

02. Caking index of a coal is a measure of its

- (A) Abradability
- (B) Reactivity
- (C) Agglutinating (binding) properties
- (D) Porosity

Answer: Option C

03. White flue gas (resembling steam) coming out of the chimney of a thermal power plant indicates that the fuel used in the boiler furnace is

- (A) Tar
- (B) Coke oven gas
- (C) Pitch
- (D) Pulverised coke

Answer: Option B

04. Main component of sewage gas produced during anaerobic decomposition of organic waste (by suitable bacteria) during sewage disposal is

- (A) H₂
- (B) CH₄
- (C) CO₂
- (D) N₂

Answer: Option B

05. Spontaneous combustion of coal on storage results due to

- (A) Inadequate ventilation
- (B) Low temperature oxidation
- (C) Storage in large heaps with small surface to volume ratio
- (D) All (A), (B) and (C)

Answer: Option D

06. The shift conversion reaction taking place during water gas manufacture is given by

- (A) $C + H_2O \leftrightarrow CO + H_2$
- (B) $C + 2H_2O \leftrightarrow CO_2 + 2H_2$
- (C) $CO + H_2O \leftrightarrow CO_2 + H_2$
- (D) None of these

Answer: Option C

07. 'Wobbe index' is a characteristic of

- (A) Solid fuels
- (B) Gaseous fuels
- (C) Liquid fuels
- (D) Fat coals

Answer: Option B

08. _____ of the coal is the basis for Seylor's coal classification.

- (A) Proximate analysis
- (B) Ultimate analysis
- (C) Caking index
- (D) Calorific value

Answer: Option B

09. In case of pulverised coal fired steam boiler, the secondary air serves the main purpose of

- (A) Transportation of coal
- (B) Drying of coal
- (C) Combustion of coal by supplying it around the burner
- (D) Preheating the primary air

Answer: Option C

10. The optimum percentage of excess air for combustion depends upon the _____ of the fuel.

- (A) Type (solid, liquid or gaseous)
- (B) Calorific value
- (C) Sulphur content
- (D) Ignition temperature

Answer: Option A

11. In flue gas analysis by Orsat's apparatus, carbon monoxide is absorbed by

- (A) Cuprous chloride
- (B) Potassium hydroxide
- (C) Alkaline pyrogallol solution
- (D) None of these

Answer: Option A

12. Presence of free moisture in coal during its high temperature carbonisation

- (A) Reduces the coking time
- (B) Protects the volatile products from pyrolysis (cracking) in the presence of hot coke and hot oven walls
- (C) Increases the loss of fine coal dust from the ovens when charging
- (D) None of these

Answer: Option B

13. Washing of coal decreases its

- (A) Caking index
- (B) Mineral matter content
- (C) Ash content
- (D) Both (B) and (C)

Answer: Option B

14. In high temperature carbonisation of coal compared to low temperature carbonisation

- (A) Yield of ammonia is less
- (B) Aromatic content of tar is low
- (C) H_2 content in the coke oven gas is more
- (D) Calorific value of the coke oven gas is lower

Answer: Option C

15. To avoid fire by spontaneous combustion of coal due to its low temperature oxidation, it should be stored in

- (A) Shallow and small piles
- (B) Fine sizes without the presence of any lump
- (C) Closed space without any ventilation facility
- (D) Large heaps with small surface to volume ratio

Answer: Option A

16. KOH solution used in Orsat apparatus absorbs

- (A) CO_2
- (B) SO_2
- (C) Both (A) & (B)
- (D) Neither (A) nor (B)

Answer: Option C

17. The gas which contributes maximum to the heating value of natural gas is

- (A) CO
- (B) CO_2
- (C) H_2
- (D) CH_4

Answer: Option D

18. The heat of combustion of a fuel

- (A) Is equal to the heat of formation
- (B) Is always negative
- (C) Can't be known without calculating it
- (D) Is always positive

Answer: Option B

19. Nitrogen in coal

- (A) Is present upto 1-2%
- (B) Comes from protein in parent vegetable matter
- (C) Is recovered as ammonia during its carbonisation
- (D) All (A), (B) and (C)

Answer: Option D

20. Which of the following is not increased by using preheated combustion air in place of ordinary air at room temperature?

- (A) Calorific value of the fuel
- (B) Flame temperature achieved
- (C) Speed of combustion of fuel
- (D) Heat transfer rate to the stock in the furnace

Answer: Option A

21. Calorific value of blast furnace gas is around _____ KCal/Nm³.

- (A) 850
- (B) 1800
- (C) 4200
- (D) 6500

Answer: Option A

22. Coking time in beehive coke oven is about

- (A) 12 hours
- (B) 2-3 days
- (C) One week
- (D) Two weeks

Answer: Option B

23. Ash content in the middling coal (a byproduct of coal washeries) in India ranges between _____ percent.

- (A) 15 to 25
- (B) 35 to 45
- (C) 55 to 75
- (D) 75

Answer: Option B

24. Which of the following would require least amount of secondary air for combustion?

- (A) Coke breeze containing 25% ash and 2% volatile matter
- (B) Anthracite containing 10% volatile matter and 8% ash
- (C) Bituminous coal containing 20% ash and 25% volatile matter
- (D) Semi-bituminous coal containing 25% ash and 20% volatile matter

Answer: Option A

25. Which of the following is not a binder for coal briquetting?

- (A) Coal tar
- (B) Bitumen
- (C) Molasses
- (D) None of these

Answer: Option D

26. Bulk density of pulverised coal may be about _____ kg/m³.

- (A) 100
- (B) 500
- (C) 1000
- (D) 1500

Answer: Option B

27. Which of the following is the maximum coal producing state in India?

- (A) Orissa
- (B) West Bengal
- (C) Jharkhand
- (D) Assam

Answer: Option C

28. Pick out the wrong statement.

- (A) Angle of repose of coal increases with its increasing size
- (B) Specific gravity of coal increases with its increasing maturity
- (C) Refractive index and reflectance of coal increases with the increasing rank of coal

(D) Specific heat of coal decreases with increases in the volatile matter and decrease in the C/H ratio of coal

Answer: Option D

29. A coal with high ash content

- (A) Has higher calorific value
- (B) Is harder and stronger
- (C) Is not subjected to washing
- (D) Has low quantity of mineral matter

Answer: Option B

30. Bunsen burner is an example of a/an _____ burner.

- (A) Inside mixing/premix type
- (B) Outside mixing/diffusion flame/nozzle mix type
- (C) Rotary cup
- (D) Submerged combustion

Answer: Option A

31. Caking index of coal blend used for blast furnace coke making is about

- (A) 8
- (B) 12
- (C) 22
- (D) 36

Answer: Option C

32. The main drawback of supplying more excess air in the combustion of fuel is the

- (A) Excessive power requirement of air blower
- (B) Enhanced sensible heat loss in the flue gas
- (C) Intermittent and uncontrolled combustion of the fuel
- (D) High exit flue gas temperature from the furnace

Answer: Option B

33. Calorific value of coke oven gas is around _____ Kcal/Nm³.

- (A) 900
- (B) 4200
- (C) 7500
- (D) 2000

Answer: Option B

34. The maximum adiabatic flame temperature in air is _____ the maximum flame temperature in pure oxygen.

- (A) Lower than
- (B) Higher than
- (C) Same as
- (D) Not related to

Answer: Option A

35. Fusion point of coal ash increases with increase in its _____ content.

- (A) Iron sulphate
- (B) Iron silicate
- (C) Lime and magnesia
- (D) All (A), (B) and (C)

Answer: Option D

36. Largest constituent of coke oven gas is

- (A) N₂
- (B) H₂
- (C) CH₄
- (D) CO₂

Answer: Option B

37. Sulphur in metallurgical coal

- (A) Contributes to its heating value
- (B) Affects the quality of steel produced as cracks develop on the surface while rolling the steel
- (C) Both (A) and (B)

(D) Neither (A) nor (B)
Answer: Option C

38. Bomb calorimeter can be used to determine the _____ of the coal.

- (A) Sulphur content
 - (B) Calorific value
 - (C) Both (A) & (B)
 - (D) Neither (A) nor (B)
- Answer: Option C

39. Which of the following is not a by-product fuel?

- (A) Sewage gas
 - (B) Refinery gas
 - (C) Producer gas
 - (D) Bagasse
- Answer: Option C

40. A fuel containing carbon and carbon monoxide (but containing no hydrogen or its compounds) is burnt in pure oxygen at constant pressure. Its gross calorific value as compared to net calorific value will be

- (A) More
 - (B) Less
 - (C) Same
 - (D) Data insufficient; can't be predicted
- Answer: Option C

41. Oxygen content in a flue gas was found to be 4%. It implies that excess air used for combustion was around _____ percent.

- (A) 4
 - (B) 96
 - (C) 20
 - (D) 40
- Answer: Option C

42. Combustion reaction of fuels is a/an _____ reaction.

- (A) Auto catalytic
 - (B) Exothermic
 - (C) Endothermic
 - (D) None of these
- Answer: Option B

43. Gasification of the solid fuel converts its organic part into combustible by interaction with air/oxygen and steam so as to obtain a secondary gaseous fuel of high calorific value having no ash. Gasification reactions are normally carried out at about _____ °C.

- (A) 400-500
 - (B) 900-1000
 - (C) 1400-1500
 - (D) 1700-1800
- Answer: Option B

44. A coal having high volatile matter content will

- (A) Give less yield of tar and gas on carbonisation
 - (B) Burn with a small non-smoky flame
 - (C) Have a very high calorific value
 - (D) None of these
- Answer: Option D

45. Oxygen percentage (by weight) in atmospheric air is

- (A) 19
 - (B) 21
 - (C) 23
 - (D) 29
- Answer: Option C

46. Mott and Wheeler test is conducted on coke to find its

- (A) Reactivity with O₂
- (B) Abradability
- (C) Phosphorus content
- (D) Volatile matter content

Answer: Option A

47. The main advantage of forced draft over natural draft is that

- (A) Combustion of fuel is complete
- (B) Smaller height chimney can be used
- (C) Furnace control is easier
- (D) All (A), (B) & (C)

Answer: Option D

48. Coal is pulverised before burning in large capacity boiler furnaces mainly to

- (A) Ensure its complete combustion
- (B) Facilitate easy ash removal
- (C) Enhance its calorific value
- (D) Provide trouble free operation

Answer: Option A

49. If the specific heat of gaseous products of combustion of a fuel is high, the adiabatic flame temperature will be

- (A) Low
- (B) High
- (C) Very high, if the fuel is of low calorific value
- (D) None of these

Answer: Option A

50. Laboratory gas is obtained by the cracking of

- (A) Gasoline
- (B) Diesel
- (C) Fuel oil
- (D) Kerosene

Answer: Option D

51. Low temperature oxidation and spontaneous combustion of freshly mined coal is accentuated, if

- (A) It contains large amount of volatile matter
- (B) It is stored in tall heaps
- (C) Smaller fines are stored in large quantity
- (D) All (A), (B) and (C)

Answer: Option D

52. 'Wind loss' resulting from unscientific storage of coal may be the order of about _____ percent.

- (A) 2.5
- (B) 7.5
- (C) 10.5
- (D) 14.5

Answer: Option A

53. The ratio of % total carbon obtained in the ultimate analysis of coke and % fixed carbon obtained in the proximate analysis is always

- (A) 1
- (B) < 1
- (C) > 1
- (D) Unpredictable

Answer: Option C

54. Caking index of the coal blend used for the manufacture of metallurgical coke should be around

- (A) 5
- (B) 21
- (C) 40
- (D) 48

Answer: Option B

55. Coalification means the

- (A) Process of conversion of lignite into anthracite
- (B) Underground gasification of coal
- (C) Complete combustion of coal
- (D) Direct hydrogenation of coal

Answer: Option A

56. Main constituent of the gas produced from a gobar gas plant is

- (A) CO_2
- (B) CH_4
- (C) H_2
- (D) CO

Answer: Option B

57. Washing of coal

- (A) Reduces its ash & sulphur content
- (B) Improves its coking properties
- (C) Increase the fusion point of its ash by removing chlorine compounds
- (D) All (A), (B) and (C)

Answer: Option D

58. Cannel coal and boghead coal are the examples of

- (A) Humic coals
- (B) Liptobiolites
- (C) Sapropelic coals
- (D) None of these

Answer: Option C

59. Bituminous coal

- (A) Ignites less easily than anthracite
- (B) Is generally coking
- (C) Burns with smoky yellow flame
- (D) Both (B) and (C)

Answer: Option D

60. Which of the following is not endothermic?

- (A) Cracking
- (B) Reforming
- (C) Gasification
- (D) Partial oxidation

Answer: Option D

61. Volumetric ratio of N_2 to O_2 in dry atmospheric air is

- (A) 0.21
- (B) 3.76
- (C) 4.76
- (D) 0.79

Answer: Option B

62. Gross calorific value will be equal to the net calorific value for

- (A) H_2
- (B) C_2H_2
- (C) CO
- (D) C_2H_6

Answer: Option C

63. _____ prohibits the use of alcohols directly in petrol engines.

