



Across

- 2 Any chemical or heat process used to convert a feedstock to a gaseous fuel
- 4 A molecule composed of long chains of alpha-glucose molecules linked together (repeating unit  $C_{12}H_{16}O_5$ ). These linkages occur in chains of alpha-1,4 linkages with branches formed as a result of alpha-1,6 linkages
- 11 The carbohydrate that is the principal constituent of wood and other biomass and forms the structural framework of the wood cells. It is a polymer of glucose with a repeating unit of  $C_6H_{10}O_5$  strung together by  $\beta$ -glycosidic linkages.
- 12 A long-chain carbohydrate containing at least three molecules of simple anhydrosugars linked together.
- 13 A biochemical reaction that breaks down complex organic molecules (such as carbohydrates) into simpler materials (such as ethanol, carbon dioxide, and water). Bacteria or yeasts can ferment sugars to ethanol
- 14 A biodegradable transportation fuel for use in diesel engines that is produced through the transesterification of organically- derived oils or fats.
- 15 A mixture of carbon monoxide (CO) and hydrogen (H<sub>2</sub>) which is the product of high temperature gasification of organic material such as biomass.
- 17 Xylan — A polymer of xylose with a repeating unit of  $C_5H_8O_4$ , found in the hemicellulose fraction of biomass
- 18 The production, conversion, and use of material directly or indirectly produced by photosynthesis (including organic waste) to manufacture fuels and substitutes for petrochemical and other energy-intensive products
- 19 The major noncarbohydrate, polyphenolic structural constituent of wood and other native plant material that encrusts the cell walls and cements the cells together.
- 20 The dried stalks and leaves of a crop remaining after the grain has been harvested.
- 23 Simple photosynthetic plants containing chlorophyll, often fast growing and able to live in freshwater, seawater, or damp soils. May be unicellular and microscopic or very large,
- 24 A gaseous mixture of carbon dioxide and methane produced by the anaerobic digestion of organic matter.

Down

- 1 The breaking apart of complex molecules by heating in the absence of oxygen, producing solid, liquid, and gaseous fuels
- 3 A conversion process using acids, bases, or enzymes in which long-chain carbohydrates are broken down into their component fermentable sugars
- 5 A family of enzymes that break down cellulose into glucose molecules.
- 6 Abbreviation for fatty acid methyl ester can be created by a catalysed reaction between fatty acids and methanol.
- 7 Term means a facility (including equipment and processes) that converts renewable biomass into biofuels and biobased products, and may produce electricity.
- 8 A clear, colorless, flammable oxygenated hydrocarbon which is typically produced chemically or biologically from the fermentation of various sugars from carbohydrates found in agricultural crops and cellulosic residues from crops or wood. It is used in the United States as a gasoline octane enhancer and oxygenate (blended up to 10 percent concentration), can also be used in high concentrations (E85) in vehicles designed for its use
- 9 Ignition performance rating of diesel fuel
- 10 The resulting substances and materials that accompany the production of a fuel product such as ethanol.
- 16 Family of enzymes that act together to hydrolyze starch to individual glucose and dextran units.
- 18 Biomass converted to liquid or gaseous fuels such as ethanol, methanol, methane, and hydrogen.
- 20 Animal fat, which can be used as a feedstock for biodiesel production
- 21 The abbreviation for barrels of oil equivalent