Worksheet 4

Name Class Date

**1** Balance the following equations showing incomplete combustion.  
When balancing combustion reactions of hydrocarbons, start by balancing the carbon dioxide and water first.

**a** C2H6  \_\_\_\_O2 → C  CO  \_\_\_\_H2O

*Hint: In the equation, use the information that the hydrocarbon fuel, the carbon, and the carbon monoxide do not need to be balanced as each have one molecule in the equation which cannot be changed. From this the number of hydrogen atoms can be determined.*

**b** C4H8  \_\_\_\_O2 → \_\_\_\_C  2CO  \_\_\_\_H2O

**2** Complete the section below about the incomplete combustion of gasoline (petrol).

Fill in the gaps using words from the word bank.

**Word bank**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| breathing | carbon dioxide | complete | death | detectors | haemoglobin | incomplete |
| monoxide | oxidised | oxygen | smell | soot | surfaces |  |

If gasoline is burned in a limited supply of oxygen or air, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ combustion occurs producing carbon and carbon \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. It is possible to tell that carbon is being released by seeing the release of smoke and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This can cause:

* blackened \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* blocked chimneys and flues
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ problems
* global dimming.

Carbon monoxide is produced as the carbon atoms from the gasoline are only partially \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Electronic carbon monoxide \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are needed near gas appliances because we cannot see or \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carbon monoxide. We need to know if carbon monoxide is being produced as it can cause unconsciousness and even \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This happens because as carbon monoxide is breathed in, it gets into the bloodstream and combines with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the red blood cells. This reduces the amount of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ carried in the blood.

**3** Complete the following sentences by underlining the correct words in each *pair*.

**a Incomplete** **combustion** happens if the supply of air is *plentiful* | *limited*.

**b carbon monoxide** is formed during *complete* | *incomplete* **combustion** of hydrocarbon fuels.

**c** compared to **complete** **combustion**, *more* | *less* energy is released during incomplete combustion.

**4** Carbon particles are released during the incomplete combustion of hydrocarbon fuels.   
Complete the table by placing a tick (✓) in each box that correctly describes a problem caused by carbon particles. There are four ticks to place.

|  |  |
| --- | --- |
| Possible problem | Caused by carbon particles (✓) |
| smoke and soot formed |  |
| surfaces become damp |  |
| surfaces become black or dirty |  |
| enhanced greenhouse effect |  |
| may cause breathing problems |  |
| flue pipes from boilers get blocked |  |