- (A) Low octane number
- (B) High cost & availability
- (C) Low flash point
- (D) Low calorific value

Answer: Option B

64. Optimum preheating temperature for pitch creosote mixture (PCM) which is also termed as C.T.F-200, before atomisation through burners is

- (A) 200 °F
- (B) 200 °C
- (C) 200 °K
- (D) 200 °R

Answer: Option A

65. Highly reactive coke have lower

- (A) Porosity
- (B) Coke reactivity index (CRI)
- (C) Critical air blast (CAB) value
- (D) Both (B) and (C)

Answer: Option C

66. The average molecular weight of a flue gas having the composition by volume as CO₂ = 25%, O₂ = 25%, N₂ = 50% will be

- (A) 27.6
- (B) 23
- (C) 47.3
- (D) 42.9

Answer: Option B

67. Natural draught produced by a chimney depends upon the

- (A) Density of the chimney gases
- (B) Height of the chimney
- (C) Both (A) and (B)
- (D) Neither (A) nor (B)

Answer: Option C

68. The hottest part of the flame lies in its _____ zone.

- (A) Non-luminous
- (B) Luminous
- (C) Yellow
- (D) Unburnt gases

Answer: Option A

69. Width of the coke oven towards coke side is slightly more than that on pusher side to

- (A) Facilitate easy discharging of coke as it swells during carbonisation
- (B) Facilitate uniform heating of the oven
- (C) Increase the output of the coke
- (D) None of these

Answer: Option A

70. Highly caking coals

- (A) Produce weak coke
- (B) Produce strong coke
- (C) May damage the coke oven walls during carbonisation
- (D) Both (B) and (C)

Answer: Option D

71. Which of the following gaseous fuels has the highest net calorific value (kcal/Nm³)?

- (A) Producer gas
- (B) Carburetted water gas
- (C) Natural gas
- (D) Liquefied petroleum gas

Answer: Option D

72. Pick out the wrong statement.

- (A) Pulverised fuel can be completely burnt with less percentage of excess air compared to lump coal
- (B) Low grade coal can be used, but generally high volatile matter coals are more suitable for making pulverised fuel
- (C) Regulation of furnace temperature and atmosphere (oxidising or reducing) is easily possible with pulverised fuel firing

(D) None of these
Answer: Option D

73. Preheating of coal charge for the coke ovens reduces the

- (A) Time of carbonisation
 - (B) Yield of gas and tar
 - (C) Fuel consumption in coking
 - (D) All (A), (B) and (C)
- Answer: Option D

74. L.D. converter gas (produced in steel plant) comprises mainly of

- (A) CO (upto 65%) & CO₂
 - (B) CO₂ & H₂
 - (C) CO & O₂
 - (D) CO₂ & O₂
- Answer: Option A

75. Washing of coal does not reduce its

- (A) S & P content
 - (B) Heating value
 - (C) Fusion point of ash
 - (D) None of these
- Answer: Option D

76. A gaseous fuel in order to develop luminosity on burning, must contain

- (A) Carbon monoxide
 - (B) Hydrocarbons
 - (C) Hydrogen
 - (D) Oxygen
- Answer: Option B

77. Pure carbon is completely burnt in oxygen. The flue gas analysis is 70%CO₂, 20%CO and 10%O₂. The percent excess oxygen used is

- (A) 20
 - (B) 12.5
 - (C) 0
 - (D) 10
- Answer: Option C

78. The cuprous chloride used in orsat apparatus can absorb

- (A) Only CO
 - (B) Both CO and CO₂
 - (C) Both CO and O₂
 - (D) All CO, CO₂, and O₂
- Answer: Option D

79. Blast furnace gas constitutes mainly of

- (A) N₂ & CH₄
 - (B) N₂ & H₂
 - (C) N₂ & CO
 - (D) CH₄ & CO₂
- Answer: Option C

80. A good metallurgical coke

- (A) Should have high porosity
 - (B) Should be brittle
 - (C) Must contain moderate quantities of ash, moisture, sulphur and volatile matters
 - (D) Should have low fusion point of its ash
- Answer: Option A

81. Which of the following is a single stage, fixed bed high pressure coal gasification process?

- (A) Winkler process
- (B) Kopper-Totzek process
- (C) Lurgi Process
- (D) None of these

Answer: Option C

82. _____ has the widest inflammability limit (explosion limit) of all the gases.

- (A) Hydrogen
- (B) Carbon monoxide
- (C) Acetylene
- (D) Methane

Answer: Option C

83. In low temperature carbonisation of coal, the

- (A) Yield of coke oven gas is $290 \text{ Nm}^3/\text{ton}$ dry coal
- (B) Volatile matter in coke is zero
- (C) Temperature maintained is 700°C
- (D) Yield of tar is about 3% of dry coal

Answer: Option C

84. "Micum Index" of a coke is a measure of its

- (A) Reactivity
- (B) Porosity
- (C) Bulk density
- (D) Hardness & strength

Answer: Option D

85. Furnace oil consumption in a furnace for a given duty employing preheated combination air (at 300°) may be reduced by about _____ percent as compared to the use of atmospheric combustion air.

- (A) 5
- (B) 10
- (C) 20
- (D) 35

Answer: Option C

86. High excess air in combustion of fuels results in

- (A) Increased fuel consumption
- (B) Incomplete combustion
- (C) Smoky flame
- (D) None of these

Answer: Option A

87. Gray King Assay and Swelling Index of a coal is a measure of its

- (A) Swelling characteristics
- (B) Abradability
- (C) Agglutinating properties
- (D) Resistance to impact breakage

Answer: Option A

88. Very _____ coals are completely devoid of cokability i.e., it is non-coking.

- (A) Young
- (B) Mature
- (C) Both 'a' & 'b'
- (D) Neither 'a' nor 'b'

Answer: Option C

89. Coke made in narrower by-product coke ovens (as compared to wider ovens) is

- (A) Less reactive
- (B) Stronger
- (C) Smaller in size
- (D) All (A), (B) & (C)

Answer: Option D

90. Incomplete combustion of a fuel is characterised by the high _____ in the flue gas.

- (A) Smoke
- (B) Temperature
- (C) Oxygen
- (D) Carbon monoxide

Answer: Option D

91. _____ present in coal is not determined in its ultimate analysis.

- (A) Fixed carbon
- (B) Total carbon
- (C) Hydrogen
- (D) Nitrogen

Answer: Option A

92. Pitch creosote mixture (PCM) as compared to furnace oil is a better fuel, because its

- (A) Emissivity factor is higher
- (B) Sulphur content is lower
- (C) Flue gas has lower dew point thereby facilitating more waste heat recovery
- (D) All (A), (B) and (C)

Answer: Option D

93. Calorific value of

- (A) Light paraffinic fuel oils is equal to that of equivalent olefins
- (B) n-paraffin is lower than that of iso-paraffins of the same compounds
- (C) Light paraffinic fuel oils is higher than that of equivalent olefins
- (D) Light paraffinic fuel oils is lower than that of equivalent olefins

Answer: Option C

94. Which is the most matured coal?

- (A) Lignite
- (B) Bituminous
- (C) Semi-anthracite
- (D) Anthracite

Answer: Option D

95. Out of the following fuels, the difference between the net and gross calorific value is maximum in case of

- (A) Pitch
- (B) Fuel oil
- (C) Blast furnace gas
- (D) Bituminous coal

Answer: Option B

96. Percentage of carbon monoxide in blast furnace gas may be around

- (A) 8
- (B) 14
- (C) 22
- (D) 52

Answer: Option C

97. Compound coke ovens are those which can be heated by

- (A) Both steam and electrical power
- (B) Lean gas (e.g., B.F. gas)
- (C) Rich gas (e.g., coke oven gas)
- (D) Both (B) and (C)

Answer: Option D

98. Main use of hard coke produced by high temperature carbonisation is in the

- (A) Iron blast furnace
- (B) Cupola in foundries
- (C) Sinter making
- (D) Domestic ovens

Answer: Option A

99. Which of the following is coking?

- (A) Vitrain
- (B) Fussain
- (C) Both (A) & (B)
- (D) Neither (A) nor (B)

Answer: Option A

100. For every 10% increase in the excess air; the fuel consumption increases by _____ percent.

- (A) 0.1
- (B) 0.2
- (C) 0.5
- (D) 1.0

Answer: Option A

101. Main constituents of purified Lurgi gas are

- (A) H_2 , C_mH_n & CO_2
- (B) CO , H_2 & CH_4
- (C) CO_2 , O_2 & CO
- (D) N_2 , H_2 & CO_2

Answer: Option B

102. A coal gasifier operating at 20 atm. (e.g. Lurgi gasifier) as compared to one operating at atmospheric pressure (e.g. Kopper-Totzek or Winkler gasifier) will produce a gas having

- (A) Higher methane content and thus higher calorific value
- (B) Higher carbon monoxide content
- (C) Lower carbon dioxide content
- (D) None of these

Answer: Option A

103. Coke compared to the coal from which it has been made, contains

- (A) Less volatile matter
- (B) More carbon
- (C) Greater percentage of ash
- (D) All (A), (B) and (C)

Answer: Option D

104. "Overfire burning" in a furnace is a phenomenon characterised by the

- (A) Supply of excess fuel
- (B) Supply of excess air
- (C) Burning of carbon monoxide and other incombustibles in upper zone of furnace by supplying more air
- (D) None of these

Answer: Option C

105. Producer gas comprises mainly of

- (A) CO & N_2
- (B) CO & H_2
- (C) CO_2 & N_2
- (D) CO_2 & H_2

Answer: Option A

106. Which of the following fuels is the best for burning on chain grate stoker?

- (A) Non-caking coal
- (B) Caking coal
- (C) Coking coal
- (D) Pulverised coal

Answer: Option A

107. Net calorific value is the gross calorific value less the _____ heat of water in the product of combustion when cooled to 15°C.

- (A) Sensible
- (B) Latent
- (C) Sensible and latent
- (D) None of these

Answer: Option C

108. Pick out the correct statement.

- (A) Oxygen content decreases from lignite to bituminous coal as the coalification increases
- (B) The less the oxygen content, better is the coal, as it reduces the calorific value

- (C) With increase in oxygen content, moisture holding capacity of coal increases and the caking power decreases
(D) All (A), (B) and (C)
Answer: Option D

109. In flue gas analysis by Orsat's apparatus, carbon dioxide is absorbed by

- (A) Potassium hydroxide
(B) Dilute potassium carbonate
(C) Cuprous chloride
(D) Alkaline pyrogallol solution
Answer: Option A

110. Desirable "Micum Index" values of metallurgical coke are

- (A) $M_{40} > 78\%$ and $M_{10} < 10\%$
(B) $M_{40} > 4\%$ and $M_{10} < 80\%$
(C) $M_{40} > 10\%$ and $M_{10} < 78\%$
(D) $M_{40} > 98\%$ and $M_{10} < 2\%$
Answer: Option A

111. Fischer-Tropsch method aims at the

- (A) Gasification of coal
(B) Synthesis of gasoline (from water gas)
(C) Hydrogenation of coal to produce gasoline
(D) None of these
Answer: Option B

112. The main reason for making the copper calorimeter (used in bomb calorimeter) silvery white and shining/polished is to

- (A) Minimise its corrosion
(B) Avoid radiation heat loss
(C) Make it look attractive
(D) None of these
Answer: Option B

113. About _____ Nm^3 of air will be required for the complete combustion of 2Nm^3 of CO.

- (A) 2
(B) 3
(C) 4
(D) 5

Answer: Option D

114. Advantages of fluidised bed combustion are

- (A) Reduced NO_x formation in flue gas
(B) Lower furnace operating temperature
(C) High heat transfer rate
(D) All (A), (B) & (C)

Answer: Option D

115. Calorific value of coal middling generated in coal washeries during washing of coal may be around _____ Kcal/kg.

- (A) 1000
(B) 4000
(C) 6000
(D) 8000

Answer: Option B

116. Wood charcoal is obtained by the destructive distillation of wood. It is used in the production of activated carbon, which is not used for the

- (A) Decolourisation of sugar
(B) Solvent recovery from air and gases
(C) Absorption of gases and vapor
(D) Electrode manufacture

Answer: Option D

117. Pulverised coal used in boiler firing need not have

- (A) Less moisture content
- (B) High fusion point of its ash
- (C) High bulk density
- (D) Lower ash content

Answer: Option B

118. With increase in C/H ratio of a fuel, the amount of CO₂ formed on its complete combustion

- (A) Increases
- (B) Decreases
- (C) Remain same
- (D) Either (A) or (B), depends on other factors

Answer: Option A

119. Benzol is used

- (A) As a motor fuel blend
- (B) For producing benzene, toluene & xylene by its distillation
- (C) Both (A) & (B)
- (D) Neither (A) nor (B)

Answer: Option C

120. 'Fat coals' are those coals which have very high

- (A) Caking capacity
- (B) Volatile matter content
- (C) Fusion point of its ash
- (D) Inherent moisture content

Answer: Option A

121. Undercharging of coal in the by-product coke ovens results in

- (A) Decrease in the c.v. of coke oven gas
- (B) Increase in its throughput
- (C) Increase in the c.v. of coke oven gas
- (D) No change in the c.v. of coke oven gas

Answer: Option A

122. Dry air required to burn 1 kg of carbon completely may be around _____ kg.

- (A) 11
- (B) 2
- (C) 20
- (D) 38

Answer: Option A

123. Gobar gas is produced by the _____ of cow dung.

- (A) Fermentation
- (B) Oxidation
- (C) Hydrogenation
- (D) None of these

Answer: Option A

124. Catalyst used in Fischer-Tropsch process is

- (A) Nickel
- (B) Zinc oxide
- (C) Alumina
- (D) Thorium oxide

Answer: Option A

125. Hard pitch is used for making

- (A) Pulverised fuel
- (B) Perfumes
- (C) Insecticides
- (D) Plastics

Answer: Option A

126. Nitrogen present in the flue gas is determined in the Orsat apparatus by absorbing it in

- (A) KOH
- (B) Ammoniacal cuprous chloride

- (C) Pyrogallol solution
 - (D) None of these
- Answer: Option D

127. Main constituents of Benzol are

- (A) Benzene, toluene & xylene
 - (B) Tar & creosote
 - (C) Ammonia & phenol
 - (D) Anthracene & phenol
- Answer: Option A

