

Video worksheet – fuels -biodiesel , petrodiesel (Structure and properties)

1. Which one of the following statements is correct? Explain your reasoning

- A. Pentane has a higher flashpoint than octane.
- B. The flashpoint of all the structural isomers of $C_4H_{10}O$ are equal.
- C. The higher the flashpoint of a compound, the higher its fire risk.
- D. The flashpoint of all the structural isomers of 3-methyl hexane are equal because they all have the same molecular mass.
- E. None of the options are true

2. Both biogas and coal seam gas contain CH_4 as their main component. Why is biogas considered a renewable energy source but coal seam gas is not?

3. Petrodiesel is made up of a number of different molecules, including $C_{12}H_{26}$. Biodiesel often contains $C_{11}H_{22}O_2$. When comparing $C_{12}H_{26}$ and $C_{11}H_{22}O_2$, which one of the following statements is correct?

- A. $C_{12}H_{26}$ has a higher viscosity due to the dispersion forces between the molecules.
- B. $C_{12}H_{26}$ is less hygroscopic as it has only dispersion forces between the molecules.
- C. $C_{11}H_{22}O_2$ has a higher energy content when it combusts as it contains oxygen atoms.
- D. $C_{11}H_{22}O_2$ produces more carbon dioxide per mole when it combusts due to its higher molecular weight.

4. A student is asked to research and then recommend either petrodiesel or biodiesel as the preferred fuel for a small Victorian transport company. The company stores some of its fuel supplies in tanks situated in remote locations for occasional use. The air temperature in these remote locations can range between $0\text{ }^\circ\text{C}$ and

$40\text{ }^\circ\text{C}$. Based on this information, the student would recommend petrodiesel rather than biodiesel because petrodiesel is

- A. more hygroscopic, more viscous and less likely to biodegrade when stored.
- B. more hygroscopic, less viscous and more likely to biodegrade when stored.
- C. less hygroscopic, more viscous and more likely to biodegrade when stored.
- D. less hygroscopic, less viscous and less likely to biodegrade when stored.

5. Cold weather can affect the performance of diesel fuels, such as petrodiesel and biodiesel. As the temperature is lowered, a point is reached at which the larger molecules in the fuel begin to solidify out of the liquid. When this point is reached, the fuel starts to become cloudy. The temperature at which this point is reached is known as the cloud point. Which statement is correct?

- A. A high cloud point indicates that the diesel fuel is a biodiesel and will produce more pollutants.
- B. A low cloud point indicates that the diesel fuel is a biodiesel and has good hygroscopic properties.
- C. A low cloud point indicates that the diesel fuel is a petrodiesel and will flow readily in cold temperatures.
- D. A high cloud point indicates that the diesel fuel is a petrodiesel and contains only straight-chain carbon molecules.

The information below refers to questions 6 and 7.

Vehicle model	Fuel	Fuel consumption (L/100 km)	CO ₂ produced (g CO ₂ /L of fuel)
1	LPG	19.7	1665
2	petrol	14.5	2392
3	E10	14.2	2304
4	petrodiesel	9.2	2640

6. Four identical vehicle models, 1, 2, 3 and 4, were tested for fuel efficiency using LPG, petrol (unleaded, 91 octane), E10 (petrol with 10% ethanol added) and petrodiesel. Carbon dioxide, emissions per litre of fuel burnt were also determined. The following table summarises the results.

Using the information in the table above, which one of the following statements about petrodiesel is correct?

- A. It has the highest energy content.
- B. It has the poorest fuel efficiency.
- C. It is a renewable energy source.
- D. It has the lowest CO₂ emissions when burnt.

7. The use of which vehicle has the smallest impact on the environment, in terms of the grams of CO₂ produced per 100 km?

- A. Vehicle model 1
- B. Vehicle model 2
- C. Vehicle model 3
- D. Vehicle model 4