Product datasheet (en)

Version:	1703_27.03.2018

Photo:

Name:

leXsolar-BioFuel Ready-to-go

Item number:

1703

Youtube link:

Area of application:

Chemistry
Technology Training
Chemical and Environmental Engineering
Renewable Energies

Dimensions (cm x cm x cm)

64x37x16,5

Weight (kg):

8,4

User group:

Basic Training
Highschool / Secondary School
Middle School / Junior High School
Industrial Customers

Key facts:

Production of biofuel displayed in experiments for students
Interdisciplinary experiments for chemistry, physics and biology
Includes an Ethanol-fuel cell for the generation of electrical energy out of biofuel
All additional devices already included - usable without laboratory equipment

List of components:

1 x 1100-23 Potentiometer module
1 x 1100-27 Motor module without gear
1 x 1700-01 leXsolar ethanol fuel cell module
1 x 1702-01 Plug with hose
1 x 1702-02 Yeast
1 x 1700-02 Chain clamp
2 x L2-06-011 Digital multimeter
3 x L2-06-012 Test lead black 25 cm
2 x L2-06-013 Test lead red 25 cm
4 x L2-02-016 Bumpon transparent 5,0 mm height X 11,1mm diameter
1 x L2-02-017 Propeller
1 x L2-06-016 Laboratory thermometer
1 x L2-06-070 Distilling head, 2 cores 75°, NS 19/26
1 x L2-06-071 Condenser
1 x L2-06-072 Alcoholmeter
1 x L2-06-075 Erlenmeyer flask 1000 ml
1 x L2-06-076 Airlock
1 x L2-06-077 Rubber stopper
1 x L2-06-079 Areometer
1 x L2-06-082 Beaker 250 ml
3 x L2-06-083 Test tubes
1 x L2-06-084 Grip stopper
3 x L2-06-085 Pasteuer pipette
1 x L2-06-086 Measuring cylinder 100ml
1 x L2-06-087 Syringe 2ml
1 x L2-06-110 Silicone ring
1 x L3-03-258 Info sheet initial startup
1 x L3-01-107 Insert BioFuel Rtg 1703
1 x L2-06-116 Universal stand clamp
1 x L2-06-119 Stand rod 60cm, M10
2 x L2-06-120 Double clamp
1 x L2-06-118 Stand base plate
1 x L3-01-099 Aluminium case BioFuel Rtg 1703
1 x L3-03-175 Einräumplan 1703 BioFuel Ready-to-go

Extras needed:

1 x L2-06-177 Supplementary BioFuel
1 x L2-06-114 Bunsen burner

Extras available:

No extras available.

Description:

The entire process of producing biofuel is demonstrated with leXsolar-Biofuel Ready-to-go in the form of student experiments. The suitcase contains all necessary parts and components and can be used from any location.
The first step is resource selection and fermentation. The resulting mash is then distilled with the custom-built leXsolar-condensor and the resulting ethanol will be characterized. Lastly, the produced bio fuel needs to be converted into usable energy - for example into electricity with the provided ethanol fuel cell.
leXsolar-BioFuel Ready-to-go does not only cover bio ethanol production but also the generation of biodiesel through transesterification of fats.

Experiments:

Part 1: Biodiesel production

Transesterification from fat to Biodiesel (FAME)
Determination of fat parameters
Extraction of fats from foods and oil plants

Part 2: Alcohol fermentation

Production of a mash/ alcoholic fermentation
Fermentation of different sugar types
(including catalytic splitting of starch)
Proof of fermentation gases

Part 3: Distillation and production of Bioethanol

Distillation of mash
Characteristics of the produced Ethanol

Part 4: Ethanol fuels

Introduction Ethanol fuel cell
I-V curve of Ethanol fuel cells
Dependency of Ethanol fuel cells on concentration and temperature
Energy balance of the whole process

Specifications of components

1100-23 Potentiometer module:
Plug-in module with adjustable resistance
Resistance continuously adjustable: 0 - 1.1 kOhm
Maximum current: 1A
Module contains two potentiometers connected in seris (1 x 100 Ohm and 1 x 1 kOhm)
Allows an exact adjustment of the resistance while having a large resistance range
Layout: plug-in module with 4mm jacks
Grid-dimension of the jacks: 70mm
Module size: 85mmx85mm

1100-27 Motor Module without Gear:

Plug-in module with DC-motor
Initial current: 20 mA
Initial voltage: 0.35 V
Equipped with automatic fuse protecting from overvoltage
Layout: plug-in module with 4 mm jacks
Grid-dimension of the jacks: 70 mm
Module size: 85 mm x 85 mm

1700-01 leXsolar ethanol fuel cell module:
Ethanol fuel cell for conversion of chemical energy into elecrical energy
Stack of two fuel cells with separately contactable single fuel cells
For ethanol solution with concentration up to 20%
Recommended ethanol concentration for continuous operation 10%
Open circuit voltage Voc = 1 V (double cell)
Maximum short circuit current Isc = 40 mA
Maximum peak power P = 10mW
Approx. continuous power P = 2mW (at least 2 min.)