128. Coal tar fuels (CTF) as compared to petroleum based fuel oils have higher

- (A) Calorific value
 - (B) Higher C/H ratio
 - (C) Sulphur content
 - (D) Difference in gross & net calorific value
- Answer: Option B

129. Adiabatic flame temperature of a fuel is dependent on the initial temperature of

- (A) Fuel
 - (B) Air
 - (C) Both (A) & (B)
 - (D) Neither (A) nor (B)
- Answer: Option C

130. With increase in the oxygen content of the coal, its _____ decreases.

- (A) Calorific value
 - (B) Caking power
 - (C) Both (A) & (B)
 - (D) Neither (A) nor (B)
- Answer: Option C

131. Stoichiometric combustion of 12 kg of carbon requires _____ of oxygen.

- (A) 1kg mole
 - (B) 22.4 Nm³
 - (C) 32 kg
 - (D) All (A), (B) and (C)
- Answer: Option D

132. The calorific value of 'LPG' (50% propane + 50% butane) is about _____ kcal/Nm³.

- (A) 5000
- (B) 25,000
- (C) 10,000
- (D) 15,000

Answer: Option B

133. Blast furnace gas is a very poisonous gas because of its predominantly high _____ content.

- (A) H₂O
- (B) CO₂
- (C) CO
- (D) CH₄

Answer: Option C

134. Fuel for a nuclear reactor (thermal) is

- (A) Uranium
 - (B) Plutonium
 - (C) Radium
 - (D) None of these
- Answer: Option A

135. The weathering index of a coal

- (A) Gives an idea of the fusion temperature of ash
- (B) Is related to its calorific value
- (C) Is a measure of its size stability, when stored & exposed to weather

(D) Is a measure of its caking tendency

Answer: Option C

136. Presence of free moisture in coal is most disadvantageous during

(A) Its pulverisation (as it requires more power)

(B) Combustion of fire slacks on the grates

(C) Handling (e.g. when emptying wagons)

(D) None of these

Answer: Option A

137. Which of the following coke has the least percentage of ash?

(A) Petroleum coke

(B) Beehive coke

(C) Foundry coke

(D) Metallurgical coke

Answer: Option A

138. The fuel ratio of a coal is

(A) The ratio of its percentage of fixed carbon to that of volatile matter

(B) Helpful in estimation of its rank

(C) Both (A) and (B)

(D) Neither (A) nor (B)

Answer: Option C

139. Steam is intermittently admitted into the fuel bed during the production of producer gas to

(A) Convert CO to CO₂

(B) Increase the combustion rate

(C) Increase the gas production rate

(D) Minimise the chances of clinker formation

Answer: Option D

140. Lurgi coal gasifier is a pressurised _____ bed reactor.

(A) Moving

(B) Fixed

(C) Fluidised

(D) Entrained

Answer: Option A

141. Height of coke oven is limited (say maximum upto 7 metres) mainly by the

(A) Problem of uniform heating along its height

(B) Structural strength of silica bricks

(C) Problem in door cleaning

(D) Buckling of ram of pusher car at the time of coke pushing

Answer: Option A

142. A travelling grate stoker is meant for the efficient burning of _____ coal.

(A) Caking

(B) Pulverised

(C) Non-caking

(D) High ash

Answer: Option C

143. Gas yield in the Kopper-Totzek coal gasifier is about _____ Nm³/ton coal (ash = 35%).

(A) 150

(B) 1500

(C) 3500

(D) 5000

Answer: Option B

144. Largest constituent of blast furnace gas is

(A) N₂

(B) CO

(C) CO₂

(D) H₂

Answer: Option A

145. Main use of soft coke is as _____ fuel.

- (A) Domestic
- (B) Blast furnace
- (C) Foundry
- (D) None of these

Answer: Option A

146. The bright glow of a combustion process is the characteristic of _____ temperature oxidation of coal.

- (A) Fast & high
- (B) Slow & low
- (C) Slow & high
- (D) Fast & slow

Answer: Option A

147. C/H ratio is the maximum in case of

- (A) Coal
- (B) Furnace oil
- (C) Natural gas
- (D) Naphtha

Answer: Option A

148. Pick out the wrong statement:

- (A) Carburetted water gas is also called blue gas
- (B) Coals are divided in four species according to their carbon content in Seylor's classification
- (C) Carbonisation time in a by-product coke oven is about 16 hours
- (D) Gross and net calorific value of a fuel is the same, if it does not contain hydrogen or hydrocarbons

Answer: Option A

149. Traces of tar fog present in the coke oven gas is removed by

- (A) Cyclone separator
- (B) Wet packed scrubber
- (C) Electrostatic precipitator
- (D) Washing with monoethanolamine

Answer: Option C

150. A coal that softens and fuses on heating is

- (A) Classified
- (B) Carbonised
- (C) Caking
- (D) Non-caking

Answer: Option C

151. In general, the limit of inflammability/explosion limit of fuel gases is widened by the

- (A) Increase in gas pressure
- (B) Increase in temperature (i.e. preheating)
- (C) Use of pure oxygen for combustion instead of air
- (D) All (A), (B) & (C)

Answer: Option D

152. During the carbonisation of coal

- (A) All tar is evolved at $< 600^{\circ}\text{C}$
- (B) Evolution of H_2 and formation of methane and aromatics occur at $> 700^{\circ}\text{C}$
- (C) Hard semi-coke starts shrinking at 600°C
- (D) All (A), (B) and (C)

Answer: Option D

153. With increase in moisture content of coal, its

- (A) Calorific value increases
- (B) Caking properties diminish
- (C) Swelling during carbonisation becomes excessive
- (D) None of these

Answer: Option B

154. Which of the following coal gasification processes will produce gas having maximum methane content?

- (A) Winkler process
- (B) Lurgi process
- (C) Kopper-Totzek process
- (D) All can produce same methane content

Answer: Option B

155. Coke oven gas burns with a yellowish flame, because of the presence of

- (A) CO_2
- (B) CH_4
- (C) H_2
- (D) NH_3

Answer: Option B

156. Gobar gas constitutes mainly of

- (A) CH_4 & CO_2
- (B) CO & CO_2
- (C) CH_4 & N_2
- (D) CO & N_2

Answer: Option A

157. Correct viscosity of furnace oil at the burner tip for proper atomisation is about 25 centistokes. To reduce the viscosity of high viscosity furnace oil (250 centistokes) to the correct atomisation viscosity (i.e. 25 cst), it should be preheated to about _____ °C.

- (A) 70
- (B) 85
- (C) 105
- (D) 145

Answer: Option C

158. While the first commercial low temperature coal carbonisation plant is located at Neyveli (in Chennai, India), the second such plant has been built at

- (A) Dankuni (West Bengal)
- (B) Dhanbad
- (C) Singreni (AP.)
- (D) Raniganj

Answer: Option A

159. Supply of excess air for complete combustion of fuel is necessitated to facilitate

- (A) Its thorough mixing with air
- (B) Attainment of chemical equilibrium
- (C) Attainment of high temperature
- (D) None of these

Answer: Option A

160. High temperature carbonisation of coal produces

- (A) Inferior coke compared to low temperature carbonisation
- (B) Less of gases compared to liquid products
- (C) Large quantity of tar compared to low temperature carbonisation
- (D) None of these

Answer: Option D

161. Combustion of pulverised coal compared to the lumpy coal

- (A) Provides better control of furnace temperature
- (B) Facilitates combustion with lower excess air
- (C) Provides higher thermal efficiency & flame temperature
- (D) All (A), (B) & (C)

Answer: Option D

162. Which of the following constituents of a fuel does not contribute to its calorific value on combustion?

- (A) Hydrogen

- (B) Sulphur
 - (C) Carbon
 - (D) None of these
- Answer: Option D

163. High rate of heating of coke ovens

- (A) May damage its walls due to abrupt excessive swelling of coal
 - (B) Produces larger size coke
 - (C) Increases the time of carbonisation
 - (D) None of these
- Answer: Option A

164. Benzene is used

- (A) As a motor fuel
 - (B) As an explosive
 - (C) For making insecticides (e.g., DDT, BHC etc.), detergent & rubber (SBR)
 - (D) As a perfume
- Answer: Option C

165. Low temperature oxidation of stored coal results in the

- (A) Decrease in its caking power & calorific value
 - (B) Decrease in its carbon & hydrogen content
 - (C) Increase in its oxygen content
 - (D) All (A), (B) and (A)
- Answer: Option D

166. Coke oven gas after passing through return electrostatic tar precipitator (RETP) is used for the

- (A) Hot scarfing of steel slabs
 - (B) Mixing with blast furnace gas
 - (C) Coke oven battery heating
 - (D) Steel ladle drying
- Answer: Option C

167. High sulphur content in a fuel _____ of the flue gases.

- (A) Decreases the dew point
 - (B) Increases the dew point
 - (C) Reduces the combustion efficiency by limiting the permissible temperature reduction
 - (D) Both (B) and (C)
- Answer: Option D

168. Water gas constitutes mainly of

- (A) CO & H₂
 - (B) CO & N₂
 - (C) CO₂ & H₂
 - (D) CH₄ & H₂
- Answer: Option A

169. Which of the following petrological constitutes is responsible for bright and lustrous black band of bituminous coal?

- (A) Vitrain
 - (B) Clarain
 - (C) Durain
 - (D) Fussain
- Answer: Option A

170. Efficient burning of anthracite coal requires

- (A) Low preheat of air
 - (B) Fine grinding
 - (C) High excess air
 - (D) All (A), (B) and (C)
- Answer: Option B

171. Which will have the least volatile matter and hence will be the most difficult to ignite?

- (A) Bituminous coal

- (B) Coke
 - (C) Semi-bituminous coal
 - (D) Anthracite
- Answer: Option B

172. Washing of coal is done to reduce the

- (A) Inherent impurities
 - (B) Adhering impurities
 - (C) Mineral matter
 - (D) Both (B) and (C)
- Answer: Option D

173. Number of macrocomponents present in coal according to Stopes are:

- (A) Four
 - (B) Five
 - (C) Six
 - (D) Two
- Answer: Option A

174. Too much of excess air in combustion results in high

- (A) Fuel consumption for the same heat load
 - (B) Stack gas temperature
 - (C) Percentage of oxygen in flue gases
 - (D) All (A), (B) and (C)
- Answer: Option D

175. Weathering of coal during storage causes

- (A) Reduction in coal size
 - (B) Increase in its friability
 - (C) Decrease in its caking capacity
 - (D) All (A), (B) and (C)
- Answer: Option D

176. Coking time in narrow by-product coke ovens is around _____ hours.

- (A) 18
 - (B) 48
 - (C) 8
 - (D) 80
- Answer: Option A

177. The main function of primary air in pulverised coal fired burner is to

- (A) Burn CO to CO₂
 - (B) Dry and transport the coal
 - (C) Have proper combustion by supplying it around the burner
 - (D) Preheat the tertiary air used for complete combustion of CO to CO₂
- Answer: Option B

178. Which of the following is a primary fuel?

- (A) Blast furnace coke
 - (B) Gasoline
 - (C) Natural gas
 - (D) Wood charcoal
- Answer: Option C

179. Which of the following has the highest calorific value (kcal/Nm³)?

- (A) Carburetted water gas
 - (B) Gobar gas
 - (C) Natural gas
 - (D) LPG
- Answer: Option D

180. Hard coke is manufactured from

- (A) Lignite
- (B) Bituminous coal
- (C) Semi-anthracite

(D) Anthracite
Answer: Option B

181. Blast furnace gas compared to coke oven gas has

- (A) Lower ignition temperature
 - (B) Narrower limit of inflammability
 - (C) Higher calorific value
 - (D) Lower theoretical flame temperature
- Answer: Option D

182. Coal tar (produced by high temperature carbonisation) is the main source of

- (A) Aromatic compounds
 - (B) Aliphatic compounds
 - (C) Paraffins
 - (D) Olefins
- Answer: Option A

183. Pick out the wrong statement.

- (A) Cokes of high reactivity are obtained from weakly coking coals
 - (B) Cokes of high reactivity are obtained from strongly coking coals
 - (C) Reactivity of coke is inversely proportional to its absolute density
 - (D) Abrasion index of the coke is a measure of its hardness
- Answer: Option B

184. Ionisation potential applied across the electrodes of electrostatic tar precipitator is around

- (A) 230 V AC
 - (B) 60 KV AC
 - (C) 230 V DC
 - (D) 60 KV DC
- Answer: Option D

185. Which of the following is a poisonous fuel gas?

- (A) Coke oven gas
 - (B) Blast furnace gas
 - (C) Natural gas
 - (D) None of these
- Answer: Option B

186. Kopper-Totzek coal gasifier (installed in a coal based nitrogenous fertiliser plant) employs a/an _____ bed gasifier.

