some cars and trains, fuel for large ships and some power stations, surfacing roads and roofs.

Lesson 74 – Worksheet 3

**1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Boiling point | Ease of  ignition | Number of  carbon atoms | Viscosity |
| Exactly the same throughout the fraction | **🗶** | **🗶** | **🗶** | **🗶** |
| Similar throughout the fraction | **✓** | **✓** | **✓** | **✓** |

**2 a**

|  |  |
| --- | --- |
| Name of fraction | Use of fraction |
| **refinery gases** | domestic heating and cooking |
| gasoline (petrol) | **fuel for cars** |
| kerosene | **fuel for aircraft** |
| **diesel** | fuel for some trains |
| **fuel oil** | fuel for some power stations |
| **bitumen** | surfacing roads and roofs |

**b i** fuel for some cars

**ii** fuel for some ships

**3 a** gas to liquid

**b i** gasoline (petrol); because it condenses higher up the fractionating column; temperature decreases going up the column

**ii** gasoline (petrol); because smaller hydrocarbons travel further up the column/gasoline (petrol) has the lower boiling point (so weaker intermolecular forces)

**iii** gasoline (petrol); because ease of ignition increases going up the column/smaller hydrocarbon molecules ignite more easily.

**iv** kerosene; because viscosity decreases going up the column/it has larger molecules (with stronger intermolecular forces).

**Optional Challenge question**

**4** A physical property is given with a difference described, e.g.:

* + number of hydrogen and carbon atoms in molecules is lower in gasoline
  + boiling point is lower in gasoline
  + ease of ignition is easier in gasoline
  + viscosity is lower in gasoline.

The opposite answers for fuel oil are also acceptable, e.g.:

* + number of hydrogen and carbon atoms in molecules is higher in fuel oil.

Lesson 74 – Worksheet 4

**1**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Boiling point | Ease of  ignition | Number of  carbon atoms | Viscosity |
| Exactly the same throughout the fraction | **🗶** | **🗶** | **🗶** | **🗶** |
| Similar throughout the fraction | **✓** | **✓** | **✓** | **✓** |

**2 a**

|  |  |
| --- | --- |
| Name of fraction | Use of fraction |
| **refinery gases** | domestic heating and cooking |
| gasoline (petrol) | **fuel for cars** |
| kerosene | **fuel for aircraft** |
| **diesel** | fuel for some trains |
| **fuel oil** | fuel for some power stations |
| **bitumen** | surfacing roads and roofs |

**b i** fuel for some cars

**ii** fuel for some ships

**3 a** gas to liquid

**b i** gasoline (petrol); because it condenses higher up the fractionating column; temperature decreases going up the column

**ii** gasoline (petrol); because smaller hydrocarbons travel further up the column/gasoline (petrol) has the lower boiling point (so weaker intermolecular forces)

**iii** gasoline (petrol); because ease of ignition increases going up the column/smaller hydrocarbon molecules ignite more easily.

**iv** kerosene; because viscosity decreases going up the column/it has larger molecules (with stronger intermolecular forces).

IG Teaching Hubs Chemistry Homework sheets

Lesson 74 – Homework

**1 a i** kerosene

**ii** refinery gases

**iii** bitumen

**b i** fuel for large ships; fuel for some power stations

**ii** fuel for some cars; fuel for some trains

**2 a** Diesel; because smaller hydrocarbons have weaker intermolecular forces; so lower boiling points.

**b** Diesel; because it has the lower boiling point.

**c** Fuel oil; because it has the larger hydrocarbon molecules.

**3** **a** Scatter graph plotted with number of carbon atoms on the horizontal axis; flashpoint on the vertical axis; suitable title; points plotted ± 1 space square; scales chosen so that the plotted points occupy an area at least 50% of the space between axes.

**b i** The flashpoint increases as the number of carbon atoms increases/the flashpoint is proportional to the number of carbon atoms.

**ii** answer in the range 113–117 °C

**iii** alkanes with fewer than nine carbon atoms have flashpoints 13 °C or lower; which is less than room temperature/20 °C; so they vaporise to form a mixture with air that could be ignited; which would be dangerous.