B.Sc I

Heat transfer & Aspects of Chemistry

Paper – III

semester – II

Energy balance

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37) Burning is always an ... process
a) Exothermic b) Endothermic
c) No heat transfer d) None

38) Temperature for standard heat of formation is
a) 298 K b) 300 K c) 400 K d) None

39) Pressure ofer standard heat formation is
a) 1 atm b) 1 psi c) 1 kg/m² d) None

40) Enthalpy change associated with the formation of 1 mole of compound from its constituent elements and product is their standard state is called
a) standard heat of formation b) Heat of Reaction
c) Heat of Combustion d) none

41) The heat of formation as ... to the standard state for each stable element
a) zero b) Can not be calculated c) Negative d) positive

42) standard heat of formation are ... for exothermic reaction
a) Negative b) positive c) zero d) None

43) ... is the enthalpy change that is associated with a reaction.
a) standard heat of formation b) Heat of Reaction
c) Heat of Combustion d) None of these

44) Heating value is the Negative of the
a) standard heat of formation
b) standard heat of Reaction
c) standard heat of combustion
d) None of Mentioned

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45) Enthalpy reference state is at which the enthalpy is
a) Zero b) Positive
c) Negative d) None of these

46) Value of the Negative of the heat combustion when the product Water is liquid, is
a) Higher Heating Value b) Lower Heating Value
c) both a & b d) None of these

47) The quantity of matter or region of space chosen for study is called
a) Boundary b) Surrounding
c) System d) None

48) A system that is not in steady state is in a state that is
a) Transient state b) Unsteady state
c) both a) & b) d) None of these

49) A system that does not exchange heat with a surrounding during a process is - -
a) adiabatic system b) Isobaric system
c) Isochronic system
d) None of these

50) A system In which the temperature is invarient during process is
a) adiabatic process
b) Isobaric System
c) Isobaric system
d) Isothermal System

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Process calculation — II

Sem - II

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Energy balances

1) . . . . It is the energy which a body possesses by virtue of its motion relative to some reference plane
   a) Kinetic energy
   b) Internal energy
   c) potential energy
   d) None of these

2) potential energy is that energy a substance possesses by virtue of its . . . . relative to some reference plane
   a) motion b) position c) velocity
   d) None of these

3) . . . It is the energy in transmit between a hot source and cold receiver
   a) Chemical b) Radiation c) Heat
   d) none of these

4) In Mechanics Work done by force is defined as the product of the . . . . moved in the direction of the applied force
   a) force and acceleration
   b) Force and distance
   c) distance and mass
   d) none of these

5) . . . is defined as the quantity of heat required to raise the temperature of one gram of water by 1°c in the vicinity of 15°c
   a) Calorie b) BTU
   c) Joule d) none of these

6) . . . process is the one in which stream of materials continually enter and leave the system.
   a) Continuous process b) Flow process
   c) Batch process d) none of these

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7) If a chemical reaction is involved where in heat is evolved or absorbed, it must be includes in the ...

a) energy balance equation ✓ b) mass balance

c) both a & b d) none of these

8) Energy balance equation for closed system is

a) $E = mc^2$

✓ b) Net energy transferred to the system = final system energy − Initial system energy

c) $E = h/v$

d) None of these

9) Enthalpy (H) is given by equation

a) $H = U - PV$ ✓ b) $H = U + PV$

c) $H = U/PV$ d) none of these

10) .... heat that must be transferred to raise or lower the temperature of a substance or mixture of substance.

✓ a) Sensible b) Non-sensible

c) both a & b d) none of these

11) Heat capacity is the amount of heat required to increase the temperature of one kg of substance by ...

a) 1 °F b) 1 °C

c) both a & b. ✓ d) 1 K

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12) Specific heat (c) =

a) $dT \times dQ$ b) $dT - dQ$

c) $\frac{dQ}{dT}$ d) none of these

13) Relationship between C_p and C_v for an Ideal gas

a) $C_p - C_v = R$ b) $C_p + C_v = R$

c) $C_p / C_v = R$ d) None of these

14) Heat capacity of gases at constant pressure

a) $Q = \int_{T_1}^{T_2} C_p$ b) $Q = \int_{T_1}^{T_2} C_p \cdot dT$

c) $Q = \int_{T_1}^{T_2} C_p - C_v$. d) none of these

15) When heat is absorbed the reaction is said to be . . .