- (A) Entrained
 - (B) Moving
 - (C) Fixed
 - (D) Fluidised
- Answer: Option A

187. Use of preheated air for combustion of fuel in the furnace, increases the

- (A) Scale losses of the furnace stock
 - (B) Calorific value of the fuel
 - (C) Flame temperature
 - (D) None of these
- Answer: Option C

188. A coal having high ratio of volatile matter to fixed carbon as compared to a coal having low ratio of volatile matter to fixed carbon

- (A) Is less liable to spontaneous combustion on storage
 - (B) Is more difficult to ignite and produces a shorter flame
 - (C) Requires smaller combustion space and less secondary air
 - (D) None of these
- Answer: Option D

189. Which of the following is unsuitable fuel for producer gas manufacture?

- (A) Coke
- (B) Anthracite
- (C) Coal having low fusion point of its ash

(D) Coal having high fusion point of its ash

Answer: Option C

190. The calorific value is the highest out of the following for

(A) Producer gas

(B) Water gas

(C) Coke oven gas

(D) Blast furnace gas

Answer: Option C

191. A coal having higher volatile matter content, has lower

(A) Smoking tendency on burning

(B) Coke oven gas yield on carbonisation

(C) Chance of catching fire during storage in open space

(D) Ignition temperature

Answer: Option D

192. Ash content in the coke produced from a coking coal having 20% ash may be around _____ percent.

(A) 6

(B) 12

(C) 18

(D) 24

Answer: Option D

193. Caking coal is desirable for

(A) Burning on travelling grate

(B) Coke making

(C) Burning on firebars

(D) All (A), (B) and (C)

Answer: Option B

194. The lowest temperature, at which a solid fuel produces enough vapors to support continuous combustion, is called

(A) Fire point

(B) Smoke point

(C) Burning temperature

(D) Kindling temperature

Answer: Option C

195. Coals used for the generation of producer gas should have

(A) High caking index

(B) Low fusion point of ash

(C) High volatile matter content

(D) Very low ash content (8-10%)

Answer: Option C

196. Stack (chimney) height in a big thermal power plant is dictated by the

(A) Pollution control aspect

(B) Draught to be created

(C) Limitation of constructional facilities

(D) None of these

Answer: Option B

197. Coke having higher porosity has

(A) Lower bulk density

(B) Lower strength

(C) Higher reactivity

(D) All (A), (B) and (C)

Answer: Option D

198. During coking of coal, the ash content (percentage)

(A) Increases

(B) Decreases

(C) Remain constant

(D) None of these
Answer: Option A

199. Out of the following, which is the most important parameter for the blast furnace grade coke?

- (A) CSR & CRI
 - (B) Ash content
 - (C) Moisture content
 - (D) Volatile matter content
- Answer: Option A

200. Percentage of nitrogen in blast furnace gas may be around

- (A) 5
 - (B) 25
 - (C) 55
 - (D) 80
- Answer: Option C

201. Artificial draught produced by a fan can be controlled by the

- (A) Speed of the fan
 - (B) Damper
 - (C) Variation in the pitch of the fan blades
 - (D) All (A), (B) and (C)
- Answer: Option D

202. In low temperature carbonisation of coal as compared to high temperature carbonisation _____ produced is less.

- (A) Difference in gross & net calorific value of the coke oven gas
 - (B) Free carbon content in tar
 - (C) Yield percentage of coke
 - (D) Yield of ammonia present in coke oven gas
- Answer: Option A

203. Which of the following will be unsuitable for dust cleaning from flue gas at 400°C from a pulverised coal fired boiler?

- (A) Multicyclones
 - (B) Bag filter
 - (C) Wet scrubber
 - (D) Hydrocyclones
- Answer: Option B

204. The pyrogallol solution used in Orsat apparatus can absorb

- (A) Only O₂
 - (B) Both O₂ and CO₂
 - (C) Both O₂ and CO
 - (D) All CO, CO₂, and O₂
- Answer: Option B

205. In low temperature carbonisation (as compared to high temperature carbonisation) of coal

- (A) Ammonia yield is more
 - (B) Aliphatic tar is produced
 - (C) Free carbon in tar is more
 - (D) All (A), (B) and (C)
- Answer: Option B

206. A fuel with high heat release rate will

- (A) Require smaller combustion chamber
 - (B) Have high calorific value
 - (C) Have high adiabatic flame temperature
 - (D) None of these
- Answer: Option A

207. Tar is a better fuel than furnace oil, because of its

- (A) Higher calorific value
- (B) Lower sulphur content

- (C) Higher emissivity (0.8-0.9) resulting in higher radiation heat transfer rate
(D) Both (A) and (B)
Answer: Option D

208. A certain thickness of the coal, if stored unscientifically on soft (katcha) ground having no metallic/concrete flooring gets sunked into the ground, which is termed as the 'carpet loss'. The carpet loss may be of the order of _____ cms.

- (A) 1 to 2
(B) 3 to 4
(C) 5 to 15
(D) 20 to 40

Answer: Option C

209. _____ is used as jet engine fuel.

- (A) Petrol
(B) Diesel
(C) Kerosene
(D) LPG

Answer: Option C

210. Bright coal

- (A) Contains more than 90% durain
(B) Contains more than 90% fuscain
(C) Contains mainly vitrain & clarain and is generally coking
(D) Is non-coking

Answer: Option C

211. Theoretical flame temperature of a fuel is that temperature which is attained, when the fuel is completely burnt 'using theoretical amount of air in

- (A) Air
(B) Oxygen
(C) Either (A) or (B)
(D) Either (A) or (B) without gain or loss of heat

Answer: Option D

212. Low temperature oxidation of coal resulting from bad storage conditions does not decrease its

- (A) Caking power
(B) Calorific value
(C) Hydrogen content
(D) Oxygen content

Answer: Option D

213. Low temperature oxidation of coal during storage does not decrease its

- (A) Oxygen content
(B) Caking power
(C) Calorific value
(D) None of these

Answer: Option D

214. High ash containing coke

- (A) Produces more slag when used in the blast furnace
(B) Has poor strength and abrasion resistance
(C) Is desirable in producer gas manufacture
(D) None of these

Answer: Option A

215. Calorific value of a typical dry anthracite coal may be around _____ Kcal/kg.

- (A) 1000
(B) 4000
(C) 8000
(D) 15000

Answer: Option C

216. Which of the following fuel gases will require maximum amount of air for combustion of 1 Nm³ gas?

- (A) Blast furnace gas
- (B) Natural gas
- (C) Producer gas
- (D) Water gas

Answer: Option B

217. The catalyst used in shift converter is

- (A) Nickel
- (B) Vanadium
- (C) Silica gel
- (D) Alumina

Answer: Option A

218. A coal with high _____ content, would ignite most easily.

- (A) Fixed carbon
- (B) Volatile matter
- (C) Ash
- (D) Oxygen

Answer: Option B

219. With increase in the temperature of carbonisation of coal

- (A) Hydrogen content of coke oven gas increases due to cracking of hydrocarbons
- (B) Methane content in the coke oven gas decreases and carbon monoxide content increases
- (C) Calorific value of the coke oven gas decreases due to cracking of hydrocarbons which is not compensated by increase in CO & H₂ content
- (D) All (A), (B) and (C)

Answer: Option D

220. Fuel combustion is never cent per cent efficient due to

- (A) Incomplete combustion
- (B) Dry gas/stack gas loss
- (C) Moisture loss
- (D) All (A), (B) and (C)

Answer: Option D

221. Volatile matter content in coking coal may be about _____ percent.

- (A) 1
- (B) 7
- (C) 22
- (D) 46

Answer: Option C

222. Pick out the wrong statement.

- (A) Percentage of ash in coke produced from medium coking coal is more than that in coal
- (B) The calorific value (kcal/Nm³) of coke oven gas reduces on removal of hydrogen from it by cryogenic method
- (C) Ash is normally removed as 'fly-ash' in Kopper-Totzek process of coal gasification
- (D) Coal based fertiliser plants in India at Talcher (Orissa) and Ramagundam (A.P) employ Kopper-Totzek process of coal gasification

Answer: Option C

223. The maximum adiabatic flame temperature is attained, when the fuel is burnt with

- (A) Theoretically required amount of air
- (B) More than theoretically required amount of air
- (C) Less than theoretically required amount of air
- (D) Theoretically required amount of oxygen

Answer: Option D

224. Degree of carbonisation of coal during coke making can be roughly judged by the _____ of the coke produced.

- (A) Colour
- (B) Moisture content
- (C) Ash content

(D) Volatile matter
Answer: Option D

225. Atomising steam to fuel oil ratio in a burner should be around

- (A) 0.5
- (B) 1.5
- (C) 2.5
- (D) 3.5

Answer: Option A

226. Insitu theory and drift theory are related to the

- (A) Origin of petroleum oil
- (B) Origin of coal
- (C) Coalification
- (D) Variation of coal quality with depth

Answer: Option B

227. Gobar gas is produced by the _____ of 'gobar' (cow dung).

- (A) Hydrolysis
- (B) Fermentation
- (C) Oxidation
- (D) Dehydration

Answer: Option B

228. Washing of coal

- (A) Reduces its sulphur and ash content
- (B) Controls its ash fusibility and increases its calorific value
- (C) Improves its coking properties
- (D) All (A), (B) and (C)

Answer: Option D

229. Percentage of methane in coke oven gas may be around

- (A) 5
- (B) 15
- (C) 25
- (D) 50

Answer: Option C

230. A good metallurgical coke should have very low

- (A) Sulphur & phosphorous content
- (B) Porosity
- (C) Fusion point of its ash
- (D) Hardness & strength

Answer: Option A

231. A carbonaceous fuel (containing no H₂ or hydrocarbons) is burnt and the resulting flue gas contains 21% CO₂. It means that

- (A) 21% excess air has been used for combustion
- (B) 21% excess oxygen has been used for combustion
- (C) Complete combustion of fuel has taken place
- (D) No excess air has been used for combustion

Answer: Option C

232. For which pair of the fuel gases, calorific value (C.V.) of one fuel is almost double that of the other on volume basis (i.e., kcal/Nm³), while the C.V. is same on weight basis (i.e., kcal/kg)?

- (A) Propane and acetylene
- (B) Propane and LPG
- (C) Sewage gas and gobar gas
- (D) B.F. gas and coke oven gas

Answer: Option A

233. Which of the following combustibles is absent in blast furnace gas?

- (A) H₂
- (B) CH₄
- (C) CO

(D) None of these
Answer: Option B

234. Ignition temperature decreases progressively from anthracite to lignite, because

- (A) Volatile matter content increases
- (B) Carbon content decreases
- (C) Moisture content increases
- (D) Ash content increases

Answer: Option A

235. Tolerable concentration of toxic carbon monoxide in atmospheric air is about _____ ppm.

- (A) 50
- (B) 1000
- (C) 5000
- (D) 10000

Answer: Option A

236. (64-132) rank coal (ASTM) means a coal with 64%

- (A) Fixed carbon and having a heat value of 13, 200 BTU/lb
- (B) Ash and a heating value of 13, 200 BTU/lb
- (C) Fixed carbon and a heating value of 132 BTU/lb
- (D) None of these

Answer: Option A

237. Higher fuel combustion efficiency cannot be achieved by

- (A) Preheating of fuel gases & combustion air
- (B) Reducing sulphur content in the fuel
- (C) Adopting proper fuel firing technique & fuel preparation
- (D) Supplying correct amount of combustion air

Answer: Option B

238. The most matured coal out of the following is

- (A) Lignite
- (B) Semi-anthracite
- (C) Sub-bituminous
- (D) Bituminous

Answer: Option B

239. A sample of natural gas containing 80% methane (CH₄) and rest nitrogen (N₂) is burnt with 20% excess air. With 80% of the combustibles producing CO₂ and the remainder going to CO, the Orsat analysis in volume percent is

- (A) CO₂ : 6.26, CO : 1.56, O₂ : 3.91, H₂O : 15.66, N₂ : 72.60
- (B) CO₂ : 7.42, CO : 1.86, O₂ : 4.64, N₂ : 86.02
- (C) CO₂ : 6.39, CO : 1.60, O₂ : 3.99, H₂O : 25.96, N₂ : 72.06
- (D) CO₂ : 7.60, CO : 1.90, O₂ : 4.75, N₂ : 85.74

Answer: Option B

240. Calorific value of both the solid & liquid fuels can be determined by using _____ calorimeter.

- (A) Junker's
- (B) Bomb
- (C) Boy's
- (D) None of these

Answer: Option B

241. Softening temperature of coal ash is a measure of the _____ of coal.

- (A) Caking tendency
- (B) Coking tendency
- (C) Clinkering tendency
- (D) Size stability

Answer: Option C

242. The advantage of firing pulverised coal in the furnace lies in the fact, that it

- (A) Permits the use of high ash content coal

- (B) Permits the use of low fusion point ash coal
 - (C) Accelerates the burning rate and economises on fuel combustion
 - (D) All (A), (B) and (C)
- Answer: Option C

243. Calorific value of coke oven gas produced by low temperature carbonisation of coal is about _____ Kcal/Nm³.

- (A) 4000
- (B) 2500
- (C) 6500
- (D) 10000

Answer: Option C

244. Function of secondary air in pulverised coal firing is to

- (A) Transport the coal to the burner
- (B) Dry the coal
- (C) Ensure efficient burning of coal around the burner
- (D) Reduce primary air requirement

Answer: Option C

245. During combustion of coal on grate, clinker formation is increased by the

- (A) Use of thick fire bed
- (B) Low fusion point of ash (< 1100° C)
- (C) Use of preheated primary air
- (D) All (A), (B) & (C)

Answer: Option D

246. A coal having higher volatile matter content will necessarily have lower

- (A) Ash fusion temperature
- (B) Calorific value
- (C) Ignition temperature
- (D) Caking index

