

Edo state polytechnic, usen.
Tutorial kit

ND Chemical Engineering Technology

COURSE: INTRODUCTION TO CHEMICAL ENGINEERING AND PROCESSES

(CHE111)

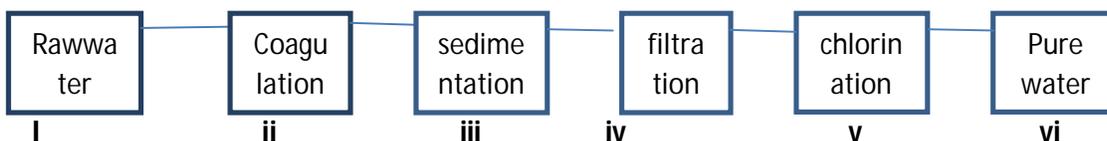
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Questions

1. Crude oil was first discovered in Nigeria in the year -----
(a) 1856 (b) 1956 (c) 1756 (d) 1656
2. Crude oil was first discovered in Nigeria in a place called -----
(a) Olibiri (b) Olobiri (c) Oloibiri (d) Oluibiri
3. Petrochemicals are products obtained from -----
(a) Petrol and chemicals (b) Industrial chemicals (c) value added products (d) petroleum
4. Ethylene is an example of -----
(a) Petroleum chemicals (b) value added products (c) crude chemicals (d) polyethylene
5. A substance which dissolves solute is called -----
(a) Solute dissolver (b) solvents (c) solvent (d) plasticizers
6. Toluene and ethanol are examples of -----
(a) Solutes (b) pigments (c) plasticizers (d) solvents

Answer questions 7-9 from the diagram below



7. The diagram is a typical example of -----
(a) Block diagram (b) flow sheet (c) water treatment diagram (d) none of the above
8. The diagram shows -----
(a) Stages involved in the treatment of water (b) stages involved in the treatment of rainwater (c) none of the above (d) all of the above
9. The items inside the boxes from ii-v are referred to as -----
(a) Unit processes (b) unit operations (c) stages of water treatment (d) water treatment process
10. The diagrammatic representation of all the information in a process is called -----

- (a) Flow sheet (b) flow sheeting (c) block diagram (d) information diagram
11. What is the name of the man who is regarded as the father of chemical engineering?
(a) Prof. Levis Mill Norton (b) sir H. Hartley (c) George F. Davis (d) George E. Davis
 12. The man who is considered as the father of chemical engineering was a -----
(a) Pharmaceutical engineer (b) Chemical engineer (c) British chemist (d) none of the above
 13. The difference between chemical engineers and other types of engineers is that they apply a knowledge of ----- in addition to other engineering disciplines
(a) Physics (b) chemistry (c) technology (d) science
 14. Chemical engineers work in process plants producing -----
(a) Polymers (b) paints and adhesives (c) fertilizers (d) all of the above
 15. Petrochemicals are also known as ----- (a) chemical products (b) crude products (c) value added products (d) all of the above

Answer questions 16-35 by filling the gaps

- Chemical engineers are sometimes called ----16---- because their ----17---- and ----18---- mastery is so broad.
 - Crude oil is usually found in association with ----19---- which forms a gas cap over the petroleum.
 - The molecular formula of ethylene is ----20----
 - Alkylation is the formation of ----21---- by adding ----22---- molecules to ----23---- feed stocks.
 - The equation $C_{17}H_{36(l)} \longrightarrow C_8H_{18(g)} + 3C_2H_4(g) + C_3H_6(g)$ explains ----24-----.
 - SBR is used for making vehicle tyres and footwear because of its ----25---- property.
 - Benzene and benzene derivatives are called ----26--- compounds.
 - The molecular formula of benzene is ----27----
 - Write down the structures of phenol(28), p-xylene(29), styrene(30), propene(31) and cyclohexane(32)
 - Oxygen and nitrogen are examples of ----33----
 - Slaked lime is produced by the ----34---- of quick lime
 - Tetraoxosulphate(VI) acid is produced industrially by a process called ----35-----.
36. What is the purpose of alkylation?
 37. Write down the equation for the production of styrene butadiene rubber (SBR) through the copolymerization process.
 38. Write down the contributory (equivalent) and intermediate structures of benzene.
 39. Write an equation for the production of slaked lime from quick lime.
 40. List in sequence the two stages involved in the industrial preparation of oxygen.
 41. Define the term solvents
 42. How are solvents classified?
 43. Pure methanal cannot be stored or supplied in the gaseous or liquid form, (i) why and (ii) how is it handled?
 44. Write down in sequence the steps involved in the manufacturing of lime.

Model answers to above questions

1. (b) 1956
2. (c) Oloibiri
3. (d) petroleum
4. (b) value added products
5. (c) solvent
6. (d) solvents
7. (d) none of the above
8. (c) none of the above
9. (b) unit operations
10. (a) Flow sheet
11. (d) George E. Davis
12. (c) British chemist
13. (b) chemistry
14. (d) all of the above
15. (c) value added products

16-18. Chemical engineers are sometimes called **UNIVERSAL ENGINEERS** because their **SCIENTIFIC** and **TECHNICAL** mastery is so broad.

19. Crude oil is usually found in association with **NATURAL GAS** which forms a gas cap over the petroleum.

20. The molecular formula of ethylene is C_2H_4

21-23 Alkylation is the formation of **COMPLEX MOLECULES** by adding **PARAFFIN** molecules to **OLEFIN** feed stocks.

24. The equation $C_{17}H_{36(l)} \rightarrow C_8H_{18(g)} + 3C_2H_4(g) + C_3H_6(g)$ explains **CRACKING OF GAS OIL FRACTION OF PETROLEUM**

25. SBR is used for making vehicle tyres and footwear because of its **ABRASION RESISTANCE** property.

26. Benzene and benzene derivatives are called **AROMATIC** compounds.

27. The molecular formula of benzene is C_6H_6

28. structure of phenol is



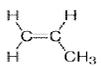
29. p-xylene is



30. styrene is



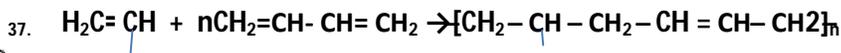
31. propene is



32. cyclohexane is



33. Oxygen and nitrogen are examples of INDUSTRIAL GASES
 34. Slaked lime is produced by the HYDRATION of quick lime
 35. Tetraoxosulphate vi acid is produced industrially by a process called CONTACT PROCESS
 36. The purpose of alkylation is to produce hydrocarbon boiling in the gasoline temperature range and possessing relatively high octane number.



Styrene

butadiene

styrene butadiene rubber (SBR)

38.  and  are the contributory structures of benzene while  is the intermediate structure.

39. $\text{CaO} + \text{H}_2\text{O} \rightarrow \text{Ca}[\text{OH}]_2$ is the equation for the production of slaked lime from quick lime
 40. Liquification of air, fractional distillation of liquid air.
 41. Solvents are substances which dissolve solute
 42. Solvents are usually classified into organic and inorganic solvents.
 43. Pure methanal cannot be stored or supplied in the gaseous or liquid form because it polymerises easily at room temperature sometimes with explosive violence to form a solid. It is handled as 37% solution in water (aqueous solution) containing a little methanol. This solution is called formalin.
 44. Manufacturing of lime involves:

Blasting down of limestone from a quarry surface → transportation from quarry to mills → crushing of stones in jaw and gyratory crusher → screening and size classification → burning of limestone according to sizes in kilns → packaging of finished products (quick lime) → hydration of some semi finished product (quick lime) → packaging