a) endothermic b) exothermic

c) both a & b d) none of these

16) Standard heat of Reaction denoted by symbol

a) ΔH b) $\Delta H^\circ_R - \Delta H_C$

c) ΔH°_R d)

17) . . . . is the enthalpy change accompanying the formation of one mole compound from its element at a given temperature and pressure.

a) Heat of formation b) Heat of Combustion

c) Heat of Standardization d) none of these

18) The standard heat of Reaction equal to ΔH°_R =

a) $\Delta H^\circ_R = \sum \Delta H^\circ_f$ (product) + $\sum \Delta H^\circ_f$ (Reactant)

b) $\Delta H^\circ_R = \sum \Delta H^\circ_f$ (product) $- \sum \Delta H^\circ_f$ (Reactant)

c) both a & b

d) none of these

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19) - - Law permits us to treat all stoichiometric equation as algebraic equation.

a) Eistanie Law
b) Avogadroves Law
c) Law of motion
d) Hess Law of constant heat Summation

20) The condensation is a reverse of - - -

a) Distillation b) Vaporisation
c) a & b d) None of these

21) - - - it is the heat required to vaporise a Unit amount of solid or constant temperature and pressure

a) Latent heat of sublimation
b) Latent heat of Vaporisation
c) Latent heat of Sulmilation & Vaporisation
d) None of these

22) Heat always results in an increase in temperature the statement is

a) Correct b) Incorrect c) both & b d) none of these

23) The energy of a system plus surrounding can neither be created nor destroyed is the law of - - -

a) Conservation of mass b) Conservation of energy
c) Conservation of Momentum d) None of these

24) Evaporator that concentrate a solute is an example of

a) open steady state prress b) open usteady state press
c) closed stead state d) None of these

25) Batch Distillation is a example of

a) open, steady state press b) open unsteady state press
c) closed steady state process d) None of these

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26) ... represents a Microscopic account of all the Molecular, atomic and sub atomic energies
a) potential energy b) Kinetic energy
c) internal energy d) None of these

27) Internal energy is a function of
a) Temperature and pressure c) pressure and volume
b) Temperature and volume d) none of these

28) Internal energy is a
a) path Variable b) State Variable c) both a & b d) None of the

29) A system is at rest, the Kinetic energy of the system is
a) infinite b) greater than zero c) less than zero d) None

30) specific enthalpy is the function of
a) Temperature and pressure b) Temperature and volume
c) pressure and volume d) None

31) C_p is the change in enthalpy with respect to temperature at constant
a) pressure b) volume c) temperature d) None

32) for Ideal gases, Enthalpy and internal energy is the only function of
a) pressure b) volume c) temperature d) None

33) Which is the correct relation
a) $C_p + C_V = 0$ b) $C_p = 1 + R/C_V$
c) $1 = C_p/C_V$ d) $C_p = R + C_V$

34) A reaction for which heat must be added to the system to maintain isothermal condition is called
a) Endothermic reaction b) Exothermic Reaction
c) Neutral reaction d) None of these

35) photosynthesis is
a) Exothemic b) Endothermic c) No heat transfer
d) None

36) Electrolysis of Water is
a) Exothermic b) Endothermic c) both a & b
d) None of these

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Recycle operation

13) Recycle product is . . .
a) Input to process b) out put to process
c) both a & b d) none of these

14) The feed stream that enters A bypass stream does not go through which of the following
a) mixer b) process c) separator d) none of these

15) In which of the following does the purge stream comes from
a) feed stream b) product stream
c) Recycle stream d) None

16) Which of the following composition is controlled by purge stream
a) feed b) product stream
c) Recycle stream d) none of these

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Recycle operation

1) Recycling operation, commonly encountered in unit operation and unit process are performed for

a) Maximum Utilisation of valuable Reactants.
b) Improvement of the performance of the equipment
c) Maintaining process rate at a high value
d) All of the above

2) . . . is a process stream that returns material leaving a process unit back to the entrance of the same unit

a) recycle stream
b) recycle ratio
c) both a & b
d) None of these

3) . . . . is the fraction of the recycle stream which is continuously blend-off in order to avoid an accumulation of inerts in the recycle loop.

a) recycle ratio
b) purge stream
c) both a & b
d) None of these

4) for steady-state operation - - -

a) Inerts in purge + Inerts in feed
b) Inerts in purge - Inerts in feed
c) Inerts in purge = inerts in fresh feed
d) None of the

5) Recycle ratio =

a) $\frac{R}{f}$ b) $\frac{f}{R}$ c) f+R d) f-R

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6) purge ratio based any component A written as ...

a) A in purge X A in recycle feed

b) A in purge - A in feed ✓ A in purge / A in recycle feed

d) none of these

7) Gross product = ...