Answer: Option C

247. Short/intense flame is produced during combustion of gaseous fuel by using

- (A) High amount/current of combustion air
- (B) Low amount/current of combustion air
- (C) Preheated secondary air
- (D) Very little excess air

Answer: Option A

248. High sulphur (4-6%) coal in India are found in

- (A) Assam
- (B) Andhra Pradesh
- (C) Bengal
- (D) Madhya Pradesh

Answer: Option A

249. The calorific value of producer gas is around _____ kcal/Nm³.

- (A) 1300
- (B) 500
- (C) 4500
- (D) 9000

Answer: Option A

250. Heat penetration rate in narrow coke ovens in high temperature carbonisation of coal is around _____ cm/hr.

- (A) 2.5
- (B) 0.5
- (C) 10
- (D) 20

Answer: Option A

251. Which is the heaviest fuel gas out of the following?

- (A) Blast furnace gas

- (B) Coke oven gas
 - (C) Water gas
 - (D) Carburetted water gas
- Answer: Option A

252. Low temperature carbonisation of coal produces

- (A) Metallurgical coke
 - (B) Soft coke
 - (C) Very low calorific value coke oven gas
 - (D) No by-products
- Answer: Option B

253. Presence of phosphorous in metallurgical coal

- (A) Is not undesirable
 - (B) Reduces its calorific value
 - (C) Badly affects the quality of steel
 - (D) Increases its caking power
- Answer: Option C

254. For the case of a fuel gas undergoing combustion with air, if the air/fuel ratio is increased, the adiabatic flame temperature will

- (A) Increase
 - (B) Decrease
 - (C) Increase or decrease depending on the fuel type
 - (D) Not change
- Answer: Option B

255. The reaction, $C + CO_2 \leftrightarrow 2CO$, taking place during coal gasification is called the _____ reaction.

- (A) Neumann reversal
 - (B) Shift conversion
 - (C) Boudouard
 - (D) Reduction
- Answer: Option C

256. Blast furnace coke is made from coal by

- (A) Low temperature carbonisation
 - (B) High temperature carbonisation
 - (C) Medium temperature carbonisation
 - (D) Heating the coal in an oven in presence of air
- Answer: Option B

257. Which of the following petrographic constituents of coal is non-coking?

- (A) Vitrain
 - (B) Clarain
 - (C) Durain
 - (D) Fussain
- Answer: Option D

258. In flue gas analysis by Orsat's apparatus, oxygen is absorbed by

- (A) Potassium hydroxide
 - (B) Cuprous chloride
 - (C) Alkaline pyrogallol solution
 - (D) None of these
- Answer: Option C

259. Power alcohol as compared to straight run gasoline has lower

- (A) Calorific value
 - (B) Octane number
 - (C) Specific gravity
 - (D) Viscosity
- Answer: Option A

260. Dry air requirement for burning 1 Nm^3 of CO to CO_2 may be around _____ Nm^3 .

- (A) 2.4

- (B) 1.75
- (C) 0.87
- (D) 11.4

Answer: Option A

261. Abrasion index of blast furnace coke should be around _____ percent.

- (A) 20
- (B) 35
- (C) 55
- (D) 80

Answer: Option D

262. Naphthalene is used for making

- (A) Insecticides (e.g. moth balls)
- (B) Unsaturated polyesters
- (C) Drug intermediates e.g. β -naphthol
- (D) All (A), (B) and (C)

Answer: Option D

263. Pick out the wrong statement.

- (A) Main constituents of LPG are propane and butane
- (B) C.V. of natural gas is about 10000 KCal/Nm³
- (C) C.V. of LPG is about 26000 kcal/Nm³ (11500 kcal/kg)
- (D) L.P.G. is lighter than air

Answer: Option D

264. Which of the following accounts for maximum energy loss in a boiler?

- (A) Flue gases
- (B) Ash content in the fuel
- (C) Incomplete combustion
- (D) Unburnt carbon in flue gases

Answer: Option A

265. The calorific value of L.D. converter gas is about _____ Kcal/Nm³.

- (A) 1800
- (B) 800
- (C) 4500
- (D) 10000

Answer: Option A

266. Of the total tar present in raw coke oven gas, the tar recovered in primary cooler is about _____ percent.

- (A) 5
- (B) 25
- (C) 55
- (D) 75

Answer: Option B

267. Which of the following has the highest heat of combustion?

- (A) H₂
- (B) CO
- (C) CH₄
- (D) C₂H₆

Answer: Option D

268. Anthracite can be used for

- (A) Recarbonising steel
- (B) Making carbon electrodes
- (C) Blending with highly coking coal to check its swelling which helps in saving coke even walls from damage and to produce high strength coke
- (D) All (A), (B) and (C)

Answer: Option D

269. Initial pressure of oxygen introduced into the 'bomb' of the bomb calorimeter for determination of calorific value of coal/fuel oil may be around _____ atm.

- (A) 3-5
- (B) 25-30
- (C) 60-65
- (D) 95-100

Answer: Option B

270. Pick out the wrong statement.

- (A) Indian coals on an average contain 25-30% ash as against 10-12% ash in imported coking coal
- (B) Ammonia is recovered in the form of ammonium sulphate in direct process of by-product recovery
- (C) A high swelling index number of coking coal indicates poor caking properties of coal
- (D) Wash oil is used for scrubbing Benzol from coke oven gas

Answer: Option C

271. Flue gas obtained on complete combustion of pure acetylene (a hydrocarbon fuel) will contain

- (A) CO
- (B) CO₂
- (C) H₂O
- (D) Both (B) & (C)

Answer: Option D

272. Froth floatation is used for

- (A) Washing fine coal dust (< 0.5 mm size)
- (B) Washing lump coal (> 80 mm size)
- (C) Removing ash from the coal based on difference in specific gravity of coal and ash
- (D) All (A), (B) and (C)

Answer: Option A

273. Which of the following has the highest calorific value?

- (A) Lignite
- (B) Sub-bituminous coal
- (C) Anthracite
- (D) Peat

Answer: Option C

274. Main constituent of natural gas is

- (A) CH₄ (upto 90%)
- (B) C₂H₆
- (C) C₃H₈
- (D) H₂

Answer: Option A

275. Octane number of 2, 2, 4 - trimethyl pentane is

- (A) 0
- (B) 100
- (C) In between 0 and 100
- (D) More than 100

Answer: Option B

276. Which of the following fertilisers is produced in the by-products recovery (from coke oven gas) plant attached to an integrated steel plant?

- (A) Ammonium sulphate
- (B) Ammonium nitrate
- (C) Ammonium phosphate
- (D) None of these

Answer: Option A

277. 'Fat' coal means a coal having

- (A) Low calorific value
- (B) High volatile matter
- (C) Low ash content
- (D) Non smoking tendency

Answer: Option B

278. A liquid/gaseous fuel containing hydrocarbons and high amount of sulphur is burnt with 40% excess air. The flue gas still contains large amount of carbon monoxide. This may be due to the

- (A) Presence of large quantity of hydrogen in the fuel
- (B) Low calorific value of the fuel
- (C) High sulphur content in the fuel
- (D) Lack of thorough mixing of fuel with air

Answer: Option D

279. Naphthalene is removed from coke oven gas by

- (A) Scrubbing with wash oil (a petroleum product)
- (B) Adsorbing on bog iron bed
- (C) Absorbing in vetro-coke solution
- (D) None of these

Answer: Option A

280. (64-132) rank coal (ASTM) means a coal with 64%

- (A) Fixed carbon and having a heating value around 13, 200 BTU/1b
- (B) Ash and heating value around 13, 200 BTU/1b
- (C) Fixed carbon and heating value around 132 BTU/1b
- (D) None of these

Answer: Option A

281. Tar yield in the low temperature and high temperature carbonisation of dry coal may be respectively _____ percent.

- (A) 3 & 10
- (B) 10 & 3
- (C) 10 & 20
- (D) 15 & 8

Answer: Option B

282. With increases in carbonisation temperature

- (A) Coke even gas yield increases
- (B) Tar yield increases
- (C) Hydrogen percentage in the coke oven gas decreases
- (D) Methane percentage in the coke oven gas increases

Answer: Option A

283. Hardgrove Grindability index of four coal samples are given below. Which of them is the easiest to grind?

- (A) 50
- (B) 70
- (C) 85
- (D) 100

Answer: Option D

284. Which of the following is a rich fuel gas?

- (A) Producer gas
- (B) Coal gas from underground gasification of coal
- (C) Refinery gases
- (D) None of these

Answer: Option C

285. Yield of pitch from distillation of high temperature tar is around _____ percent.

- (A) 10
- (B) 25
- (C) 65
- (D) 90

Answer: Option C

286. Emission of dense white smoke out of the chimney of a thermal power plant is an indication of the use of

- (A) Less air for combustion
- (B) Correct amount of air for combustion
- (C) Too much air for combustion

(D) Pulverised coal in boilers
Answer: Option C

287. The maximum percentage of CO₂ in a flue gas (from a carbonaceous fuel) can be

- (A) 21
- (B) 77
- (C) 79
- (D) 29

Answer: Option A

288. Yield of blast furnace gas is about _____ Nm³ /ton of pig iron.

- (A) 300
- (B) 2000
- (C) 5000
- (D) 10000

Answer: Option B

289. Proximate analysis of coal determines its _____ content.

- (A) Moisture, ash, sulphur & volatile matter
- (B) Moisture, volatile matter, ash & fixed carbon
- (C) Moisture, sulphur, nitrogen & fixed carbon
- (D) None of these

Answer: Option B

290. Lurgi gasifier (high pressure gasifier) as compared to Kopper Totzek gasifier (atmospheric pressure gasifier) produces

- (A) Higher amount of methane
- (B) Lower amount of hydrogen
- (C) Both (A) and (B)
- (D) Higher amount of both methane and hydrogen

Answer: Option C

291. The cooling medium used in dry quenching of coke is

- (A) Nitrogen
- (B) Air
- (C) Phenolic water
- (D) Carbon dioxide

Answer: Option A

292. Coal is heated in absence of air for 7 minutes at a temperature of about _____ °C, during its volatile matter determination for proximate analysis.

- (A) 550
- (B) 750
- (C) 950
- (D) 1150

Answer: Option C

293. Fuel consumption in coke making can be reduced by

- (A) Preheating, blending and de-ashing the coal
- (B) Stamped charging of coal
- (C) Dry quenching of coke
- (D) All (A), (B) and (C)

Answer: Option D

294. Moisture loss is determined by the

- (A) Humidity of combustion air
- (B) Moisture content of fuel
- (C) Both (A) and (B)
- (D) The water formed by combustion reaction

Answer: Option C

295. Shatter index of the coke is a measure of its

- (A) Strength
- (B) Bulk density
- (C) Reactivity

(D) None of these
Answer: Option A

296. High ash coals

- (A) Are soft & friable (poor strength and size stability)
 - (B) Require longer time of carbonisation as ash offers resistance to heat transfer
 - (C) Produce larger quantity of coke oven gas
 - (D) None of these
- Answer: Option B

297. Orsat apparatus

- (A) Gives flue gas analysis on dry basis
 - (B) Determines N_2 in flue gas indirectly
 - (C) Can't determine CO in flue gas, if it is $< 0.2\%$
 - (D) All (A), (B) & (C)
- Answer: Option D

298. Presence of free moisture in coal is most disadvantageous during its

- (A) Transportation and handling
 - (B) Washing
 - (C) Pulverisation
 - (D) Storage
- Answer: Option C

299. Calorific value of tar is about _____ Kcal/kg.

- (A) 8800
 - (B) 12000
 - (C) 14000
 - (D) 16000
- Answer: Option A

300. If CO_2 is not fully absorbed by the KOH solution meant for its absorption in the orsat apparatus, it will appear as

- (A) O_2
 - (B) CO
 - (C) N_2
 - (D) SO_2
- Answer: Option D

301. With increase in moisture content of coal, its

- (A) Calorific value increases sometimes
 - (B) Bulk density always decreases
 - (C) Clinkering tendency during combustion increases
 - (D) None of these
- Answer: Option D

302. With increase in the time of carbonisation at a particular temperature (say $1000^\circ C$), the _____ percentage in coke oven gas increases.

- (A) Hydrogen
 - (B) Methane
 - (C) Unsaturated hydrocarbons
 - (D) All (A), (B) and (C)
- Answer: Option A

303. Which of the following has the highest gross calorific value?

- (A) Blast furnace gas
 - (B) Coke oven gas
 - (C) Carburetted water gas
 - (D) Oil refinery gas
- Answer: Option D

304. Preheating of _____ the flame temperature.

- (A) The gaseous fuel before combustion decreases
- (B) Combustion air decreases
- (C) Either the fuel or the air or both, increases

(D) Either the fuel or the air does not affect
Answer: Option C

305. Which of the following is not a 'manufactured' fuel?

- (A) LPG
 - (B) Coal briquettes
 - (C) Tar
 - (D) Colloidal fuels
- Answer: Option C

306. As the C/H ratio of the fuel increases, the amount of CO₂ formed on combustion _____ for the same percentage of excess air.

