

SEAT No. _____

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SARDAR PATEL UNIVERSITY
B.Sc. Industrial Chemistry
(Semester – III) EXAMINATION
Course No. : US03CICH02
(Chemical Process Principles)

Date: 4/01/2021

Total Marks: 70

Time: 2.00 pm to 4.00 pm

Q.1 Answer the given multiple choice questions.

[10]

- Specific gravity of liquid is the ratio of
a) Density of liquid/Density of water c) Density of water/Density of liquid
b) Density of liquid/Density of air d) None of the above
- For an ideal gas Mole % = Volume % =
a) Pressure % b) Atomic % c) Weight % d) Volume %
- Gram atom of an atom is
a) mass in gram/molecular weight c) mass in gram/atomic weight
b) mass in gram /mass in kg d) none
- Input= Output equation valid for material balance calculation for the process.
a) without chemical reaction . c) both (a) and (b).
b) with chemical reaction. d) none of these .
- Excess reactant is in excess amount than
a) Stoichiometric requirement c) Both (a) and (b)
b) Theoretical requirement d) None of these.
- The capacity of an object to do work is.....
a) Velocity c) Energy.
b) Acceleration. d) Force.
- Flow calorimeter works on the basis of
a) Temperature Scale c) Second law of Thermodynamic
b) First law of thermodynamics d) None
- Which of the following is true for energy balance calculations it is based on
a) Law of conservation of energy c) Both (a) and (b).
b) Law of conservation of mass d) None of these
- A substance on the surface which the concentration of other substance increases is known as
a) Pores substance b) Liquid substance c) Adsorbent d) Adsorbate
- Absolute humidity is the ratio of
a) moles of water vapor/moles of liquid
b) moles of water vapor /moles of dry air
c) weight of water vapor/moles of dry air
d) weight of water vapor/weight of dry air.

Q.2. True or False

[4]

- 98 gram of H₂SO₄ contains 2 gmole of H₂SO₄.
- Material balance calculations is based on Law of conservation of energy.
- Enthalpy is a type of energy.
- Humid heat is the amount of heat required to raise the temperature of one gm of substance by one degree centigrade.

[1]

[P.T.O.]

Q.2. Fill in the blanks

[4]

1. Total volume occupied by a gaseous mixture is equal to the sum of the pure component volume of the component gases is the statement of _____ law.
2. Selectivity is defined as _____
3. First law of thermodynamics is mathematically stated as _____
4. _____ adsorption is reversible.

Q.3 Short Answer Questions (Attempt any 10 out of 12)

[20]

- i. Explain; Partial Pressure and Pure Component Volume.
- ii. Define: Average Molecular Weight ~~and Partial Pressure~~.
- iii. Explain importance of Molal Units.
- iv. Define: Yield and Selectivity.
- v. Discuss about Stoichiometric equation.
- vi. What do you mean by Purge Operation?
- vii. Write the first law of Thermodynamics.
- viii. Write about Net and Gross Calorific Value of the fuel.
- ix. Explain point function and path function.
- x. Draw different types of adsorption isotherms.
- Xi. Define: Molal humidity and Humid Volume.
- xii. Explain Adsorption Isotherm and Adsorption Isobar.

Q.4. Long Answer Questions (Attempt any Four)

[32]

1. Name and explain different methods used to express the composition of solution and mixtures.
2. A natural gas has following composition by volume. CH_4 -80.0 %, C_2H_6 -12.0% and N_2 -8.0 %. Calculate Weight %, Mole%.
3. List different steps which should be followed to solve different material balance problems.
4. The spent acid is containing 33% H_2SO_4 , 36% HNO_3 , and rest water. This acid is to be strengthen by addition of concentrated sulphuric acid containing 95% H_2SO_4 and nitric acid containing 78% HNO_3 . The desired acid contains 40% H_2SO_4 , 43% HNO_3 and rest water. Calculate the quantities of spent acid and concentrated acids that should be mixed to yield 1500 kg of desired mixed acid.
5. Discuss about different types of energy and explain intensive and extensive properties.
6. Define combustion. Prove that minimum amount of air needed for complete combustion of one kg of coal which contains C kg carbon, H kg hydrogen, S kg sulphur and O kg oxygen is given by $100/23[2.67 C + 8H + S - O]$.
7. Write a note on: i) Langmuir Adsorption Isotherm .ii) Applications of Adsorption .
8. Write a difference between physical and chemical adsorption. Also explain humidification and dehumidification.

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