

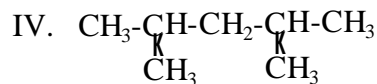
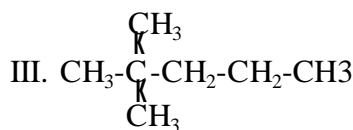
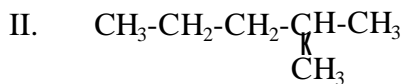
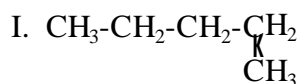
- Laboratory-scale processes are usually _____ processes and industrial chemical are usually _____ processes.
a. batch, batch b. batch, continuous c. continuous, continuous d. continuous, batch
- Which of the following high-volume chemicals produced in the United States is(are) used in the fertilizer industry? A. sulfuric acid B. nitrogen C. ethylene D. phosphoric acid E. sodium carbonate
a. A, B, E b. B,D, E c. C, E d. A, B, C, D e. A, B, D
- Metal ores are usually obtained from what source? a. atmosphere b. hydrosphere
c. lithosphere d. biosphere
- Synthesis gas is used as a economical material to produce hydrogen gas, methanol, and dry ice (or sparkling beverages). Synthesis gas is produced by the reaction of steam with
a. methane gas. b. ethanol c. ethylene d. corn cobs
- The Frasch process for sulfur uses
a. superheated air to ignite sulfur in underground deposits for easy transport to the surface as $\text{SO}_2(\text{g})$ followed by subsequent reduction to S.
b. the reaction , $\text{SO}_2(\text{g}) + 2 \text{H}_2\text{S}(\text{g}) \rightleftharpoons 3\text{S}(\text{l}) + 2 \text{H}_2\text{O}(\text{g})$
c. catalytic decomposition of $\text{SO}_2(\text{g})$ (produced by smelting of sulfide ores) to generate S(s) and $\text{O}_2(\text{g})$.
d. superheated water to melt sulfur in underground deposits and blasts of air to raise the molten sulfur to the surface.
- SO_3 gas reacts with water to form a. sulfate ion b. sulfuric acid c. sulfurous acid e. thiosulfate
- The sulfate process for the production of wood pulp involves
a. the break down of lignin and cellulose to water soluble materials.
b. the decomposition of the cellulose but leaves the lignin intact.
c. the decomposition of the lignin but leaves the cellulose intact.
- The stuff mined in Florida from which phosphate fertilizers are made is
a. superphosphate b. P_2O_3 c. phosphate rock d. Na_3PO_4
- Nitrogen from the atmosphere is fixed in compounds by
a. sonication during thunderclaps.
b. bacterial action occurring on the roots certain kinds of plants.
c. reaction occurring in the digestive tracts of cattle.
d. direct oxidation of ammonia.
- The Haber-Bosch process for the direct combination of nitrogen and hydrogen gases to form ammonia is exothermic. The reaction is run at relatively high temperatures
a. to speed up the rate of reaction.
b. to increase the equilibrium constant and increase the amount of product made.
c. to increase the production of the catalyst.
d. to keep the reaction from forming nitric acid instead ammonia.

11. Useful explosives are
- both thermodynamically and kinetically stable.
 - thermodynamically stable and kinetically unstable.
 - thermodynamically unstable and kinetically stable.
 - both thermodynamically and kinetically unstable.

12. The structure, $\text{CH}_3-\underset{\text{CH}_3}{\underset{|}{\text{C}}}\text{H}-\text{CH}_2-\text{CH}_3$, represents

- 3-methylbutane.
- 2-methylbutane.
- 2-ethyl propane.
- isobutane.

Use the following structures for problems 13, 14 and 15



13. Which of the following statements is true?
- IV is properly named 2,4-dimethylheptane.
 - IV is properly named 2,4-dimethylpentane.
 - I is properly named 1-methylbutane.
 - II is properly named 4-methylpentane.

14. Which structures represent structural isomers?

- I, II, III and IV
- I and III
- III and IV
- II and III

15. Which is an isomer of number II?

- heptane
- pentane
- 2,3-dimethylpentane
- 2,3-dimethylbutane

16. $\text{H}-\underset{\text{CH}_3}{\underset{|}{\text{C}}}=\underset{\text{CH}_3}{\underset{|}{\text{C}}}-\text{H}$ represents

- ethylene.
- trans-2-butene.
- cis-2-butene.
- trans-2-butyne.

17. $\text{CH}_2 = \text{CH}_2$ (g) + Cl_2 (g) \rightleftharpoons product. What is the product?

- $\text{H}-\text{C}=\text{C}-\text{Cl}$
- $\text{CH}_3-\text{CH}_2-\text{Cl}$
- CH_3-CH_3
- $\text{Cl}-\text{CH}_2-\text{CH}_2-\text{Cl}$

18. The most prevalent compounds in petroleum are

- aromatic hydrocarbons.
- cycloalkanes.
- straight-chain alkanes.
- alkanes with three or fewer carbon atoms per molecule.

19. In the catalytic cracking of petroleum, long-chained alkanes are

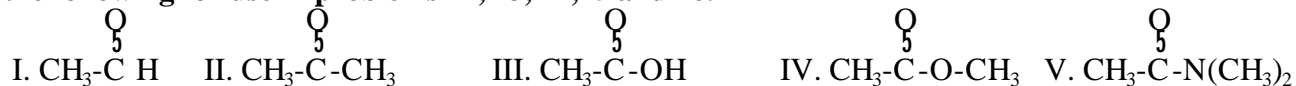
- aromatized.
- reformed to benzene, toluene and xylene.
- decomposed to carbon and hydrogen.
- broken into fragments including short-chain alkenes.