- (A) Decreases
 - (B) Increases
 - (C) Remain same
 - (D) May increase or decrease depending on the type of fuel
- Answer: Option B

307. Purity of coke means that, it is high in carbon and low in

- (A) Volatiles
 - (B) Ash
 - (C) Iron
 - (D) Moisture
- Answer: Option A

308. Low temperature oxidation of coal is accelerated by the

- (A) Storage in large heaps
 - (B) Storage in compressed piles
 - (C) Absence of porous or friable particles
 - (D) All (A), (B) and (C)
- Answer: Option A

309. Coke oven gas produced by high temperature carbonisation of coal (as compared to that produced by low temperature carbonisation), has

- (A) Higher calorific value
 - (B) Lower hydrogen content
 - (C) Both (A) and (B)
 - (D) Neither (A) nor (B)
- Answer: Option D

310. Which of the following is a measure of the agglutinating (i.e., binding) property of coal?

- (A) Thickness of plastic layer
 - (B) Caking index
 - (C) Swelling index
 - (D) Gray-king index
- Answer: Option B

311. Natural draft created by the chimney depends upon

- (A) Temperature of the flue gas
 - (B) Its height
 - (C) Both (A) & (B)
 - (D) Neither (A) nor (B)
- Answer: Option C

312. By-products recovery process from coal carbonisation is termed as direct, indirect and semi direct process depending upon the method of recovery of

- (A) Tar
 - (B) Benzol
 - (C) Ammonia
 - (D) None of these
- Answer: Option C

313. Coke oven gas constitutes mainly of

- (A) H₂ & CO
- (B) H₂ & CH₄

- (C) CH₄ & CO
 - (D) H₂ & CO₂
- Answer: Option B

314. Shatter index of metallurgical coke on 2 inches and 0.5 inch screen should be respectively around _____ percent.

- (A) 80 and 97
- (B) 95 and 100
- (C) 40 and 70
- (D) 25 and 97

Answer: Option A

315. Presence of nitrogen in combustion air does not reduce the

- (A) Amount of heat liberated
- (B) Flame temperature
- (C) Flue gas temperature
- (D) Any of the above

Answer: Option A

316. A good quality coal should have

- (A) Low fusion point of ash
- (B) High ash content
- (C) High sulphur
- (D) None of these

Answer: Option D

317. Coke oven gas is stripped of its H₂S and mercaptans content by

- (A) Absorption in wash oil
- (B) Adsorption on bog iron bed
- (C) Bubbling it through dilute sulphuric acid
- (D) Adsorption on silica gel

Answer: Option B

318. Out of the following fuels, the difference between gross and net calorific value will be minimum in case of

- (A) Coke oven gas
- (B) Water gas
- (C) Natural gas
- (D) Blast furnace gas

Answer: Option D

319. For long flame and easy ignition, the coal used should have

- (A) High volatile matter
- (B) Low ash
- (C) High calorific value
- (D) High ash

Answer: Option A

320. When the coal is heated in absence of air, it is called its

- (A) Deoxidation
- (B) Gasification
- (C) Coalification
- (D) Carbonisation

Answer: Option D

321. Quantity of coke oven gas produced by high temperature carbonisation of one ton of dry coal may be around _____ Nm³.

- (A) 30
- (B) 300
- (C) 3,000
- (D) 30,000

Answer: Option B

322. High temperature carbonisation of coal takes place at _____ °C.

- (A) 2000

- (B) 600
- (C) 1100
- (D) 1600

Answer: Option C

323. The gasification reaction represented by, $C + H_2O = CO + H_2$, is

- (A) Exothermic
- (B) Endothermic
- (C) Catalytic
- (D) Autocatalytic

Answer: Option B

324. With increase in C/H ratio of a fuel, the dew point of flue gases

- (A) Increases
- (B) Decreases
- (C) Remain same
- (D) May increase or decrease; depends on the type of fuel

Answer: Option B

325. The calorific value of a gas of composition $CO_2 = 20\%$, $H_2 = 50\%$, $CH_4 = 30\%$, is y . If the composition of gas is changed to $H_2 = 50\%$, $CH_4 = 30\%$, $CO_2 = 10\%$, $N_2 = 10\%$, then the calorific value will be

- (A) y
- (B) $0.95 y$
- (C) $1.05 y$
- (D) $1.8 y$

Answer: Option A

326. Coking time in a commercial high temperature coal carbonisation plant is about _____ hours.

- (A) 6
- (B) 18
- (C) 28
- (D) 36

Answer: Option B

327. C/H ratio is the minimum in case of

- (A) Furnace oil
- (B) Natural gas
- (C) Coal
- (D) Naphtha

Answer: Option B

328. Which of the following would require maximum amount of % excess air for complete combustion?

- (A) Coke oven gas
- (B) Furnace oil
- (C) Pulverised coal
- (D) Lump coal (fixed on chain grate)

Answer: Option D

329. Which of the following is the most important deterrents to an extended use of pulverised coal in boiler firing?

- (A) Ash disposal problem
- (B) Excessive fly-ash discharge from the stack
- (C) High power consumption in its transportation
- (D) Erosion of induced draft fan blades

Answer: Option A

330. Which of the following is not a micro component present in coal?

- (A) Micrinite
- (B) Clarain
- (C) Fusinite
- (D) Liptinite

Answer: Option B

331. Which of the following will generate maximum volume of product of complete combustion (Nm^3/Nm^3 of fuel)?

- (A) Carburetted water gas
- (B) Blast furnace gas
- (C) Natural gas
- (D) Producers' gas

Answer: Option C

332. Coke oven gas is a better fuel than blast furnace gas, because of its higher

- (A) Calorific value, cleanliness and relatively low distribution cost (due to its low specific gravity)
- (B) Adiabatic flame temperature
- (C) Heat release rate (thus requiring smaller combustion chamber)
- (D) All (A), (B) and (C)

Answer: Option D

333. Which of the following has the highest theoretical flame temperature?

- (A) Blast furnace gas
- (B) Hydrogen
- (C) Acetylene
- (D) Coke oven gas

Answer: Option C

334. A coal containing high amount of volatile matter will have

- (A) Low ignition temperature
- (B) Very little ash content
- (C) High fusion point of its ash
- (D) Low adiabatic flame temperature

Answer: Option A

335. Which of the following has the highest flame velocity?

- (A) H_2
- (B) CO
- (C) CH_4
- (D) C_2H_6

Answer: Option A

336. High amount of sulphur and phosphorous in coke causes

- (A) Decrease in its calorific value
- (B) Increase in its strength
- (C) Brittleness of steel made by using it
- (D) None of these

Answer: Option C

337. In Lurgi coal gasifier,

- (A) Coking coals cannot be used
- (B) Low carbon conversion efficiency is achieved
- (C) Entrainment of solids is higher
- (D) Larger quantity of coal can be processed

Answer: Option D

338. The calorific value of natural gas is about _____ kcal/Nm^3 .

- (A) 10,000
- (B) 2,500
- (C) 25,000
- (D) 35,000

Answer: Option A

339. Cannel coal

- (A) Is non-coking
- (B) Has a high volatile matter content and burns with a luminous smoky flame
- (C) Is a non-banded coal which can be ignited easily with a match stick or candle flame, hence is so named

(D) All (A), (B) and (C)
Answer: Option D

340. Fusion point of coal ash generally varies from 1000 to 1700° C. Ash having fusion point less than _____ °C is liable to form clinker.

- (A) 1100
- (B) 1250
- (C) 1350
- (D) 1400

Answer: Option A

341. Which of the following is not a by-product fuel?

- (A) Pitch
- (B) Blast furnace gas
- (C) Petrol
- (D) Refinery gas

Answer: Option C

342. Which of the following fuels has the highest calorific value per unit mass (kcal/kg)?

- (A) Coal
- (B) Kerosene
- (C) Natural gas
- (D) Furnace oil

Answer: Option D

343. Which of the following fuel gases is heavier than air?

- (A) Blast furnace gas
- (B) Coke oven gas
- (C) Natural gas
- (D) Water gas

Answer: Option A

344. Which adsorbent is used for removing sulphur compounds (S Q, H₂S, RSH etc.) removal from coke oven gas in by-products recovery plant?

- (A) Silica gel
- (B) Diatomaceous earth
- (C) Basalt
- (D) Bog iron (i.e., moist ferric hydroxide)

Answer: Option D

345. Use of pulverised coal in boiler furnace provides

- (A) High calorific value
- (B) Better combustion
- (C) Smokeless burning
- (D) Less erosion on furnace walls

Answer: Option B

346. Calorific value as determined by bomb calorimeter is the

- (A) Higher calorific value at constant volume
- (B) Gross calorific value at constant pressure
- (C) Lower calorific value at constant pressure
- (D) Net calorific value at constant volume

Answer: Option A

347. High pressure coal gasification is employed in _____ process.

- (A) Lurgi
- (B) Kopper-Totzek
- (C) Winkler
- (D) None of these

Answer: Option A

348. Calorific value of gobar gas (containing CH₄ = 60% , H₂ = 10% ; CO₂ = 30%) may be about _____ Kcal/Nm³.

- (A) 1,800
- (B) 3,200
- (C) 5,400
- (D) 10,200

Answer: Option C

349. Lignite is

- (A) A high rank coal
- (B) A coking coal
- (C) Can be used for gasification and steam generation
- (D) A black banded coal which burns with a non-smoky yellowish flame

Answer: Option C

350. Which of the following reactions occurring during coal gasification is called the Neumann reversal reaction?

- (A) $2\text{CO} \leftrightarrow \text{C} + \text{CO}_2$
- (B) $\text{CO} + \text{H}_2\text{O} \leftrightarrow \text{CO}_2 + \text{H}_2$
- (C) $\text{C} + \text{H}_2\text{O} \leftrightarrow \text{CO} + \text{H}_2$
- (D) $\text{C} + 2\text{H}_2\text{O} \leftrightarrow \text{CO}_2 + 2\text{H}_2$

Answer: Option A

351. The internal energy of the combustion products is _____ compared to that of reactants.

- (A) More
- (B) Less
- (C) Equal
- (D) More or less; (depends on the state of fuel.)

Answer: Option B

352. Coke oven gas compared to blast furnace gas is

- (A) More explosive and inflammable
- (B) Less poisonous
- (C) Lighter
- (D) All (A), (B) and (C)

Answer: Option D

353. Gross heating value of coal is _____ the net heating value.

- (A) Higher than
- (B) Lower than
- (C) Same as
- (D) None of these

Answer: Option A

354. Which of the following gaseous fuels is likely to have the highest gross calorific value?

- (A) Sewage gas
- (B) LPG
- (C) Producer gas
- (D) Natural gas

Answer: Option B

355. In high temperature carbonisation (as compared to low temperature carbonisation) of coal

- (A) Coke oven gas yield is more
- (B) Tar yield is less but free carbon in tar is more
- (C) Calorific value of coke oven gas is less
- (D) All (A), (B) and (C)

Answer: Option D

356. Pick out the wrong statement.

- (A) LPG is also used as fuel for automobiles & small furnaces and for cutting & welding of metals
- (B) The minimum temperature, at which a petroleum oil vapor catches fire and continues to burn, is called its flash point
- (C) Each ton of petroleum oil on distillation produces about 30-50 Nm³ of gas
- (D) Maximum yield of naphthalene is obtained on distillation of crude oil

Answer: Option B

357. The difference between total carbon and fixed carbon of coal will be minimum in case of

- (A) Lignite
- (B) Bituminous coal

- (C) Anthracite
 - (D) High temperature coke ($V.M < 0.5\%$)
- Answer: Option D

358. Mineral matter content (M) and ash content (A) in coal are approximately related as

- (A) $M = 1.1A$
- (B) $M = A$
- (C) $M = 1.5A$
- (D) $M = 2A$

Answer: Option A

359. Increase in ash content of blast furnace coke

- (A) Reduces its consumption in the furnace
- (B) Increases its consumption in the furnace
- (C) Does not affect its consumption in the furnace
- (D) Decreases its hardness and abrasion resistance

Answer: Option B

360. Preheating of a gaseous fuel results in increased

- (A) Flame length
- (B) Flame temperature
- (C) Quantity of flue gas
- (D) Ignition temperature

Answer: Option B

361. Which of the following accentuates clinkering trouble on furnace grate burning coal?

- (A) Low reactivity of carbonised residue containing high proportions of iron & sulphur
- (B) Low forced draught and fuel bed temperature
- (C) Thick fire bed and preheated primary air
- (D) All (A), (B) and (C)

Answer: Option D

362. Efficiency of the combustion of a fuel is judged by the _____ the flue gas.

- (A) % of CO_2 in
- (B) % of O_2 in
- (C) Temperature of
- (D) Colour of

Answer: Option B

363. Gross heating value of coal is _____ the net heating value.

- (A) Higher than
- (B) Lower than
- (C) Same as
- (D) Either (A) or (B); depends on the type of coal

Answer: Option A

364. Which of the following is not applicable to fluidised bed combustion of coal?

- (A) It cannot burn low grade coal
- (B) It achieves higher fuel combustion efficiency
- (C) Less heat transfer surface area is required in boilers
- (D) None of these

Answer: Option A

365. Which of the following is the most poisonous gas?

- (A) Coke oven gas
- (B) Producer gas
- (C) Blast furnace gas
- (D) L.D. converter gas

Answer: Option D

366. A coal with high ash content is undesirable, as

- (A) It is abrasive to the coal pulveriser (i.e. ball mill) and the combustion chamber
- (B) The ash in molten condition gets absorbed in the pores of the refractory lining of the furnace and causes its spalling due to different co-efficient of expansion/contraction of the refractory and the ash

(C) The ash retains the sulphur & phosphorus and thus affects the quality of products in metallurgical furnace apart from increasing the slag volume. Besides, it may fuse and stick to the boiler tubes thereby reducing the heat transfer