✓a) Recycle feed + Net product

b) Recycle feed - Net product

c) Recycle feed / Net product

d) None of these

8) ... is the ratio of the quantity of mixed feed to the quantity of fresh feed

a) Recycle feed

b) Net feed

✓c) combined feed ratio

d) None of these

9) Recycling reduces

a) energy usage b) air pollution

c) Water pollution ✓d) All of above

10) A stream containing the recycle material is known as

✓a) Recycle stream b) purge stream c) By pass stream

11) A recycle stream includes ... recyle stream

✓a) one or more b) only one c) Two d) none

12) The feed stream that enters a reactor, usually used in process both a reactor and recycle is

✓a) process feed b) overall process

b) overall product d) None

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Combustion

1) principally coal which is a mixture of
   a) carbon, hydrogen
   b) non combustible ash, water & sulphur
   c) coke and some extent wood
   d) All of above

2) .... hydrocarbons obtained by distillation of a crude oil
   a) liquid fuels b) solid fuels c) gaseous fuel
   d) none of these

3) natural gas which usually contain ... metane
   a) 60 to 80 % b) 60 to 70 %
   c) 80 to 95 %

4) The rapid reaction of a fuel with oxygen is known as ....
   a) Combustion b) formation c) addition d) none of these

5) A combustion reaction in which ... is formed is refered to as partial or incomplete combustion
   a) CO b) Cu c) CO_2 d) none of the

6) for economic reasion .... is the source of oxygen in the most combustion operation
   a) Water b) water & air c) air
   d) none of these

7) Since the standard heat of combustion is always negative the clorific value is ...
   a) positive
   b) Negative
   c) both a & b
   d) None of these

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8) ---- is defined as the total heat produced when Unit mass of fuel is completely burnt with pure oxygen.

a) Calorific Value

b)

c)

d)

9) % excess air =

a)

b) $\frac{(\text{actual air suply} - \text{theoretical air requirment})}{\text{Theoretical air requirment}}$

c)

d)

10) Petroleum formed several millim ago from

a) organic matter

b) Inorganic Matter

c) both a & b

d) None of these

11) The Useful method to Seprabin of petroleum product from crude oil

a) Simple Distillabin

b) steam distillabin

c) fractional Distillabin

d) both a & b.

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12) ... fuels which occur in nature

a) primary fuels ✓ b) secondary fuels

c) both a & b d) None of these

13) ... fuel is derived from primary fuels

a) secondary fuels ✓ b) primary fuels

c) both a & b d) None of these

14) ... is defined as the quantity of heat required to raise the temperature of one pound of water through one degree fahrenheit

a) BTU ✓ b) Calorie

c) Kilo calorie d) None of these

15) Net calorific value = ...

a) Gross calorific value − Latent heat of condensation of water vapour produced ✓

b) Gross calorific value + Latent heat of condensation

c) both a & b

d) None of these

16) $HCV = \frac{1}{100[8,080C + 34500(H - O/8) + 2,240]}$ Kcal/kg

17) ... regarded as a fossil fuel produced from large accumulation of vegetable debries due to partial decay and alteration by the action of heat and pressure over Millions of years.

a) Coal ✓ b) Water c) air d) None of these

18) ... coals are referred as low rank coal because a qualitative measure of carbon content

a) peat, lignit and sub-bituminous ✓

b) anthracite, bituminous

c) both a & b d) None of these

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19) Coal is are classified on the basis of
a) degree or extent of maturation
b) Carbon contents
c) both a & b
d) None of these

20) proximate analysis it includes the determination of
a) Moisture
b) Volatile matter
c) ash and fixed carbon
d) ~~Most~~ All of these

21) Ultimate analysis it includes the determination of ~~carbon~~
a) carbon & hydrogen
b) nitrogen sulphur
c) oxygen in coal
d) All of these