1702-01 Plug with hose:
'Stopper (PE) for Erlenmeyer flask L2-06-075 pierced with PE-tube
Joint: ST/NS 29/32
To be used for detection of carbon dioxide

1702-02 Yeast:
Turbo Yeast - 14% of pure alcohol within 24 h! Instruction per 25 litres: [1] In a plastic fermentation container dissolve 6 kg of sugar in 6 litres of hot boiled water (solution volume shall increase to 9,6-9,9 litres). [2] Fill up with cold water to 25L. [3] Once the solution is cooled to temperature of 30-35°C, add sachet's contents and mix very thoroughly. [4] Once a fermentation lock is mounted, the solution should be subject to fermentation at a temperature of 20-30°C within 24 h. From 6 kg of sugar 14% of pure alcohol is produced. Caution: Fermentation proceeds stormily. Ingredients: distillery yeast, growth medium. Turbo Yeast can be used not only for fermentation of sucrose but also corn mashes, barley mashes, rye mashes, wheat mashes, potato mashes and molasses mashes. Store in a dry place at room temperature

Composition: Active yeast , yeast nutrient salt (vitamins , macro- and microelements).

1700-02 Chain clamp:

L2-02-016 Bumpon transparent 5,0 mm height X 11,1mm diameter:

L2-02-017 Propeller:

L2-06-016 Laboratory thermometer:
Alcohol laboratory thermometer with red liquid. White occupied capillaries, amber stain graduation, Length according to ISO 305 mm, 6mm Ø, with suspension eye, packed in a protective plastic holder, measurement range: -10..+ 110°C, graduation: 1°C

L2-06-070 Distilling head, 2 cores 75°, NS 19/26:
Fractionating column with 2 joints NS 29/32 and GL14 fitting for thermometer L2-06-016

L2-06-071 Condenser:
Condenser for destillation of ethanol
Joint: NS 29/32 for Erlenmeyer flask L2-06-075
No need for cooling water circuit
Destillation of approx. 750ml with one cooling water charge possible

L2-06-072 Alcoholmeter:
Alcoholometer for measuring the concenctration of ethanol solutions
For concentration of 30 - 90 vol.%

L2-06-075 Erlenmeyer Flask 1000 ml:
Erlenmeyer flask 1000 ml with joint NS 29/32
Borosilicate glass

L2-06-076 Airlock:
Airlock for fermentation
Together with stopper L2-06-077 to be used with erlenmeyer flask L2-06-075

L2-06-077 Rubber stopper:
Rubber stopper for NS 29/32 with hole for air lock L2-06-076

L2-06-079 Areometer:
Areometer for measuring the sugar content of water sugar solutions
Density range 0 … 300 g/L

L2-06-082 Beaker 250 ml:
Borosilicate beaker 250ml

L2-06-083 Test tubes:
Test tubes 160x60

L2-06-084 Grip stopper:
Grip stopper for test tube L2-06-083

L2-06-085 Pasteuer pipette:
Plastics pasteuer pipette

L2-06-086 Measuring cylinder 100ml:
Measuring cylinder 100 ml (PE)

L2-06-087 Syringe 2ml:

L2-06-110 Silicone ring:

L3-03-258 Info sheet initial startup:

L3-01-107 Insert BioFuel Rtg 1703:

L2-06-116 Universal stand clamp:

L2-06-119 Stand rod 60cm, M10:

L2-06-120 Double clamp:

L2-06-011 Digital multimeter:
TÜV/GS-approved Pocket size mini Multimeter.

L2-06-012 Test lead black 25 cm:
The black test lead is used for the electrical connection of the modules. The cable is directly plugged into the base plate or alternatively directly into the plug connection of the modules. The cables have two different colors to distinguish between the positive and the negative pole. The black cables are plugged into the negative pole.

L2-06-013 Test lead red 25 cm:
The red test lead is used for the electrical connection of the modules. The cable is directly plugged into the base plate or alternatively directly into the plug connection of the modules. The cables have two different colors to distinguish between the positive and the negative pole. The red cables are plugged into the positive pole.

L2-06-118 Stand base plate:

L3-01-099 Aluminium case BioFuel Rtg 1703:

Specifications extras needed:

L2-06-177 Supplementary BioFuel:
The leXsolar Complete Solution Chemistry contains all necessary chemicals for the experiments with the leXsolar-BioFuel experimental kit .
The chemicals are sufficient for carrying out the experiments 20 times. Whether 20 times with one leXsolar-BioFuel experimental kit, or 2 times per experimental kit with e.g. a class set consisting of 10 experimental systems.

L2-06-114 Bunsen burner:

Specifications extras available:

No extras available.