(D) All (A), (B) and (C)

Answer: Option D

367. With increase in calorific value of fuels, their adiabatic flame temperatures

(A) Increase

(B) Decrease

(C) Remain unchanged

(D) May increase or decrease; depends on the quantity of products of combustion

Answer: Option D

368. Percentage of hydrogen in coke oven gas may be around

(A) 10

(B) 25

(C) 45

(D) 60

Answer: Option D

369. Low temperature carbonisation of coal takes place at _____ °C.

(A) 300

(B) 1100

(C) 700

(D) 150

Answer: Option C

370. Soft coke is not

(A) Produced by low temperature carbonisation of coal

(B) A domestic fuel

(C) Used in blast furnaces

(D) None of these

Answer: Option C

371. Prime coking coal is always blended with medium or non-coking coal before carbonisation

(A) To check against its excessive swelling during heating, which may exert high pressure and damage coke oven walls

(B) Because, it alone produces unreactive coke

(C) Both (A) and (B)

(D) Neither (A) nor (B)

Answer: Option C

372. Coke ovens in steel plant are heated by

(A) Electricity

(B) Coke oven gas

(C) Mixed gas

(D) Both (B) & (C)

Answer: Option D

373. Which of the following is not a manufactured fuel?

(A) Furnace oil

(B) Bagasse

(C) Semi-coke

(D) Kerosene

Answer: Option B

374. Bomb calorimeter is used for the determination of calorific value of the _____ fuels.

(A) Gaseous

(B) Solid

(C) Liquid

(D) Both (B) and (C)

Answer: Option D

375. In high temperature carbonisation (as compared to low temperature carbonisation) of coal, the

- (A) Gas yield is less
 - (B) Tar yield is more
 - (C) Ignition temperature of coke produced is less
 - (D) Aromatic content of tar produced is more
- Answer: Option D

376. Flue gas discharge velocity through chimney of a big thermal power plant may be around _____ m/sec.

- (A) 0.5
- (B) 10
- (C) 50
- (D) 500

Answer: Option B

377. Grindability index of a coal is 100. It implies that the

- (A) Coal can be pulverised with great difficulty
- (B) Coal can't be pulverised
- (C) Coal can be easily pulverised
- (D) Power consumption in grinding the coal will be very high

Answer: Option C

378. When steam is passed over coal resulting in the endothermic reaction represent by, $C + H_2O = CO + H_2$, it is called the _____ of coal.

- (A) Carbonisation
- (B) Oxidation
- (C) Coalification
- (D) Gasification

Answer: Option D

379. Naphthalene recovered from coke oven gas is used

- (A) As moisture proof coating on fibres
- (B) As moth balls (insecticides)
- (C) As a fuel in furnaces
- (D) For making electrodes

Answer: Option B

380. Dust content in raw blast furnace gas is about _____ gm/Nm³; hence it is cleaned to the dust level of about < 10 mg /Nm³ before use.

- (A) 15-30
- (B) 1-2
- (C) 70-100
- (D) 150-200

Answer: Option A

381. When incomplete combustion loss is high, the flue gas analysis shows large amount of

- (A) CO₂
- (B) CO
- (C) O₂
- (D) C

Answer: Option B

382. Rate of low temperature oxidation of coal due to bad storage conditions

- (A) Decreases with increase in surface area
- (B) Does not vary with increase in surface area
- (C) Is more for low volatile coal compared to high volatile coal
- (D) Is accelerated by storage in large heaps with small surface to volume ratio

Answer: Option D

383. One kg of carbon for theoretically complete combustion requires _____ kg of air.

- (A) 11.5
- (B) 0.5
- (C) 23
- (D) 12

Answer: Option A

384. Which of the following is called "blue gas"?

- (A) Coke oven gas
- (B) Water gas
- (C) Natural gas
- (D) Producer gas

Answer: Option B

385. _____ process is meant for direct hydrogenation of coal to produce liquid fuel.

- (A) Fischer-Tropsch
- (B) Bergius
- (C) Lurgi
- (D) None of these

Answer: Option B

386. Temperature of preheated air used for the transportation of pulverised coal through pipes to the burner of a boiler furnace is restricted to a maximum limit of about 300° C to avoid the

- (A) Requirement of large volume combustion chamber
- (B) Risk of explosion
- (C) Chances of clinker formation
- (D) Incomplete combustion of coal

Answer: Option B

387. During combustion of a gaseous fuel, the presence of a non-luminous flame is an indication of the

- (A) Incomplete combustion
- (B) Complete combustion
- (C) High oxygen in flue gas
- (D) None of these

Answer: Option B

388. Use of excess of combustion air in the combustion of fuels results in

- (A) Heat losses
- (B) Long flame
- (C) Condensation of water vapour from the fuel gas
- (D) None of these

Answer: Option A

389. If oxygen content in the flue gas rises too high, fuel is being wasted by

- (A) Incomplete combustion
- (B) Dry gas/stack gas loss
- (C) Moisture loss
- (D) None of these

Answer: Option B

390. Which of the following fuels is generally not used in thermal power plant boiler firing?

- (A) Furnace oil, light diesel oil and tar/PCM
- (B) Pulverised coking coal
- (C) Coal middling from washeries
- (D) B.F. gas, coke oven gas and L.D. converter gas

Answer: Option B

391. Higher efficiency in the combustion of solid fuel cannot be achieved by

- (A) Proper fuel preparation
- (B) Keeping the flue gas exhaust temperature very high
- (C) Adopting efficient-fuel firing technique & equipment
- (D) Supplying correct quantity of combustion air

Answer: Option B

392. Which of the following has the highest flame speed?

- (A) CO
- (B) H₂
- (C) CH₄
- (D) C₂H₆

Answer: Option B

393. Ultimate analysis of coal determines its _____ content.

- (A) Carbon, hydrogen, nitrogen & sulphur
- (B) Carbon, ash, sulphur & nitrogen
- (C) Carbon, sulphur, volatile matter & ash
- (D) Carbon, volatile matter, ash & moisture

Answer: Option A

394. For maximum discharge through a chimney, its height should be

- (A) 200 meters
- (B) Infinitely long
- (C) More than 105.7 metres
- (D) Equal to the height of the hot gas column producing draught

Answer: Option D

395. Pick out the wrong statement.

- (A) High concentration of oxygen in flue gas means high stack loss
- (B) Gaseous fuels require the least % excess air for complete combustion
- (C) The ratio of fixed carbon to volatile matter percentage in coal is called its 'fuel ratio'
- (D) Calorific value of natural gas is more than that of LPG

Answer: Option D

396. Presence of _____ in a dry gaseous fuel does not contribute to its calorific value.

- (A) Sulphur
- (B) Oxygen
- (C) Hydrogen
- (D) Carbon

Answer: Option B

397. A particular coal is said to be free burning when it

- (A) Burns completely
- (B) Gives smokeless burning
- (C) Shows little or no fusing action
- (D) None of these

Answer: Option C

398. Ammonia content in raw coke oven gas is about _____ gm/Nm³.

- (A) 1
- (B) 5
- (C) 50
- (D) 100

Answer: Option B

399. Critical Air Blast (CAB) value of coke is a direct measure of its

- (A) Reactivity
- (B) Hardness
- (C) Strength
- (D) None of these

Answer: Option A

400. The maximum adiabatic flame temperature in air as compared to that in pure oxygen is

- (A) Much lower
- (B) Much higher
- (C) Same
- (D) Either lower or higher, depends on the type of fuel

Answer: Option A

401. Improper storage condition results in the weathering of coal and spontaneous combustion, which increases its

- (A) Caking index
- (B) Yield of carbonised products
- (C) Friability & oxygen content
- (D) Calorific value

Answer: Option C

402. Calorific value of wood gas is about _____ kcal/Nm³.

- (A) 1500
- (B) 3300
- (C) 5400
- (D) 8500

Answer: Option B

403. The sequence of absorption in flue gas analysis by Orsat's apparatus is respectively

- (A) CO₂, O₂, CO
- (B) CO, O₂, CO₂
- (C) CO₂, CO, O₂
- (D) O₂, CO₂, CO

Answer: Option A

404. Oxygen required for theoretically complete combustion of 1 Nm³ methane is _____ Nm³.

- (A) 2
- (B) 4
- (C) 6
- (D) 1

Answer: Option A

405. Sometimes water is sprayed during coal charging in the coke oven, which helps in

- (A) Prevention of clinker formation in the oven
- (B) Controlling the dust nuisance while charging the coal
- (C) Reducing the cracking of hydrocarbons in the gas and increasing the percentage of CO & H₂ in the gas (due to the endothermic reaction represented by $C + H_2O = CO + H_2$)
- (D) All (A), (B) and (C)

Answer: Option D

406. Ratio of primary air to secondary air increases with increase in the rank of coal, because the

- (A) High rank coals have higher amount of volatile matter
- (B) Ratio of fixed carbon to volatile matter increases
- (C) Oxygen content progressively decreases
- (D) Calorific value of the coal increases

Answer: Option B

407. Coal tar fuel - 200 (CTF 200) is a mixture of

- (A) Pitch and creosote oil
- (B) Light oil and pitch
- (C) Anthracene and creosote oil
- (D) Solar oil and pitch

Answer: Option A

408. Coking coals are invariably

- (A) Lignites
- (B) Bituminous coals
- (C) Semi-anthracites
- (D) Anthracites

Answer: Option B

409. During coal carbonisation process, the conversion of semi-coke to coke is accompanied by an increase in the _____ of the mass.

- (A) Density
- (B) Porosity
- (C) Electrical resistivity
- (D) None of these

Answer: Option A

410. Volatile matter content of metallurgical coke may be around _____ percent.

- (A) 1-2
- (B) 10-15
- (C) 22-26
- (D) 30-33

Answer: Option A

411. Combustion of pulverised coal as compared to that of lump coal

- (A) Develops a non-luminous flame
- (B) Develops a low temperature flame
- (C) Can be done with less excess air
- (D) Provides a lower rate of heat release

Answer: Option C

412. C.V. (kcal/Nm³) of gaseous fuels _____ with increase in molecular weight.

- (A) Decreases
- (B) Increases
- (C) Remain constant
- (D) May increase or decrease, depends on combustibles

Answer: Option D

413. Calorific value of dry wood may be around _____ Kcal/kg.

- (A) 5
- (B) 50
- (C) 500
- (D) 5000

Answer: Option A

414. Fuel for a fast breeder nuclear reactor is

- (A) Plutonium
- (B) Uranium
- (C) Radium
- (D) Neptunium

Answer: Option A

415. Mineral matter, 'M' and ash percentage 'A' in coal are roughly related as

- (A) $M = 1.8 A$
- (B) $M = 0.5 A$
- (C) $M = 1.1 A$
- (D) $M = A$

Answer: Option C

416. Actual flame temperature is always lower than the adiabatic flame temperature, because there is

- (A) No possibility of obtaining complete combustion at high temperature
- (B) Always loss of heat from the flame
- (C) Both (A) and (B)
- (D) Neither (A) nor (B)

Answer: Option C

417. Flue gas from the heating chamber of byproduct coke ovens is removed by

- (A) Forced draft fan
- (B) Induced draft fan
- (C) Steam ejector
- (D) Natural draft

Answer: Option D

418. 'Fuel' can be defined as a substance which produces heat by

- (A) Combustion
- (B) Nuclear fission
- (C) Nuclear fusion
- (D) All (A), (B) & (C)

Answer: Option D

419. Safe condition for storage of high V.M. bituminous coal is that

- (A) Height of the coal heap should be < 3 metres
- (B) Maximum 200 tons should be stored in a heap
- (C) Both (A) and (B)
- (D) Neither (A) nor (B)

Answer: Option C

420. Bomb calorimeter is used to determine the (where, GCV - Gross Calorific Value, NCV - Net Calorific Value.)

- (A) GCV at constant pressure
- (B) GCV at constant volume
- (C) NCV at constant pressure
- (D) NCV at constant volume

Answer: Option B

421. Which of the following is used for making the explosive 'TNT'?

- (A) Benzol
- (B) Toluene
- (C) Pyridine
- (D) Cerosote

Answer: Option B

422. Narrow coke ovens as compared to wider coke ovens

- (A) Produce smaller coke
- (B) Produce stronger coke
- (C) Require less time of carbonisation
- (D) All (A), (B) and (C)

Answer: Option D

423. Incomplete combustion of fuel in the furnace is judged by high _____ of the flue gases.

- (A) CO content
- (B) Dew point
- (C) CO₂ content
- (D) O₂ content

Answer: Option A

424. Coal containing large quantity of _____ are difficult to wash.

- (A) Ash
- (B) Inherent mineral matter
- (C) Free impurities
- (D) Volatile matter

Answer: Option B

425. Producer gas containing least amount of tar is produced by the

- (A) Partial combustion of coal
- (B) Partial combustion of large size (< 50 mm) coke
- (C) High pressure gasification of coal (e.g. in Lurgi gasifier)
- (D) Atmospheric pressure gasification of coal (e.g., in Kopper-Totzek gasifier)

Answer: Option B

426. The temperature at which plastic layer formation takes place during carbonisation of coal varies from _____ °C.

- (A) 100 to 150
- (B) 350 to 450
- (C) 550 to 650
- (D) 700 to 850

Answer: Option B

427. Temperature of coke oven gas just before entering into saturator (for recovery of NH₃) is about _____ °C.

- (A) 30
- (B) 65
- (C) 120
- (D) 180

Answer: Option B

428. Preheating of combustion air is done to

- (A) Increase the adiabatic flame temperature
- (B) Increase the calorific value of the fuel
- (C) Complete the combustion of fuel
- (D) Reduce its requirement for effecting the complete combustion

Answer: Option A

429. The function of secondary combustion air is to

- (A) Pneumatically convey the pulverised coal
- (B) Completely burn the volatile matter
- (C) Burn the lumpy coal
- (D) None of these

Answer: Option B

430. 'Mixed gas' used in steel plants is a mixture of

- (A) B.F. gas and coke oven gas
- (B) Coke oven gas and converter gas
- (C) Coke oven gas and L.P.G
- (D) Blast furnace gas and naphtha vapor

Answer: Option A

431. A coal containing very high percentage of durain is called _____ coal.

- (A) Bright
- (B) Splint
- (C) Non-banded
- (D) Boghead

Answer: Option B

432. Light oil whose major component is Benzol, is obtained by the distillation of crude tar in the temperature range of _____ °C.