20. $\text{CH}_3-\underset{\text{OH}}{\underset{|}{\text{C}}}-\text{CH}_3$ is an example of a

- secondary alcohol.
- tertiary alcohol.
- primary alcohol.
- an isomer of acetone.

21. The reaction of CH_3NH_2 with hydrochloric acid produces
 a. NH_3 . b. $\text{NH}_4^+\text{CH}_3\text{O}^-$. c. CH_3Cl . d. ClNHCH_3 e. $\text{CH}_3\text{NH}_3^+\text{Cl}^-$

Given the following for use in problems 22, 23, 24, 25 and 26.



22. Which structure above represents a dehydration product of an alcohol and a carboxylic acid.
 a. II b. IV c. I d. III e. V
23. Which structure above represents a compound that can be easily oxidized to a carboxylic acid.
 a. I b. II c. V d. IV e. III
24. Which structure above represents a compound that can be reduced to a secondary alcohol.
 a. I b. II c. V d. IV e. III
25. Which structure represents a compound that will neutralize NaOH ?
 a. I b. II c. V d. IV e. III
26. Which structure represents an amide?
 a. I b. II c. V d. IV e. III
27. Which is not an aromatic compound? a. benzene b. toluene c. cyclohexane d. m-xylene
28. Which is capable of forming a condensation polymer?
 a. propylene b. ethanol c. ethene d. an amino acid e. styrene
29. Which is a polyamide? a. teflon b. polystyrene c. polypropylene d. protein
30. Which compound has a chiral center and rotates the plane of plane-polarized light?
 a. dibromomethane b. 2-bromopropane c. 2-bromobutane d. 2-bromopropene
31. In organic molecules, the number of bonds on H, Br, O, C and N are ____, ____, ____, ____, and ____ respectively.
 a. 1,2,2,3,4 b. 1,1,2,4,3 c. 1,1,2,3,3 d. 1, 1, 1, 1, 1
32. A CH_3CH_2- radical is called a(n)
 a. ethyl group b. methyl group c. phenyl group. d. propyl group. e. butyl group.
33. Which statement(s) regarding benzene is(are) true?
 A. Its molecular formula is C_6H_6 .
 B. It is a very stable ring compound.
 C. It is called an aromatic compound.
 D. It is unsaturated.
 E. It exhibits resonance.
 a. A, B, C b. A, C, D c. C, D, E d. A, C, E e. A, B, C, D, E
34. Which has the highest octane number? a. 2,3,4-trimethylhexane b. octane

c. heptane

d. 2-methylheptane

35. Which is **not** a natural polymer? a. polypropylene b. cellulose c. hemoglobin
d. DNA e. rubber
36. The segment $-\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2-$ represents a polymer named
a. polyhexane b. polyhexene c. polypropylene d. polystyrene e. polyethylene
37. If $-(\text{CH}_2-\underset{\text{Cl}}{\text{CH}})-$ represents the polymer, polyvinyl chloride, the monomer from which it was made is
a. $\text{CH}_2 = \text{CHCl}$ b. $\text{CH}_3\text{CH}_2\text{Cl}$ c. $\text{CH}_2 = \text{CH}_2 + \text{Cl}_2$ d. CH_3Cl
38. The process by which natural rubber is crosslinked with sulfur is called
a. sulfurization b. catalysis c. vulcanization d. elastomerization e. polymerization
39. The presence of what group would tend to make an addition polymer most “water-loving”?
a. $-\text{Cl}$ b. $-\text{CH}_3$ c. $-\text{COO}^-$ d. phenyl e. $-\text{CN}$
40. Butadiene ($\text{CH}_2 = \text{CH}-\text{CH} = \text{CH}_2$) is used commercially to produce
a. cups. b. synthetic rubber. c. latex paint. d. water absorbing polymers. e. carpet fiber.
41. The alpha in a natural alpha amino acid means that the
a. amino acid is of primary importance.
b. amino acid can not be synthesized biologically.
c. amino acid is always at the end of the carbon chain.
d. amino group is bonded to the same carbon as the carboxyl (COOH) group.
e. amino acid is the mirror image of the beta amino acid.
42. Which is **not** a protein **nor** a carbohydrate polymer?
a. DNA b. enzyme c. hemoglobin d. cellulose e. starch
43. Third generation insecticides are characterized by which of the following?
A. They kill all insects, good and bad.
B. They can be used in small quantities.
C. They are fairly insect-specific and often involve sex attractants.
D. They are organophosphorus compounds.
a. B, C, D b. A, B, D c. B, C d. C, D
44. Morphine and acetaminophen are examples of
a. analgesics b. antibacterial agents c. herbicides d. insecticides
45. The genetic code is found on
a. fibrous protein. b. insulin. c. nucleic acids.
d. complex carbohydrates.
46. When a fat is hydrolyzed in base
a. soaps are formed. b. polypeptides are formed.
c. amino acids are formed. d. it becomes saturated.

47. The web pages I wanted you to look at regarding the production of the chemical industry in the U.S. comes from what magazine?

- a. Chemical and Engineering News
- b. Playboy
- c. Country
- d. Successful Farming