22) - - - This analysis gives exact results and are useful in calculating the calorific value of coal using Dulong's formula
a) proximate analysis
b) Ultimate analysis
c) elemental analysis
d) All of these

23) percentage of Moisture of coal =
a) $\frac{\text{Loss in weight}}{\text{Wt of coal taken}} \times 100$
b) Loss of weight — Wt of coal taken / 100
c) both a & b
d) None of these

24) % of Volatile Matter Of Coal =
a) $\frac{\text{Loss in weight due to removal of Volatile matter}}{\text{Wt of coal sample taken}} \times 100$

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25) Fixed % of ~~Moisture~~ fixed carbon of coal can be calculated by . . .

a) 100 - % of (moisture + Volatile Matter + ash remain)

b) 10 - % of (Moisture)

c) 1000 - (% of Volatile Matter)

d) All of these

26) A high Volatile matter content means that high proportion of fuel will be distilled and burned as a . . . .

a) gas or vapour

b) gas and solid

c) both a & b

d) None of these

27) Ash is useless, non-combustible matter, which reduces the . . . .

a) calorific value of coal

b) non-calorific value

c) both a & b

d) None of these

28) Higher the % fixed carbon

a) greater the calorific value

b) better the quality of coal

c) smaller the % of Volatile Matter

d) both a & b

29) % of carbon of coal calculated as =

a) $= \frac{\text{Increase in weight of KOH tube} \times 12 \times 100}{\text{weight loss sample taken}}$

b)

c)

d)

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30) % of Hydroge calculated from coal =

a) Increase in a Weight of $CaCl_2$ tube X 2 X 100 / Weight sample taken X 18

b)

c)

d)

31) % Nitrogen from coal calculated as =

A) Volume of acid × Normality × 1.4 / Weight of coal taken

b) Volume of acid + Normality X 2 / Weight of coal taken

c)

d) Volume of acid / weight of coal taken

none of these

32) for Determination of Nitrogen .... flask is used

a) Kjeldahl's b) c)

d)

33) % of sulphure determined by formula

a) Weight of $BaSO_4$ obtained X 32 / Weight of coal sample taken in bomb X 233

b)

c)

d)

34) petroleum or crude oil is a dark greenish brown or black coloured Viscous oil found in ----

a) deep in earth Crust

b) on the earth

c) both a & b

d) none of these

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35) Crude oil containing Mixture of
a) paraffinic
b) oletinic and aromatic Hydrocarbon
c) with Minor amounts of N, O and S
d) All of these

36) The equipment used in seperation of petroleum product
a) fractional distillation
b)
c)
d)

37) petroleum Jelly (vaseline) is the ~~product of~~ produced from
a) crude oil b) c) d)

38) candles / wax paper, boot polish derived from
a) paraffin vas b) c) d)

39) Grease is fraction of crude oil used as
a) Lubricants
b) cosmetic
c) medicines
d)

40) Asphalt or bitumen is a petroleum fraction used as
a) making roads
b) waterproof roofing
c) both a & b
d) None of these

41) ... is defined as decomposition of bigger hydrocarbon molecules into simpler low boiling Hydrocarbons of lower molecular weight
a) Cracking
b)
c)
d)

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42) Tetra ethyl lead is a Important additive added to ...
a) petrol
b) kerosene
c) both a & b
d) None of these

43) When the leaded petrol is used as a fuel the TEL is converted to
a) Lead oxide and metallic lead
b) Lead oxide
c) metallic lead
d) none of these

44) octane Number is introduced to express the
a) Knocking characteristics of petrol.
b) Cracking of petrol
c) both a & b
d) None of these

45) The primary component present in CNG is
a) Methane. b) c) d)

46) producer gas is mixture of
a) combustible gases CO and H_2
b) non-combustible gases N_2 & CO_2
c) both a & b
d) None of these

47) Calorific Value of producer gas is
a) 1300 K cal/m3
b) 1200 kcal/m3
c) 1100 kcal/m3
d) None of these

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48) Klater gas is a mixture of ~~combustible~~

a) Combustible gases CO and H_2

b) non-combustible gas CO_2 and N_2

c) both a & b

d) None of these

49) Water gas is the Rich mixture of..

a) CO and H_2

b) CO_2 & N_2

c) both a & b

d) None of these

50) producer gas used in a

a) reducing agent in metallurgical operations

b) It is used for heating Muffle furnace

c) open-hearth furnace

d) All of these

51)