Energy and Sustainable Energy Program
Bioenergy (ESE404)

Model Answer

Total Marks: 40

Date: Sunday 20/06/2021
Time allowed: 2 Hours
Second Semester 2020/2021
Number of Questions: 40
Number of Pages: 4

For each question, *choose your answer and* fill in the corresponding *bubble* on *your answer sheet*

1- Bioalcohols can be produced ……
a) chemically b) biologically c) thermally d) physically

2- Synthesis of bioalcohols produced by a process called……..
a) fermentation b) trans-esterification c) gasification d) digestion

3- In bialcohol production, ……gas is evolved
a) oxygen b) nitrogen c) carbon dioxide d) hydrogen

4- Fermentation is an …….. process.
a) anaerobic b) aerobic c) chemical d) thermal

5- …… is one of the feed stocks for alcohol production.
a) Animal wastes b) Sugar cane c) Fats d) Oils

6- Ethanol is an alternative fuel for ……
a) diesel b) benzene c) gasoline d) coal

7- Biogas is produced by a process called…….
a) pyrolysis b) trans-esterification c) gasification d) digestion

8- Feed stocks for biogas production are ……..
a) sugar canes b) municipal wastes c) greases d) oils

9- Preparation of biogas should be taken place in presence of……
a) yeast b) methanogene bacteria c) oxygene d) nitrogen

10- Biogas has …….. pressure compared to natural gas.
a) lower b) higher c) equal d) no

11- Factor affecting the biogas production is …….
a) digester type b) mixing way c) temperature d) all of them

12- All of the following are stages of biogas production **except**……...
a) Hydrolysis b) Acidogensis c) Pyrolysis d) Acetogensis

13- …….. bacteria convert complex organic materials into simple liquid materials.
a) Methanogenic b) Acidogenic c) Acetogenic d) Hydraulic

14- …….. bacteria convert fatty acids and alcohols into H_2, CO_2 and acetic acid.
a) Methanogenic b) Acidogenic c) Acetogenic d) Hydraulic

15 – Mesophilic digester works typically at …… ^oC.
a) 15 b) 37 c) 50 d) 60

16- Thermophilic digester is …….. in fermentation than a mesophilic digester.
a) faster b) slower

17- …… is the most used kind of bio-digesters in the world (90%).
a) Mesophilic b) Thermophilic

18- The biofuel that has corrosive nature is……..
a) syngas b) biogas c) biodiesel d) bioalcohol

19- Decomposition of organic material by burning in absence of oxygen is called
a) fermentation b) gasification c) pyrolysis d) digestion

20- Partial combustion of the biomass in a low oxygen, then passing of hot steam is called…..
a) fermentation b) gasification c) pyrolysis d) digestion

21. Which of the following is a non-renewable energy resource?
a) Solar b) Methane c) Hydroelectric d) Coal

22. Chemical reactions triggered by _____ transform organic material into hydrocarbons.
a) solar energy b) hydroelectric
c) elevated temperatures d) decomposition

23. Which of the following are used in fermentation process of sewage?
a) Yeast b) Bacteria c) Algae d) Virus

24. Which one of the following is an example of starch crops biomass feed stocks?
a) Sugar cane b) Wheat straw c) Corn Stover d) Orchard pruning's

25. The aerobic digestion of sewage is used to produce _____
a) Biomass b) Bio fuels c) Synthetic fuels d) Metal articles

26. What are the two main products of anaerobic digestion?
a) Biogas and bio-fertilizer b) Waste water c) Producer gas d) Syngas.

27. What is unique about the gasification agent entering in a fluidized gasifier?
a) Enters from bottom at a relatively fast rate as compared to a fixed bed gasifier
b) Enters from bottom at a relatively slow rate as compared to a fixed bed gasifier.
c) Enters from top at a relatively fast rate as compared to a fixed bed gasifier
d) Enters from top at a relatively slow rate as compared to a fixed bed gasifier

28. What are the three types of fluidized gasifiers used?
a) Single fluidized bed, dual fluidized bed and bubbling fluidized bed
b) Straight fluidized bed, dual fluidized bed and bubbling fluidized bed
c) Circulating fluidized bed, dual fluidized bed and bubbling fluidized bed
d) Single fluidized bed, dual fluidized bed and straight fluidized bed

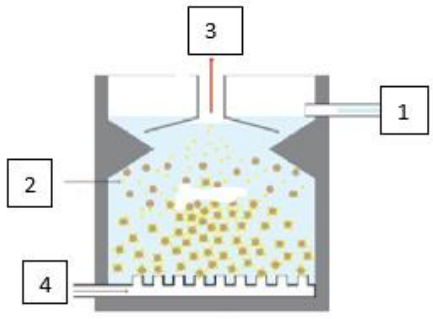
29. What are the four main types of thermo-chemical processes?
a) Galvanization, photovoltaic effect, chemo-mechanical effect, pyrolysis
b) Pyrolysis, gasification, combustion, hydrothermal processing
c) Pyrolysis, gasification, combustion, doping
d) Photovoltaic effect, gasification, combustion, hydrothermal processing

30. What are the two primary processes under bio-chemical conversion?
a) Photosynthesis and respiration
b) Photosynthesis and photovoltaic
c) Anaerobic digestion and fermentation
d) Anaerobic digestion and photosynthesis

31. Which of the following fuel can reduce the bad smell and protects water resources?
a) Syngas b) Biogas c) Bioalcohol d) Biodiesel

32. Which of the following products of anaerobic digestion consists of organic humus and nutrients?
a) Biogas b) Chlorine c) Top soil d) Bio-fertilizer

From the front figure (UASB), answer questions (33-36)



33. (No 1) represents
a) Gas bubbies b) Inlet wastes
c) Outlet d) Gas

34. (No 2) represents
a) Gas bubbies b) Inlet wastes
c) Outlet d) Gas

35. (No 3) represents
a) Gas bubbies b) Inlet wastes c) Outlet d) Gas

36. (No 4) represents
a) Gas bubbies b) Inlet wastes c) Outlet d) Gas

37. Which of the following condition **is not** suited for anaerobic treatment of solid wastes?

a) Controlled temperature b) Controlled moisture
c) Closed vessel d) Open vessel

38. By what means can hydrogen be stored?

a) Physically and chemically b) As atoms
c) As ions d) As fuel cells

39. Estimate the gross heating values in kJ/kg for the biomass redwood by using ultimate analysis. Elemental composition is given by:

Name	Fixed Carbon	Volatiles (%)	Ash (%)	C (%)	H (%)	O (%)	N (%)	S (%)
Redwood	16.10	83.50	0.40	53.50	5.90	40.30	0.10	0.00

a) 24,440 kJ/kg b) 20,440 kJ/kg c) 21,440 kJ/kg

40. From data in **question 39**, estimate the gross heating values in kJ/kg by using dry ash content.

a) 17,914 kJ/kg b) 19,914 kJ/kg c) 18,914 kJ/kg

With our best wishes

Examiners board: *Prof. Khairy Hussein, Prof. Ahmed Attia, Assoc. Prof. Hanaa Abulmagd*