- (A) 80-170
- (B) 200-300
- (C) 250-270
- (D) 280-300

Answer: Option A

433. By-products are _____ recovered in 'Beehive ovens'.

- (A) Fully
- (B) Partially
- (C) Not at all
- (D) Negligibly

Answer: Option C

434. Which of the following can be made into briquettes without the use of a binder?

- (A) Lignite
- (B) Bituminous coal
- (C) Anthracite coal
- (D) None of these

Answer: Option A

435. Anthracite coal

- (A) Contains more volatile matter than bituminous coal
- (B) Ignites more easily than bituminous coal
- (C) Is essentially a coking coal
- (D) Burns with short, bluish, yellow-tipped flame producing very little smoke

Answer: Option D

436. Junker's calorimeter is used to determine the calorific value of

- (A) Pulverised coal
- (B) Gaseous fuels
- (C) Fuel oil
- (D) None of these

Answer: Option B

437. Pick the odd man out.

- (A) Briquettes
- (B) Wood
- (C) Oil gas
- (D) Pitch creosote mixture

Answer: Option B

438. Deficiency of combustion air during combustion of a gaseous fuel

- (A) Lengthens the flame
- (B) Causes heat loss of fuel by its partial combustion
- (C) Both (A) & (B)
- (D) Shortens the flame

Answer: Option C

439. Method of maintaining fires in furnace during standby periods without undue consumption of fuel is called

- (A) Back draughting
- (B) Banking
- (C) Under pressurising
- (D) None of these

Answer: Option B

440. Fossil fuels mean

- (A) Solid fuels
- (B) Liquid fuels
- (C) Those fuels which are found in the crust of earth
- (D) Premature fuels with low calorific value

Answer: Option C

441. Stack heat losses can be minimised by

- (A) Controlling the excess air
- (B) Oxygen enrichment of combustion air
- (C) Using low c.v. fuels
- (D) Maintaining proper draft in the furnace

Answer: Option A

442. Removal of hydrogen from coke oven gas

- (A) Increases its calorific value
- (B) Decreases its calorific value
- (C) Does not alter its calorific value
- (D) Is not possible on commercial scale

Answer: Option A

443. Calorific value of bituminous coal may be around _____ Kcal/kg.

- (A) 500
- (B) 1500
- (C) 6500
- (D) 20000

Answer: Option C

444. Gross & net calorific value is the same for

- (A) Blast furnace gas
- (B) Coke oven gas
- (C) L.D. converter gas
- (D) None of these

Answer: Option C

445. Calorific values of both the solid as well as the liquid fuels can be determined by _____ calorimeter.

- (A) Bomb
- (B) Boy's
- (C) Junkers
- (D) None of these

Answer: Option A

446. A good coking coal should have high _____ content.

- (A) Ash
- (B) Sulphur & phosphorus
- (C) Moisture
- (D) None of these

Answer: Option D

447. Fuel gases containing hydrocarbons (e.g. coke oven gas) are not preheated before burning, mainly because

- (A) The hydrocarbons crack thereby choking and fouling the heat transfer surface by carbon soot
- (B) It reduces its calorific value tremendously
- (C) It reduces its flame temperature tremendously
- (D) There are chances of explosion during preheating

Answer: Option A

448. The ratio of maximum adiabatic flame temperature in air to that in pure oxygen is always

- (A) 1
- (B) < 1
- (C) > 1
- (D) Unpredictable

Answer: Option B

449. Calorific value of pitch creosote mixture (PCM) i.e., C.T.F.-200 is about

- (A) 8800 kcal/m³
- (B) 8800 kcal/kg
- (C) Same as that of coal middling
- (D) 25000 kcal/kg

Answer: Option B

450. Which of the following is not a by-product recovered in a high temperature coal carbonisation plant?

- (A) Benzol
- (B) Pitch-creosote mixture (PCM)
- (C) Naphthalene
- (D) Ethylene

Answer: Option D

451. Blast furnace gas burns with a bluish flame, because of the presence of

- (A) CO
- (B) CH₄
- (C) CO₂
- (D) S

Answer: Option A

452. Air/gas ratio for complete combustion will be the highest for

- (A) LPG
- (B) Gobar gas
- (C) Coke oven gas
- (D) Carburetted water gas

Answer: Option A

453. Yield of coke oven gas in low temperature carbonisation of coal is about _____ Nm³/ton of dry coal.

- (A) 60
- (B) 160
- (C) 500
- (D) 750

Answer: Option B

454. Calorific value of furnace oil is about _____ Kcal/kg.

- (A) 10,000
- (B) 15,000
- (C) 5,000
- (D) 20,000

Answer: Option A

455. Orsat apparatus is meant for

- (A) Gravimetric analysis of flue gas
- (B) Finding out combustion efficiency
- (C) Direct determination of nitrogen in flue gas by absorbing it in ammoniacal cuprous chloride
- (D) None of these

Answer: Option D

456. During combustion of gaseous fuels, deficiency of air

- (A) Lengthens the flame
- (B) Tends to shorten the flame
- (C) Does not affect the flame length
- (D) Increases the flame temperature

Answer: Option A

457. The combustion reaction, $C + O_2 = CO_2$, is

- (A) Exothermic
- (B) Endothermic
- (C) Autocatalytic
- (D) None of these

Answer: Option A

458. Yield of charcoal in high temperature carbonisation of wood is about _____ percent.

- (A) 10
- (B) 25
- (C) 50
- (D) 75

Answer: Option B

459. Which of the following constituents of coal is the most important in the production of coke?

- (A) Moisture
- (B) Ash
- (C) Volatiles
- (D) Carbon

Answer: Option D

460. Fixed carbon in coal is defined as

- (A) That present in volatile matters
- (B) The total quantity of carbon present in the coal
- (C) Hundred minus the percentage of volatile matter, ash and moisture
- (D) The one which is present in the residue after combustion

Answer: Option C

461. The liquid used for the washing of coal in an industrial coal washery is a mixture of water and

- (A) Carbon tetrachloride
- (B) Sand (40%)
- (C) Mineral oil of high viscosity & specific gravity (1.6)
- (D) None of these

Answer: Option B

462. A coal having high amount of volatile matter

- (A) Would require smaller combustion chamber
- (B) Produces very little of tar and gas on carbonisation
- (C) Ignites easily and burns with long smoky flame
- (D) All (A), (B) and (C)

Answer: Option D

463. Quantity of coke produced from metallurgical coal may be around _____ percent.

- (A) 30
- (B) 50
- (C) 75
- (D) 95

Answer: Option C

464. Which of the following is not a manufactured fuel?

- (A) Coke breeze
- (B) Soft coke
- (C) Colloidal fuels
- (D) Charcoal

Answer: Option A

465. Explosion limit of blast furnace gas is 37 to 71% gas in gas-air mixture. It means that the blast furnace gas will explode when burnt in a confined space, if its concentration in the gas-air mixture is _____ percent.

- (A) < 37%
- (B) > 71%
- (C) In between 37 & 71%
- (D) None of these

Answer: Option C

466. The main product of high temperature carbonisation of coal is

- (A) Coke
- (B) Ammonia
- (C) Tar
- (D) Coke oven gas

Answer: Option A

467. Fussain

- (A) Is friable, charcoal like substance
- (B) Has highest fixed carbon and lowest volatile matter content of all the four banded components of coal
- (C) Is non-coking, but when blended with highly coking coal, controls its swelling and produces high strength coke on carbonisation
- (D) All (A), (B) and (C)

Answer: Option D

468. Pensky-Marten apparatus is used for those oils, whose flash points are _____ °F.

- (A) < 120
- (B) > 120
- (C) < 90
- (D) 90-110

Answer: Option B

469. Commercial production of petrol from coal (as practised in a factory at Sasol in South Africa) is done by the _____ of coal.

- (A) Hydrogenation
- (B) Gasification
- (C) Carbonisation
- (D) None of these

Answer: Option A

470. Kopper-Totzek coal gasifier

- (A) Can give ammonia synthesis gas ($H_2 + N_2$)
- (B) Is a moving bed reactor
- (C) Cannot use coking coal
- (D) Operate at very high pressure

Answer: Option A

471. Gross and net calorific value of a fuel will be the same

- (A) If its ash content is zero
- (B) If its carbon content is very low
- (C) If its hydrogen/hydrogen compound content is zero
- (D) Under no circumstances

Answer: Option C

472. During its calorific value determination by bomb calorimeter, coal is combusted by

- (A) Air
- (B) Oxygen
- (C) Oxygen enriched air
- (D) None of these

Answer: Option B

473. Beehive coke oven

- (A) Facilitates by-products recovery
- (B) Takes 2-3 days for coking of coal but requires no external fuel for heating

(C) Gives larger yield of coke (around 85%) as compared to by-product ovens

(D) Produces coke with very poor strength

Answer: Option B

474. High temperature in gasification of coal favours

(A) High production of CO_2

(B) Low production of CO_2

(C) High production of CO

(D) Both (B) and (C)

Answer: Option D

475. Coal is heated in presence of air to a temperature of about _____ °C, while determining its ash content for proximate analysis.

(A) 500

(B) 750

(C) 950

(D) 1100

Answer: Option B

476. Assam (India) coals suffers mainly from the disadvantage of high _____ content.

(A) Ash

(B) Volatile matter

(C) Sulphur (4-6%)

(D) Moisture

Answer: Option C

477. Higher percentage of ash in coal meant for the production of metallurgical grade coke

(A) Decreases the hardness of coke

(B) Decreases the abrasion resistance of coke

(C) Causes brittleness in steel

(D) None of these

Answer: Option D

478. Abel apparatus is used for those oils, whose flash points are _____ °F.

(A) < 120

(B) > 120

(C) > 280

(D) 300-600

Answer: Option A

479. Eschka mixture, which is used for the determination of sulphur in coal, is a mixture of

(A) MgO & Na_2CO_3

(B) MgSO_4 & BaCl_2

(C) BaSO_4 & NaCl

(D) MgCO_3 & NaCl

Answer: Option A

480. Which of the following is the most reactive (as regards the formation of $\text{CO} + \text{H}_2$ from $\text{C} + \text{H}_2\text{O}$)?

(A) Blast furnace coke

(B) Low temperature coke

(C) Anthracite coal

(D) Sub-bituminous coal

Answer: Option B

481. Ignition temperature of a fuel in air is _____ that in pure oxygen.

(A) More than

(B) Less than

(C) Equal to

(D) Either more or less; depends on the type of fuel

Answer: Option A

482. In Orsat's apparatus, ammoniacal cuprous chloride is used for selectivity absorbing

(A) CO

(B) CO_2

- (C) O₂
- (D) H₂O

Answer: Option A

483. Which of the following gaseous fuels has the lowest calorific value?

- (A) Gobar gas
- (B) Refinery gas
- (C) Converter gas
- (D) Blast furnace gas

Answer: Option D

484. Which of the following fuel gases has the highest calorific value?

- (A) Natural gas
- (B) Coal bed methane (CBM)
- (C) Liquefied petroleum gas (LPG)
- (D) Sewage gas

Answer: Option C

485. Turndown ratio of a gas burner is equal to the

- (A) Maximum to minimum heat input ratio
- (B) Maximum to minimum permissible gas flow rate
- (C) Both (A) & (B)
- (D) Minimum to maximum heat input ratio

Answer: Option C

486. Which of the following is not used as a binder in coal briquetting?

- (A) Tar
- (B) Molasses
- (C) Pitch
- (D) Line

Answer: Option D

487. Which of the following has the least calorific value (kcal/Nm³)?

- (A) Blast furnace gas
- (B) Coke oven gas
- (C) Sewage gas
- (D) Natural gas

Answer: Option A

488. Pick out the wrong statement.

- (A) Theoretical flame temperature is the temperature attained by the products of combustion, when the fuel is burned without loss or gain of heat
- (B) Burning the fuel with theoretically required amount of pure oxygen results in attainment of maximum adiabatic flame temperature
- (C) Burning the fuel with excess pure oxygen results in maximum theoretical flame temperature
- (D) Adiabatic flame temperatures of actual combustions are always less than the maximum values

Answer: Option C

489. Carbon Content by weight in air dried wood may be about _____ percent.

- (A) 10
- (B) 25
- (C) 50
- (D) 80

Answer: Option C

490. As the equilibrium moisture content of the coal increases, its

- (A) Calorific value increases
- (B) Swelling number decreases
- (C) Swelling number increases
- (D) Bulk density decreases

Answer: Option B

491. Which of the following oil gasification processes is non-catalytic?

- (A) Semet-Solvay process
- (B) Segas process